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International data transmission systems

Bringing-into-service of international leased circuits that are supported by international data transmission systems

ITU-T Recommendation M.1380

(Formerly CCITT Recommendation)

ITU-T M-SERIES RECOMMENDATIONS

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

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ITU-T Recommendation M.1380

Bringing-into-service of international leased circuits that are supported by international data transmission systems

Summary

This ITU-T Recommendation is only applicable to international leased circuits that are supported by a data transmission system. The requirements described in this ITU-T Recommendation should ensure that an international leased circuit meets performance limits and is fully tested prior to introduction into service.

The Bringing-Into-Service tests described in this ITU-T Recommendation should ideally include periods of normal industrial activity to be representative of typical network conditions. This ITU-T Recommendation has been developed to be consistent with ITU-T Recommendation M.1370 that describes the Bringing-Into-Service of international data transmission systems.

ITU-T Recommendation M.1385 covers maintenance issues for international leased circuits that are supported by a data transmission system maintained in accordance with ITU-T Recommendation M.1375.

This ITU-T Recommendation addresses the Bringing-Into-Service requirements of leased circuits with a PDH digital presentation at Customers' premises. Another ITU-T Recommendation is being developed for Bringing-Into-Service and Maintenance procedures for SDH leased circuits.

For leased circuits with an analogue presentation, the Bringing-Into-Service procedures given in ITU-T Recommendation M.1050 apply, with performance achievement in accordance with ITU-T Recommendations M.1020, M.1025 or M.1040 as appropriate.

Source

ITU-T Recommendation M.1380 was revised by ITU-T Study Group 4 (1997-2000) and approved under the WTSC Resolution 1 procedure on 4 February 2000.

Keywords

Bringing-Into-Service, exchange of Information, in-service monitoring, international data transmission system, international leased circuit, testing of performance objectives.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. 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, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSC Resolution 1.

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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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementors are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database.

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ITU-T Recommendation M.1380

Bringing-into-service of international leased circuits that are supported by international data transmission systems

1 Scope

This ITU-T Recommendation describes the Bringing-Into-Service (BIS) procedures[1] for an international leased circuit that is supported by a data transmission system. The circuit will have a digital presentation, normally in the PDH domain, at the Customer's premises, but in some cases may be terminated in the SDH domain. This case of mixed PDH/SDH leased circuit needs further study. The provisions of this ITU-T Recommendation should be considered in conjunction with those of ITU-T Recommendation M.1370 [19] for international data transmission systems.

This ITU-T Recommendation does not cover the BIS requirements of leased circuits with an analogue presentation at the Customer's premises. Such leased circuits are described in ITU-T Recommendation M.1050 [16].

2 References

The following ITU-T Recommendations and other references 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 and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

[1] ITU-T Recommendation G.701 (1993), *Vocabulary of digital transmission and multiplexing, and Pulse Code Modulation (PCM) terms*.

[2] ITU-T Recommendation G.703 (1998), *Physical/electrical characteristics of hierarchical digital interfaces*.

[3] CCITT Recommendation G.802 (1988), *Interworking between networks based on different digital hierarchies and speech encoding laws*.

[4] ITU-T Recommendation G.823 (2000), *The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy*.

[5] ITU-T Recommendation G.824 (2000), *The control of jitter and wander within digital networks which are based on the 1544 kbit/s hierarchy*.

[6] ITU-T Recommendation G.825 (2000), *The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)*.

[7] ITU-T Recommendation M.60 (1993), *Maintenance terminology and definitions*.

[8] CCITT Recommendation M.80 (1988), *Control stations*.

[9] CCITT Recommendation M.90 (1988), *Sub-control stations*.

[10] CCITT Recommendation M.1012 (1988), *Circuit control stations for leased and special circuits*.

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[1] The BIS procedures include the setting up of the leased circuit, the exchange of information, the setting of performance limits and the testing against those performance limits.

[11] CCITT Recommendation M.1013 (1988), *Sub-control station for leased and special circuits*.

[12] ITU-T Recommendation M.1020 (1993), *Characteristics of special quality international leased circuits with special bandwidth conditioning*.

[13] ITU-T Recommendation M.1025 (1993), *Characteristics of special quality international leased circuits with basic bandwidth conditioning*.

[14] CCITT Recommendation M.1040 (1988), *Characteristics of ordinary quality international leased circuits*.

[15] ITU-T Recommendation M.1045 (1996), *Preliminary exchange of information for the provision of international leased circuits and international data transmission systems*.

[16] ITU-T Recommendation M.1050 (1993), *Lining up an international point-to-point leased circuit*.

[17] ITU-T Recommendation M.1300 (1997), *Maintenance of international data transmission systems operating in the range 2.4 kbit/s to 140 Mbit/s*.

[18] ITU-T Recommendation M.1340 (1996), *Performance objectives, allocations and limits for international data transmission links and systems*.

[19] ITU-T Recommendation M.1370 (1998), *Bringing-into-service of international data transmission systems*.

[20] ITU-T Recommendation M.1375 (1998), *Maintenance of international data transmission systems*.

[21] ITU-T Recommendation M.1385 (2000), *Maintenance of international leased circuits that are supported by international data transmission systems*.

[22] ITU-T Recommendation M.1400 (1997), *Designations for international networks*.

[23] CCITT Recommendation M.1510 (1992), *Exchange of contact point information for the maintenance of international services and the international network*.

[24] ITU-T Recommendation M.1530 (1999), *Network maintenance information*.

[25] ITU-T Recommendation M.1535 (1996), *Principles for maintenance information to be exchanged at customer contact point (MICC)*.

[26] ITU-T Recommendation M.1537 (1997), *Definition of maintenance information to be exchanged at customer contact point (MICC)*.

[27] ITU-T Recommendation M.1539 (1999), *Management of the grade of network maintenance services at the maintenance service customer contact point (MSCC)*.

[28] ITU-T Recommendation M.1540 (1994), *Exchange of information for planned outages of transmission systems*.

[29] CCITT Recommendation M.1560 (1992), *Escalation procedure for international leased circuits*.

[30] ITU-T Recommendation M.3208.1 (1997), *TMN management services for dedicated and reconfigurable circuits network: leased circuit services*.

[31] ITU-T Recommendation V.10 (1993), *Electrical characteristics for unbalanced double-current interchange circuits operating at data signalling rates nominally up to 100 kbit/s (also numbered as X.26)*.

[32] ITU-T Recommendation V.11 (1996), *Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbit/s (also published as X.27)*.

[33] ITU-T Recommendation V.12 (1995), *Electrical characteristics for balanced double-current interchange circuits for interfaces with data signalling rates up to 52 Mbit/s*.

[34] ITU-T Recommendation V.24 (2000), *List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE)*.

[35] ITU-T Recommendation V.28 (1993), *Electrical characteristics for unbalanced double-current interchange circuits*.

[36] ITU-T Recommendation V.38 (1996), *A 48/56/64 kbit/s data circuit-terminating equipment standardized for use on digital point-to-point leased circuits*.

[37] ITU-T Recommendation V.110 (2000), *Support by an ISDN of data terminal equipments with V-series type interfaces*.

[38] ITU-T Recommendation V.120 (1996), *Support by an ISDN of data terminal equipment with V-series type interfaces with provision for statistical multiplexing*.

[39] ITU-T Recommendation V.300 (1999), *A 128 (144) kbit/s data circuit-terminating equipment standardized for use on digital point-to-point leased circuits*.

[40] CCITT Recommendation X.21 (1992), *Interface between Data Terminal Equipment and Data Circuit-terminating Equipment for synchronous operation on public data networks*.

[41] CCITT Recommendation X.24 (1988), *List of definitions for interchange circuits between Data Terminal Equipment (DTE) and Data Circuit-terminating Equipment (DCE) on public data networks*.

3 Terms and definitions

ITU-T Recommendation M.1300 [17] provides general descriptions of international data transmission systems relevant to this ITU-T Recommendation. Terminology and definitions relating to this ITU-T Recommendation are provided in ITU-T Recommendations G.701 [1] and M.60 [7]. For the purposes of this ITU-T Recommendation, the following definitions of an international digital leased circuit and Service Level Agreement (SLA)/Contract apply:

3.1 An **international digital leased circuit**: Is the digital path between two Network Terminating Equipments (NTEs). The digital leased circuit may be bidirectional or unidirectional and its end points are at the boundaries between the Network Operator/Service Provider and the Customer. The NTEs may be owned by the Network Operator/Service Provider or owned by the Customer.

3.2 An **SLA/Contract**: Is a set of appropriate procedures and targets formally or informally agreed between Network Operators/Service Providers or between Network Operators/Service Providers and Customers, in order to achieve and maintain specified Quality of Service (QoS) in accordance with ITU (ITU-T and ITU-R) Recommendations. The SLA may be an integral part of the Contract. These procedures and targets are related to specific circuit/service availability, error performance, Ready for Service (RFS) date, Mean Time Between Failures (MTBF), Mean Time to Restore Service (MTRS), Mean Time to Repair (MTTR).

4 Abbreviations

This ITU-T Recommendation uses the following abbreviations:

BIS Bringing-Into-Service

DCE Data Circuit-terminating Equipment

DTE Data Terminal Equipment

ES Errored Second

MTBF Mean Time Between Failures

MTRS Mean Time to Restore Service

MTTR Mean Time to Repair

NTE Network Terminating Equipment

PDH Plesiochronous Digital Hierarchy

QoS Quality of Service

RFS Ready for Service

SDH Synchronous Digital Hierarchy

SES Severely Errored Second

SLA Service Level Agreement

5 Performance limits and objectives

Performance limits for the international portion should be consistent with those given in ITU-T Recommendation M.1340 [18]. For all performance tests described in this ITU-T Recommendation, the Errored Second (ES) and Severely Errored Second (SES) limits should be met simultaneously for the test result to be considered acceptable.

For the national circuit portions, limits will be set independently by the Network Operators/Service Providers involved taking account of national conditions and the need to preserve overall end-to-end performance. Performance achievement will be dependent upon the performance and topology of the local transmission facilities. To maintain consistency with ITU-T Recommendation M.1340 [18], Network Operators/Service Providers should use ES and SES events to measure performance achievement.

The possible development and application of performance objectives for transmission availability, delay and jitter is left for further study.

All test results obtained during BIS tests should be retained for possible future reference during maintenance activities.

6 Preliminary exchange of information

Consideration should be given to information that has already been exchanged for the international data transmission system that will support the service. See clause 2/M.1370 [19].

Circuit information should be exchanged in accordance with ITU-T Recommendation M.1045 [15]. In addition, Network Operators/Service Providers may find that it is advantageous to exchange the following information:

- details of any special maintenance or fault reporting arrangements that have been requested (e.g. single end fault reporting, SLA/Contract details);

- contact details for, and operational arrangements with, any additional Network Operators/Service Providers that are involved with the provision of service (e.g. Network Operators/Service Providers that provide a transit routing facility);
- precise details of the interface presentation and functionality at the Customer's premises (this should ideally be in accordance with existing ITU-T Recommendations, e.g. G.703 [2], V.10 [31], V.11 [32], V.12 [33], V.24 [34], V.28 [35], V.38 [36], V.110 [37], V.120 [38], V.300 [39], X.21 [40] and X.24 [41]);
- performance limits for the national circuit portions (see below) and for the overall circuit;
- confirmation of the data rate presented at the Customer interface where this is different to the data rate extended internationally (e.g. application of ITU-T Recommendation G.802 [3] for the support of 1544 kbit/s circuits within a 2048 kbit/s transmission hierarchy);
- details of any equipment loopback capabilities that may be available;
- details of escalation arrangements and contacts that may be used to overcome operational difficulties (see ITU-T Recommendations M.1535 [25], M.1537 [26], M.1539 [27] and M.1560 [29]).

Network Operators/Service Providers should confirm that the information exchanged is consistent and that the circuit will be able to support the service.

The information that has been exchanged, as detailed above, should be retained for future reference.

7 Bringing-Into-Service procedures

It should be noted that neither a 24-hour nor a 2-hour test duration can be expected to give a particularly reliable indication of transmission performance due to the statistics of transmission media over such a short period. See 5.4/M.1340 [18] for further guidance. National circuit portions and international circuit portions may be set up and tested simultaneously or consecutively. However, careful harmonization of these procedures is required to ensure overall end-to-end performance is acceptable.

7.1 National circuit portions

Before setting up the national circuit portions, suitable performance limits for the national circuit portions should be developed and exchanged between the Network Operators/Service Providers involved, always ensuring that the overall end-to-end performance can be achieved.

7.2 International circuit portions

If in-service performance monitoring is available, and the error performance of the supporting data transmission system is acceptable, all new circuits should be tested for 15 minutes. In the case where a number of circuits using the same data transmission system are brought into service at the same time, and in-service performance monitoring is not available, the first circuit should be tested for 24 hours, and the remaining circuits could be tested for 15 minutes each. Any portions of the circuit, which are not supported by the data transmission system, should be tested for 24 hours.

The performance objectives given in clause 7/M.1340 [18] should be met. Where there is little confidence regarding the capabilities of a particular international data transmission system, or where the short duration test objectives were not met, a 24-hour test should be performed using the limits that were originally developed to test the international data transmission system (see clause 3/M.1370 [19]).

In the event that the 24-hour limits are not met, Network Operators/Service Providers should agree to an appropriate course of action (see ITU-T Recommendation M.1375 [20] for guidance).

Where the international circuit portion extends significantly beyond the channel interfaces of a particular international data transmission system (e.g. where a transit routing involves the interconnection of two international data transmission systems) additional tests may be required. Network Operators/Service Providers should ensure that all parts of the international circuit portion are fully tested. Suitable additional limits should be agreed between the Network Operators/Service Providers involved. Consistency with ITU-T Recommendation M.1340 [18] should be sought wherever possible.

7.2.1 Bringing-Into-Service using an alternative international link

If any portion of the link, which would normally be used to carry the international leased circuit, is restored onto an alternative route before BIS testing is commenced, or during BIS testing, then testing may proceed, or continue, if the following three criteria are met:

1) the performance of the alternative link is known to be acceptable; and
2) the alternative link uses the same transmission media as the original link; and
3) the length of the alternative link is not substantially different from the original link.

If these criteria are not met, then testing should be postponed, or halted, until the original link is returned to service.

If a single unavailability event occurs during the BIS test, and the cause of this event is precisely known and not recurrent, then this event should be ignored in the test results.

7.3 End-to-end test

It will normally be advantageous to perform an end-to-end test to confirm overall integrity and stability. A 24-hour test duration is recommended. Test limits should include allowances for the international and two national circuit portions. Network Operators/Service Providers should pay particular attention to highlighting any problems that may be associated with the interworking of separately timed networks, especially for the first circuit provision that uses a particular equipment configuration. In particular, the jitter/wander performance requirements of ITU-T Recommendations G.823 [4], G.824 [5] and G.825 [6] should be respected as appropriate to the leased circuit and supporting transmission network.

Dependent upon the loopback capabilities provided by the network terminating equipments at the Customer's premises, it may be possible to perform end-to-end tests from intermediate points within the network (e.g. at Terminal International Centres).

Where loop tests are employed, it is proposed that no special additional performance allowance is made (i.e. doubling of limits is not recommended).

7.3.1 Alternative end-to-end test

If Network Operators/Service Providers agree, based upon experience of similar network conditions, and in-service performance monitoring is available on the entire international data transmission system, a 2-hour end-to-end test may be performed. In this case, the BIS procedure is as follows:

1) The national circuit portion is brought-into-service according to existing national procedures.
2) No international circuit portion test is carried out, as this portion has already been tested according to the procedures of ITU-T Recommendation M.1370 [19], and in-service performance monitoring is being used to ensure that the performance of the data transmission system is acceptable.

3) An end-to-end test of two hours is performed to verify the cross-connection capabilities of the digital cross-connect equipment. This test may be performed to a loopback at one or both ends. The performance objective for this test is given in Table 2/M.1340 [18]. There should be no clock slips or periods of unavailability during this test. If these conditions cannot be met, then the 24-hour test, as described above, should be carried out.

As mentioned above in 7.3, Network Operators/Service Providers should pay particular attention to highlighting any problems that may be associated with the interworking of separately timed networks, as these may not be evident from a 2-hour test.

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