INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

M.3610

(05/96)

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

Integrated services digital networks

Principles for applying the TMN concept to the management of B-ISDN

ITU-T Recommendation M.3610

(Previously CCITT Recommendation)

ITU-T M-SERIES RECOMMENDATIONS

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

Introduction and general principles of maintenance and maintenance organization	M.10–M.299
International transmission systems	M.300–M.559
International telephone circuits	M.560–M.759
Common channel signalling systems	M.760–M.799
International telegraph systems and phototelegraph transmission	M.800–M.899
International leased group and supergroup links	M.900–M.999
International leased circuits	M.1000–M.1099
Mobile telecommunication systems and services	M.1100–M.1199
International public telephone network	M.1200–M.1299
International data transmission systems	M.1300–M.1399
Designations and information exchange	M.1400–M.1999
International transport network	M.2000–M.2999
Telecommunications management network	M.3000–M.3599
Integrated services digital networks	**M.3600–M.3999**
Common channel signalling systems	M.4000–M.4999

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION M.3610

PRINCIPLES FOR APPLYING THE TMN CONCEPT TO THE MANAGEMENT OF B-ISDN

Summary

This Recommendation describes the principles for applying the TMN concept to the maintenance aspect of B-ISDN management. This Recommendation presents terminology definitions, maintenance principles for B-ISDN, and reference models for the management of B-ISDN.

Source

ITU-T Recommendation M.3610 was prepared by ITU-T Study Group 4 (1993-1996) and was approved under the WTSC Resolution N° 1 procedure on the 12th of May 1996.

Keywords

B-ISDN, maintenance, Telecommunications Management Network (TMN).

FOREWORD

ITU (International Telecommunication Union) is the United Nations Specialized Agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of the ITU. Some 179 member countries, 84 telecom operating entities, 145 scientific and industrial organizations and 38 international organizations participate in ITU-T which is the body which sets world telecommunications standards (Recommendations).

The approval of Recommendations by the Members of ITU-T is covered by the procedure laid down in WTSC Resolution No. 1 (Helsinki, 1993). In addition, the World Telecommunication Standardization Conference (WTSC), which meets every four years, approves Recommendations submitted to it and establishes the study programme for the following period.

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.

CONTENTS

Recommendation M.3610

PRINCIPLES FOR APPLYING THE TMN CONCEPT TO THE MANAGEMENT OF B-ISDN

(Geneva, 1996)

1 Scope

1.1 General

This Recommendation defines B-ISDN management concepts for maintenance aspects of fault, performance, configuration and security management of B-ISDN subscriber installations, networks, including access and transit networks and interworking between B-ISDNs and between B-ISDNs and other networks. In addition, this Recommendation defines the relationship between B-ISDN and the TMN.

This Recommendation introduces a series of Recommendations that:

a) describe the reference model that shows the relations of the TMN and its functional interfaces to B-ISDN equipment;

b) define the management functions provided through the TMN when management activities are performed in the B-ISDN;

c) define extensions to the generic network information model needed to support B-ISDN.

1.2 Relation to other Recommendations

This Recommendation extends Recommendation M.3600 [4] to B-ISDNs. Additional concepts and definitions for B-ISDNs are included.

Recommendation M.3010 [2] specifies the TMN interfaces and reference points that are referred to in this Recommendation.

Recommendation I.610 [7] describes OAM functions to be provided in network equipment for the purpose of layer management, while this Recommendation focuses on the TMN role in the management of B-ISDN.

Recommendation M.3207.1 [9] specifies the TMN management service for B-ISDN according to the methodology specified in Recommendation M.3020 [11]. That is, the description of the TMN management service, the relationship to other TMN management services, the resource/service overview, the architecture, and TMN management function sets are described. The TMN management function sets are identified from the maintenance aspects of fault, performance, configuration and security management.

2 References

The following 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] CCITT Recommendation M.20 (1992), *Maintenance philosophy for telecommunications networks*.

[2] ITU-T Recommendation M.3010 (1996), *Principles for a telecommunications management network.*

[3] CCITT Recommendation M.3200 (1992), *TMN management services: Overview.*

[4] CCITT Recommendation M.3600 (1992), *Principles for the management of ISDNs*.

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

[6] ITU-T Recommendation I.311 (1993), *B-ISDN general network aspects.*

[7] ITU-T Recommendation I.610 (1995), *B-ISDN operation and maintenance principles and functions*.

[9] ITU-T Recommendation M.3207.1 (1996), *TMN management service: Maintenance aspect of B-ISDN management.*

[10] CCITT Recommendation M.3400 (1992), *TMN management functions*.

[11] ITU-T Recommendation M.3020 (1995), *TMN interface specification methodology*.

[12] ITU-T Recommendation I.413 (1993), *B-ISDN user-network interface.*

[13] ITU-T Recommendation I.414 (1993), *Overview of Recommendations on layer 1 for ISDN and B-ISDN customer accesses.*

[14] ITU-T Recommendation I.112 (1993), *Vocabulary of terms for ISDNs*.

[15] ITU-T Recommendation G.803 (1993), *Architectures of transport networks based on the Synchronous Digital Hierarchy (SDH).*

3 Definitions

For the definitions of management function entities, see Recommendation M.3600 [4].

For the purposes of this Recommendation, the following definitions apply.

3.1 Broadband Exchange Termination (B-ET): B-ET is placed at a local exchange to terminate the subscriber transmission line and the signalling virtual connection.

Maintenance functions included in exchange termination functions may be derived from Recommendation I.112 [14]. These functions are:

- supervision of information related to or received from the B-ISDN digital section;
- transmission performance evaluation.

3.2 Broadband Network Termination 1 (B-NT1): B-NT1 is a functional group, which includes functions equivalent to layer 1 of the OSI reference model. Examples of B-NT1 functions are:

- line transmission termination;
- transmission interface handling;
- OAM functions.

For the detailed specification of B-NT1, see Recommendation I.413 [12].

3.3 Broadband Terminal Equipment (B-TE): B-TE is a functional group that includes functions belonging to layer 1 and higher layers of X.200 reference model.

Examples of B-TE functions are:

- user/user and user/machine dialogue and protocol;
- interface termination and other layer 1 functions;
- protocol handling for signalling;
- connection handling to other equipment;
- OAM functions.

For the detailed specification of B-TE, see Recommendation I.413 [12].

3.4 Communication Function (CF): CF is the capability to exchange management information between B-ET and B-NT1 for OAM-OSF to manage B-NT1.

3.5 Interface Management Application (IMA): An application placed at either an ET or a TE to perform interface management. The IMA of an ET or a TE can exchange information for the purpose of management. If the IMA of an ET receives requests to invoke interface management from the OAM-OSF, management information is exchanged between IMAs using interface management services. The IMA then passes the results to the OAM-OSF. Similarly, if the IMA of a TE receives requests from the subscriber or the MSP-OSF, management information is exchanged between IMAs using interface management services. The IMA then passes the results to the subscriber or the Management Services Provider OSF (MSP-OSF).

3.6 Interworking Function (IWF): IWF is the function that interconnects B-ISDN and other networks with transforming information between the ATM cell format and other formats.

3.7 management functions: See Recommendations M.60 [5], M.3200 [3] and M.3400 [10].

3.8 Management Service Provider (MSP): MSP is an organization that provides maintenance services to subscriber. For details, see Recommendation M.3600 [4].

3.9 management services: See Recommendations M.60 [5] and M.3200 [3].

3.10 Network Element Function (NEF): See Recommendation M.3010 [2].

3.11 Operation, Administration and Maintenance (OAM): See Recommendation M.3600 [4]. This Recommendation uses the term OAM to describe the set of management applications related to internal operation of the network. Namely, the management activities on subscriber installations are excluded from the OAM applications.

3.12 Operations Systems Function (OSF): See Recommendation M.3010 [2].

3.13 q-reference point: See Recommendation M.3010 [2].

3.14 Q3 interfaces: See Recommendation M.3010 [2].

3.15 Subscriber Access (SA): SA is the network portion that is placed between the subscriber and the associated local exchange. The SA consists of B-NT1, B-ET, and the subscriber transmission line. For detailed configurations of B-ISDN subscriber access, Figure 2/I.414 [13] gives useful information.

3.16 X interfaces: See Recommendation M.3010 [2].

3.17 x-reference point: See Recommendation M.3010 [2].

3.18 virtual channel: See Recommendation I.311 [6].

3.19 virtual path: See I.311 [6].

4 Maintenance principles for B-ISDN

In this clause, the M.20 [1] maintenance phases are identified, the management function sets used to support the phases are listed and the entities managed noted. Recommendation M.3207.1 [9] defines the TMN management services needed for B-ISDN including the application of M.3400 [10] functions to B-ISDN and the definition of new management functions.

4.1 Maintenance phases

In performing maintenance, the following maintenance phases from M.20 [1] apply:

– performance measurement;
– failure detection;
– system restoration;
– failure or performance information;
– fault localization;
– logistic delay;
– fault correction;
– verification;
– restoration.

4.2 TMN management function sets

The following management function sets and groups are used to provide the TMN support of M.20 [1] maintenance phases. The details of these management function sets are found in Recommendation M.3207.1 [9]:

– alarm surveillance;
– testing;
– fault correction;
– performance management control;
– NE configuration;
– security management;
– virtual channel connection alarm generation control;
– continuity check control;
– ATM performance monitoring control;
– ATM test control.

4.3 Entities to be managed

In B-ISDN, entities to be managed include the following:

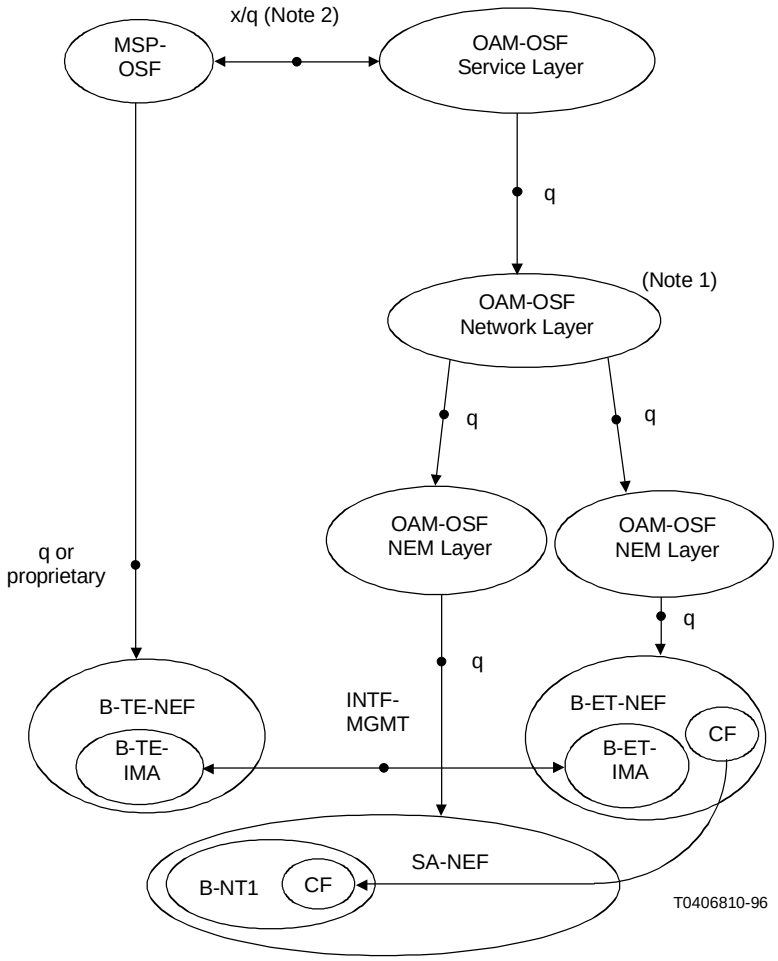
– physical layer, both SDH and cell based;
– ATM virtual path links and connections;
– ATM virtual channel links and connections;
– B-ISDN functional groups: B-ET, B-NT1, B-NT2, B-TE.

5 Reference models for the management of B-ISDN

This clause introduces reference models that show the relation of the TMN and its functional interfaces to B-ISDN equipment.

5.1 Subscriber installation and subscriber access network

See Figure 1.



NEM Network Element Management
IMA Interface Management Application
CF Communications Function

NOTES
1 This OSF may consist of several OSFs.
2 The q-reference point is used when the MSP-OSF is provided by the Administration. The x-reference point is used when the MSP-OSF is not provided by the Administration and MSP-OSF and the OAM-OSF are in different

FIGURE 1/M.3610

Reference configuration for subscriber installation and access

Figure 1 shows a reference model that describes the functional relationship between operation systems and subscriber installation/access. This figure shows a B-TE-NEF, B-ET-NEF and subscriber access (SA)-NEF as Network Element Functions (NEFs) associated with the B-ISDN subscriber installation/access. Between the NEFs and the two operations systems functions (MSP-OSF and OAM-OSF), q-reference points are shown. Additionally, an x- or q-reference point is defined for the communication between MSP-OSF and OAM-OSF. (The q-reference point is used when the MSP-OSF is provided by the Administration and therefore the OAM-OSF and MSP-OSF are part of the same TMN. The x-reference point is used when the MSP-OSF and the OAM-OSF are in different TMNs.) These reference points can appear as Q3 and X interfaces in a physical configuration.

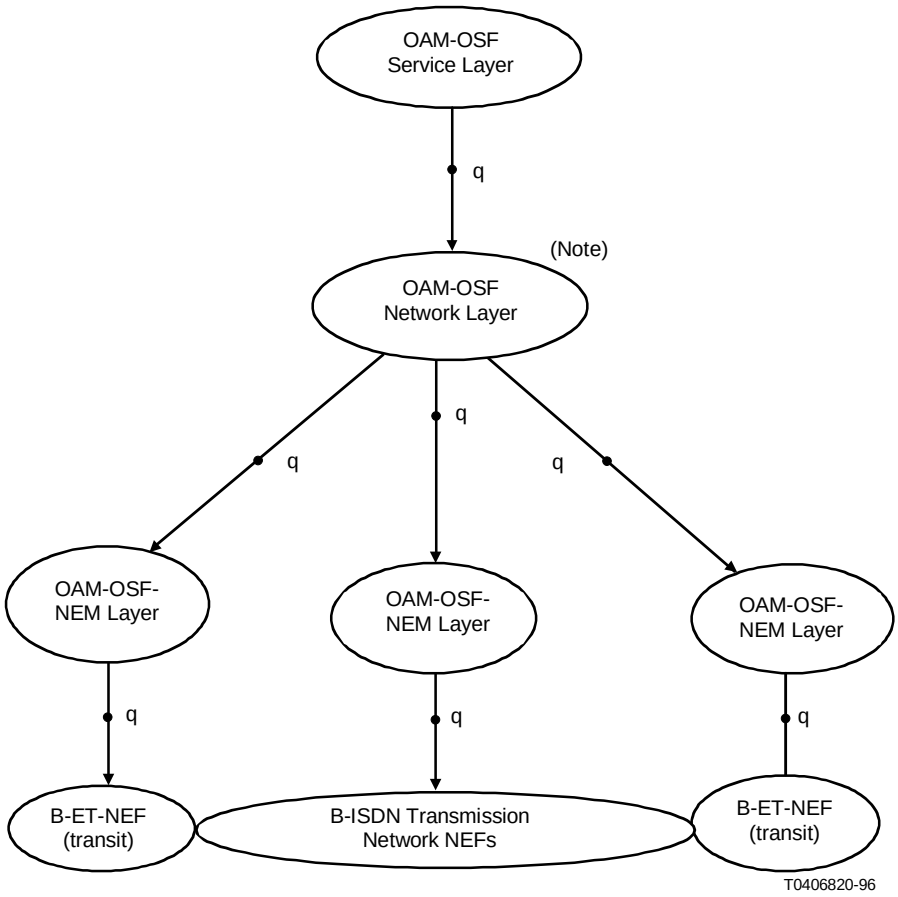
Communications through non-TMN interfaces are utilized by a part of the management as follows:

– B-NT1 maintenance capabilities, for example a loopback if provided, are controlled by the Communication Functions (CF) of B-NT1 and B-ET. From an OAM-OSF, control information is directed to the B-ET-NEF across the TMN q-reference point, and then B-ET-CF communicates with B-NT1-CF to pass control information to B-NT1.

– Interface management is controlled by information exchange between the IMAs of the B-ET and the B-TE. No TMN reference points are defined between the IMAs.

5.2 Transit network

See Figure 2.



NOTE - This OSF may consist of several OSFs.

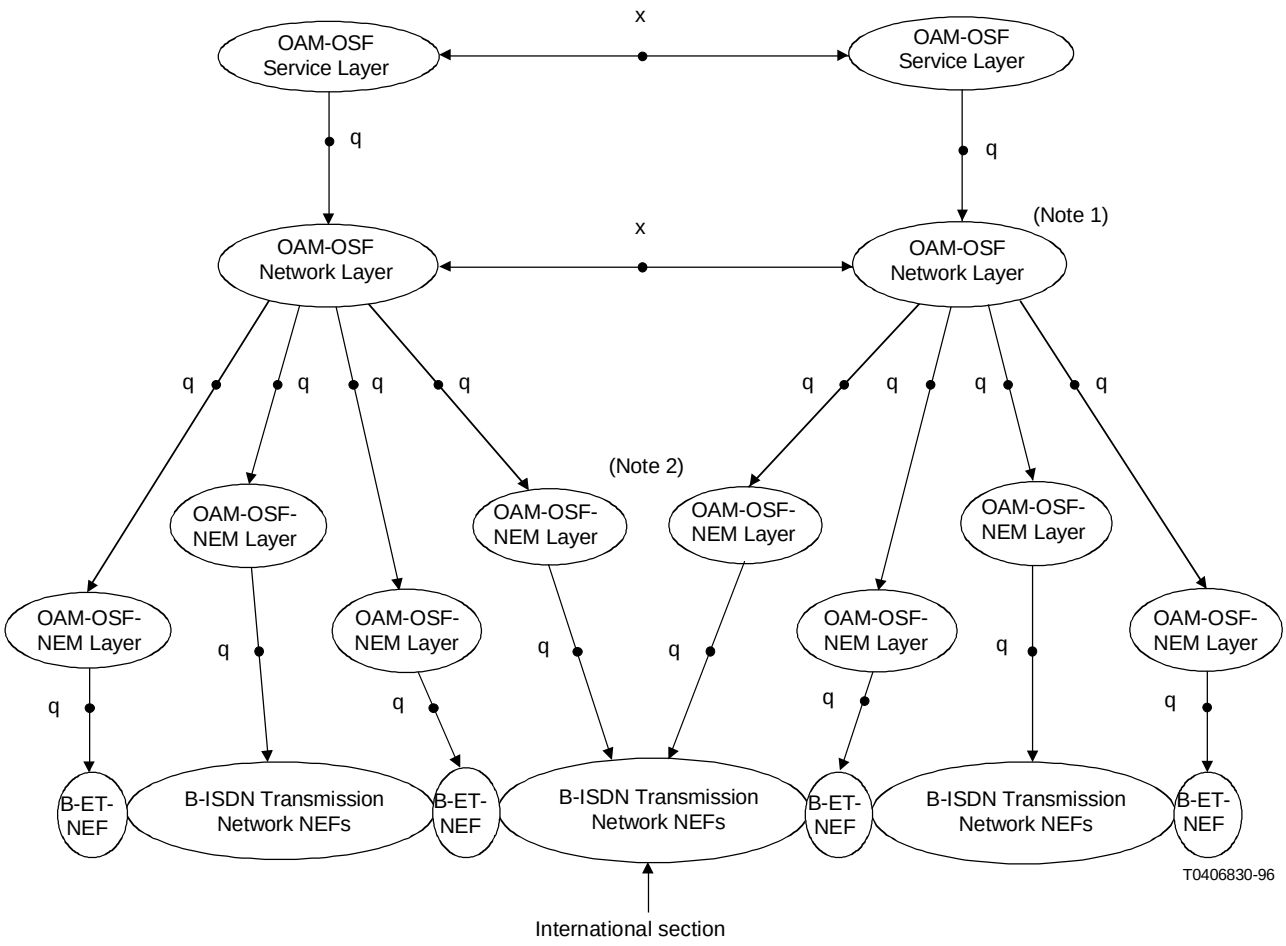
FIGURE 2/M.3610

Reference configuration for B-ISDN transit network

Figure 2 shows a reference model that describes the functional relationship between operation systems and a B-ISDN transit network. A transit part of B-ISDN consists of B-ETs and a transmission network, through which a virtual channel/path connection is set up between the B-ETs. Thus, q-reference points are defined between the OSF and the NEFs of the B-ETs and the transmission network elements. They can become Q3 interfaces in a physical configuration.

5.3 Interworking between B-ISDNs

See Figure 3.



NOTES
1 This OSF may consist of several OSFs.
2 Care must be taken in the international section to assure that there is no conflict of control between the OAM-OSFs managing this section.

FIGURE 3/M.3610

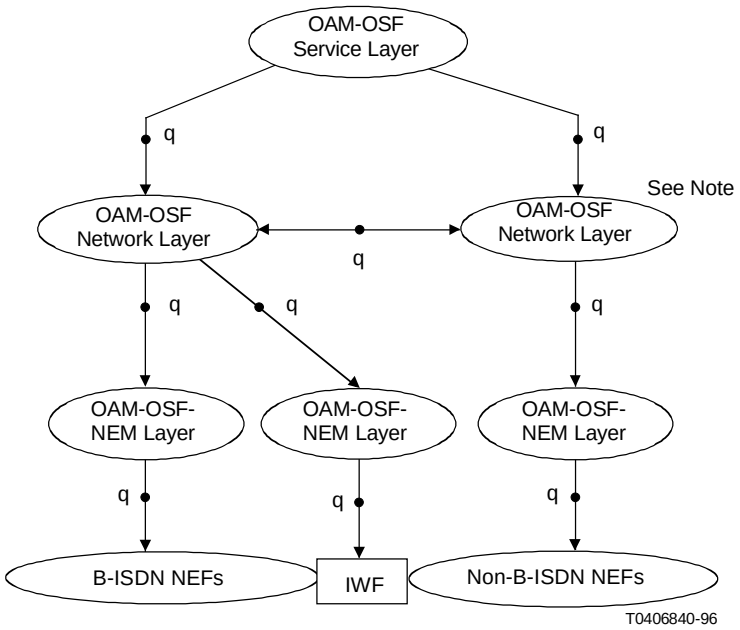
Reference configuration for interworking between B-ISDNs

Figure 3 shows a reference model that describes the functional relationship between multiple B-ISDNs. The corresponding Service OSFs and Network OSFs in each of the B-ISDN transfer service and network level information respectively via x-reference points. The Network Element Management OSFs in the B-ISDNs communicate via q-reference points with the B-ISDN transmission network NEFs linking their respective B-ISDNs.

The reference points can appear as Q3 and X interfaces in a physical configuration.

5.4 Interworking between B-ISDNs and other networks

See Figure 4.



NOTE - This OSF may consist of several OSFs.

FIGURE 4/M.3610

Reference configuration for interworking between B-ISDN and other networks

Figure 4 shows a reference model that describes the functional relationship between B-ISDNs and other networks. The Service OSFs and Network OSFs in the B-ISDN transfer service and network level information to the Network OSF in the other network via q-reference points. The Network Element Management OSF in the B-ISDN manages the Interworking Function (IWF) via a q-reference point. In this figure, networks and OSFs belong to a single Administration.

The reference points can appear as Q3 interfaces in a physical configuration.

ITU-T RECOMMENDATIONS SERIES

Series A	Organization of the work of the ITU-T
Series B	Means of expression
Series C	General telecommunication statistics
Series D	General tariff principles
Series E	Telephone network and ISDN
Series F	Non-telephone telecommunication services
Series G	Transmission systems and media
Series H	Transmission of non-telephone signals
Series I	Integrated services digital network
Series J	Transmission of sound-programme and television signals
Series K	Protection against interference
Series L	Construction, installation and protection of cables and other elements of outside plant
Series M	**Maintenance: international transmission systems, telephone circuits, telegraphy, facsimile and leased circuits**
Series N	Maintenance: international sound-programme and television transmission circuits
Series O	Specifications of measuring equipment
Series P	Telephone transmission quality
Series Q	Switching and signalling
Series R	Telegraph transmission
Series S	Telegraph services terminal equipment
Series T	Terminal equipment and protocols for telematic services
Series U	Telegraph switching
Series V	Data communication over the telephone network
Series X	Data networks and open system communication
Series Z	Programming languages