



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

X.170

(06/99)

SERIES X: DATA NETWORKS AND OPEN SYSTEM
COMMUNICATIONS

Public data networks – Maintenance

Network-network management architecture for data networks

ITU-T Recommendation X.170

(Previously CCITT Recommendation)

ITU-T X-SERIES RECOMMENDATIONS
DATA NETWORKS AND OPEN SYSTEM COMMUNICATIONS

PUBLIC DATA NETWORKS

Services and facilities	X.1-X.19
Interfaces	X.20-X.49
Transmission, signalling and switching	X.50-X.89
Network aspects	X.90-X.149
Maintenance	X.150-X.179
Administrative arrangements	X.180-X.199

OPEN SYSTEMS INTERCONNECTION

Model and notation	X.200-X.209
Service definitions	X.210-X.219
Connection-mode protocol specifications	X.220-X.229
Connectionless-mode protocol specifications	X.230-X.239
PICS proformas	X.240-X.259
Protocol Identification	X.260-X.269
Security Protocols	X.270-X.279
Layer Managed Objects	X.280-X.289
Conformance testing	X.290-X.299

INTERWORKING BETWEEN NETWORKS

General	X.300-X.349
Satellite data transmission systems	X.350-X.399

MESSAGE HANDLING SYSTEMS

X.400-X.499

DIRECTORY

X.500-X.599

OSI NETWORKING AND SYSTEM ASPECTS

Networking	X.600-X.629
Efficiency	X.630-X.639
Quality of service	X.640-X.649
Naming, Addressing and Registration	X.650-X.679
Abstract Syntax Notation One (ASN.1)	X.680-X.699

OSI MANAGEMENT

Systems Management framework and architecture	X.700-X.709
Management Communication Service and Protocol	X.710-X.719
Structure of Management Information	X.720-X.729
Management functions and ODMA functions	X.730-X.799

SECURITY

X.800-X.849

OSI APPLICATIONS

Commitment, Concurrency and Recovery	X.850-X.859
Transaction processing	X.860-X.879
Remote operations	X.880-X.899

OPEN DISTRIBUTED PROCESSING

X.900-X.999

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

ITU-T RECOMMENDATION X.170**NETWORK-NETWORK MANAGEMENT ARCHITECTURE
FOR DATA NETWORKS****Summary**

The rapid evolution of data transmission service has increased internetwork traffic between several types of data networks (e.g. packet switched networks, frame relay networks, ISDN networks and ATM networks), or between public and private data networks. Accordingly, the variety and the volume of management information (e.g. charging or traffic information) of each network have also increased, and there may be a demand to exchange such management information in a uniform way so that all networks can have access to each other by using a unique protocol or mechanism.

In view of these circumstances, this Recommendation describes the general principles and the framework, for exchanging management information and management operations between data networks.

Source

ITU-T Recommendation X.170 was prepared by ITU-T Study Group 7 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 18th of June 1999.

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. 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, establishes the topics for study by the ITU-T Study Groups which, in their turn, produce Recommendations on these topics.

The approval of Recommendations by the Members of the ITU-T is covered by the procedure laid down in WTSC Resolution No. 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 term *recognized operating agency (ROA)* includes any individual, company, corporation or governmental organization that operates a public correspondence service. The terms *Administration*, *ROA* and *public correspondence* are defined in the *Constitution of the ITU (Geneva, 1992)*.

INTELLECTUAL PROPERTY RIGHTS

The ITU draws attention to the possibility that the practice or implementation of this Recommendation may involve the use of a claimed Intellectual Property Right. The ITU takes no position concerning the evidence, validity or applicability of claimed Intellectual Property Rights, whether asserted by ITU members or others outside of the Recommendation development process.

As of the date of approval of this Recommendation, the 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.

© ITU 1999

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.



Documents
Document Sharing Hub

CONTENTS

	<i>Page</i>
1 Scope	1
2 References	1
2.1 Identical Recommendations International Standards	1
2.2 Paired Recommendations International Standards	2
2.3 Additional references	2
3 Definitions	2
3.1 X.160 definitions.....	2
3.2 X.701 management framework definitions	3
3.3 X.710 CMIS definitions	3
3.4 M.3010 definitions	3
3.5 Network-Network Management (NNM) definitions.....	3
4 Abbreviations	4
5 Conventions	4
6 Model for Network-Network Management	4
6.1 Relationship between the Architecture, the Services and the Management Information documents	4
6.2 Overview of NNM	5
6.3 NNM model involving more than two networks	5
7 NNM Architecture	6
7.1 NNM Physical architecture	6
7.2 NNM Functional architecture	7
7.3 NNM Informational architecture.....	8
7.4 NNM services and information definition at the NNM interface.....	9
7.5 NNM interaction model	9
7.5.1 Overview	9
7.5.1.1 Event occurrence basis	9
7.5.1.2 On demand basis	9
7.5.1.3 Periodic basis.....	9
7.5.2 Interaction of NNM information	9
7.5.2.1 A notification from the NNM Agent to the NNM Manager.....	9
7.5.2.2 Access from the NNM Manager to the NNM Agent.....	10
7.5.2.3 Interaction including periodic actions	11
7.6 NNM interface conditions.....	11
7.7 Authentication Control for the Service	11
7.8 Relationship to other Recommendations.....	11
7.9 Distributed Processing Environment.....	11
Appendix I – NNM procedural description based on CMISE	12
I.1 Procedure	12
I.2 Connectivities between NNM service user and service provider systems by CMIP	12
Appendix II – NNM Service Requirements.....	13
II.1 Overview	13
II.2 Service list.....	13
II.3 Requirements for each NNM service	14
Appendix III – NNM Interaction Model.....	16
III.1 Overview	16
III.2 Combined interaction	16

Recommendation X.170

NETWORK-NETWORK MANAGEMENT ARCHITECTURE FOR DATA NETWORKS

(Geneva, 1999)

1 Scope

This Recommendation is one of a set of Recommendations dealing with Network-Network Management Interface for data networks, which include:

- the definition of the architectural framework to exchange management information for the provision of total Customer Network Management (CNM) services by the carrier accommodating its subscribers;
- the description of services between two networks;
- the definition of management information elements, such as the managed object (MO);
- classes, attribute types, action types, notification types;
- compliance requirements placed on other ITU-T Recommendations definitions; and
- conformance requirements.

When a carrier provides CNM services defined in Recommendation X.160, there may be requirements to exchange management information or operations with its adjacent network related to its customers' internetwork communication. This Recommendation resolves such requirements for the provision of total CNM services for its customers. It defines the architectural framework for Network-Network Management to exchange management information necessary for a carrier to provide its customers with CNM services related to internetwork communication with another network.

This Recommendation makes use of the principles of the CNM and the TMN X-interface. Within these overall frameworks, it meets requirements specific to data networks and the provision of CNM services.

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.

2.1 Identical Recommendations | International Standards

- ITU-T Recommendation X.283 (1997) | ISO/IEC 10733:1998, *Information technology – Elements of management information related to the OSI Network layer.*
- ITU-T Recommendation X.701 (1997) | ISO/IEC 10040:1998, *Information technology – Open Systems Interconnection – System management Overview.*
- ITU-T Recommendation X.703 (1997) | ISO/IEC 13244:1998, *Information technology – Open Distributed Management Architecture.*
- ITU-T Recommendation X.710 (1997) | ISO/IEC 9595:1998, *Information technology – Open Systems Interconnection – Common management information service.*
- ITU-T Recommendation X.711 (1997) | ISO/IEC 9596-1:1998, *Information technology – Open Systems Interconnection – Common management information protocol: Specification.*
- CCITT Recommendation X.720 (1992) | ISO/IEC 10165-1:1993, *Information technology – Open Systems Interconnection – Structure of management information: Management information model.*
- CCITT Recommendation X.721 (1992) | ISO/IEC 10165-2:1992, *Information technology – Open Systems Interconnection – Structure of management information: Definition of management information.*



Documents

Document Sharing Hub

Recommendation X.170 (06/99)

1

- CCITT Recommendation X.722 (1992) | ISO/IEC 10165-4:1992, *Information technology – Open Systems Interconnection – Structure of management information: Guidelines for the definition of managed objects.*
- ITU-T Recommendation X.723 (1993) | ISO/IEC 10165-5:1994, *Information technology – Open Systems Interconnection – Structure of management information: Generic management information.*
- ITU-T Recommendation X.724 (1996) | ISO/IEC 10165-6:1997, *Information technology – Open Systems Interconnection – Structure of management information: Requirements and guidelines for implementation conformance statement proformas associated with OSI management.*
- CCITT Recommendation X.730 (1992) | ISO/IEC 10164-1:1993, *Information technology – Open Systems Interconnection – Systems Management: Object Management Function.*
- CCITT Recommendation X.731 (1992) | ISO/IEC 10164-2:1993, *Information technology – Open Systems Interconnection – Systems Management: State Management Function.*

2.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.700 (1992), *Management Framework for Open Systems Interconnection (OSI) for CCITT applications.*

ISO/IEC 7498-4:1989, *Information processing systems – Open Systems Interconnection – Basic Reference Model – Part 4: Management framework.*

2.3 Additional references

- ITU-T Recommendation M.3010 (1996), *Principles for a telecommunications management network.*
- ITU-T Recommendation M.3020 (1995), *TMN interface specification methodology.*
- ITU-T Recommendation M.3100 (1995), *Generic network information model.*
- ITU-T Recommendation M.3320 (1997), *Management requirements framework for the TMN X-interface.*
- ITU-T Recommendation X.160 (1996), *Architecture for customer network management service for public data networks.*
- ITU-T Recommendation X.161 (1997), *Definition of customer network management services for public data networks.*
- ITU-T Recommendation X.162 (1997), *Definition of management information for customer network management service for public data networks to be used with the CNMc interface.*
- ITU-T Recommendation X.163 (1995), *Definition of management information for customer network management service for public data networks to be used with the CNMe interface.*
- ITU-T Recommendation X.790 (1995), *Trouble management function for ITU-T applications.*
- ISO 9735:1988, *Electronic data interchange for administration, commerce and transport (EDIFACT) – Application level syntax rules.*

3 Definitions

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

3.1 X.160 definitions

This Recommendation makes use of the following terms defined in Recommendation X.160:

- Customer Network Management (CNM);
- CNM service;
- CNM interface;
- CNM provider;