



INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

I.322

(02/99)

SERIES I: INTEGRATED SERVICES DIGITAL NETWORK

Overall network aspects and functions – Reference
models

Generic protocol reference model for telecommunication networks

ITU-T Recommendation I.322

(Previously CCITT Recommendation)

ITU-T I-SERIES RECOMMENDATIONS
INTEGRATED SERVICES DIGITAL NETWORK

GENERAL STRUCTURE

Terminology	I.110–I.119
Description of ISDNs	I.120–I.129
General modelling methods	I.130–I.139
Telecommunication network and service attributes	I.140–I.149
General description of asynchronous transfer mode	I.150–I.199

SERVICE CAPABILITIES

Scope	I.200–I.209
General aspects of services in ISDN	I.210–I.219
Common aspects of services in the ISDN	I.220–I.229
Bearer services supported by an ISDN	I.230–I.239
Teleservices supported by an ISDN	I.240–I.249
Supplementary services in ISDN	I.250–I.299

OVERALL NETWORK ASPECTS AND FUNCTIONS

Network functional principles	I.310–I.319
Reference models	I.320–I.329
Numbering, addressing and routing	I.330–I.339
Connection types	I.340–I.349
Performance objectives	I.350–I.359
Protocol layer requirements	I.360–I.369
General network requirements and functions	I.370–I.399

ISDN USER-NETWORK INTERFACES

Application of I-series Recommendations to ISDN user-network interfaces	I.420–I.429
Layer 1 Recommendations	I.430–I.439
Layer 2 Recommendations	I.440–I.449
Layer 3 Recommendations	I.450–I.459
Multiplexing, rate adaption and support of existing interfaces	I.460–I.469
Aspects of ISDN affecting terminal requirements	I.470–I.499

INTERNETWORK INTERFACES

I.500–I.599

MAINTENANCE PRINCIPLES

I.600–I.699

B-ISDN EQUIPMENT ASPECTS

ATM equipment	I.730–I.739
Transport functions	I.740–I.749
Management of ATM equipment	I.750–I.799

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

ITU-T RECOMMENDATION I.322

GENERIC PROTOCOL REFERENCE MODEL FOR TELECOMMUNICATION NETWORKS

Summary

This Recommendation defines a Generic Protocol Reference Model (GPRM) used to describe heterogeneous transport networks based on the deployment of overlaid switching and transmission techniques. GPRM models the interconnection and exchange of information, including information pertaining to the user, control and management functions.

Source

ITU-T Recommendation I.322 was prepared by ITU-T Study Group 13 (1997-2000) and was approved under the WTSC Resolution No. 1 procedure on the 15th of February 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.

CONTENTS

Page

1	Scope	1
2	References	1
3	Relationship with existing standards	2
4	Modelling principles.....	2
4.1	Service and functional model	2
4.2	Layer networks and adaptation.....	4
4.3	Partitioning	5
4.4	Stratification	7
4.4.1	The supplier viewpoint.....	9
4.4.2	The customer viewpoint.....	9
4.4.3	The relationship between the supplier viewpoint stratification and Recommendation X.200.....	9
4.4.4	The relationship between the customer viewpoint stratification and Recommendation X.200.....	10
5	Generic protocol reference model	11
5.1	Relationship between protocol blocks of adjacent Strata.....	12
5.2	Interworking between adjacent Strata	14
6	Application of the GPRM principles to ISDN case.....	16
7	Application of the GPRM principles to B-ISDN case.....	16
8	Application to IP based networks.....	16
9	Application to SDH	16

.....



Documents

Document Sharing Hub

Recommendation I.322 (02/99)

iii

Recommendation I.322**GENERIC PROTOCOL REFERENCE MODEL FOR
TELECOMMUNICATION NETWORKS***(Geneva, 1999)***1 Scope**

The objective of this Recommendation is the definition of a Generic Protocol Reference Model (GPRM) able to describe heterogeneous transport networks based on the deployment of overlaid switching and transmission techniques.

The scope of the Generic Protocol Reference Model is not associated with any particular network type or any particular service. The GPRM models the interconnection and exchange of information including user, control and management information through a Global Transport Network (GTN). The GTN is a generic network that provides a Global Transfer Service ensuring a global connectivity with standardized classes of services.

The Generic Protocol Reference Model is developed by using the modelling principles of stratification, partitioning, functional modelling and layering.

The concepts of the Generic Protocol Reference Model are then applied to specific networks (ISDN and B-ISDN) based on specific techniques.

The Recommendation is structured into two parts:

A general part covering the modelling principles and describing the Generic Protocol Reference Model.

A second part, which remains for further study, will show the application of the concepts of the Generic Protocol Reference Model to the specific cases of N-ISDN, B-ISDN, IP-based networks, and networks based on the SDH. Recommendations I.320 and I.321 remain valid protocol reference models for N-ISDN and B-ISDN respectively.

The Generic Protocol Reference Model also describes the interworking issues that arise from the coexistence of different transmission and switching techniques in the GTN.

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.

- ITU-T Recommendation G.803 (1997), *Architecture of transport networks based on the synchronous digital hierarchy (SDH)*.
- ITU-T Recommendation G.805 (1995), *Generic functional architecture of transport networks*.
- ITU-T Recommendation G.872 (1999), *Architecture of the optical transport networks*.
- ITU-T Recommendation I.320 (1993), *ISDN protocol reference model*.

**Documents**

Document Sharing Hub

Recommendation I.322 (02/99)

1

- CCITT Recommendation I.321 (1991), *B-ISDN protocol reference model and its application*.
- ITU-T Recommendation I.326 (1995), *Functional architecture of the transport networks based on ATM*.
- ITU-T Recommendation X.200 (1994), *Information technology – Open Systems Interconnection – Basic reference model: The basic model*.
- ITU-T Recommendation X.213 (1995), *Information technology – Open Systems Interconnection – Network service definition*.
- ITU-T Recommendation Y.110 (1998), *Global Information Infrastructure principles and framework architecture*.
- ITU-T Recommendation Y.120 (1998), *Global Information Infrastructure scenario methodology*.

3 Relationship with existing standards

The intent of this Recommendation is to cover the full range of telecommunication networks and services and to be consistent with the concepts of the GII described in the Y.100-series of Recommendations. In order to illustrate this universal applicability, the way in which the GPRM is applied to ISDN, B-ISDN, Internet, and networks based on SDH is included in this Recommendation.

Recommendations have been produced, in the past, describing protocol reference models for different networks. The ISDN Protocol Reference Model (Recommendation I.320) and the B-ISDN Protocol Reference Model (Recommendation I.321) formalize the information flows to provide ISDN and B-ISDN telecommunication services. While these Recommendations define many important concepts for the networks they describe, they have proved hard to extrapolate to a more generic case. This Recommendation validates the important concepts while removing aspects of the description that prevent extrapolation to the generic case.

In a similar way, the OSI reference model described in Recommendation X.200 contains many important concepts, however, it is oriented towards message-based, non-real time networking and so is equally hard to extrapolate. The relationship of this Recommendation to Recommendation X.200 is covered in 4.4.

4 Modelling principles

This clause describes a number of general principles relevant to the definition of the Generic Protocol Reference Model. The concepts of stratification, functional modelling, layering, reference configuration and partitioning are discussed and combined together.

4.1 Service and functional model

User applications generate requirements for telecommunications services as shown in Figure 1. These requirements can be for real time and non-real time transfer of information between geographically separated components of the application, some or all of which may include people. The way in which this arises is described in Recommendation Y.110.

In addition to the user information, the application must pass control and management information to the global transport network in order to allow it to transfer the information in accordance with the requirements of the user application. This is also shown in Figure 1.