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SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE
AND INTERNET PROTOCOL ASPECTS

Internet protocol aspects – General

IP framework – A framework for convergence of telecommunications network and IP network technologies

ITU-T Recommendation Y.1001

(Formerly CCITT Recommendation)

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IP framework – A framework for convergence of telecommunications network and IP network technologies

Summary

In order to support the development of IP-related standards, this Recommendation identifies a framework to position the telecommunications aspects with respect to IP networks. This framework serves to identify and assist understanding the IP network issues, from the telecommunications point of view, with respect to the provision of seamless services to the user between IP networks and telecommunications networks in a convergence context.

This Recommendation outlines a number of general architectures involving a mix of Telecommunication Network and Internet Protocol (IP) Network technologies. In this Recommendation, IP, the Internet Protocol, is considered in its role as a protocol purely associated with transporting connectionless packets.

Source

ITU-T Recommendation Y.1001 was prepared by ITU-T Study Group 13 (2001-2004) and approved under the WTSA Resolution 1 procedure on 24 November 2000.

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 Assembly (WTSA), 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 WTSA 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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1 Introduction

In order to support the development of IP-related standards, this Recommendation identifies a framework to position the telecommunications aspects with respect to IP networks. This framework serves to identify and assist understanding the IP network issues, from the telecommunications point of view, with respect to the provision of seamless services to the user between IP networks and telecommunications networks in a convergence context.

This Recommendation outlines a number of general architectures involving a mix of Telecommunication Network and Internet Protocol (IP) Network technologies. In this Recommendation, IP, the Internet Protocol, is considered in its role as a protocol purely associated with transporting connectionless packets.

2 Scope and terms of reference

2.1 Scope

The scope of this Recommendation includes:

- a) the basic horizontal and vertical architectural principles that will be encountered in combining IP and telecommunications technologies in a variety of ways;
- b) a generic protocol reference model and its application to an mixed IP/Telecommunication environment;
- c) architectures for the use of the IP over telecommunications transport technologies;
- d) other architectures involving the convergence, co-existence, or interworking between IP technologies and other telecommunications technologies.

NOTE – This framework will cover both the integrated and non-integrated cases. Initially, it may be envisaged that the IP and non-IP technologies will co-exist separately, and/or only loosely coupled. Ultimately, it is envisaged that IP and non-IP (telecommunication) technologies will be converged into a single, optimally integrated IP telecommunication architecture.

The scope embraces three possible types of scenarios involving networks and services based on ITU-T Recommendations, IETF RFCs/STDs, or other IP standards¹:

- e) ITU-T and ITU-R defined transport capabilities used to carry IP;
- f) the use of IP to transport higher layer information whose semantics are defined in ITU-T Recommendations;

¹ Produced by a recognized standards development organization.

- g) services² arising from standards defined by the Internet Engineering Task Force (IETF), or other recognized bodies, that are to be interworked with those defined in ITU-T Recommendations for the purposes of achieving seamless end-to-end user service.

Cases f) and g) are particular examples of scope item d) above.

2.2 Terms of reference

The types of architecture described in this Recommendation are functional in nature, covering the following aspects:

- a) general architectural concepts;
- b) service/protocol layering;
- c) service interworking; and
- d) integration.

3 References (Informative)

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; 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 published regularly.

3.1 ITU-T

- ITU-T H.225.0 (2000), *Call signalling protocols and media stream packetization for packet-based multimedia communication systems*.
- ITU-T H.245 (2000), *Control protocol for multimedia communications*.
- ITU-T H.248 (2000), *Gateway control protocol*.
- ITU-T H.323 (2000), *Packet-based multimedia communications systems*.
- ITU-T I.555 (1997), *Frame relaying Bearer service interworking*.

3.2 IETF

- RFC 791 *Internet Protocol*.
- RFC 1661 *The Point-to-Point Protocol (PPP)*.
- RFC 1662 *PPP in HDLC-like Framing*.
- RFC 2225 *Classical IP and ARP over ATM*.
- RFC 2327 *SDP: Session Description Protocol*.
- RFC 2364 *PPP over AAL5*.
- RFC 2427 *Multiprotocol Interconnect over Frame Relay*.

² In this Recommendation the word "service" is used in two different ways according to the context. It is sometimes used in the architectural sense, as the abstract representation of features offered by a horizontal interface, or by a vertical (layer) interface. Alternatively, the word service is sometimes used in a more general sense, say to represent a particular telecommunications service, such as the "telephone service" defined by E-series Recommendations.

RFC 2543	<i>SIP: Session Initiation Protocol.</i>
RFC 2615	<i>PPP over SONET/SDH.</i>
RFC 2684	<i>Multiprotocol Encapsulation over ATM Adaptation Layer 5.</i>
RFC 2458	<i>Toward the PSTN/Internet Inter-networking.</i>

4 Definitions

This Recommendation defines the following terms:

4.1 IP Service, IP Network Service: A data transmission service in which the data that is transferred across the interface between the user and provider is in the form of IP (Internet Protocol) packets (sometimes called datagrams). The IP (Network) Service includes the service provided by using the IP Transfer Capabilities.

4.2 IP Network³ (or IP Layer Network): A network in which IP is used as a layer protocol.

4.3 IP Transfer Capability: The set of network capabilities provided by the Internet Protocol (IP) layer. It may be characterized by the traffic contract as well as performance attributes supported by control and management functions of the underlying protocol layers. Examples of IP Transfer Capability include basic best effort IP packet delivery and the capability provided by Intserv, and Diffserv framework defined by the IETF.

4.4 IP Based Service: The functions, facilities and capabilities implemented and executed over the IP Network Service. The IP based service utilizes the IP Transfer Capabilities offered by a network provider.

4.5 Circuit Switched Network (CSN): A network in which a fixed bandwidth channel is established for, and dedicated to the duration of a communication session. The PSTN is an example of a CSN, where a circuit is established for the duration of a telephone call.

5 Abbreviations

AAL	ATM Adaptation Layer
AP	Application Protocol
ATM	Asynchronous Transfer Mode
B-ISDN	Broadband ISDN
CN	Customer Network
CRF	Connection Related Function
CSN	Circuit Switched Network
IETF	Internet Engineering Task Force
IN	Intelligent Network
INAP	Intelligent Network Application Protocol
IP	Internet Protocol

³ The term "IP Network" is distinct from, and should not be confused with, the term "Internet". Many IP networks exist, each operated by different owners. Generally, individual IP networks may differ in scope and extent. They may be globally public (i.e. the Internet), totally private (i.e. with no open structure and without gateways to the Internet other private IP networks) or combinations of public and private networks (e.g. a privately run IP network with gateways and access to the Internet, but not necessarily vice versa).

ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
IWU	Interworking Unit
LFC	Local functional Capability
LLC	Lower Layer Capability
N-ISDN	Narrowband ISDN
PDH	Plesiochronous Digital Hierarchy
PhDH	Photonic Digital Hierarchy
POP	Point of Presence
PPP	Point-to-Point Protocol
PSTN	Public Switched Telephone Network
QoS	Quality of Service
SCP	Service Control Point
SDH	Synchronous Digital Hierarchy
SMS	Service Management System
SS7	Signalling System No. 7
SSP	Service Switching Point
TE	Terminal Equipment
TN	Telecommunications Network
UNI	User Network Interface
WDM	Wave Division Multiplexing

6 General framework for an IP network

This clause outlines some very general high level aspects.

6.1 General model

Architecture for IP networks may consist of three parts, Application (or Service) Model, System Model and Technology Model. Relationships among the three parts for IP Networks' Architecture are as shown in Figure 1.

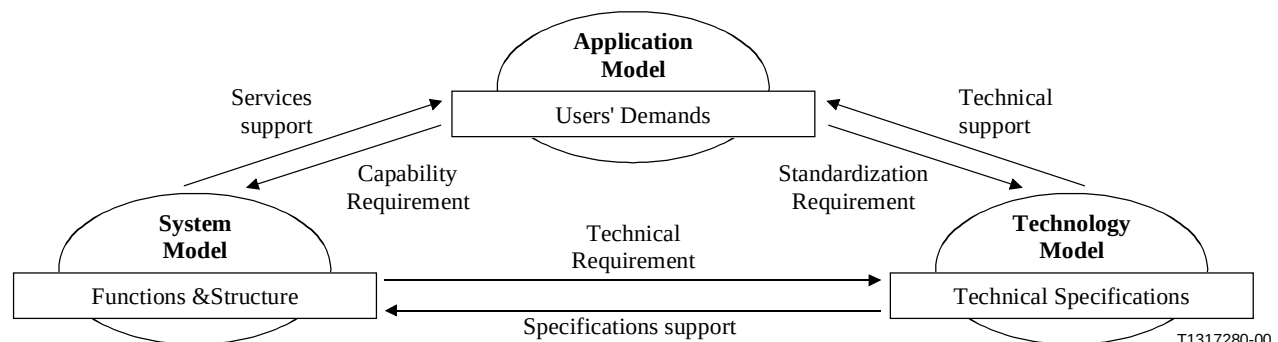


Figure 1/Y.1001 – Model relationships