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SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE
AND INTERNET PROTOCOL ASPECTS

Internet protocol aspects – Interworking

ATM-MPLS network interworking – Cell mode user plane interworking

ITU-T Recommendation Y.1411

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ITU-T Recommendation Y.1411

ATM-MPLS network interworking – Cell mode user plane interworking

Summary

This Recommendation addresses required functions of network interworking between ATM networks and MPLS networks specifically the user plane interworking mechanisms and procedures. One of the key aspects of network interworking is to provide network support for ATM services during the evolution of networks. Details of the interworking model and required interworking functions are described.

Source

ITU-T Recommendation Y.1411 was prepared by ITU-T Study Group 13 (2001-2004) and approved under the WTSA Resolution 1 procedure on 22 February 2003.

Keywords

ATM, MPLS, interworking, network, user plane.

FOREWORD

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Introduction

There is a need to focus on required functions of network interworking between ATM networks and MPLS networks specifically the user plane interworking mechanisms and procedures. One of the key aspects of network interworking is to provide network support for ATM services during the evolution of networks.

ITU-T Recommendation Y.1411

ATM-MPLS network interworking – Cell mode user plane interworking

1 Scope

This Recommendation focuses on required functions for network interworking between ATM and MPLS, specifically the user plane interworking mechanisms and procedures for cell mode transport. In particular it specifies a list of requirements, interworking scenarios and interworking encapsulation format and semantics for ATM-MPLS cell mode network interworking.

This Recommendation enables transport of ATM Permanent Virtual Connections (PVC) or Switched Virtual Connections (SVC) over an MPLS network. The encapsulation allows ATM Virtual Channel Connections (VCCs) or Virtual Path Connections (VPCs) to be carried within MPLS Label Switched Paths (LSPs). The scope includes support of all AAL types as well as OAM and RM cells, and the ability to encapsulate one or multiple ATM cells in a single MPLS Frame.

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; 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. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [1] ITU-T Recommendation I.510 (1993), *Definitions and general principles for ISDN interworking*.
- [2] IETF RFC 3031 (2001), *Multiprotocol label switching architecture*.
- [3] ITU-T Recommendation I.610 (1999), *B-ISDN operation and maintenance principles and functions*.
- [4] ITU-T Recommendation I.610 (1999)/Cor.1 (2000), *B-ISDN operation and maintenance principles and functions – Corrigendum 1*.
- [5] ITU-T Recommendation I.610 (1999)/Amd.1 (2000), *B-ISDN operation and maintenance principles and functions – Amendment 1*.
- [6] ITU-T Recommendation Y.1710 (2002), *Requirements for Operation & Maintenance functionality in MPLS networks*.
- [7] ITU-T Recommendation Y.1711 (2002), *Operation & Maintenance mechanism for MPLS networks*.
- [8] ITU-T Recommendation I.371 (2000), *Traffic control and congestion control in B-ISDN*.
- [9] ITU-T Recommendation I.371.1 (2000), *Guaranteed frame rate ATM transfer capability*.
- [10] ITU-T Recommendation I.356 (2000), *Muti-protocol Label Switching (MPLS) B-ISDN ATM layer cell transfer performance*.
- [11] IETF RFC 3270 (2002), *Muti-protocol Label Switching (MPLS) Support of Differentiated Services*.
- [12] IETF RFC 3032 (2001), *MPLS Label Stack Encoding*.
- [13] ITU-T Recommendation I.732 (2000), *Functional characteristics of ATM equipment*.

- [14] ATM Forum, af-sec-0100.002 (2001), *ATM Security Specification Version 1.1*.
- [15] ITU-T Recommendation I.361 (1999), *B-ISDN ATM layer specification*.
- [16] IETF RFC 2475 (1998), *An Architecture for Differentiated Services*.
- [17] IETF RFC 3260 (2002), *New terminology and clarifications for DiffServ*.

3 Definitions

This Recommendation defines the following terms:

3.1 cell concatenation: The process of bundling a group of cells belonging to VCCs or VPCs into a MPLS frame. Note that this is not AAL segmentation and reassembly.

3.2 interworking: The term "interworking" is used to express interactions between networks, between end systems, or between parts thereof, with the aim of providing a functional entity capable of supporting an end-to-end communication. The interactions required to provide a functional entity rely on functions and on the means to select these functions [1].

3.3 interworking function (IWF): These functions are referred to in the interworking definition, which include the conversion between protocols and the mapping of one protocol to another. The functionality required between networks can be separated from the functionality, if any, required in end systems. The IWFs needed as a result of a service requirement for interworking are categorized as connection-dependent IWFs (i.e., those functions needed in order to interconnect two networks) or communication-dependent IWFs (i.e., those functions in addition to connection-dependent IWFs needed in order to establish a specific end-to-end communication and which may differ from application to application) [1]. The IWF includes interworking between U-plane, C-plane and M-plane functions.

3.4 ingress IWF/network element: The point where the ATM cells are encapsulated into an MPLS frame (ATM-to-MPLS direction.)

3.5 egress IWF/network element: The point where the ATM cells are de-encapsulated from an MPLS frame (MPLS-to-ATM direction.)

3.6 one-to-one mode: The one-to-one mode specifies an encapsulation method which maps one ATM VCC (or one ATM VPC) to one interworking LSP.

3.7 N-to-one mode: The N-to-one mode specifies an encapsulation method which maps one or more ATM VCCs (or one or more ATM VPCs) to one interworking LSP.

4 Abbreviations

This Recommendation uses the following abbreviations:

AAL	ATM Adaptation Layer
AINI	ATM Inter-Network Interface
ATC	ATM Transfer Capability
ATM	Asynchronous Transfer Mode
ATM-F	ATM Forum
B-ISDN	Broadband-Integrated Services Digital Network
B-ISUP	Broadband ISDN User Part
CES	Circuit Emulation Service
CLP	Cell Loss Priority

DSS2	Digital Subscriber Signalling System No. 2
E-LSP	EXP-inferred-PSC LSP
EXP	Experimental Bits
FIFO	First In First Out
GFC	Generic Flow Control
HEC	Header Error Control
ILMI	Integrated Local Management Interface
ISDN	Integrated Services Digital Network
ISH	Interworking Specific Header
IWF	Interworking Function
L-LSP	Label-only-inferred-PSC LSP
LSP	Label Switched Path
LSR	Label Switching Router
MPLS	Multi-Protocol Label Switching
MTU	Maximum Transport Unit
NNI	Network-to-Network Interface
OAM	Operation And Maintenance
PHB	Per Hop Behaviour
PM	Performance Monitoring
PNNI	Private Network-to-Network Interface
PSC	PHB Scheduling Class
PTI	Payload Type Identifier
PVC	Permanent Virtual Connection
QoS	Quality of Service
RFC	Request for Comments
RM	Resource Management
S-bit	Stack bit
SPVC	Soft PVC
SVC	Switched Virtual Connection
TTL	Time To Live
UNI	User-Network Interface
VC	Virtual Channel
VCC	Virtual Channel Connection
VCI	Virtual Channel Identifier
VP	Virtual Path
VPC	Virtual Path Connection
VPI	Virtual Path Identifier