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SERIES Y: GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-GENERATION NETWORKS

Internet protocol aspects – Interworking

SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN – Bearer control signalling

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Use of virtual trunks for ATM/MPLS client/server control plane interworking

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

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ITU-T Recommendation Y.1416/Q.3150

Use of virtual trunks for ATM/MPLS client/server control plane interworking

Summary

The virtual trunk approach provides a mechanism in which pseudo wires function as trunks through which ATM switches can transparently establish and maintain virtual channel connections (VCCs) and virtual path connections (VPCs). The virtual trunk approach decouples control plane activity in the ATM and MPLS control planes, and pseudo wire setup or teardown is requested explicitly.

Source

ITU-T Recommendation Y.1416/Q.3150 was approved on 13 June 2007 by ITU-T Study Group 13 (2005-2008) under the ITU-T Recommendation A.8 procedure.

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Introduction

Many network providers are offering and delivering VC-based services across dedicated frame relay and ATM networks. Many of these same providers have embarked upon a strategy of convergence where many per-service networks and their attendant technologies and services are migrated to a single IP/MPLS packet-switched network (PSN). It is envisaged that existing network services such as frame relay and ATM and emerging new services including IP VPN will operate over this multi-service converged PSN.

ATM networks employ dynamic signalling and routing protocols to expedite connection setup and recovery. PNNI is an example of one such protocol used to dynamically set up switched ATM connections across a native ATM network [ATM pnni-0055]. When transitioning to a PSN, service providers will expect their existing ATM operations infrastructure to work with minimal modification. In particular, control protocols for routing and signalling must continue to work end-to-end.

The Internet Engineering Task Force (IETF) has developed pseudo wire (PW) technology [b-IETF RFC 3985] to emulate services over a PSN. Specifically, [IETF RFC 4717] defines how to emulate ATM connections over a PSN. These specifications, however, only describe the data plane behaviour. They do not define how an ATM connection setup interacts with PW setup.

The virtual trunk approach provides a mechanism in which pseudo wires function as trunks through which ATM switches can transparently establish and maintain virtual channel connections (VCCs) and virtual path connections (VPCs). The virtual trunk approach decouples control plane activity in the ATM and MPLS control planes, and pseudo-wire setup or teardown is requested explicitly.

Other methods enabling switched connection setup across an MPLS network have been defined in [b-ITU-T Y.1417] and [b-ATM cs-0197]. In these approaches, each connection setup or teardown in the client control plane triggers the setup or teardown of a corresponding pseudo wire.

The terminology used in this Recommendation is based upon the terminology associated with the control and user plane protocols of the organization responsible for them. For example, within the MPLS core network IETF terminology is used (e.g., pseudo wire, PE).

This Recommendation covers issues with virtual trunks. It is one of a set of documents addressing control plane interworking of MPLS with ATM and frame relay. See also [b-ITU-T Y.1417].

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ITU-T Recommendation Y.1416/Q.3150

Use of virtual trunks for ATM/MPLS client/server control plane interworking

1 Scope

This Recommendation defines virtual trunks, their mapping to pseudo wires, and the way ATM switches establish connections through them.

The virtual trunk approach provides a mechanism in which pseudo wires function as trunks through which ATM switches can transparently establish and maintain virtual channel connections (VCCs) and virtual path connections (VPCs). This approach has two objectives:

- Minimize the amount of interactions between the ATM control plane and the MPLS control plane.
- Enable a distributed interworking approach in which ATM control plane and PW control plane may be on different interworking devices. This enables separation of the MPLS network routing domains and the ATM routing domains.

The following items are not within the scope of this Recommendation:

- Peer-partition interworking between ATM and frame relay control planes.
- Peer-partition interworking between ATM (or frame relay) and IP/MPLS control planes for setting up and managing switched connections between ATM (or frame relay) and IP/MPLS end-points.
- L2TPv3 pseudo wires [b-IETF RFC 3931].
- Signalling to establish virtual trunks.

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.

[ATM cs-0125] ATM Forum af-cs-0125.001 (2002), *ATM Inter-Network Interface (AINI) Specification Version 1.1*.

[ATM pnni-0055] ATM Forum af-pnni-0055.002 (2002), *Private Network-Network Interface Specification Version 1.1*.

[ATM tm-0121] ATM Forum af-tm-0121.000 (1999), *Traffic Management 4.1*.

[IETF RFC 4447] IETF RFC 4447 (2006), *Pseudowire Setup and Maintenance using the Label Distribution Protocol (LDP)*.

[IETF RFC 4717] IETF RFC 4717 (2006), *Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS Networks.*

3 Definitions

3.1 Terms defined elsewhere

None.

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3.2 Terms defined in this Recommendation

This Recommendation defines the following term:

3.2.1 virtual trunk: A virtual trunk is a logical connection between two client networks.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

AC	Attachment Circuit
AINI	ATM Inter-Network Interface
ATM	Asynchronous Transfer Mode
BFD	Bidirectional Forwarding Detection
CCA	Client Connection Aggregation
IP	Internet Protocol
L2E	Layer 2 Edge
LDP	Label Distribution Protocol
LER	Label Edge Router
LSP	Label Switched Path
ME	MPLS Edge
MPLS	Multi-Protocol Label Switching
NNI	Network Node Interface
OAM	Operations, Administration and Management
PE	Provider Edge
PNNI	Private Network-Network Interface
PSN	Packet Switched Network
PW	Pseudo Wire
PWE	Pseudo Wire Emulation
PWE3	Pseudo Wire Emulation Edge-to-Edge (an IETF working group)
RSVP-TE	Resource Reservation Protocol – Traffic Engineering
RVPI	Relative VPI
UNI	User Network Interface
VC	Virtual Connection
VCC	Virtual Channel Connection
VCI	Virtual Connection Identifier
VP	Virtual Path
VPC	Virtual Path Connection
VPI	Virtual Path Identifier
VPN	Virtual Private Network

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