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Pseudowire Emulation Edge-to-Edge (PWE3) Asynchronous Transfer Mode (ATM) Transparent Cell Transport Service

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Abstract

The document describes a transparent cell transport service that makes use of the "N-to-one" cell relay mode for Pseudowire Emulation Edge-to-Edge (PWE3) Asynchronous Transfer-Mode (ATM) cell encapsulation.

1. Introduction

This transparent cell transport service allows migration of ATM services to a PSN without having to provision the ATM subscriber or customer edge (CE) devices. The ATM CEs will view the ATM transparent cell transport service as if they were directly connected via a Time Division Multiplexer (TDM) leased line. This service is most likely to be used as an internal function in an ATM service provider’s network as a way to connect existing ATM switches via a higher-speed PSN, or to provide ATM "backhaul" services for remote access to existing ATM networks.

1.1. Specification of Requirements

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in RFC 2119 [1].

2. Transparent Cell Transport Definition

The transparent port service is a natural application of the "N-to-one" Virtual Circuit Connection (VCC) cell transport mode for PWE3 ATM encapsulation described in [2], and MUST be used with pseudowires of type 0x0003, "ATM transparent cell transport" [4].

The ATM transparent port service emulates connectivity between two remote ATM ports. This service is useful when one desires to connect two CEs without processing or switching at the Virtual Path Connection (VPC) or VCC layer. The ingress PE discards any idle/unassigned cells received from the ingress ATM port, and maps all other received cells to a single pseudowire.

The egress PE does not change the Virtual Path Identifier (VPI), Virtual Circuit Identifier (VCI), Payload Type Identifier (PTI), or Cell Loss Priority (CLP) bits when it sends these cells on the egress ATM port. Therefore, the transparent port service appears to emulate an ATM transmission convergence layer connection between two ports. However, since the ingress PE discards idle/unassigned cells, this service benefits from statistical multiplexing bandwidth savings.

In accordance with [2], cell concatenation MAY be used for transparent cell-relay transport in order to save the PSN bandwidth. If used, it MUST be agreed between the ingress and egress PEs. In particular, if the Pseudo Wire has been set up using the PWE3 control protocol [3], the ingress PE MUST NOT exceed the value of the "Maximum Number of concatenated ATM cells" Pseudowire Interface Parameter Sub-TLV (Interface Parameter ID = 0x02 [4]) received in the Label Mapping message for the Pseudo Wire, and MUST NOT use cell concatenation if this parameter has been omitted by the egress PE.

ATM Operations and Management (OAM) cells MUST be transported transparently, and the PEs do not act on them. If the PEs detect a PSN or pseudowire failure between them, they do not generate any OAM cells, but rather bring down the ATM interfaces to the CEs (e.g., generating LOS on the ATM port), just as if it were a transmission layer failure.

Similarly, ATM Integrated Local Management Interface (ILMI) signaling from the CEs, if any, MUST be transported transparently, and the PEs do not act on it. However, the PEs must act on physical interface failure by either withdrawing the PW labels or by using pseudowire status signaling to indicate the interface failure. The procedures for both alternatives are described in [3].

3. Security Considerations

This document does not introduce any new security considerations beyond those in [2] and [3]. This document defines an application that utilizes the encapsulation specified in [2], and does not specify the protocols used to carry the encapsulated packets across the PSN. Each such protocol may have its own set of security issues, but those issues are not affected by the application specified herein. Note that the security of the transported ATM service will only be as good as the security of the PSN. This level of security might be less rigorous than a native ATM service.

4. Congestion Control

Since this document discusses an application of the "N-to-one" VCC cell transport mode for PWE3 ATM encapsulation described in [2], the congestion control considerations are identical to those discussed in section 15 of [2]. The PWE3 Working Group is also undertaking additional work on ATM-related congestion issues, and implementers should anticipate that an RFC will be published describing additional congestion control techniques that should be applied to ATM emulation over pseudowires.

5. Normative References

[1] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[2] Martini, L., Jayakumar, J., Bocci, M., El-Aawar, N., Brayley, J., and G. Koleyni, "Encapsulation Methods for Transport of Asynchronous Transfer Mode (ATM) over MPLS Networks", RFC 4717, December 2006.

[3] Martini, L., Rosen, E., El-Aawar, N., Smith, T., and G. Heron, "Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP)", RFC 4447, April 2006.

[4] Martini, L., "IANA Allocations for Pseudowire Edge to Edge Emulation (PWE3)", BCP 116, RFC 4446, April 2006.

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