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Internet Draft

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MPLS Generic Associated Channel

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Abstract

This draft describes a generic associated channel header (GE-ACH) that provides a control channel associated with an MPLS LSP, pseudowire or MPLS section. The VCCV ACH defined for PWs in RFC 5085 is generalized to allow a larger set of control channel and OAM functions to be used to meet the requirements of packet transport and other applications of MPLS.

Conventions used in this document

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].

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1. Introduction

There is a need for Operations and Maintenance (OAM) mechanisms that can be used for edge-to-edge (i.e. between originating and terminating LSRs or T-PEs) and segment fault detection (e.g. between any two LSRs or S-PEs along the path of an LSP or PW), diagnostics, maintenance and other functions for a Pseudowire and an LSP. Some of these functions can be supported using tools such as VCCV [3] or LSP-Ping [7]. However, a requirement has been indicated to extend these toolsets, in particular where MPLS networks are used for packet transport services and network operations [6]. These include performance monitoring, automatic protection switching, and support for management and signaling communication channels. These tools must be applicable to, and function in essentially the same manner (from an operational point of view) on both MPLS PWs and MPLS LSPs. They must also operate in-band on the PW or LSP such that they do not depend on PSN routing, user data traffic or ultimately on control plane functions.

Virtual Circuit Connectivity Verification (VCCV) can use an associated channel to provide a control channel between a PW's ingress and egress points over which OAM and other control messages can be exchanged. In this draft, we propose a generic associated channel header (GE-ACH) to enable the same control channel mechanism be used for MPLS Sections, LSPs and PWs. The associated channel header (ACH) specified in RFC 4385 [2] is used with additional code points to support additional MPLS OAM functions.

1.1. Objectives

This draft proposes a mechanism to provide for the OAM needs of transport applications. It creates a generic OAM identification mechanism that may be applied to all MPLS LSPs, while maintaining compatibility with the PW associated channel header (ACH) [2]. It also normalizes the use of the ACH for PWs in a transport context.

1.2. Scope

This draft defines the encapsulation header for LSP, MPLS Section and PW associated channel messages.

It does not define how associated channel capabilities are signaled or negotiated between LSRs or PEs, the operation of various OAM functions, or the messages transmitted on the associated channel.

This draft does not deprecate existing MPLS and PW OAM mechanisms.

1.3. Terminology

ACH: Associated Channel Header

MPLS Section: A Section is a network segment between two LSRs that are immediately adjacent

2. Generic Associated Channel

VCCV [3] defines three control channel types that may be used to multiplex OAM messages onto a PW. CC type 1, uses an associated channel header and is referred to as "In-band VCCV", CC type 2 which uses the router alert label to indicate VCCV packets and is referred to as "Out of Band VCCV", and CC type 3 that uses the TTL to force the packet to be processed by the destination routers control plane (known as "MPLS PW Label with TTL == 1").

This draft proposes that in transport applications only the type 1 (associated channel header) mechanism is used for LSP OAM and for PW OAM. In transport applications a static or traffic engineered LSP is normally used, thus the data and the OAM will follow the same path. This does not preclude the use of the GE-ACH mechanism described in this draft for other applications of MPLS.

Note that VCCV also includes mechanisms for negotiating the control channel and connectivity verification (i.e. OAM tool) types between PEs.

This section defines a generic associated channel header (GE-ACH) that identifies packets on the associated channel.

2.1. Generic Associated Channel Header

The format of the GE-ACH for LSP, Section and PW associated channel traffic is shown in Figure 1:

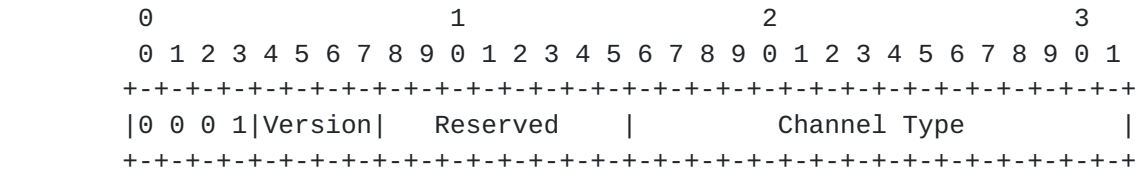

Figure 1 Generic Associated Channel Header

The first nibble is set to 0001b to indicate a channel associated with a PW or LSP. The Version and Reserved fields are set to 0, as specified in RFC 4385 [2].

Values for the channel type used for VCCV are specified in RFC 4446 [4].

This draft specifies the following additional channel types:

0xXX - for OAM functions

0xYY - for APS functions

0xKK - for Management Communications Channel (MCC) functions

0xZZ - for Signaling Communications Channel (SCC) functions

The functionality of these channel types will be defined elsewhere.

3. Congestion Considerations

The congestion considerations detailed in RFC 5085 [1] apply. Further generic associated channel-specific congestion considerations will be detailed in a future revision of this draft.

4. Security Considerations

The security considerations detailed in RFC 5085 [1] apply. Further generic associated channel-specific congestion considerations will be detailed in a future revision of this draft.

5. IANA Considerations

This draft requests that code points for the following GE-ACH channel types be allocated from the IANA PW Associated Channel Type registry [4]:

0xXX - for OAM functions

0xYY - for APS functions

0xKK - for Management Communications Channel (MCC) functions

0xZZ - for Signaling Communications Channel (SCC) functions

The PW Associated Channel Type registry is currently allocated based on the IETF consensus process, described in [5]. This allocation process was chosen based on the consensus reached in the PWE3 working group that pseudowire associated channel mechanisms should be reviewed by the IETF and only those that are consistent with the PWE3 architecture and requirements should be allocated a code point.

However, a requirement has emerged to allow for vendor-specific optimizations or extensions to OAM and other control protocols running in an associated channel, by supporting vendor specific code points [6]. This would prevent code points used for such functions from being allocated through the IETF standards process in future. Vendor specific code point space thus protects an installed base of equipment from potential inadvertent overloading of code points.

Each draft specifying ACH protocols must provide a solution for supporting vendor-specific types, in accordance with [6], in addition to those allocated by IETF consensus. The details of these solutions are outside the scope of this draft.

6. Acknowledgments

The authors gratefully acknowledge the input of Lou Berger and George Swallow.

7. References

7.1. Normative References

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

[2] S. Bryant et al., "Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN", RFC 4385, February 2006

[3] Nadeau, T. & Pignataro, S., "Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires", RFC 5085, December 2007

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

[5] Narten, T., Alvestrand, H., " Guidelines for Writing an IANA Considerations Section in RFCs", RFC 2434, October 1998

7.2. Informative References

[6] M. Vigoureux et al., "Requirements for OAM in MPLS Transport Networks", draft-vigoureux-mpls-oam-requirements-mpls-transport-00.txt,April 2008

[7] K. Kompella, G. Swallow, "Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures", RFC 4379, February 2006

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