PWE3
Internet-Draft
Updates: 5085 (if approved)
Intended status: Standards Track
Expires: March 6, 2015

T. Nadeau
lucidvision
L. Martini
S. Bryant
Cisco Systems

September 2, 2014

A Unified Control Channel for Pseudowires
draft-ietf-pwe3-vccv-for-gal-02

Abstract

This document describes a unified mode of operation for Virtual Circuit Connectivity Verification (VCCV), which provides a control channel that is associated with a pseudowire (PW). VCCV applies to all supported access circuit and transport types currently defined for PWs, as well as those being transported by the MPLS Transport Profile. This new mode is intended to augment those described in RFC5085. It describes new rules requiring this mode to be used as the default/mandatory mode of operation for VCCV. The older VCCV types will remain optional.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

Internet-Drafts are working documents of the Internet Engineering Task Force (IETF). Note that other groups may also distribute working documents as Internet-Drafts. The list of current Internet-Drafts is at http://datatracker.ietf.org/drafts/current/.

Internet-Drafts are draft documents valid for a maximum of six months and may be updated, replaced, or obsoleted by other documents at any time. It is inappropriate to use Internet-Drafts as reference material or to cite them other than as "work in progress."

This Internet-Draft will expire on March 6, 2015.

Table of Contents

1. Requirements Language and Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

AC Attachment Circuit [RFC3985].

AVP Attribute Value Pair [RFC3931].

CC Control Channel (used as CC Type).

CE Customer Edge.

CV Connectivity Verification (used as CV Type).

CW Control Word [RFC3985].

L2SS L2-Specific Sublayer [RFC3931].

LCCE L2TP Control Connection Endpoint [RFC3931].

OAM	Operation and Maintenance.
PE	Provider Edge.
PSN	Packet Switched Network [RFC3985].
PW	Pseudowire [RFC3985].
PW-ACH	PW Associated Channel Header [RFC4385].
VCCV	Virtual Circuit Connectivity Verification [RFC5085].

2. Introduction

There is a need for fault detection and diagnostic mechanisms that can be used for end-to-end fault detection and diagnostics for a Pseudowire, as a means of determining the PW's true operational state. Operators have indicated in [RFC4377], and [RFC3916] that such a tool is required for PW operation and maintenance. To this end, the IETF's PWE3 Working Group defined the Virtual Circuit Connectivity Verification Protocol (VCCV) in [RFC5085] . Since then a number of interoperability issues have arisen with the protocol as it is defined.

Over time, a variety of VCCV options or "modes" have been created to support legacy hardware, these modes use of the CW in some cases, while in others the CW is not used. The difficulty of operating these different combinations of "modes" have been detailed in an implementation survey conducted by the PWE3 Working Group and documented in [RFC7079]. The implementation survey and the PWE3 Working Group have concluded that operators have difficulty deploying the VCCV OAM protocol due to the number of combinations and options for its use.

In addition to the implementation issues just described, the ITU-T and IETF have set out to enhance MPLS to make it suitable as an optical transport protocol. The requirements for this protocol are defined as the MPLS Transport Profile (MPLS-TP). The requirements for MPLS-TP can be found in [RFC5654]. In order to support VCCV when an MPLS-TP PSN is in use, the GAL-ACH had to be created [RFC5586]. This resulted in yet another mode of VCCV operation.

This document defines two modes of operation of VCCV: 1) with a control word or 2) without a control word, both with a ACH encapsulation making it possible to handle all of the other cases handled by the other modes of VCCV. The modes of operation defined in this document MUST be implemented.

Figure 1 depicts the architecture of a pseudowire as defined in [RFC3985]. It further depicts where the VCCV control channel resides within this architecture, which will be discussed in detail later in this document.

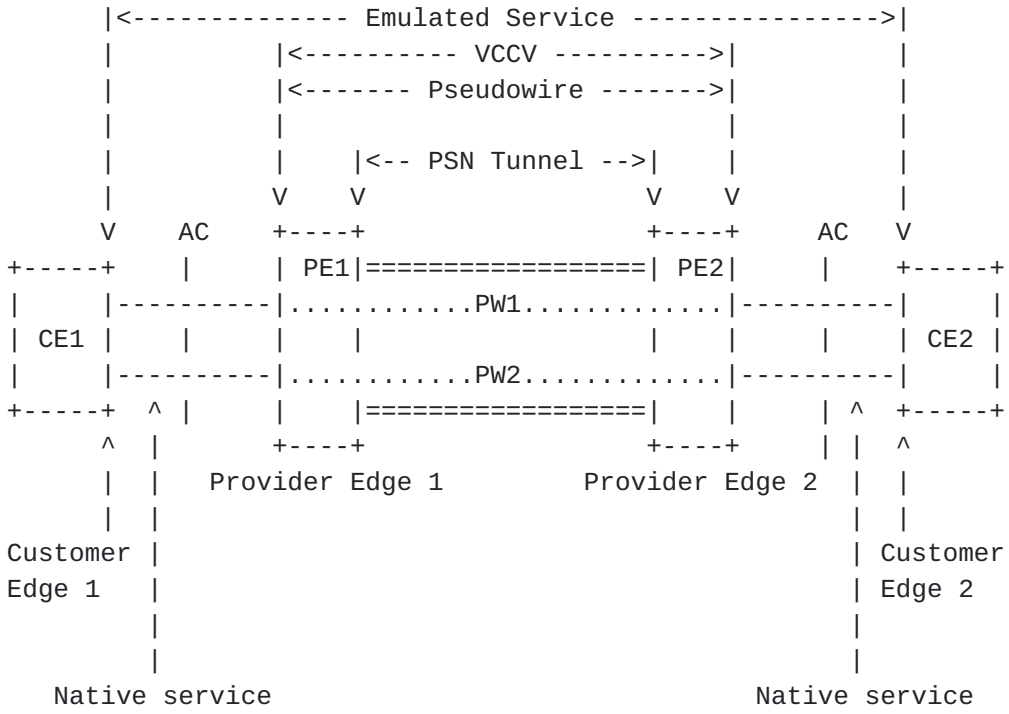


Figure 1: PWE3 VCCV Operation Reference Model

From Figure 1, Customer Edge (CE) routers CE1 and CE2 are attached to the emulated service via Attachment Circuits (AC), and to each of the Provider Edge (PE) routers (PE1 and PE2, respectively). An AC can be a Frame Relay Data Link Connection Identifier (DLCI), an ATM Virtual Path Identifier / Virtual Channel Identifier (VPI/VCI), an Ethernet port, or any other attachment type for which a PW is defined. The PE devices provide pseudowire emulation, enabling the CEs to communicate over the PSN. A pseudowire exists between these PEs traversing the provider network. VCCV provides several means of creating a control channel over the PW, between the PE routers that attach the PW.

Figure 2 depicts how the VCCV control channel is associated with the pseudowire protocol stack.

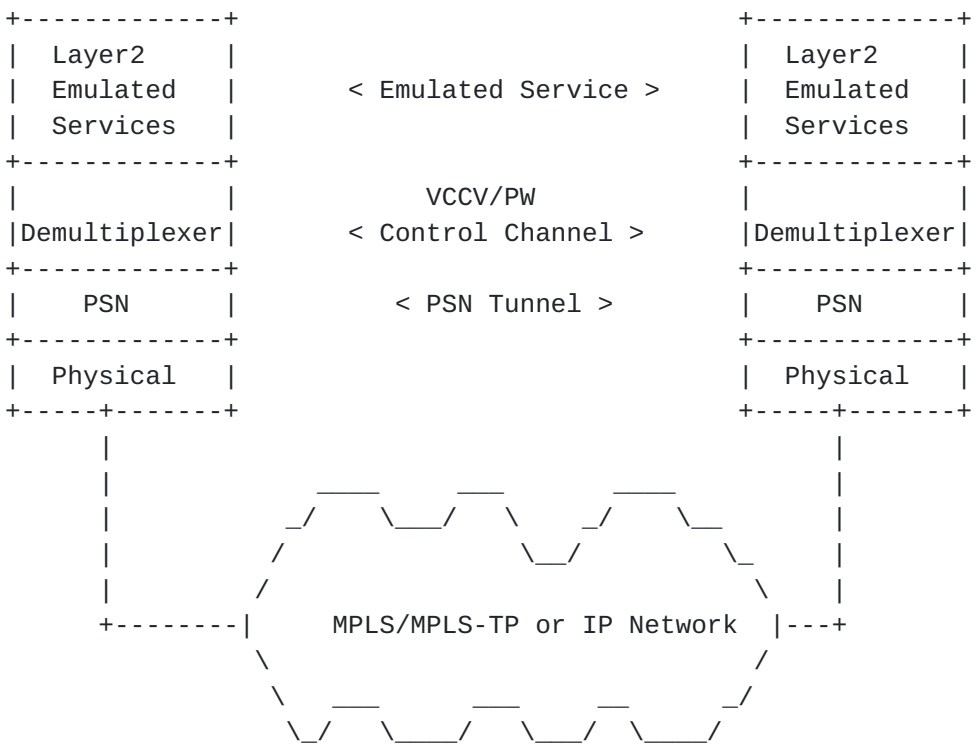


Figure 2: PWE3 Protocol Stack Reference Model including the VCCV Control Channel

VCCV messages are encapsulated using the PWE3 encapsulation as described in Section 3 and Section 4, so that they are handled and processed in the same manner (or in some cases, a similar manner) the PW PDUs for which they provide a control channel. These VCCV messages are exchanged only after the capability (the VCCV Control Channel and Connectivity Verification types) and the desire to exchange VCCV traffic has been advertised between the PEs (see Sections 5.3 and 6.3 of [RFC5085]), and VCCV type to use have been chosen.

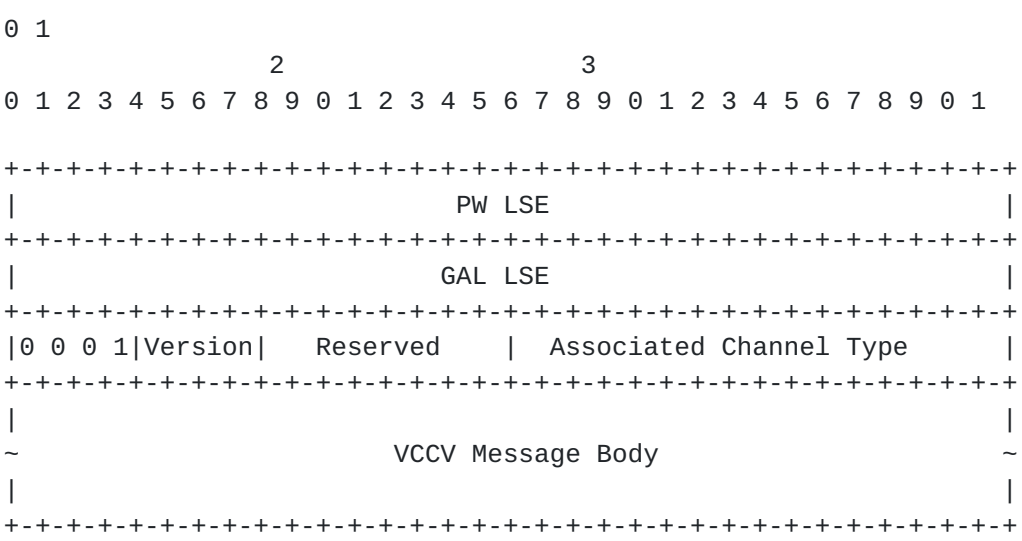
[EDITOR'S NOTE - Why are we talking about 6.3 which is L2TPv3 related in a text on GAL?]

3. VCCV Control Channel When The Control Word is Used

When the PWE3 Control Word is used to encapsulate pseudowire traffic, the rules described for encapsulating VCCV CC Type 1 as specified in section 9.5.1 of [RFC6073] and section 5.1.1 of [RFC5085] MUST be used. In this case the advertised CC Type is 1, and Associated Channel Types of 21, 07, or 57 are allowed.

4. VCCV Control Channel When The Control Word is Not Used

When the PWE3 Control Word is not used a new CC Type 4 is defined as follows:



EDITOR's note = when we wrote RFC3985 I seem to remember that TTL=1 was problematic do we want to specify TTL=1 in the text below?

EDITOR's note = not sure if it should be MUST or SHOULD in the text below.

When the PW is a single segment PW, the TTL field of the PW Label Stack Entry (LSE) SHOULD be set to 1. In the case of multi-segment pseudo-wires, the PW LSE TTL SHOULD be set to the value needed to reach the intended destination PE as described in [RFC6073].

The GAL LSE MUST contain the GAL reserved label as defined in [RFC5586].

As defined in [RFC4385] and [RFC4446] the first nibble of the next field is set to 0001b to indicate an ACH associated with a pseudowire instead of PW data. The Version and the Reserved fields MUST be set to 0, and the Channel Type is set to 0x0021 for IPv4, 0x0057 for IPv6 payloads [RFC5085] or 0x0007 for BFD payloads [RFC5885].

The Associated Channel Type defines how the "VCCV Message Body" field is to be interpreted by the receiver.

5. VCCV Capability Advertisement

The capability advertisement MUST match the c-bit setting that is advertised in the PW FEC element. If the c-bit is set, indicating the use of the control word, type 1 MUST be advertised and type 4 MUST NOT be advertised. If the c-bit is not set, indicating that the control word is not in use, type 4 MUST be advertised, and type 1 MUST NOT be advertised.

A PE supporting Type 4 MAY advertise other CC types as defined in [RFC5085] . If the remote PE also supports Type 4, then Type 4 MUST be used superseding the Capability Advertisement Selection rules of section 7 from [RFC5085] . If a remote PE does not support Type 4, then the rules from section 7 of [RFC5085] apply. If a CW is in use, then Type 4 is not applicable, and therefore the normal capability advertisement selection rules of section 7 from [RFC5085] apply.

6. Manageability Considerations

Editor's note - this is a placeholder - I am not sure if it sis needed

7. Security Considerations

This document does not by itself raise any new security considerations beyond those described in [RFC5085].

8. IANA Considerations

8.1. VCCV Interface Parameters Sub-TLV

EDITOR'S NOTE ASFAICS this section can be deleted.

The VCCV Interface Parameters Sub-TLV code point is defined in [RFC4446]. IANA has created and will maintain registries for the CC Types and CV Types (bit masks in the VCCV Parameter ID). The CC Type and CV Type new registries (see Sections 8.1.1 and 8.1.2, respectively of[RFC5085]) have been created in the Pseudo Wires Name Spaces, . The allocations must be done using the "IETF Review" policy defined in [RFC5226].

8.2. MPLS VCCV Control Channel (CC) Type 4

IANA is requested to assign a new bit from the MPLS VCCV Control Channel (CC) Types registry in the PWE3-parameters name space in order to identify VCCV type 4. It is recommended that Bit 3 be assigned to this purpose which would have a value of 0x08.

MPLS VCCV Control Channel (CC) Types

Bit (Value)	Description	Reference
Bit X (0x0Y)	Type 4	[This Specification]

9. Acknowledgements

10. References

10.1. Normative References

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997.

[RFC3931] Lau, J., Townsley, M., and I. Goyret, "Layer Two Tunneling Protocol - Version 3 (L2TPv3)", RFC 3931, March 2005.

[RFC4385] Bryant, S., Swallow, G., Martini, L., and D. McPherson, "Pseudowire Emulation Edge-to-Edge (PWE3) Control Word for Use over an MPLS PSN", RFC 4385, February 2006.

[RFC4446] Martini, L., "IANA Allocations for Pseudowire Edge to Edge Emulation (PWE3)", BCP 116, RFC 4446, April 2006.

[RFC5085] Nadeau, T. and C. Pignataro, "Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires", RFC 5085, December 2007.

[RFC5586] Bocci, M., Vigoureux, M., and S. Bryant, "MPLS Generic Associated Channel", RFC 5586, June 2009.

[RFC5654] Niven-Jenkins, B., Brungard, D., Betts, M., Sprecher, N., and S. Ueno, "Requirements of an MPLS Transport Profile", RFC 5654, September 2009.

[RFC5885] Nadeau, T. and C. Pignataro, "Bidirectional Forwarding Detection (BFD) for the Pseudowire Virtual Circuit Connectivity Verification (VCCV)", RFC 5885, June 2010.

[RFC6073] Martini, L., Metz, C., Nadeau, T., Bocci, M., and M. Aissaoui, "Segmented Pseudowire", RFC 6073, January 2011.

10.2. Informative References

[RFC3916] Xiao, X., McPherson, D., and P. Pate, "Requirements for Pseudo-Wire Emulation Edge-to-Edge (PWE3)", RFC 3916, September 2004.

[RFC3985] Bryant, S. and P. Pate, "Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture", RFC 3985, March 2005.

[RFC4377] Nadeau, T., Morrow, M., Swallow, G., Allan, D., and S. Matsushima, "Operations and Management (OAM) Requirements for Multi-Protocol Label Switched (MPLS) Networks", RFC 4377, February 2006.

[RFC5226] Narten, T. and H. Alvestrand, "Guidelines for Writing an IANA Considerations Section in RFCs", BCP 26, RFC 5226, May 2008.

[RFC7079] Del Regno, N. and A. Malis, "The Pseudowire (PW) and Virtual Circuit Connectivity Verification (VCCV) Implementation Survey Results", RFC 7079, November 2013.

Authors' Addresses

Thomas D. Nadeau
lucidvision

Email: tnadeau@lucidvision.com

Luca Martini
Cisco Systems

Email: lmartini@cisco.com

Stewart Bryant
Cisco Systems

Email: stbryant@cisco.com