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VCCV Default CC Types
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Abstract

This document specifies the default Virtual Circuit Connectivity Verification (VCCV) ([RFC5085](#)) control channel type to be used when the pseudowire control word is present and when it is not present. A new VCCV control channel type using the Generic Associated Channel Label ([RFC5586](#)) is specified for use when the control word not present.

This document updates [RFC4447](#) and [RFC5085](#).

Note to be removed at publication: this document started out as [draft-ietf-pwe3-vccv-for-gal](#) and got to version -02. When PWE3 was absorbed into PALS the next version published was [draft-ietf-pals-vccv-for-gal-00](#)

Status of This Memo

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Table of Contents

1.	Requirements Language and Terminology	2
2.	Introduction	3
3.	VCCV Control Channel When The Control Word is Used	4
4.	VCCV Control Channel When The Control Word is Not Used	4
5.	FAT PWs	5
6.	VCCV Capability Advertisement	5
7.	Manageability Considerations	6
8.	Security Considerations	6
9.	IANA Considerations	6
9.1.	MPLS VCCV Control Channel (CC) Type 4	6
10.	References	7
10.1.	Normative References	7
10.2.	Informative References	8
	Authors' Addresses	8

[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 [\[RFC2119\]](#).

ACH	Associated Channel Header [RFC4385]
CC	Control Channel (used as CC Type).
CV	Connectivity Verification (used as CV Type).
CW	Control Word [RFC3985] .
GAL	Generic Associated Channel Label [RFC5586]

OAM	Operation and Maintenance.
PSN	Packet Switched Network [RFC3985].
PW	Pseudowire [RFC3985].
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 specifies that there are two default modes of operation of VCCV: 1) with a control word or 2) without a control word, both with a ACH encapsulation [[RFC4385](#)] 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.

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 of [RFC5085]), and VCCV type to use has been chosen.

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, the new VCCV CC Type 4 defined in this section MUST be used. VCCV CC Type 4 uses the encapsulation shown in Figure 1.

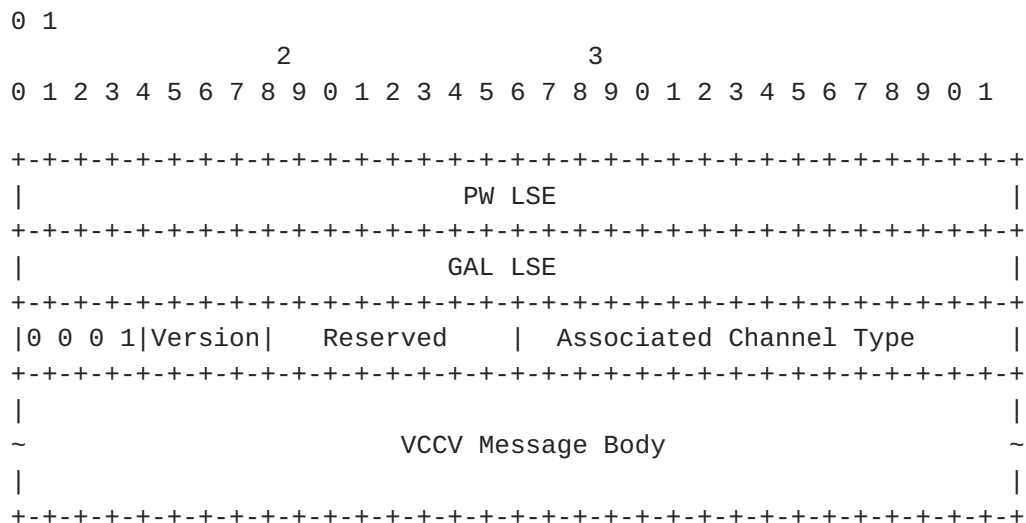


Figure 1

When the PW is a single segment PW, the TTL field of the PW Label Stack Entry (LSE) MUST be set to 2. TTL=2, rather than the more obvious TTL=1, is used because of legacy hardware considerations. In the case of multi-segment pseudo-wires, the PW LSE TTL MUST 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 is being carried 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. FAT PWs

When the flow-aware transport of pseudowires over an MPLS packet switched network [RFC6391] has been signalled or configured, the Flow LSE MUST always be present. When VCCV CC Type 4 is in use the Flow LSE MUST be immediately below the PW LSE in the label stack, and the GAL MUST be at the bottom of the label stack. This is shown in Figure 2.

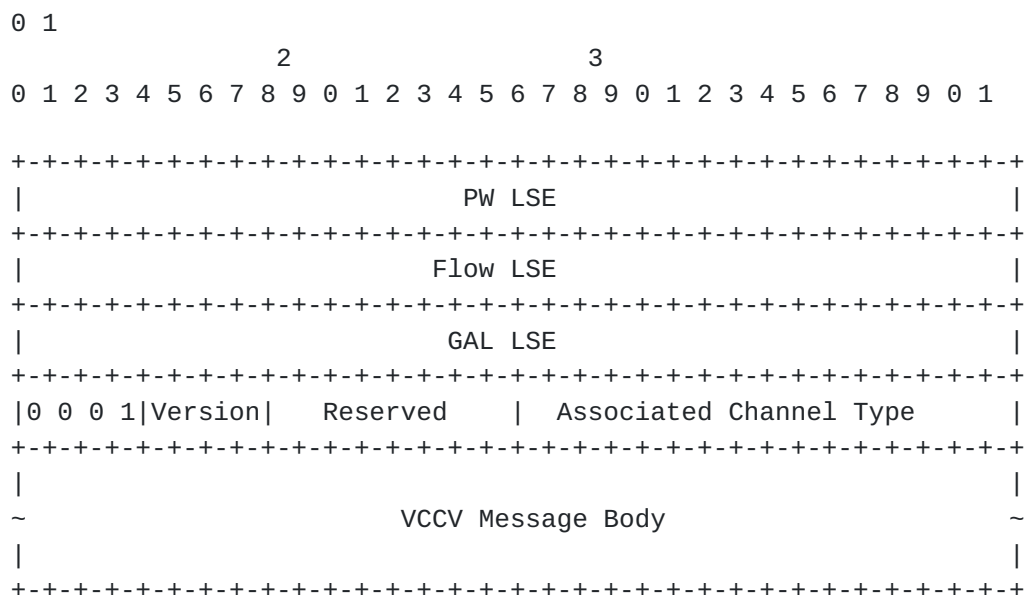


Figure 2

The ELI mechanism [RFC6790] applies to the MPLS LSP that carries the PW and is therefore out of scope of this specification.

6. VCCV Capability Advertisement

The VCCV capability advertisement MUST match the c-bit setting that is advertised in the PW FEC element [RFC4447]. If the c-bit is set, indicating the use of the control word, VCCV CC Type 1 MUST be advertised and VCCV CC Type 4 MUST NOT be advertised. If the c-bit

is not set, indicating that the control word is not in use, VCCV CC Type 4 MUST be advertised, and VCCV CC Type 1 MUST NOT be advertised.

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

7. Manageability Considerations

By introducing default VCCV CC types, and improving the compatibility with MPLS-TP, the compatibility of implementations is improved and management and configuration of the network becomes simpler.

Network operators should note that the presence of the GAL may cause the PW packet and associated VCCV packets to be subjected to different ECMP choices and thus not fate share. This effect is not present in networks that support [\[RFC6790\]](#) since reserved labels are ignored during ECMP path selection.

8. Security Considerations

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

9. IANA Considerations

9.1. 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]

10. References

10.1. Normative References

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