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Virtual Circuit Connectivity Verification (VCCV) Capability Advertisement for MPLS Transport Profile (MPLS-TP)

Abstract

This document specifies how signaling and selection processes for Pseudowire (PW) Virtual Circuit Connectivity Verification (VCCV) are modified to ensure backward compatibility and allow use of proactive Connectivity Verification (CV), Continuity Check (CC), and Remote Defect Indication (RDI) over MPLS Transport Profile (MPLS-TP) PWs. This document introduces four new CV types and, to accommodate them, a new VCCV Extended CV parameter for PW Interface Parameters Sub-TLV is defined.

Status of This Memo

This is an Internet Standards Track document.

This document is a product of the Internet Engineering Task Force (IETF). It represents the consensus of the IETF community. It has received public review and has been approved for publication by the Internet Engineering Steering Group (IESG). Further information on Internet Standards is available in Section 2 of RFC 5741.

Information about the current status of this document, any errata, and how to provide feedback on it may be obtained at http://www.rfc-editor.org/info/rfc7189.

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1. Introduction

Proactive Connectivity Verification (CV), Continuity Check (CC), and Remote Defect Indication (RDI) for the MPLS Transport Profile [RFC6428] are applicable to all constructs of the MPLS-TP, including pseudowires (PWs). If the control plane is used to operate and manage PWs then the procedures defined in [RFC5085] and [RFC5885] should be used to select the proper type of Control Channel and the corresponding type of Connectivity Verification. This document specifies how signaling and selection processes are modified to ensure backward compatibility and allow use of proactive CV-CC-RDI over MPLS-TP PWs.

1.1. Conventions Used in This Document

1.1.1. Terminology

BFD: Bidirectional Forwarding Detection

CC: Continuity Check

CV: Connectivity Verification

PE: Provider Edge

VCCV: Virtual Circuit Connectivity Verification

1.1.2. Requirements Language

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].

2. MPLS-TP CC-CV on Pseudowires

PW VCCV can support several CV Types, and it can support an arbitrary combination of CV modes advertised in the CV Types field of the VCCV Interface Parameter sub-TLV [RFC4446] [RFC4447]. Currently, six types of CV have been defined for PW VCCV. This document introduces four new CV types and, to accommodate them, a new VCCV Extended CV parameter for the PW Interface Parameters Sub-TLV is defined.

2.1. VCCV Extended CV Advertisement Sub-TLV

The format of the VCCV Extended CV Advertisement is a TLV where the format is as follows:

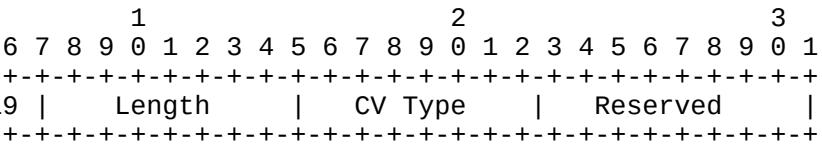

Figure 1: VCCV Extended CV Parameter Format

The Length field is the length of the sub-TLV, including type and the Length field itself. The minimum length is 4. It is recommended that extensions to the sub-TLV be done in 4-byte increments.

The Reserved field MUST be set to zeroes on transmit and ignored on receive.

The CV Type field is a bitmask that lists types of CV monitoring that a PE is capable of supporting. The VCCV Extended CV parameter sub-TLV MUST appear in combination with the VCCV parameter sub-TLV. If the VCCV parameter sub-TLV is missing, then the VCCV Extended CV parameter sub-TLV SHOULD be ignored.

2.2. MPLS-TP CC-CV Types

[RFC6428] defines coordinated and independent modes of monitoring point-to-point bidirectional connection that can be applied to monitoring PWs. At the same time, [RFC6310] defines how BFD-based

Operations, Administration, and Maintenance (OAM) can map to the status of an Attachment Circuit. Thus, there could be four MPLS-TP CV types for each combination of mode and functionality:

Modes	Fault Detection Only	Fault Detection and Status Signaling
Independent Mode	0x01	0x02
Coordinated Mode	0x04	0x08

Table 1: Bitmask Values for MPLS-TP CV Types

2.3. MPLS-TP CC-CV Type Operation

According to [RFC6428], connectivity verification is part of MPLS-TP CC/CV operation that can be used with VCCV Control Channel Type 1 [RFC5085]. If VCCV Control Channel Type 1 is selected, then PEs MAY select one of the MPLS-TP CC-CV types as the VCCV CV mechanism to be used for this PW.

2.4. CV Type Selection

CV selection rules that have been defined in Section 7 of [RFC5085] and updated in Section 4 of [RFC5885] are augmented in this document.

If VCCV Control Channel Type 1 is chosen according to Section 7 of [RFC5085] and a common set of proactive CV types that are advertised by both PEs includes MPLS-TP CC-CV types and some BFD CV types, then MPLS-TP CC-CV takes precedence over any type of BFD CV. If multiple MPLS-TP CV types are advertised by both PEs, then the following list (ordered by descending priority) is used:

1. 0x08 - Coordinated mode for PW Fault Detection and AC/PW Fault Status Signaling

2. 0x04 - Coordinated mode for PW Fault Detection only

3. 0x02 - Independent mode for PW Fault Detection and AC/PW Fault Status Signaling

4. 0x01 - Independent mode for PW Fault Detection only

3. IANA Considerations

The PW Interface Parameters Sub-TLV registry is defined in [RFC4446].

IANA has reserved a new PW Interface Parameters Sub-TLV type as follows:

Parameter ID	Length	Description	Reference
0x19	variable	VCCV Extended CV Parameter	This document

Table 2: New PW Interface Parameters Sub-TLV

3.1. VCCV Extended CV Types

IANA has set up a registry of VCCV Extended CV Types. These are 8-bit values. Extended CV Type values 0x01, 0x02, 0x04, and 0x08 are specified in Section 2.2 of this document. The remaining values (0x10 through 0x80) are to be assigned by IANA using the "IETF Review" policy defined in [RFC5226]. A VCCV Extended Connectivity Verification Type description and a reference to an RFC approved by the IESG are required for any assignment from this registry.

Bit(Value)	Description
Bit 0 (0x01)	Independent mode for PW Fault Detection only
Bit 1 (0x02)	Independent mode for PW Fault Detection and AC/PW Fault Status Signaling
Bit 2 (0x04)	Coordinated mode for PW Fault Detection only
Bit 3 (0x08)	Coordinated mode for PW Fault Detection and AC/PW Fault Status Signaling
Bit 4 (0x10)	Unassigned
Bit 5 (0x20)	Unassigned
Bit 6 (0x40)	Unassigned
Bit 7 (0x80)	Unassigned

Table 3: VCCV Extended Connectivity Verification (CV) Types

4. Security Considerations

Routers that implement the additional CV Type defined herein are subject to the same security considerations as defined in [RFC5085], [RFC5880], [RFC5881], and [RFC6428]. This specification does not raise any additional security issues beyond those.

5. Acknowledgements

The author gratefully acknowledges the thoughtful review, comments, and explanations provided by Dave Allan and Carlos Pignataro.

6. References

6.1. Normative References

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

[RFC4447] 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.

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

[RFC5880] Katz, D. and D. Ward, "Bidirectional Forwarding Detection (BFD)", RFC 5880, June 2010.

[RFC5881] Katz, D. and D. Ward, "Bidirectional Forwarding Detection (BFD) for IPv4 and IPv6 (Single Hop)", RFC 5881, June 2010.

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

[RFC6310] Aissaoui, M., Busschbach, P., Martini, L., Morrow, M., Nadeau, T., and Y(J). Stein, "Pseudowire (PW) Operations, Administration, and Maintenance (OAM) Message Mapping", RFC 6310, July 2011.

[RFC6428] Allan, D., Swallow Ed. , G., and J. Drake Ed. , "Proactive Connectivity Verification, Continuity Check, and Remote Defect Indication for the MPLS Transport Profile", RFC 6428, November 2011.

6.2. Informative References

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

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