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Connection Verification and Continuity Check for MPLS Transport
Profile Label Switched Path
[draft-boutros-mpls-tp-cv-cc-00.txt](#)

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Abstract

Connection Verification (CV) and Continuity Check (CC) are important Operations, Administration, and Management (OAM) functions of MPLS Transport Profile (MPLS-TP). This document specifies methods for CV and CC for MPLS-TP Label Switched Path (LSP) using Bidirectional Forwarding Detection (BFD).

Table of Contents

1.	Introduction.....	2
2.	Terminology.....	3
3.	MPLS-TP Connection Verification and Continuity Check Mechanism.	3
3.1.	MPLS-TP CV/CC Message format.....	4
3.2.	BFD Profile for MPLS-TP.....	5
4.	Operation.....	6
5.	Security Considerations.....	7
6.	IANA Considerations.....	7
7.	References.....	7
7.1.	Normative References.....	7
7.2.	Informative References.....	7
	Author's Addresses.....	8
	Full Copyright Statement.....	9
	Intellectual Property Statement.....	9

[1.](#) Introduction

In traditional transport networks, circuits are provisioned on multiple switches. Service Providers (SP) need OAM tools to detect mis-connectivity and loss of continuity of transport circuits. MPLS-TP LSPs [\[6\]](#) emulating traditional transport circuits need to provide the same CC and CV capabilities as mentioned in [\[2\]](#). This document describes the use of BFD [\[3\]](#) for CV and CC of an MPLS-TP LSP between 2 Maintenance End Points (MEPs). The mechanism specified in this document is restricted only to BFD asynchronous mode. The proposed method uses BFD state machine defined in Section 6.2 of [\[3\]](#).

Moreover, this document recommends the use of BFD for the Pseudowire Virtual Circuit Connectivity Verification (VCCV) as defined in [\[5\]](#).

Conventions used in this document

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this

Internet-Draft [draft-boutros-mpls-tp-cv-cc-00.txt](#)

July 2009

document are to be interpreted as described in [RFC-2119](#) [1].

[2.](#) Terminology

ACH: Associated Channel Header

BFD: Bidirectional Forwarding Detection

CV: Connection Verification

EOS: End of Stack

GAL: Generalized Alert Label

LSR: Label Switching Router

MEP: Maintenance End Point

MIP: Maintenance Intermediate Point

MPLS-OAM: MPLS Operations, Administration and Maintenance

MPLS-TP: MPLS Transport Profile

MPLS-TP LSP: Bidirectional Label Switch Path representing a circuit

MS-PW: Mult-Segment PseudoWire

NMS: Network Management System

PW: PseudoWire

RR: Record Route

TLV: Type Length Value

TTL: Time To Live

RDI: Remote defect indication.

[3.](#) MPLS-TP Connection Verification and Continuity Check Mechanism

The proposed mechanism is based on a new code point in the Generic Associated Channel Header (G-ACH) described in [8]. Under MPLS label stack of the MPLS-TP LSP, the ACH with "MPLS-TP Connection

Verification/Continuity Check (CV/CC)" code point indicates that the message is an MPLS-TP CV/CC message.

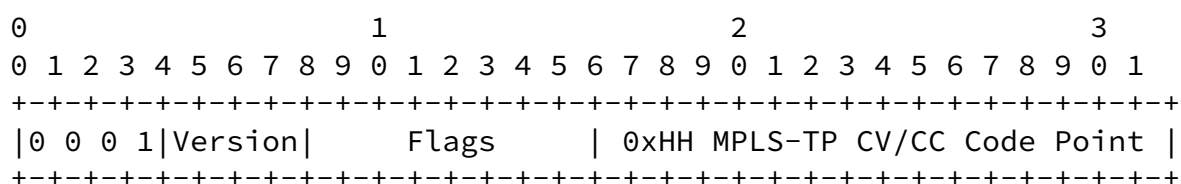


Figure 1: ACH Indication of MPLS-TP Connection Verification

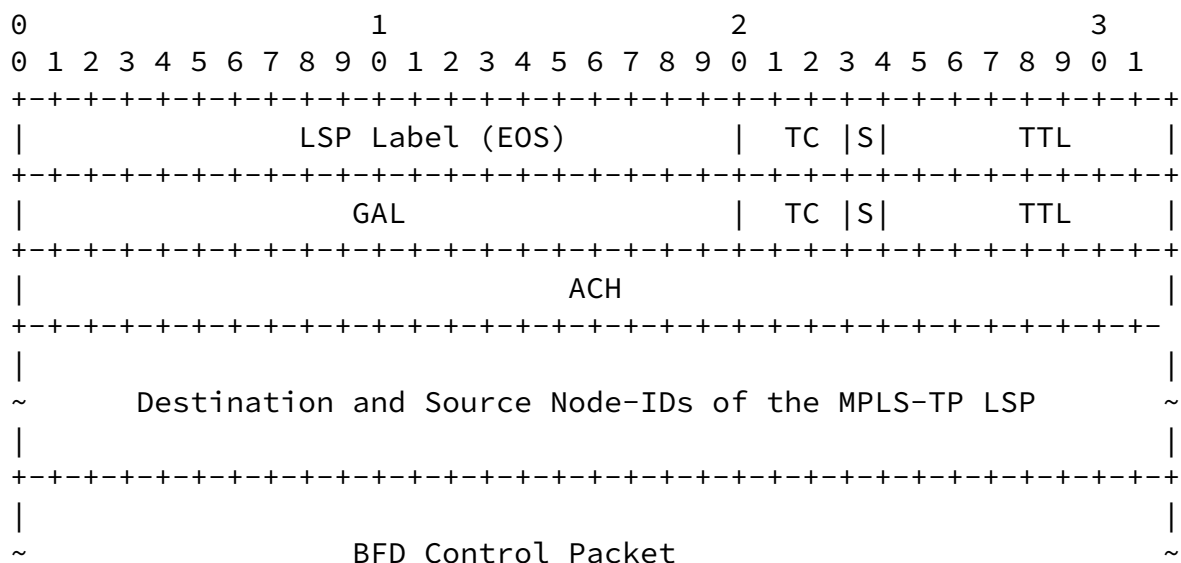
The first nibble (0001b) indicates the ACH.

The version and the reserved values are both set to 0 as specified in [8].

MPLS-TP CV/CC code point = 0xHH. [HH to be assigned by IANA from the PW Associated Channel Type registry.]

3.1. MPLS-TP CV/CC Message format

The format of an MPLS-TP CV/CC Message format is shown below.



```

|
+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+---+

```

Figure 2: MPLS-TP CV/CC Message

As shown in Figure 2, BFD Control packet as defined in [3] is transmitted as MPLS labeled packets along with GAL, G-ACH, and TLVs carrying the Destination and Source Node-IDs of the MPLS-TP LSP as defined in a new IETF draft to be published soon.

The TTL field of the GAL MUST be set to at least 1, and the GAL will be the end of stack label.

The discriminator values in the BFD control packet will be set to the LIH (Logical Interface Handle) at each side of the MPLS-TP LSP.

Combination of the Source/Destination Node-IDs and discriminator value (from the BFD packet) represents MEP-ID, i.e., the combination of the source node address and my discriminator is the Source MEP-ID, and the combination of the destination node address and your discriminator is the peer MEP-ID. Note that the format of Node ID is defined in [7].

In this mode of operation, the IP/UDP headers for the BFD control packets are omitted from the BFD encapsulation.

Furthermore, BFD is used not only for fault detection but also for mis-insertion and for Remote Defect Indication (RDI). Reception of a BFD control packet having an unexpected source Node-ID, destination Node-ID or discriminator(s) is considered a BFD mis-insertion fault.

Reception of BFD control packet with a diagnostic code of 1 (Control Detection Time Expired) or 5 (Path down) is considered an RDI fault.

[3.2.](#) BFD Profile for MPLS-TP

BFD MUST run in asynchronous mode as described in [3].

In all BFD control packets sent, both "Desired Min TX Interval" and "Required Min RX Interval" MUST be set to the operator configured values for BFD transmission period for the MPLS-TP LSP. If the

received BFD packets have different "Desired Min TX Interval field" than the one used for the transmitted packets, the BFD session MUST NOT come up by default, except if the behavior is overridden by an operator using explicit configuration.

By default the transmission rates MUST be the same at both end of the MPLS-TP LSP (both working and protecting).

The "my discriminator" field in the BFD control packets is set to the MPLS-TP LSP's local LIH (Logical Interface Handle) and the "your discriminator" field is initially set to zero. During BFD session

Boutros

Expires February 6, 2010

[Page 5]

Internet-Draft

[draft-boutros-mpls-tp-cv-cc-00.txt](#)

July 2009

negotiation, the "my discriminator" field in the received BFD packets MUST match the remote discriminator.

[4.](#) Operation

Single-hop BFD initialization procedures described in [\[4\]](#) are followed. As mentioned before, only asynchronous mode is supported. The operation of BFD over MPLS-TP LSP is symmetrical. Both endpoints of the bidirectional MPLS-TP LSP MUST send BFD messages inband in the MPLS-TP LSP using the defined code point.

Both MEPs at the end of an MPLS-TP LSP need to bootstrap the BFD session and start sending BFD control packets encapsulated within MPLS-TP CV/CC message described in this document. MPLS-TP LSP labels at both ends of the MPLS-TP LSP will be used as the de-multiplexer for the received BFD packets, and no discriminator values will be used.

A single BFD session per MPLS-TP LSP will exist between the MEP's of the MPLS-TP LSP. Both MEP's will be sending initial BFD Control packets with a "Your Discriminator" field of zero, and BFD Control packets received with a "Your Discriminator" field of zero are associated to the BFD session bound to the MPLS-TP LSP.

Both "Desired Min TX Interval" and "Required Min RX Interval" MUST be set to the configured BFD transmission period for the MPLS-TP LSP.

Assume an MPLS-TP LSP that spans across LSR-A, LSR-B and LSR-C. LSR-A LSR-C act as the MEPs whereas LSR-B act as a MIP for the MPLS-TP LSP. Furthermore, assume that on both LSR-A and LSR-C the operator provision the BFD detection time multiplier as per [\[3\]](#).

If LSR-A receives a BFD control message that has a destination node identifier different from it's identifier, or has an unexpected source node identifier, or non-zero your discriminator value or has a my discriminator value different from what LSR-A is expecting, LSR-A declares that the MPLS-TP LSP is down in its receive direction. In this case, LSR-A signals LSR-C that the BFD session is down using the State (Sta) with diagnostic code 5 (Path down).

If LSR-A stops receiving BFD control messages from LSR-C for a period of detection time multiplier (calculation of Detection Time is defined in[3]), LSR-A declares that the MPLS-TP LSP is down in its receive direction, and signals this to the remote end via the State (Sta) with Diagnostic code 1(Control Detection Time Expired). In turn, LSR-C declares the MPLS-TP LSP is down in its transmit direction setting the State to Down with Diagnostic code 3 (Neighbor signaled session down) in its control messages to LSR-A.

[5.](#) Security Considerations

The security considerations for the authentication TLV need further study.

[6.](#) IANA Considerations

To be added.

[7.](#) References

[7.1.](#) Normative References

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Boutros

Expires February 6, 2010

[Page 7]

Internet-Draft [draft-boutros-mpls-tp-cv-cc-00.txt](#)

July 2009

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Boutros

Expires February 6, 2010

[Page 8]

Internet-Draft [draft-boutros-mpls-tp-cv-cc-00.txt](#)

July 2009

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Boutros

Expires February 6, 2010

[Page 9]

Internet-Draft [draft-boutros-mpls-tp-cv-cc-00.txt](#)

July 2009

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