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Definition of P2MP PW TLV for LSP-Ping Mechanisms
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Abstract

LSP-Ping is a widely deployed Operation, Administration, and Maintenance (OAM) mechanism in MPLS networks. This document describes a mechanism to verify connectivity of Point-to-Multipoint (P2MP) Pseudowires (PW) using LSP Ping.

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Table of Contents

1. Introduction

A Point-to-Multipoint (P2MP) Pseudowire (PW) emulates the essential attributes of a unidirectional P2MP Telecommunications service such as P2MP ATM over PSN. Requirements for P2MP PW are described in [PPWREQ]. P2MP PWs are carried over P2MP MPLS LSP. The Procedure for P2MP PW signaling using LDP for single segment P2MP PWs are described in [PPWPWE3]. Many P2MP PWs can share the same P2MP MPLS LSP and this arrangement is called Aggregate P-tree. The aggregate P2MP trees require an upstream assigned label so that on the tail of the P2MP LSP, the traffic can be associated with a VPN or a VPLS instance. When a P2MP MPLS LSP carries only one VPN or VPLS service instance, the arrangement is called Inclusive P-Tree. For Inclusive P-Trees, P2MP MPLS LSP label itself can uniquely identify the VPN or VPLS service being carried over P2MP MPLS LSP. The P2MP MPLS LSP can also be used in Selective P-Tree arrangement for carrying multicast traffic. In a Selective P-Tree arrangement, traffic to each multicast group in a VPN or VPLS instance is carried by a separate

unique P-tree. In Aggregate Selective P-tree arrangement, traffic to a set of multicast groups from different VPN or VPLS instances is carried over a same shared P-tree.

The P2MP MPLS LSP are setup either using MLDP [MLDP] or P2MP RSVP-TE [RFC4875]. Mechanisms for fault detection and isolation for data plane failures for P2MP MPLS LSPs are specified in [PLSPPING]. This document describes a mechanism to detect data plane failures for P2MP PW carried over P2MP MPLS LSPs.

This document defines a new FEC 130 Pseudowire sub-TLV for Target FEC Stack for P2MP PW. The FEC 130 Pseudowire sub-TLV is added in Target FEC Stack TLV by the originator of the echo request to inform the receiver at P2MP MPLS LSP tail, of the P2MP PW being tested.

Multi-segment Pseudowires support is out of scope of this document at present and may be included in future.

2. 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 [RFC2119].

The term "FEC-Type" is used to refer to a tuple consisting of <FEC Element Type, Address Family>.

3. Terminology

ATM: Asynchronous Transfer Mode

LSR: Label Switching Router

MPLS-OAM: MPLS Operations, Administration and Maintenance

P2MP-PW: Point-to-Multipoint PseudoWire

PW: PseudoWire

TLV: Type Length Value

4. Identifying a P2MP PW

This document introduces a new LSP Ping Target FEC Stack sub-TLV, FEC 130 Pseudowire sub-TLV, to identify the P2MP PW under test at the P2MP LSP Tail/Bud node.

4.1. FEC 130 Pseudowire Sub-TLV

The FEC 130 Pseudowire sub-TLV fields are taken from P2MP PW FEC Element (FEC Type 0x82) defined in [PPWPWE3]. The PW Type is a 15-bit number indicating the encapsulation type. It is carried right justified in the field below PW Type with the high-order bit set to zero. All the other fields are treated as opaque values and copied directly from P2MP PW FEC Element (FEC Type 0x82) format.

The FEC 130 Pseudowire sub-TLV has the format shown in Figure 1. This TLV will be included in the echo request sent over P2MP PW by the originator of request.

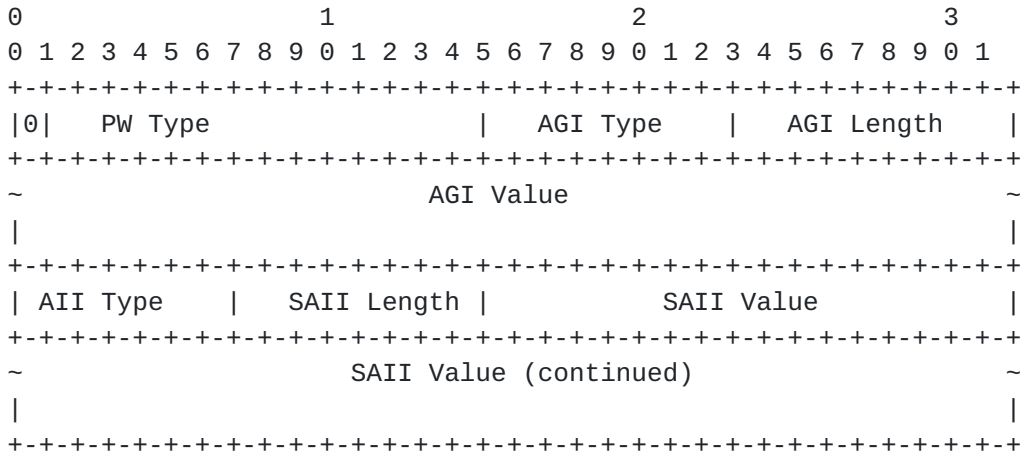

Figure 1: FEC 130 Pseudowire sub-TLV format

For Inclusive and Selective P2MP MPLS P-trees, the echo request will be sent using the P2MP MPLS LSP label.

For Aggregate Inclusive and Aggregate Selective P-trees, the echo request will be sent using a label stack of <P2MP MPLS P-tree label, upstream assigned P2MP PW label>. The P2MP MPLS P-tree label is the outer label and upstream assigned P2MP PW label is inner label.

5. Operations

In this section, we explain the operation of the LSP Ping over P2MP PW. Figure 2 shows a P2MP PW PW1 setup from T-PE1 to remote PEs (T-

PE2, T-PE3 and T-PE4). The transport LSP associated with the P2MP PW1 can be MLDP P2MP MPLS LSP or P2MP TE tunnel.

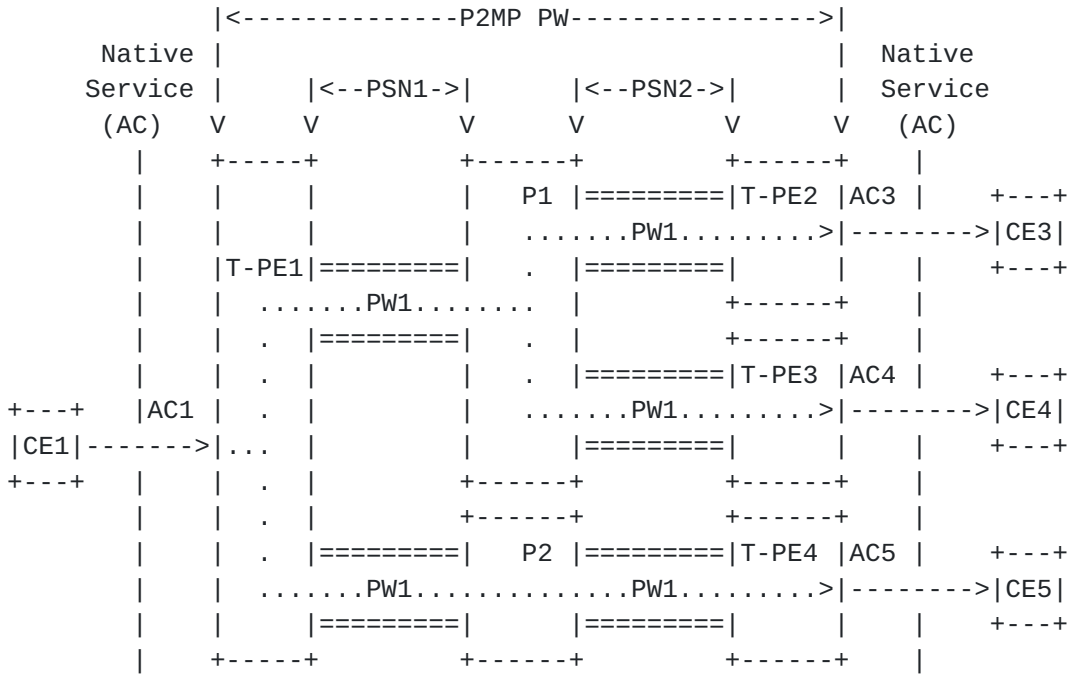

Figure 2: P2MP PW

When an operator wants to perform a connectivity check for the P2MP PW1, the operator initiate a LSP-Ping request with the Target FEC Stack TLV containing FEC 130 Pseudowire sub-TLV in the echo request packet. The echo request packet is sent over the P2MP MPLS LSP using the P2MP MPLS LSP label for Inclusive P-tree or with a label stack with Upstream assigned P2MP PW label as bottom label and P2MP MPLS LSP label as the top label. The intermediate P router will do swap and replication based on the MPLS LSP label. Once the packet reaches remote terminating PEs, the T-PEs will process the packet and perform checks for the FEC 130 Pseudowire sub-TLV present in the Target FEC Stack TLV as described in Section 4.4 in [RFC4379] and respond according to [RFC4379] processing rules.

6. Echo Reply using Downstream Assigned Label

Root of a P2MP PW may send an optional downstream assigned p2p MPLS label in the LDP Label Mapping message for the P2MP PW signaling. If the root of a P2MP PW expects leaf to send echo reply using the downstream assigned label signaled in the Label Mapping message of the P2MP PW message, the Reply Mode value of 4 "Reply via application level control channel" should be used in Reply Mode field described in Section 3 in [RFC4379] in echo request message for the P2MP PW.

7. Controlling Echo Responses

The procedures described in [PLSPPING] for preventing congestion of Echo Responses (Echo Jitter TLV) and limiting the echo reply to a single egress node (Node Address P2MP Responder Identifier TLV) can be applied to P2MP PW LSP Ping.

8. Security Considerations

The proposal introduced in this document does not introduce any new security considerations beyond that already apply to [PLSPPING].

9. IANA Considerations

This document defines a new sub-TLV type to be included in Target FEC Stack TLV (TLV Type 1) [RFC4379] in LSP Ping.

IANA is requested to assign a sub-TLV type value to the following sub-TLV from the "Multiprotocol Label Switching (MPLS) Label Switched Paths (LSPs) Parameters - TLVs" registry, "TLVs and sub-TLVs" sub-registry.

FEC 130 Pseudowire sub-TLV (See Section 3). Suggested value 24.

10. References

10.1. Normative References

[RFC4379] K. Kompella, G. Swallow, "Detecting Multi-Protocol Label Switched (MPLS) Data Plane Failures", RFC 4379, February 2006.

[PPWPWE3] Martini, L. et. al, "Signaling Root-Initiated Point-to-Multipoint Pseudowires using LDP", draft-ietf-pwe3-p2mp-pw-03.txt, Work in Progress, March 2011.

[PLSPPING]Saxena, S et. Al, "Detecting Data Plane Failures in Point-to-Multipoint Multiprotocol Label Switching (MPLS) - Extensions to LSP. draft-ietf-mpls-p2mp-lsp-ping-17, Work in Progress, June 2011

10.2. Informative References

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

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

[MLDP] Minei, I., Kompella, K., Wijnands, I., and Thomas, B., "LDP Extensions for Point-to-Multipoint and Multipoint-to-Multipoint Label Switched Paths", draft-ietf-mpls-ldp-p2mp-10.txt, Work in Progress, July 2010.

[RFC4875] Aggarwal, R., Papadimitriou, D., and Yasukawa, S., "Extensions to Resource Reservation Protocol" Traffic Engineering (RSVP-TE) for Point-to-Multipoint TE Label Switched Paths (LSPs)", RFC 4875, May 2007.

[PPWREQ] F. Jounay, et. al, "Requirements for Point to Multipoint Pseudowire", draft-ietf-pwe3-p2mp-pw-requirements-03.txt, Work in Progress, August 2010.

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