

# BFD for Multipoint Networks over Point-to-Multi-Point MPLS LSP

draft-mirsky-mpls-p2mp-bfd

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# Motivation

- p2mp MPLS LSP is here to stay and continues to find more use cases, for example BUM traffic in EVPN
- IETF published relevant RFCs – RFC 8562 and RFC 8563
- RFC “5884 BFD for MPLS LSP” applies only to the case of p2p LSP
- RFC 7880 Seamless BFD does not apply to the case of p2mp LSP

# BFD Session Bootstrapping and BFD Control Packet Encapsulation

- LSP Ping with BFD Discriminator with Target FEC TLV from sub-TLVs defined in Section 3.1 RFC 6425
  - Since BFD over p2mp MPLS LSP is in Demand mode and an egress LSP does not periodically transmit BFD Control packets to the egress, it is RECOMMENDED that the LSP Ping with BFD Discriminator had Reply mode set to “Do Not Reply”
- BGP-BFD Attribute as defined in draft-ietf-bess-mvpn-fast-failover
- Destination IP address:
  - 127.0.0.1/32 for IPv4
  - ::1/128 range for IPv6 per RFC 4291 as the only loopback address defined in IPv6
- Destination UDP port number 3784
- Source UDP port number from 49152 through 65535 range

# Head Notification Without Polling (Unsolicited, Event Triggered)

As suggested by the name, the ingress sends no Polls, but it is an egress LSR that, upon detecting a failure of p2mp LSP, transmits unicast Poll over the reverse unicast path with the Diag to signal the failure to the ingress LSR.

Destination IP address – IP address of the Multipoint Head (either from Source IP Address or Source Address TLV)

UDP Destination port – 4784 per RFC 5883 Multi-hop BFD

Your Discriminator is set to My Discriminator value associated with the BFD session (in the received BFD Control packets from the ingress)

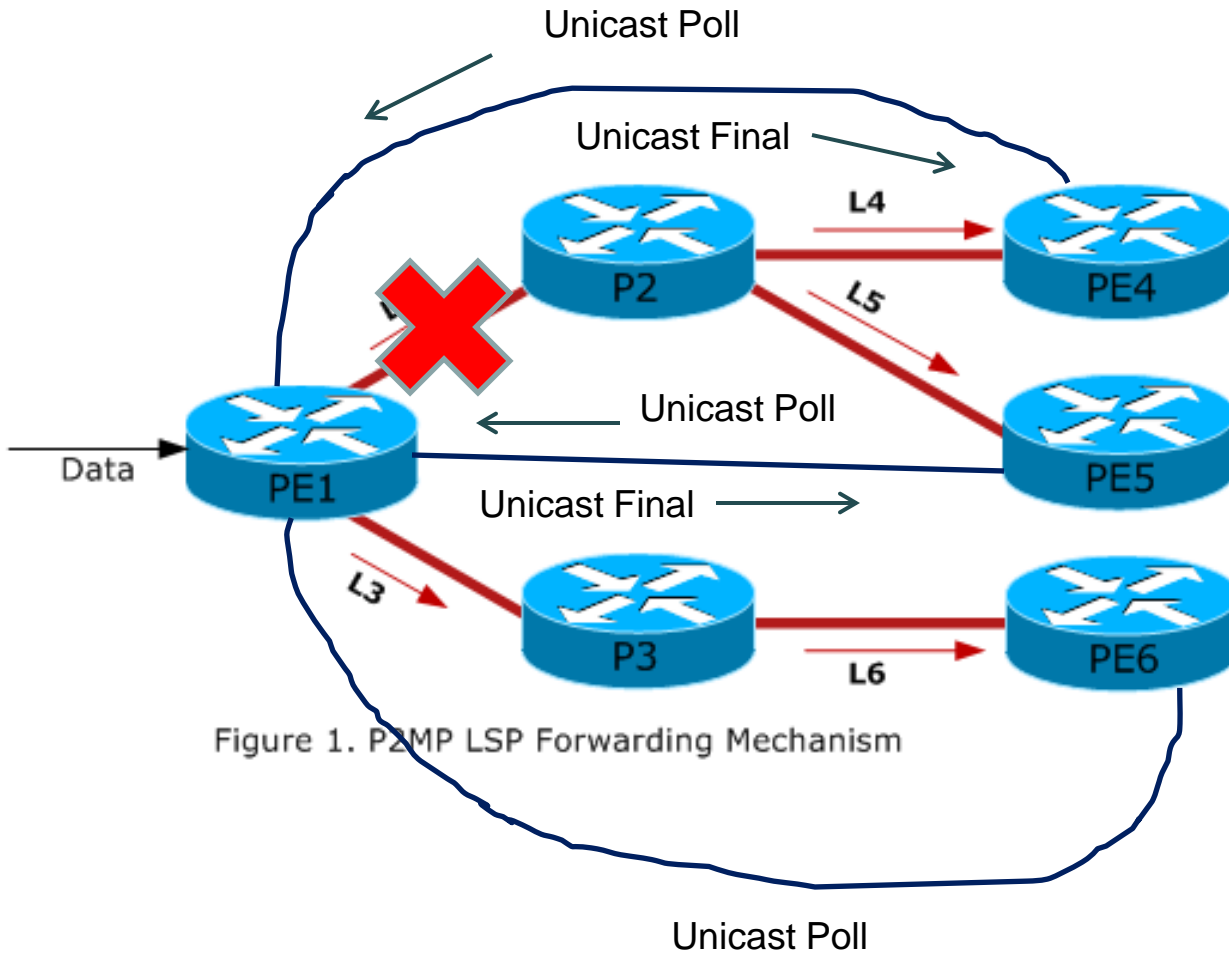
Poll bit is set

Sta (Status) – Down

Diag - Control Detection Time Expired value

That Poll packet is transmitted periodically (for example, one per second) until either the failure clears or the Final packet from the ingress LSR is received.

# Head Notification Without Polling



# Next steps

- Your comments, suggestions, questions always welcome and greatly appreciated
- WG adoption

# BFD for multipoint networks

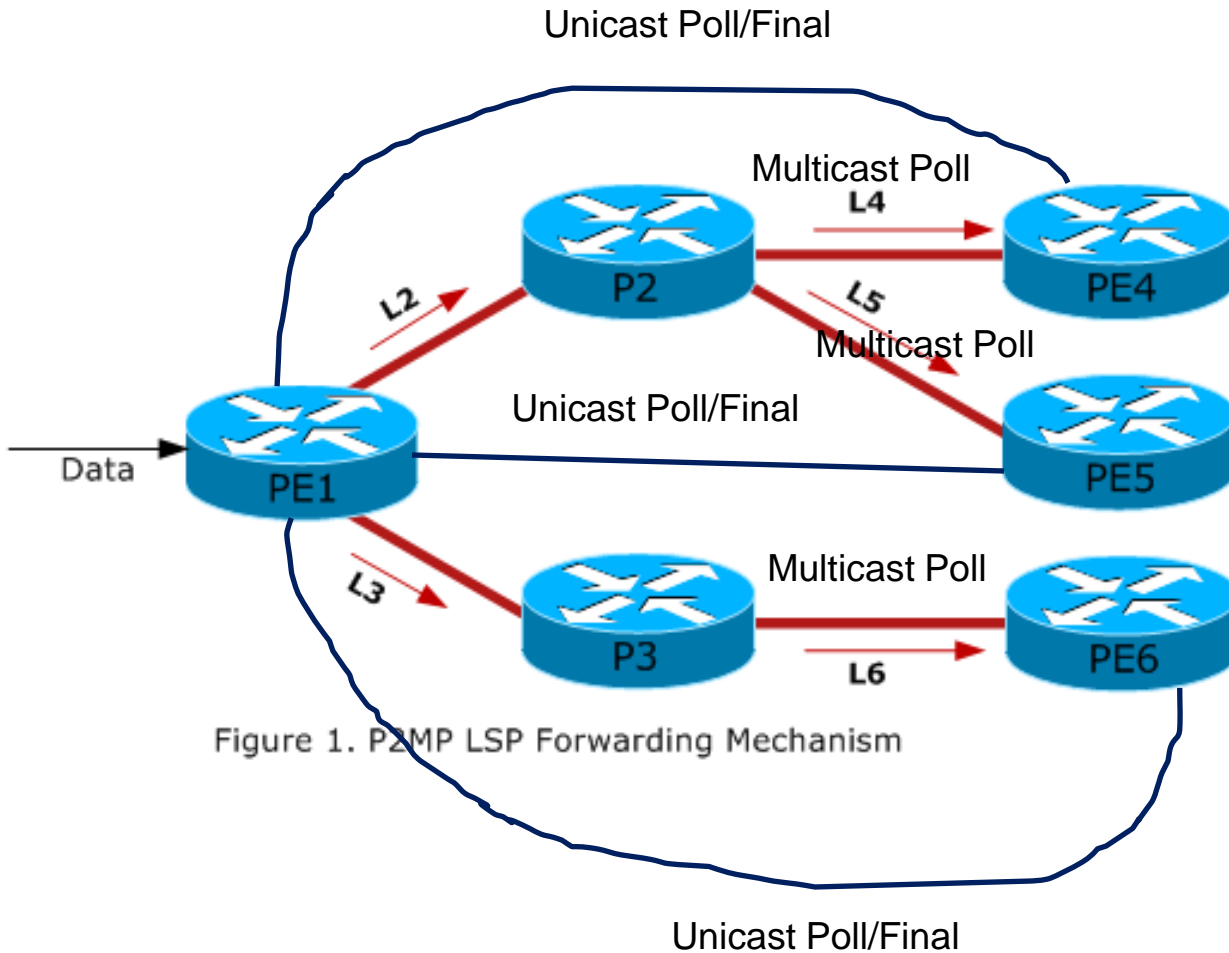
- BFD for a multipoint network uses Demand mode, defined in RFC 5880, from the very start – no three-way handshake
- Only root transmits periodic BFD Control messages with My Discriminator being set and Your Discriminator set to 0
- A leaf cannot demultiplex BFD sessions by Your Discriminator as in Asynchronous mode that is used in MPLS LSP per RFC 5884
- A leaf uses three-tuple <My Discriminator, IP Source address, Identity of the multipoint tree> to demultiplex BFD sessions
- RFC 8562 BFD for Multipoint Networks – egress (tail) detects a failure of the multicast tree (p2mp LSP). Ingress (head) doesn't know the state of the tree
- RFC 8563 BFD for Multipoint Active Tails considers several mechanisms for the ingress LSR to learn about a failure of the p2mp LSP

# P2MP BFD with Active Tail

- RFC 8563:
  - Head notification and tail solicitation with multipoint polling
    - Head occasionally transmits Poll sequence packet (BFD Control packet with P(Poll) bit set) over p2mp LSP in addition to the periodic transmission of non-Poll BFD packets
    - The tail is expected to reply with F (Final) bit set over the unicast reverse path that is disjoint with the p2mp LSP (that is how an egress informs the ingress LSR of the detected failure)
    - If either multipoint Poll or the unicast Final is lost, the ingress detects the defect but is not certain about the state of the p2mp LSP
  - Head notification with composite polling
    - The head's behavior is as described above. In addition, the ingress may send unicast Poll to a specified egress LSR, e.g., the one that failed to respond to the multipoint Poll, over the forward unicast path (disjoint from p2mp LSP) (out-of-band for p2mp LSP)
    - Because this method uses the out-of-band probe, the ingress can better localize the failure and be aware of the state of p2mp LSP. It is not 100% certainty but still better than with only multipoint Polls.



# Head Notification with Multicast and Composite Polling



# Head Notification with Multicast and Composite Polling

