

Protection Mechanisms for LDP P₂MP/MP₂MP LSP

draft-zhao-mpls-mldp-protections-00.txt

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Motivations and Scope of the Draft

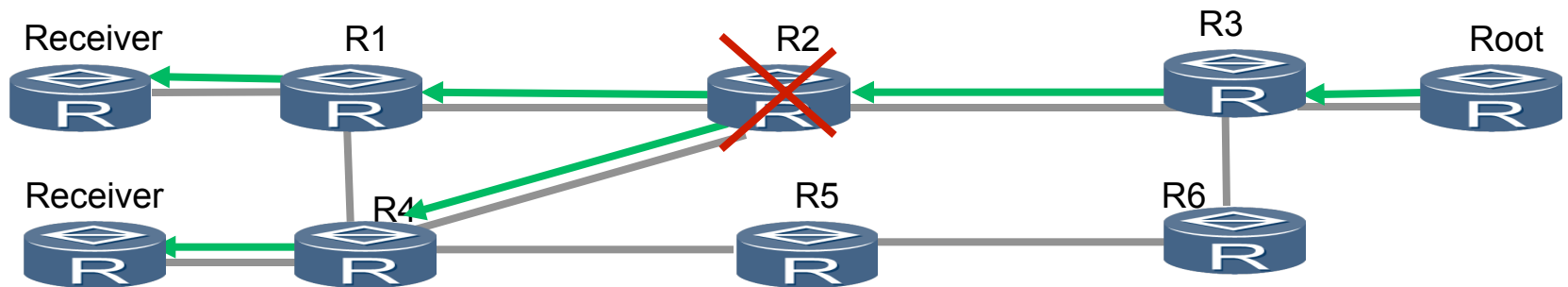
- Motivations:
 - The number of service providers to deploy real-time multicast applications using Multicast LDP (mLDP) across MPLS networks is increasing.
 - There is a clear need to protect these real-time applications and to provide the shortest switching times in the event of failure.
- The scope of this document
 - outlines the requirements,
 - describes the protection mechanisms available,
 - Propose the necessary extensions to facilitate mLDP P2MP and MP2MP LSP protection within an MPLS network.

Requirements

- A number of requirements have been identified that allow the optimal set of mechanisms to be developed. These currently include:
 - Computation of a disjointed (link and node) backup path within the multicast tree;
 - Minimization of protection convergence time;
 - Optimization of bandwidth usage.

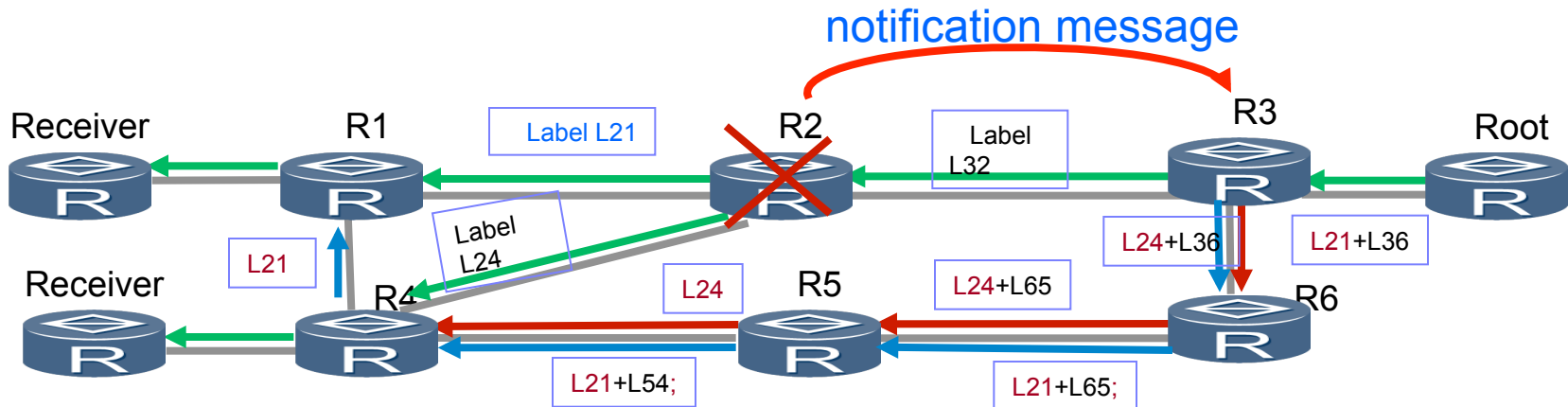
mLDPfRRoP2P Problem Statement

There is no existing automatically signaled protection solution for the node failure using a P2P backup LSP in mLDP



mLDPfRRoP2P Solution

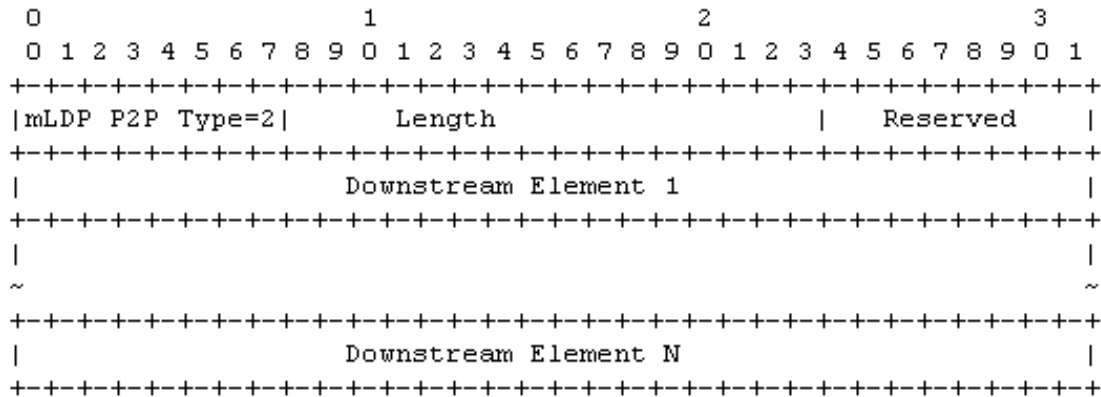
Protect the specific node or link with P2P backup LSP in mLDP



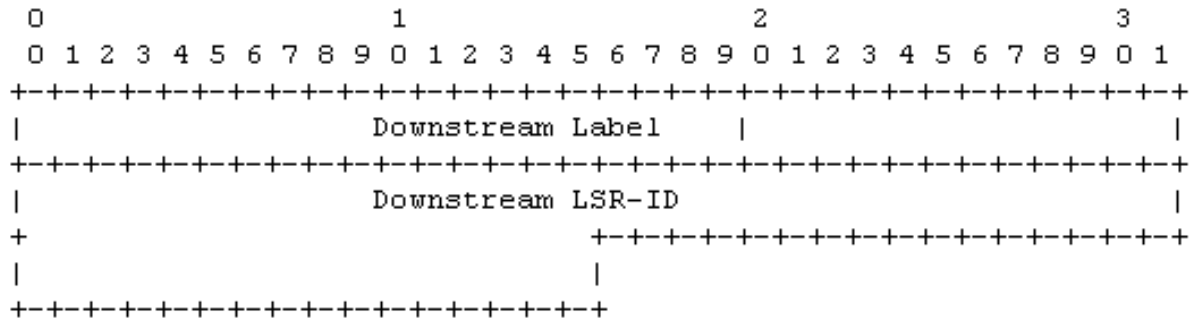
1. R2 send notification message (or extend the label mapping) to R3 and tells R3 that R2 has two downstream nodes, R1 and R4 with forwarding labels L21 and L24 respectively.
2. When R3 sees R2 node or link going down, it takes mLDP packet as it would send it to R1 and R4 through R2 and sends it into the two p2p backup tunnels :
 - a) Tunnel Red : R3->R6->R5->R4 using inner label L21;
 - b) Tunnel Blue: R3->R6->R5->R4->R1 using Inner label L24;
3. PHP in R5 for tunnel Red and in R4 for tunnel Blue will cause backup tunnel labels to be removed;
4. R1 will receive same packets as from the interface between R2 and R1 , just from different interface same forwarding !
5. R4 will receive same packets as from the interface between R2 and R4 , just from different interface same forwarding !

mLDPfRRoP2P Protocol Extension

A new type of LDP MP Status Value Element is introduced for notifying downstream LSRs and respective labels. It is encoded as follows:

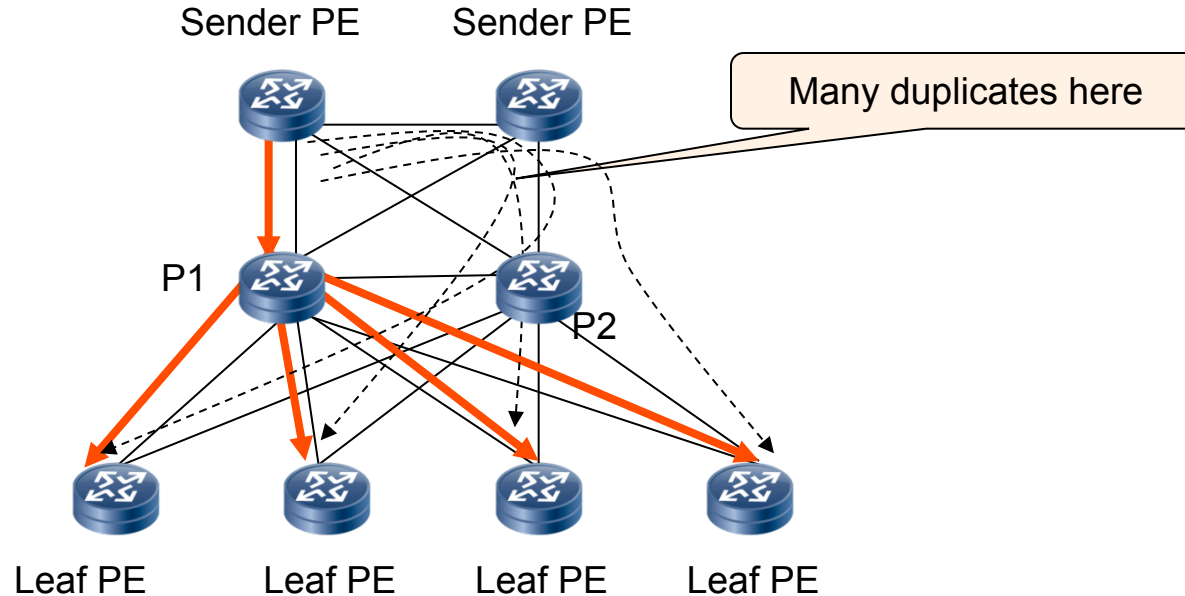


The Downstream Element is encoded as follows:

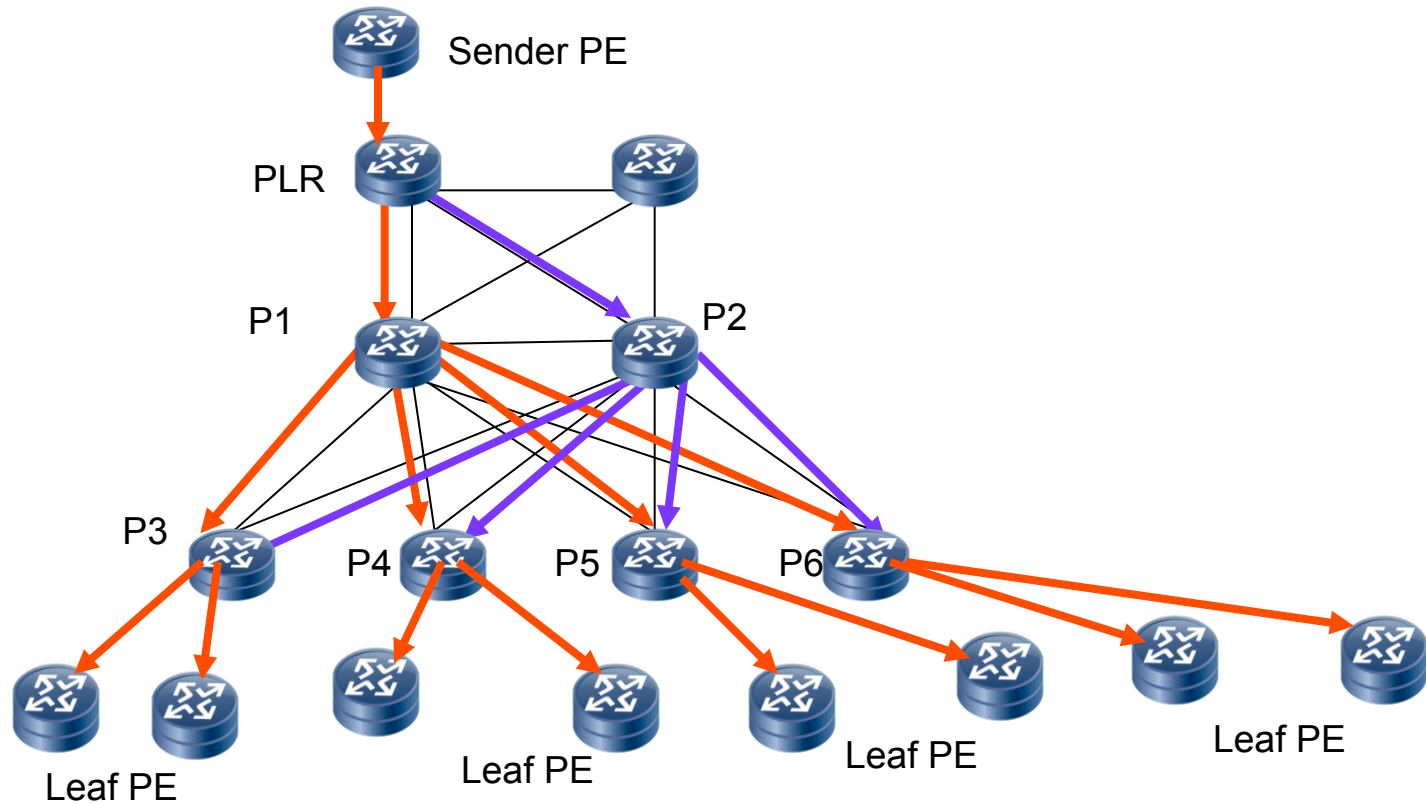


mLDPfRRoP2MP Problem Statement

When the downstream of the protected node has more branches, using mLDPfRRoP2p means a lot of duplicated p2p tunnels.



mLDPfRRoP2MP Solution

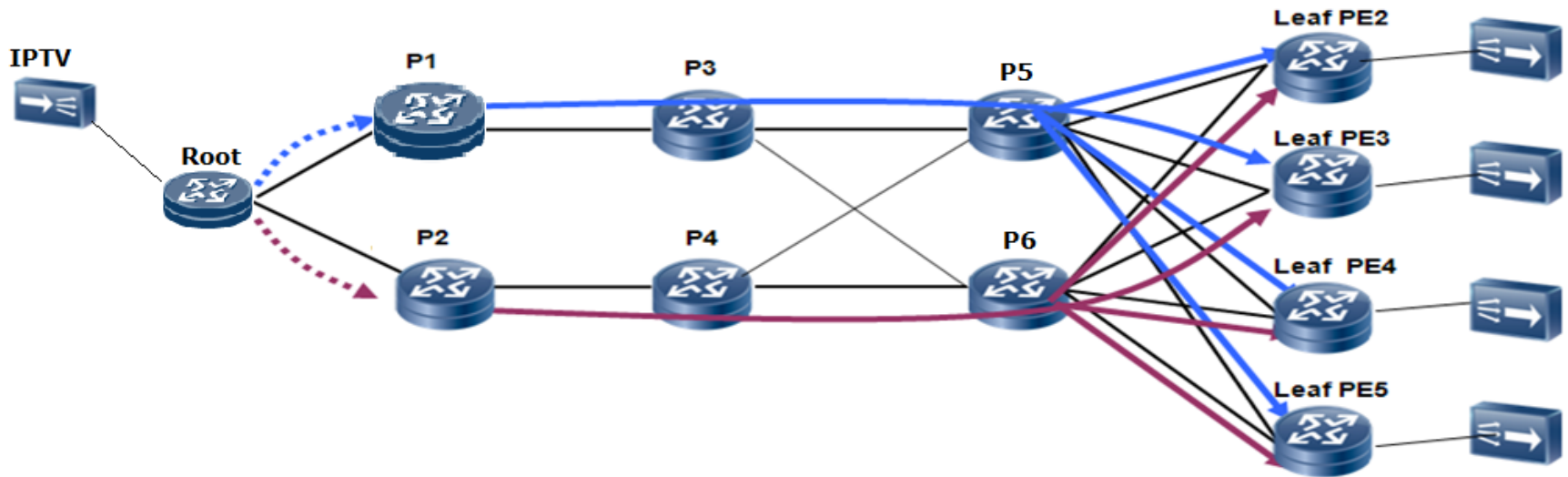


In the example above, p1 has downstream branch node p3, p4, p5 and p6. To protect the P2 node, the PLR node needs set up a p2mp bypass path through p2 to reach the p3, p4, p5, and p6 nodes.

To build the bypass path, p1 needs to signal P3, p4, p5 and p6 the upstream router PLR info and then these nodes will send the label mapping messages to PLR through the alternate route, In this example, it is the p2 node.

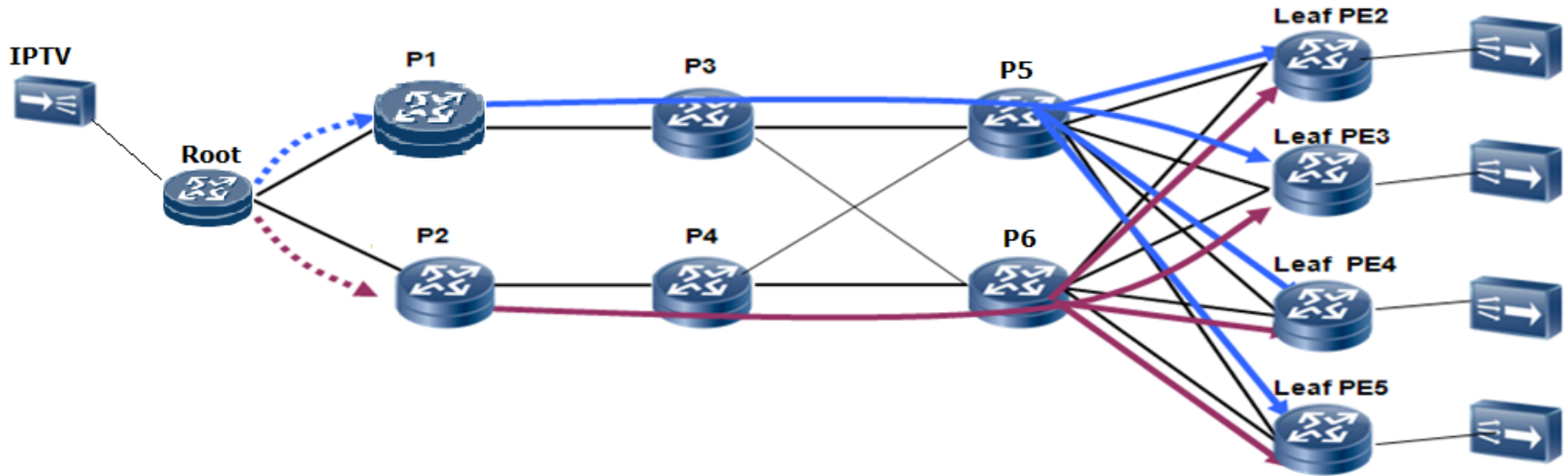
mLDPe2eFRR Problem Statement

How can we setup disjoint LSPs where the two LSP paths share the same Routing tables?



mLDPe2eFRR Solution

The draft of `ietf-mpls-ldp-multi-topology` provides a mechanism to setup disjoint LSPs within different topologies.



In the example above, Leaf 1 and Leaf 2 may trigger mLDP LSPs in different topologies sending label mapping messages with same FEC element, different MT-ID and different label. When the Root node receives the label mapping messages from different topologies, it will set up two mLDP LSPs for application as end-to-end protection.

Next Steps

- The authors will update the draft to include the details of:
 - the mLDPfRRoP2MP solution;
- The authors will update the draft to include the discussion of:
 - head end node protection;
 - leaf node protection
- The authors request WG experts to review and comment on each protection solutions.

Questions
&
Comments?

Thanks!