Protection Mechanisms for mLDP

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

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Contents

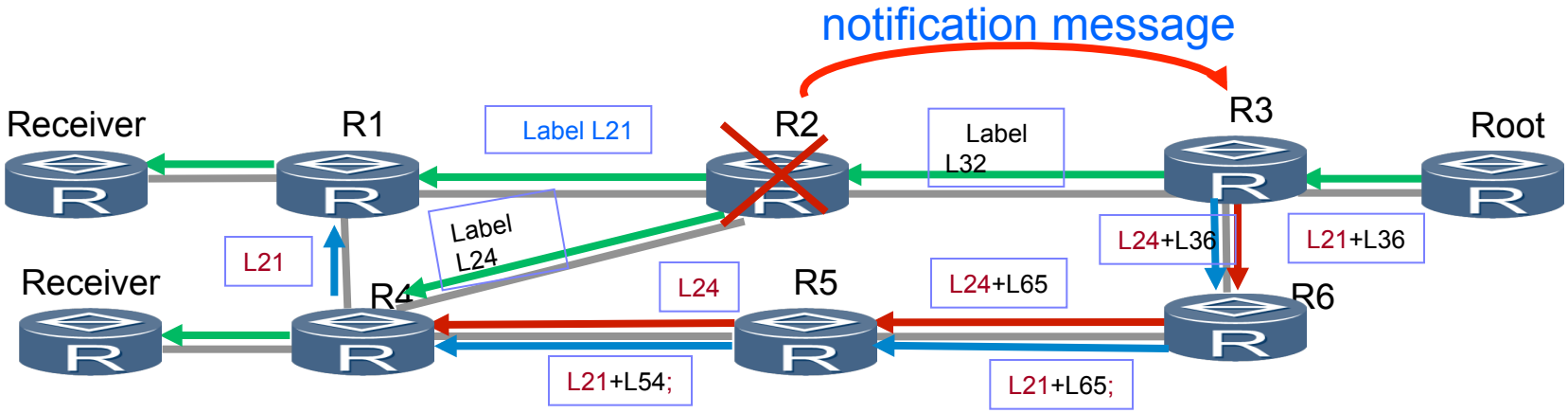
- **The scope of this document**
  - Outlines the requirements of mLDP protections;
  - Describes the p2p based protection mechanism and P2MP based protection mechanism;
  - Propose the necessary extensions to facilitate mLDP P2MP and MP2MP LSP protection within an MPLS network.

Requirements of mLDP Protection

- A number of requirements have been identified that allow the optimal set of mechanisms to developed. These currently include:
  - Computation of a disjointed (link and node) backup path within the multicast tree;
    - Where this is addressed by the MTR;
  - Minimization of protection convergence time;
  - Optimization of bandwidth usage.
  - mLDP signaling extensions and procedures;

P2P Solution

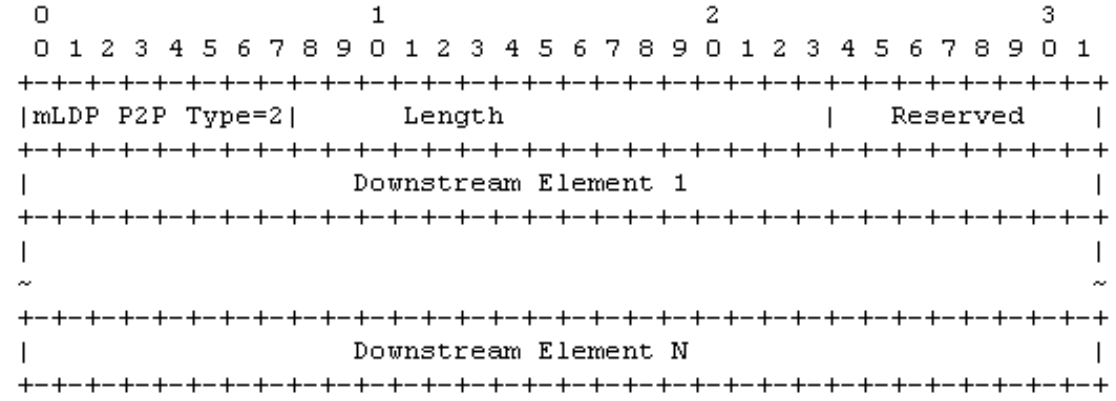
Protect the specific node or link with P2P backup LSP in mLDP



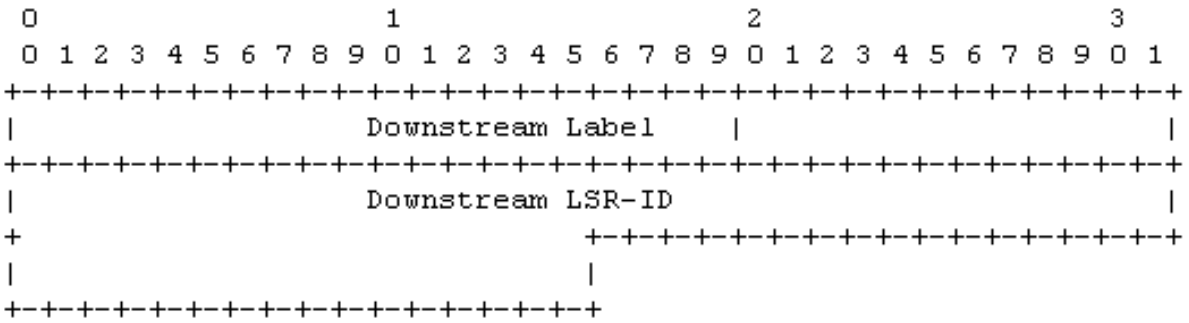
1. R2 send notification message (or extend the label mapping) to R3 and tells R3 that R2 has two downstream nodes, R1 and R4 with forwarding labels L21 and L24 respectively.
2. Using the LFA /MTR/static/ method for the backup path computation and selection;
3. When R3 sees R2 node or link going down, 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;
4. PHP in R5 for tunnel Red and in R4 for tunnel Blue will cause backup tunnel labels to be removed;
5. R1 will receive same packets as from the interface between R2 and R1 , just from different interface same forwarding !
6. R4 will receive same packets as from the interface between R2 and R4 , just from different interface same forwarding !

Protocol Extension for P2P Solution

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

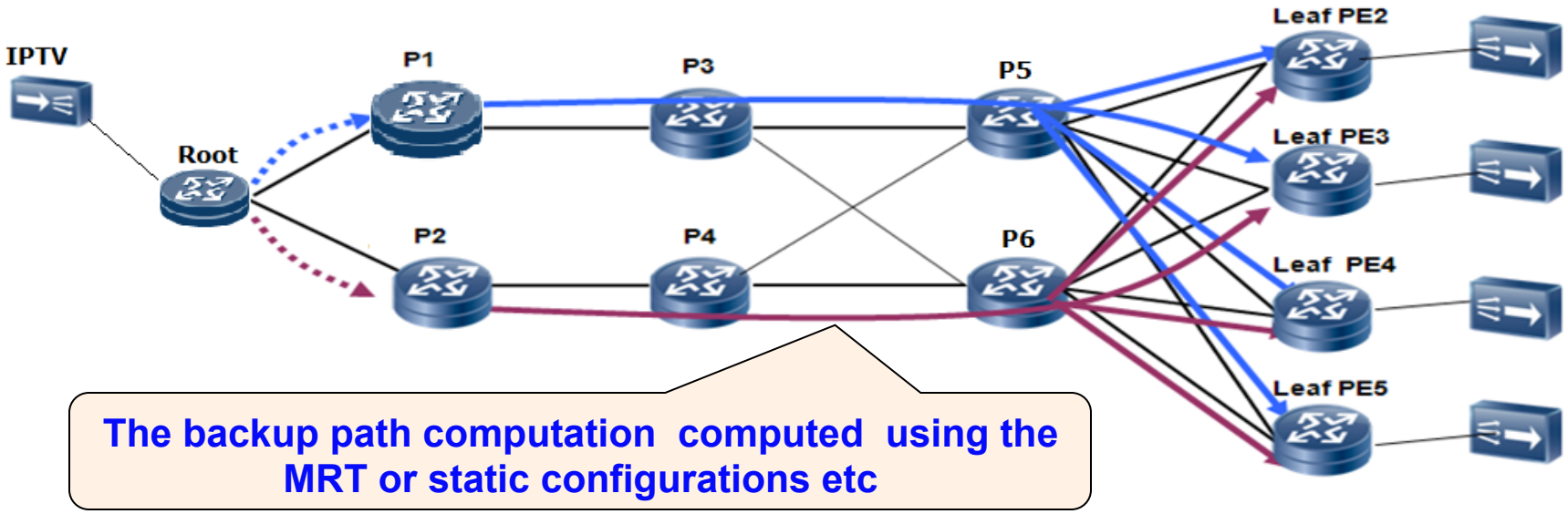


The Downstream Element is encoded as follows:



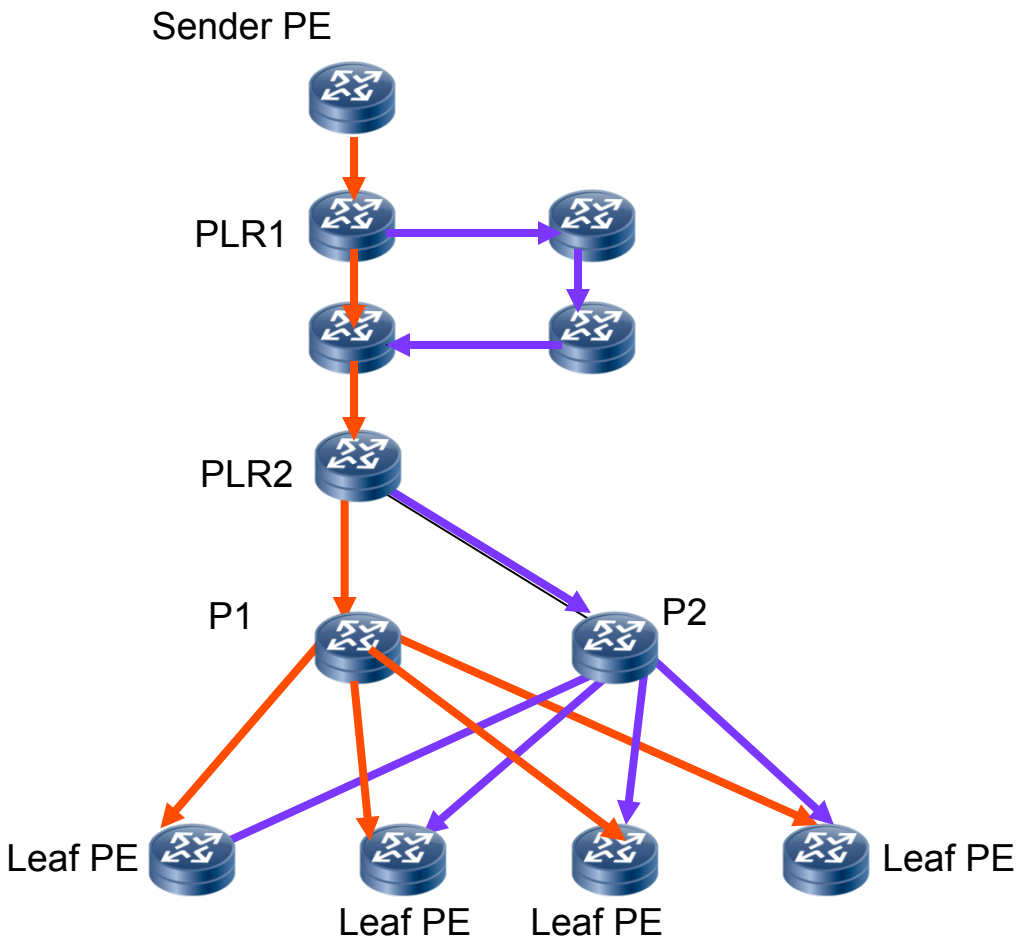
P2MP Solution (scenario1)

The draft of ietf-mpls-ldp-multi-topology provides a protocol extension ar signaling procedure for the LDP MT.



In the example above, Leaf 1 and Leaf 2 trigger mLDP LSPs in primary and secondary topologies, sending label mapping messages with same FEC element with different MT-ID for the Primary and backup path and different label. When the root node receives the label mapping messages from different topologies, it will set up the primary and backup LSP.

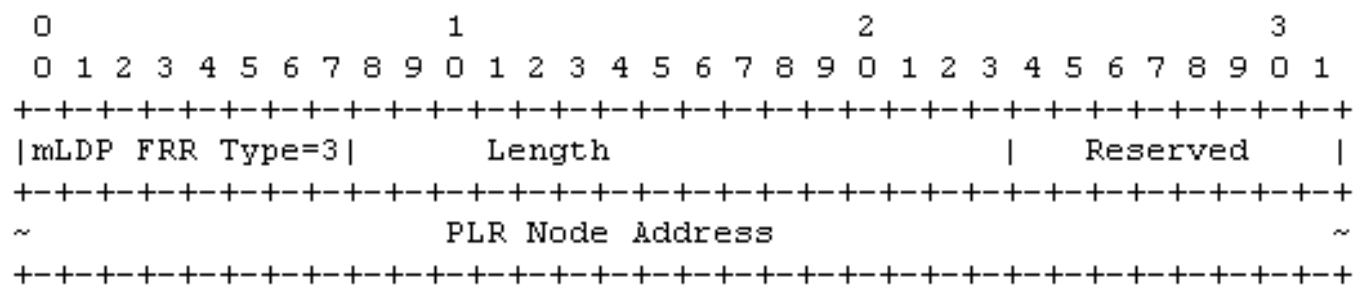
P2MP Solution (scenario2)



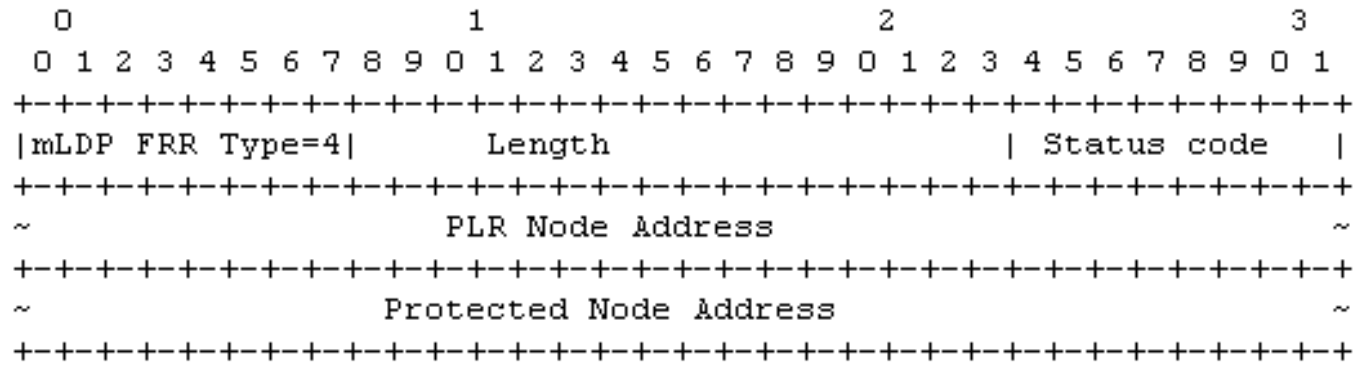
There is no totally disjoint trees available for the backup from end to end.

Protocol Extension for P2MP Solution

A new type of LDP MP Status Value Element is introduced, for notifying upstream LSR. It is encoded as follows:



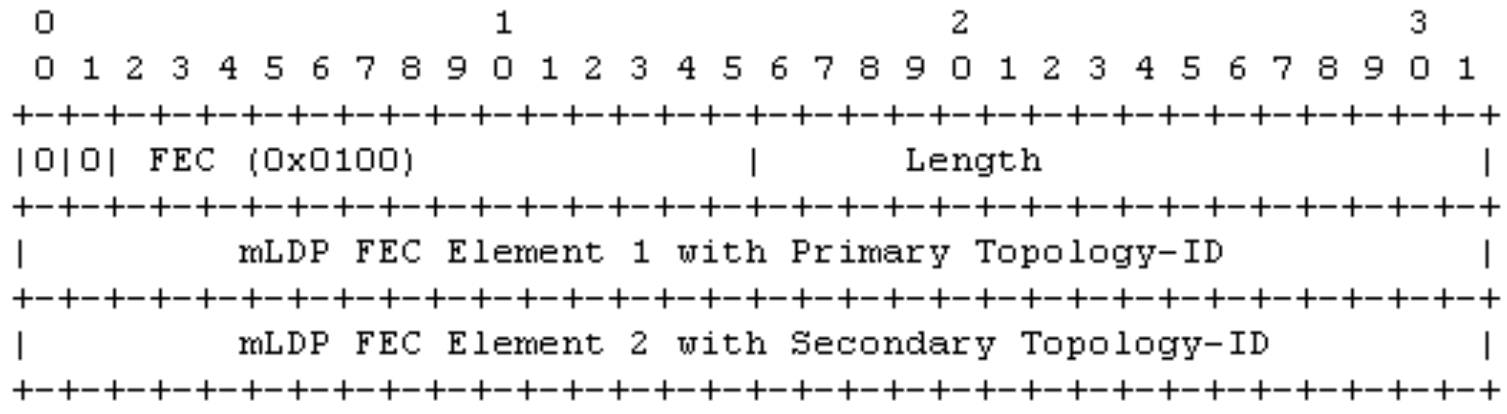
Besides, another new type of LDP MP Status Value Element is introduced, for setting up secondary mLDP LSP. It is encoded as follows:



Protocol Extension for P2MP Solution (cont)

Using the protocol extension and signaling procedure provided by [I-D.ietf-mpls-ldp-multi-topology], Leaf triggers mLDP LSPs in different topologies in the following :

- sending label mapping messages with same root address;
- same opaque value, and different MT-ID;
- If the nexthops in both primary and secondary topologies are the same, there is no need to distribute different labels for these two topologies;
- mLDP FEC TLV in Label Mapping message can be encoding as follows:



Next Steps

- The authors of this draft will collaborate with the authors of MRT draft to update the draft to include the more details each solutions especially for the scenarios where the backup path is based on the MRT;
- Through the prototyping to validity the efficiently of each the protection mechanism specified here.
- The authors request WG experts to review and comment on each protection solutions.

Questions & Comments?

Thanks!