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P2MP Based Protection Mechanisms for mLDP LSP

draft-zhao-mpls-mldp-protections-03.tx

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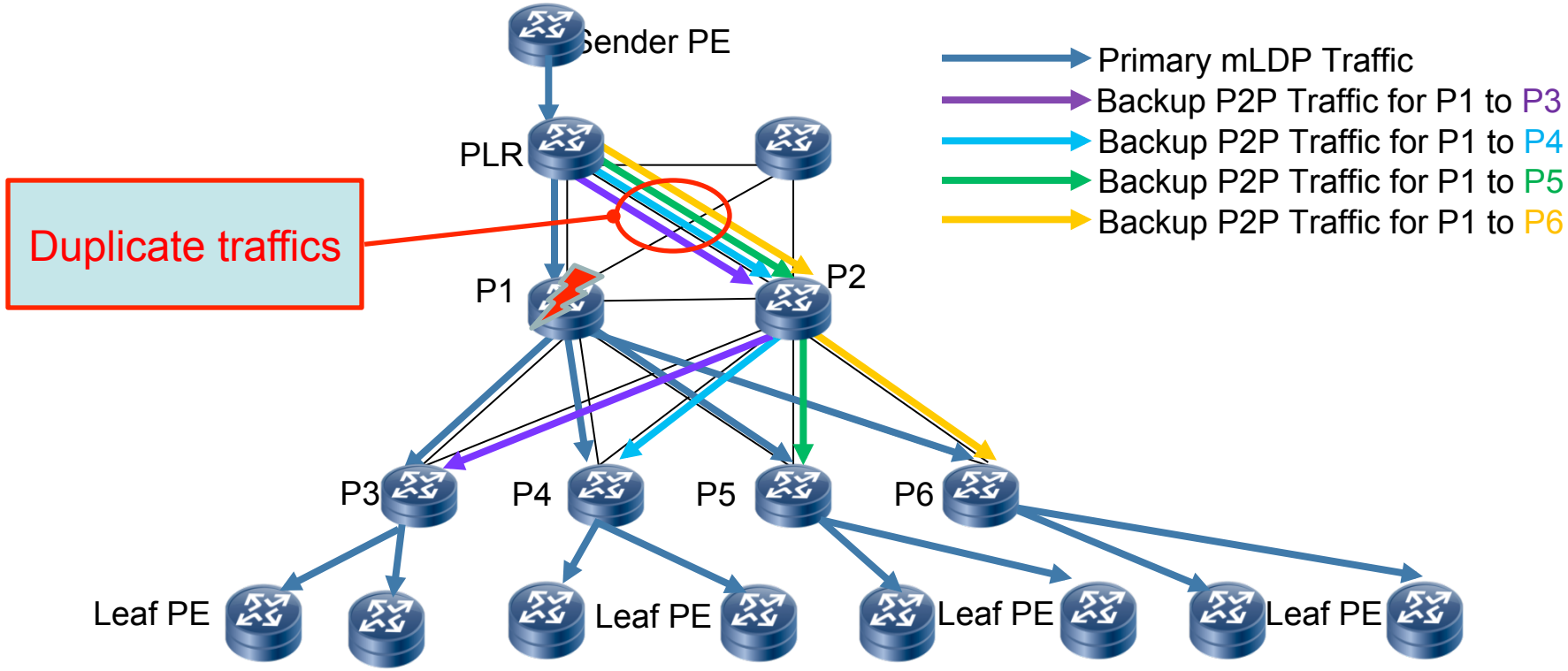
85th IETF @ Atlanta

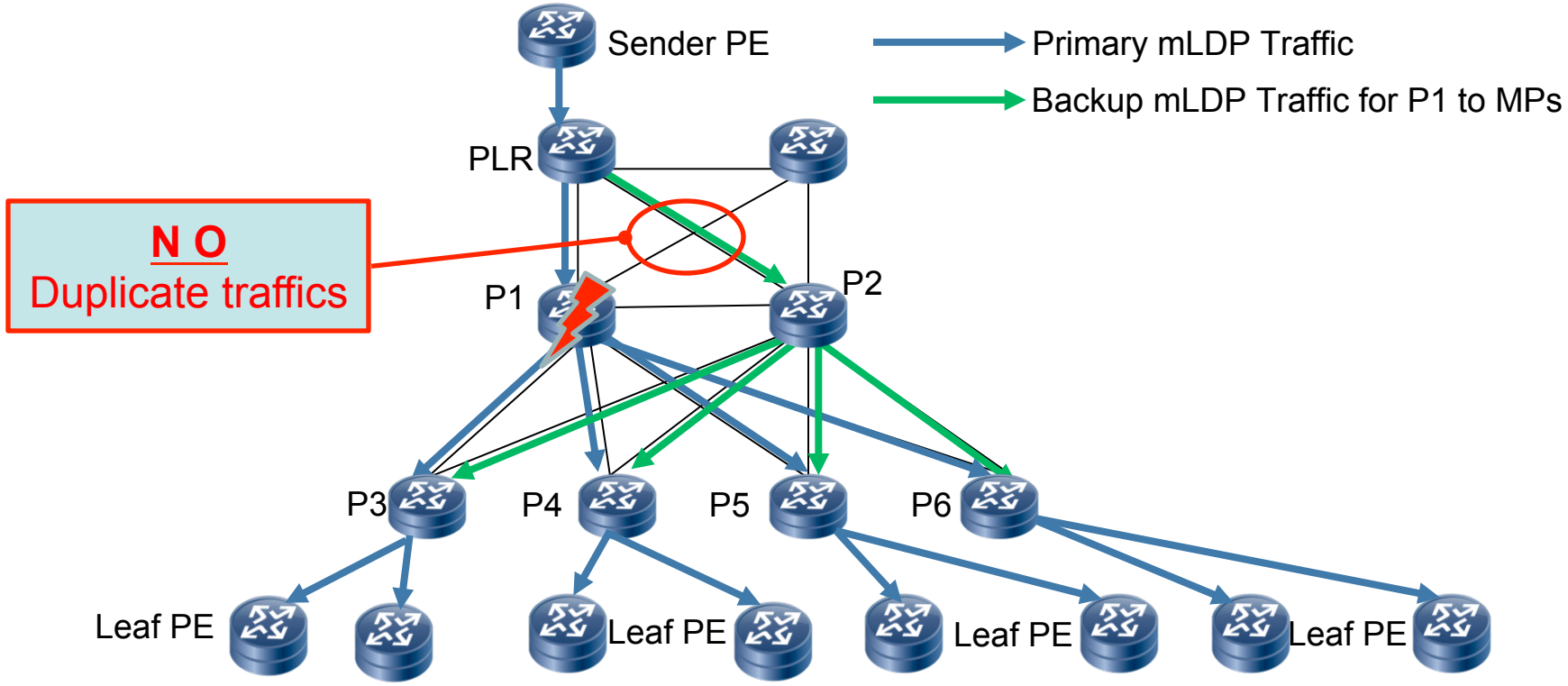
Protect the Specific Node Using P2P LDP Backup LSP



1. PLR learns MPs'(P3/P4/P5/P6) identifier and their forwarding entry by P1.
2. PLR uses P2P LSP toward each MP as P1's backup paths.
3. When PLR sees P1 node failure, it will replicate traffic to each backup P2P path.

These protection solution may causes duplicate traffics and substantial congestion in many scenarios. In the most terrible case, thousands of duplicate traffics will be transported on one single link.

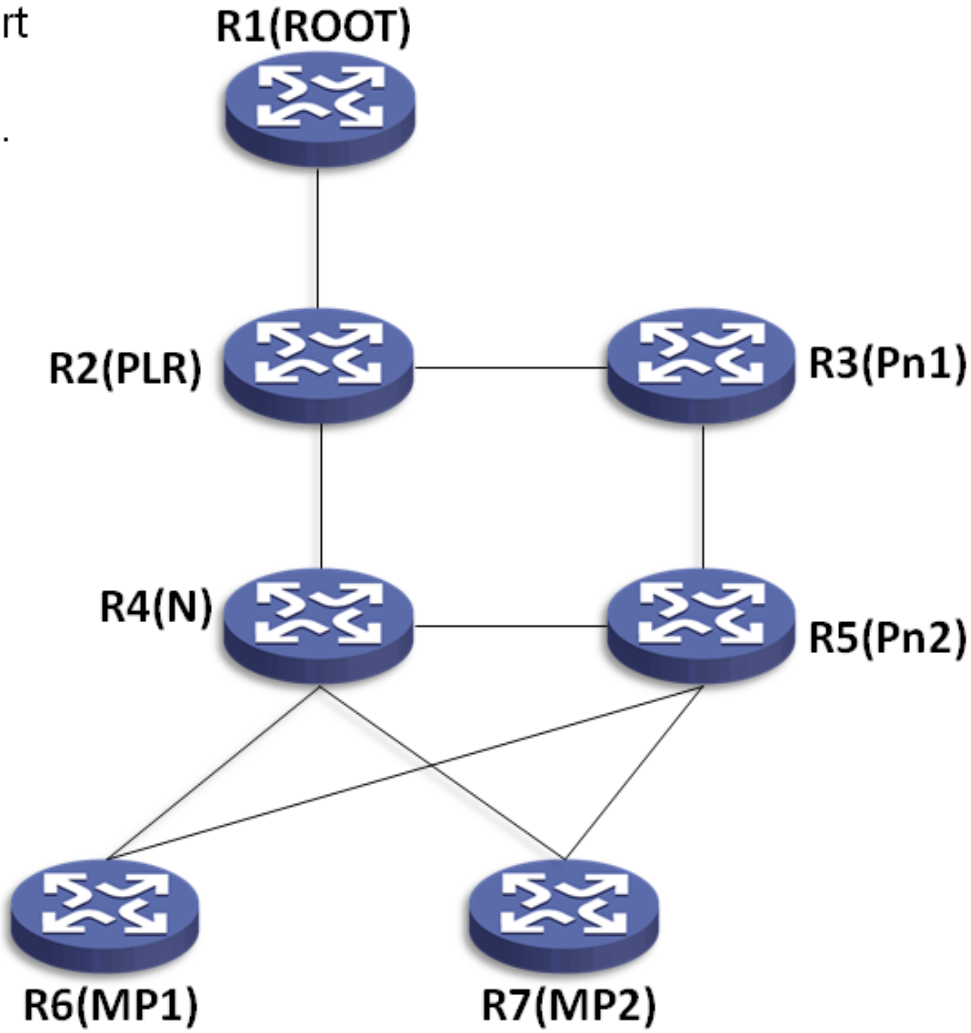
Protect the Specific Node Using P2MP LDP Backup LSP



1. Each node advertises its capabilities to peer.
2. P1 notifies P3/P4/P5/P6 that PLR is its upstream LSR.
3. P3/P4/P5/P6 consider PLR as the root node of the backup P2MP LSP, and begin signaling procedure through P2. Create the backup LSP from MP to PLR through Pn.
4. When PLR sees P1 node failure, it will switch the traffic to the backup P2MP LSP with no duplicate backup traffic .
5. The old forwarding states will be removed when session goes down or route changes.

Detour mLDP LSP based node protection procedure details

1. PLR, MP1, MP2, Pn1, Pn2 must surpport P2MP based node protection, and then advertise their capabilities to peer LSRs.



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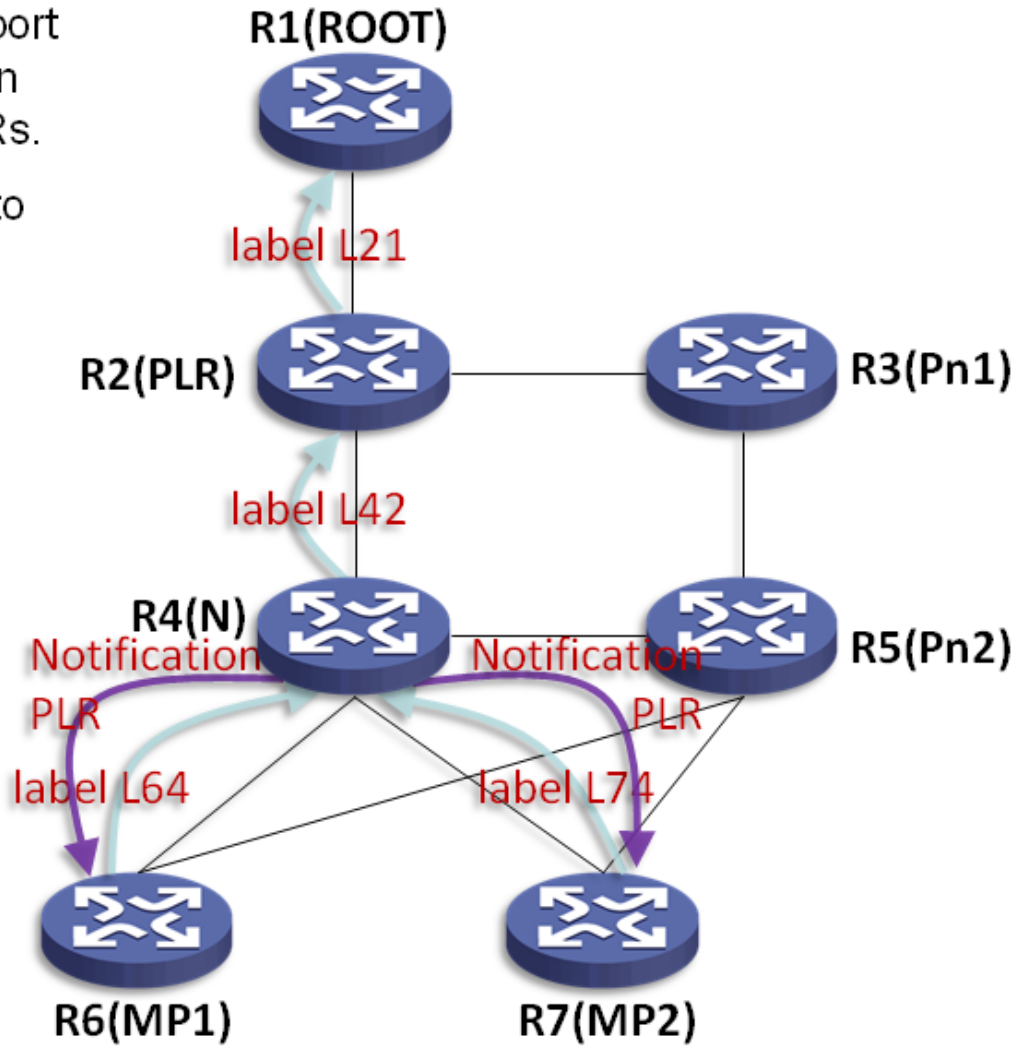

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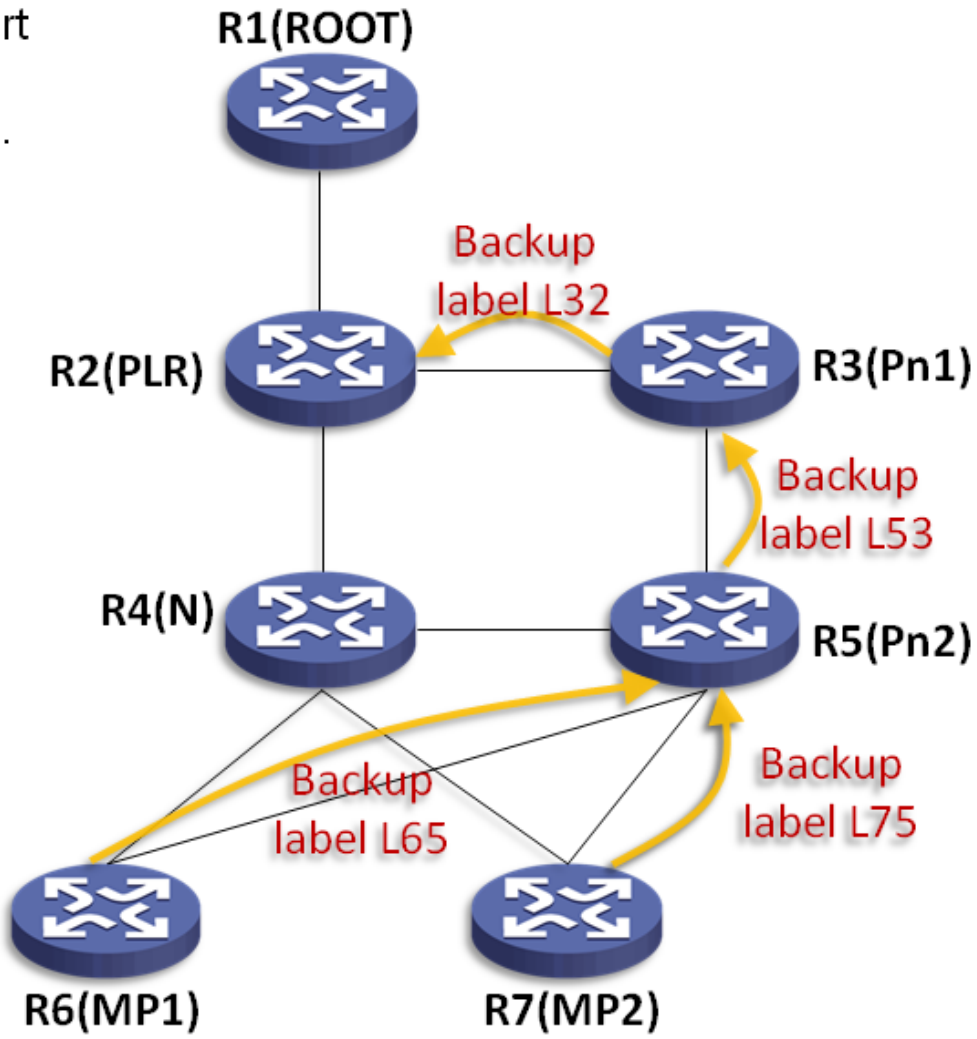
3. This notification message triggers the MP sending backup mapping message to set up a backup P2MP LSP through R3, R5. <PLR, N, original-FEC> is the backup LSP's key. Each node on the backup path will try to choose its upstream avoiding N. PLR creates the backup LSP forwarding entry and binds it to primary entry.



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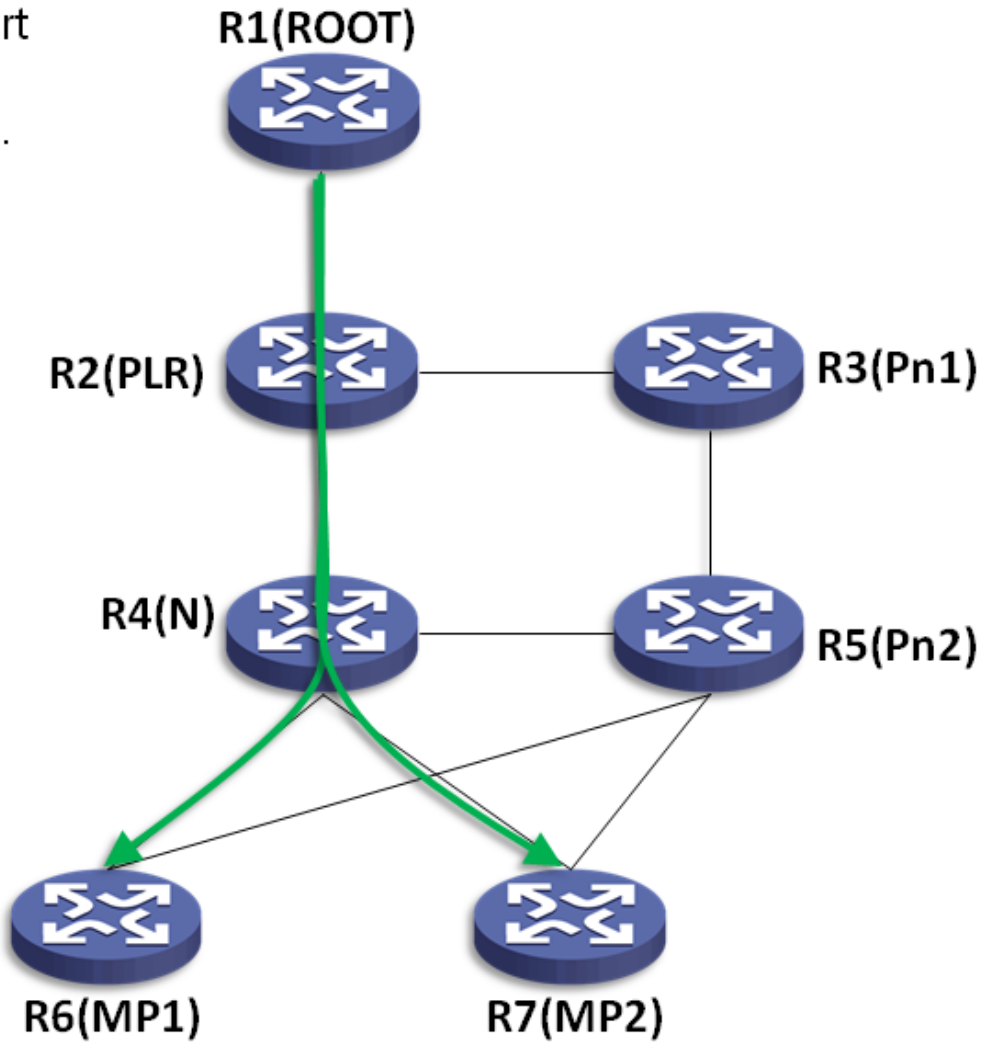
4. Traffic(in green) goes through primary path. When N fails, it switches the traffic to backup P2MP LSP path(in yellow).



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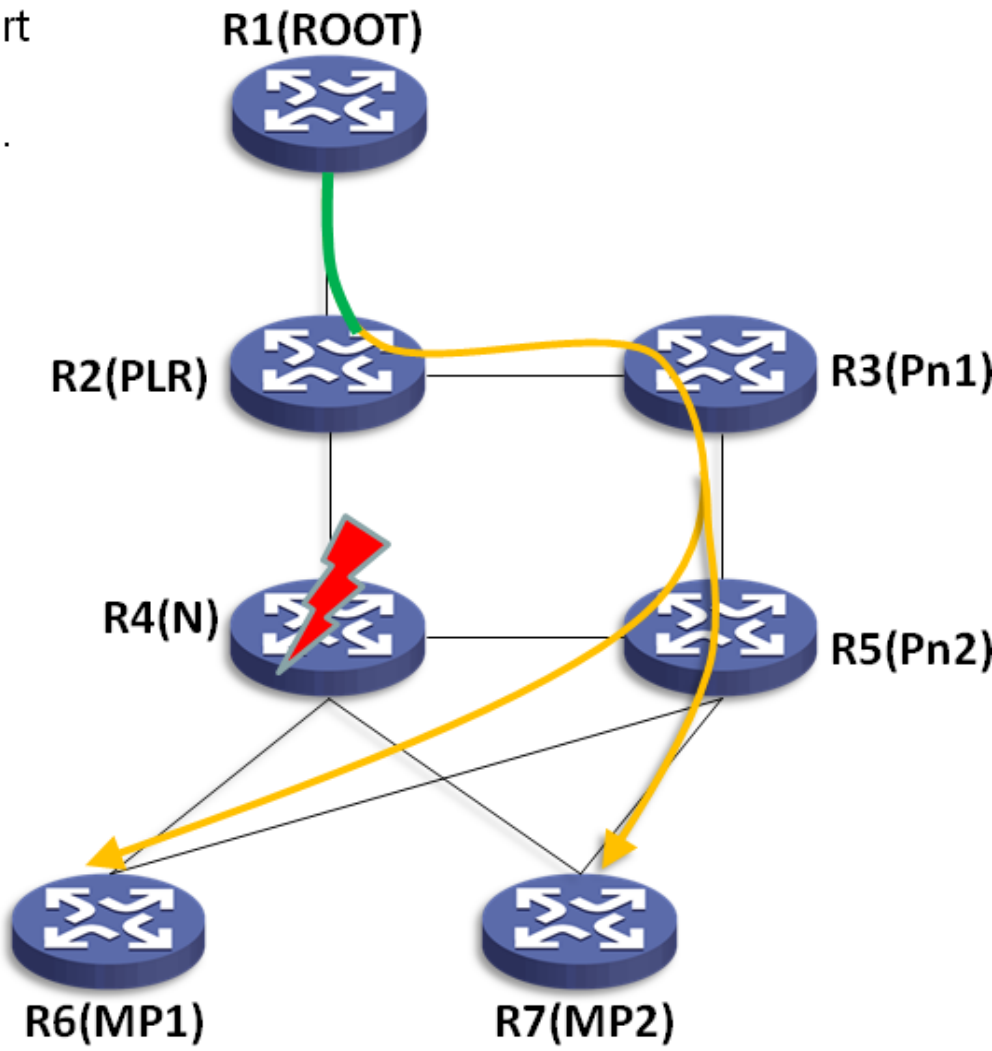

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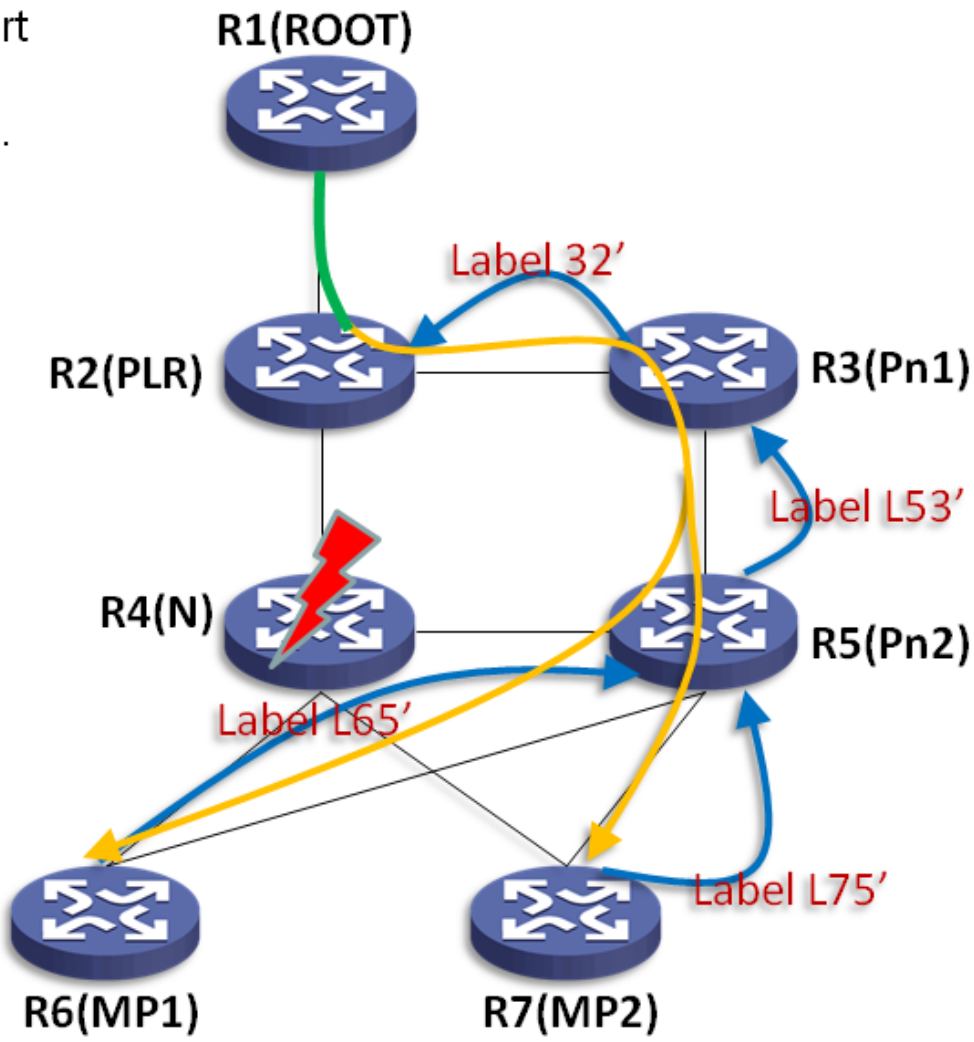

5. This backup P2MP LSP will be destroyed by label mapping withdraw message, after MP convergence.

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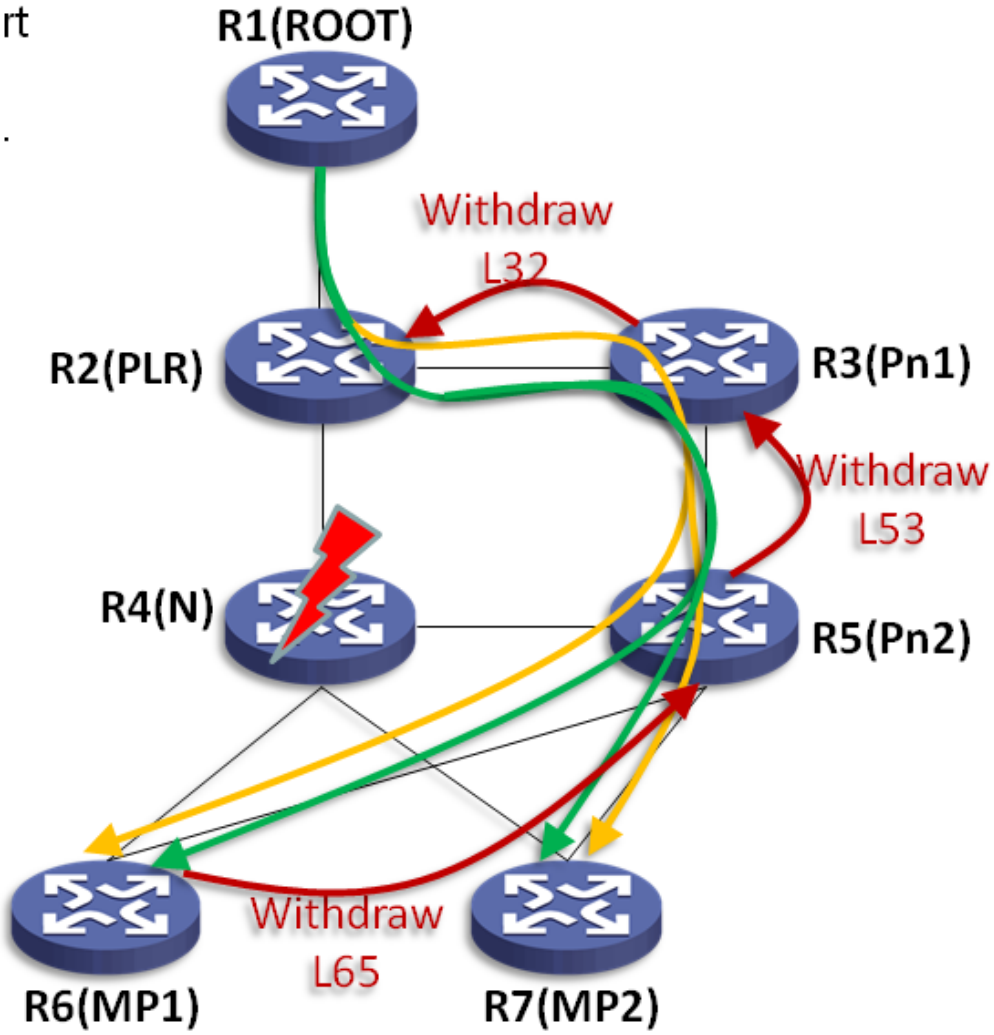

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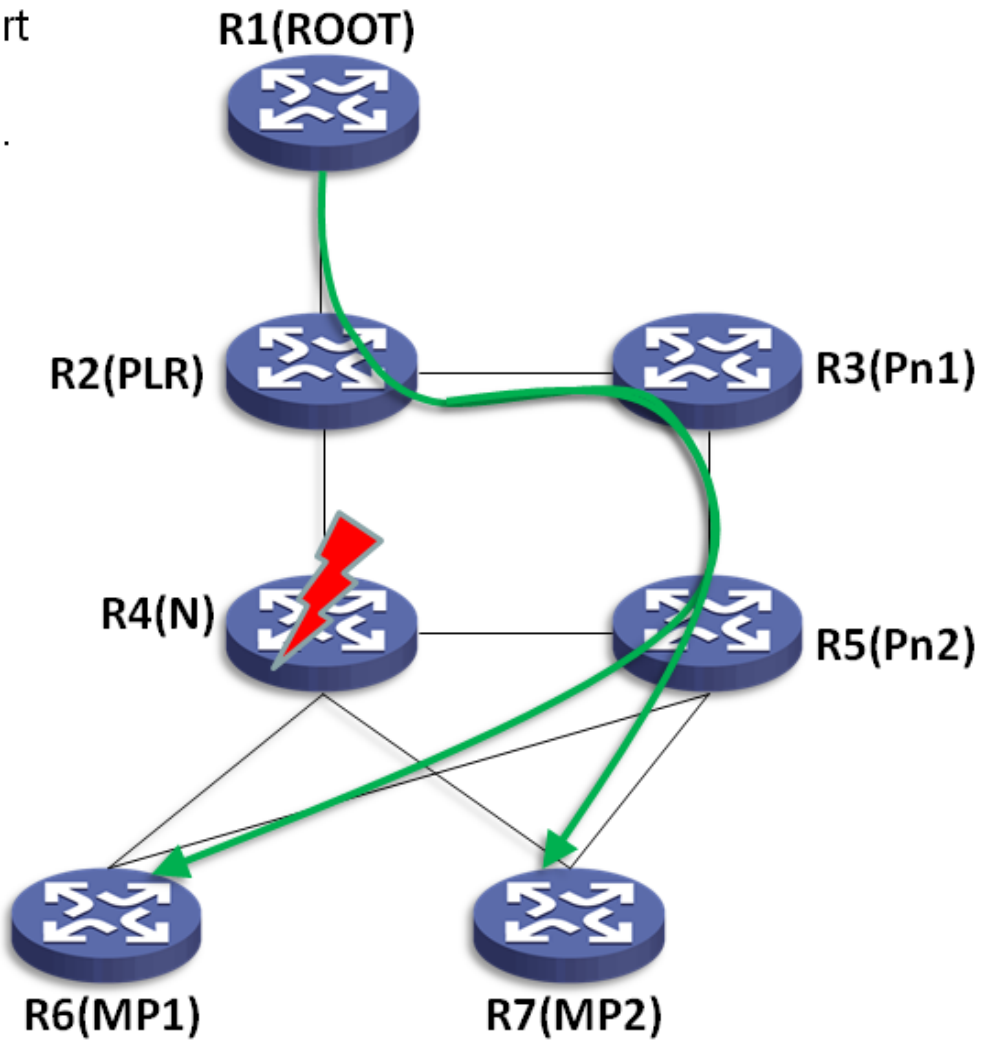

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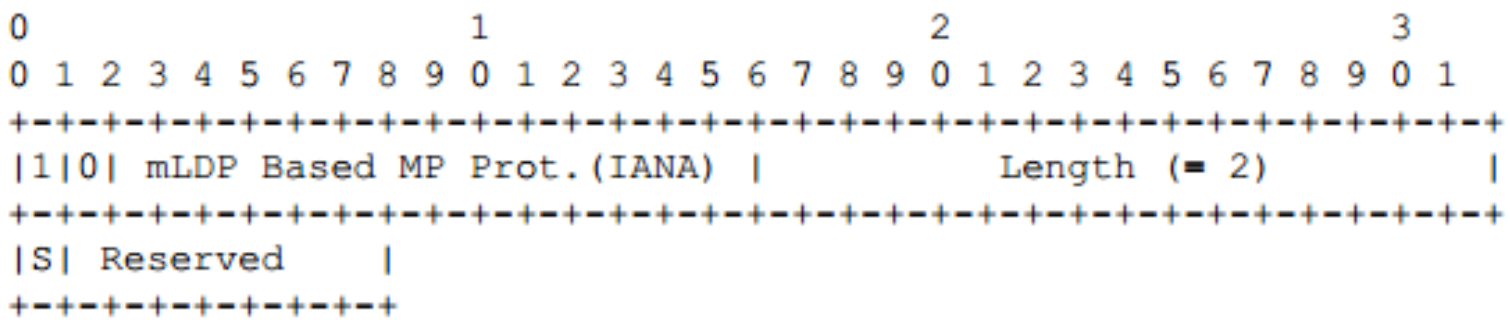
Protocol extension in Our Draft (1)

4.3.1. mLDP Based MP Protection Capability Parameter TLV

A new Capability Parameter TLV is defined as mLDP Based MP Protection Capability for node protection. Following is the format of this new Capability Parameter TLV:



S: As specified in [RFC5561]

Figure 4: mLDP Based MP Protection Capability

This is an unidirectional capability announced.

Protocol extension in Our Draft (2)

4.3.2. mLDP Based MP Node Protection Status Elements

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

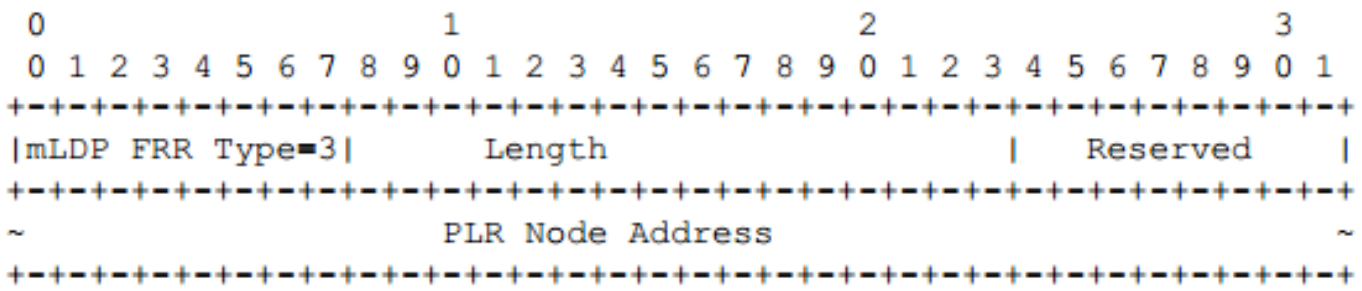


Figure 5: FRR LDP MP Status Value Element

mLDP FRR Type: Type 3 (to be assigned by IANA)

Length: If the Address Family is IPv4, the Length MUST be 5; if the Address Family is IPv6, the Length MUST be 17.

PLR Node Address: The host address of the PLR Node.

Protocol extension in Our Draft (3)

4.3.3. mLDP Backup FEC Element Encoding

A new type of mLDP backup FEC Element is introduced, for notifying upstream LSR information. It is encoded as follows:

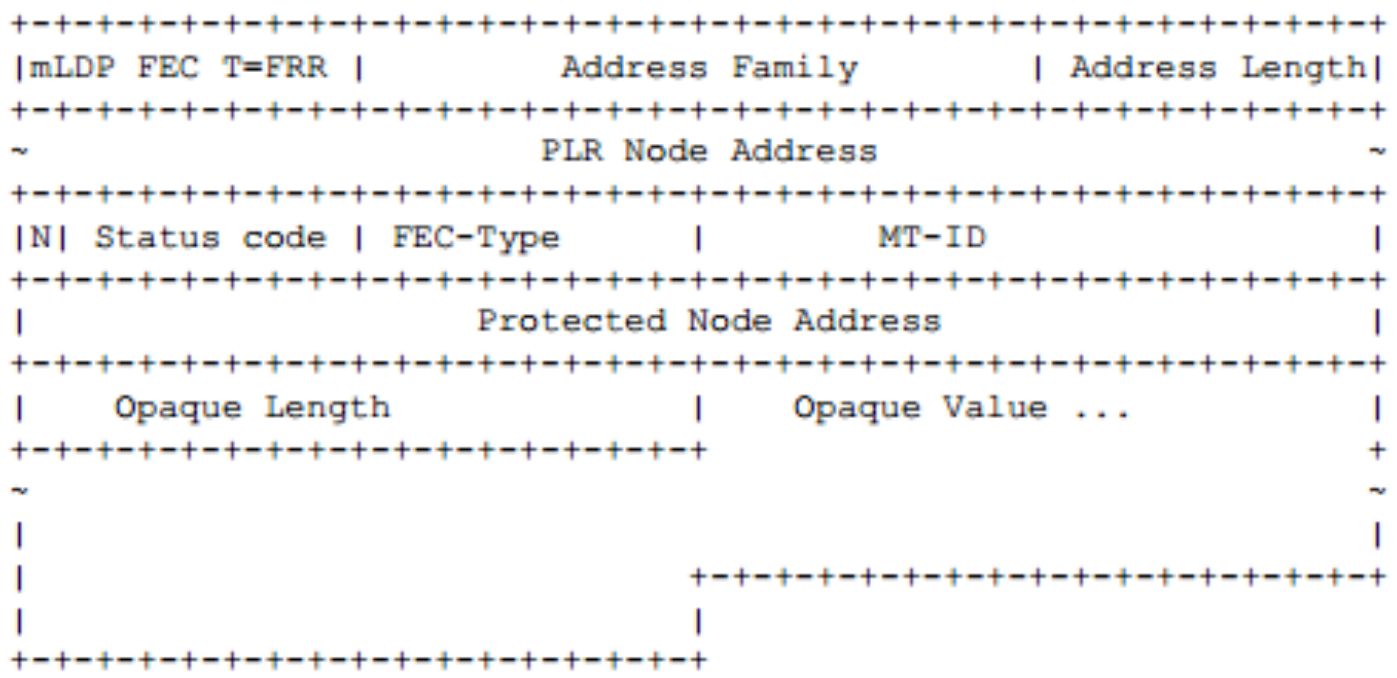


Figure 6: mLDP Backup FEC Element

Summary of the p2mp Based mLDP protection Solution

- Use P2MP LSP to protect node N, so that the backup traffic from PLR to MPs can be merged. If using multiple P2P LSPs as the backup LSPs, there would be traffic replication on the common links.
- The solution works for the end-to-end protection too.
- The backup path computation algorithms are flexible, where the user can chose either LFA, statically configured multiple topologies, or using MRT algorithm etc.
- Demo from the preliminary implementation of the solution are available.

Next Step

- Get more feedback from the working groups;
- Thanks for Ice's reviewing of this draft and his suggestions, we may split this draft into separate drafts based on the algorithm used for the backup path computation.
  - One draft using the LFA algorithm to compute the backup path;
  - One draft using the MRT algorithm to compute the backup path;
- We will continue the discussion with co-authors of Alia's draft-atlas-rtgwg-mrt-mc-arch-00.txt (expired, renew soon?)
  - Identify the overlapping between these two drafts for the MRT related portion and leave the overlapping portion in one draft and clean it from the other draft and cross referencing it.

Thanks!
Questions & Comments?