Alternative Constraints for Point-to-Multipoint Traffic-Engineered MPLS Label Switched Paths(LSPs)

draft-li-mpls-p2mp-te-alt-path-01

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# Background: Move to Complete Protection Mechanism for P2MP TE

- Local Protection:
  - Transit Link/Node: Reuse RFC4090
  - Ingress Node: draft-chen-mpls-p2mp-ingress-protection
  - Egress Node: draft-chen-mpls-p2mp-egress-protection
- End-to-End Protection
  - 1+1 / 1:1 Protection
  - MPLS OAM for P2MP TE: draft-ietf-bfd-multipoint-03
- Best-effort Protection
  - It is the basic feature for mLDP.
  - P2MP TE faces challenge and lacks mechanism.

Problem Statement of P2MP TE LSP
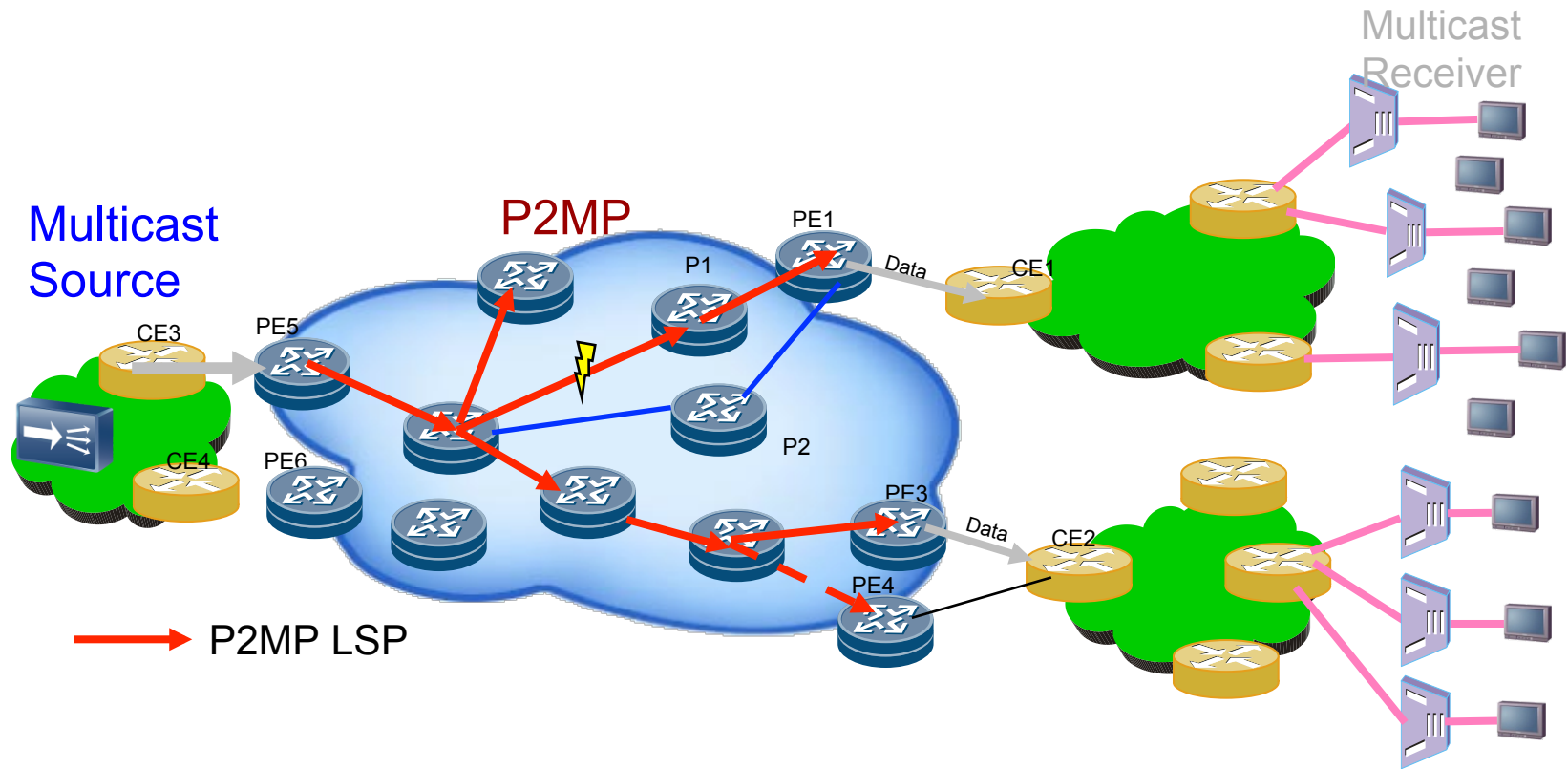
- **Traffic engineering constraints are applied to all S2L sub-LSPs. This may cause the issue that some S2L sub-LSPs can be set up while others can not according to the constraints。**
- **There will be a worse case that some S2L sub-LSPs can not be restored after link failure according to the constraints. It will cause continuous traffic loss.**
- **Comparing with mLDP, P2MP TE lacks the capability to provide a best-effort path.**

Alternative Path for P2MP TE
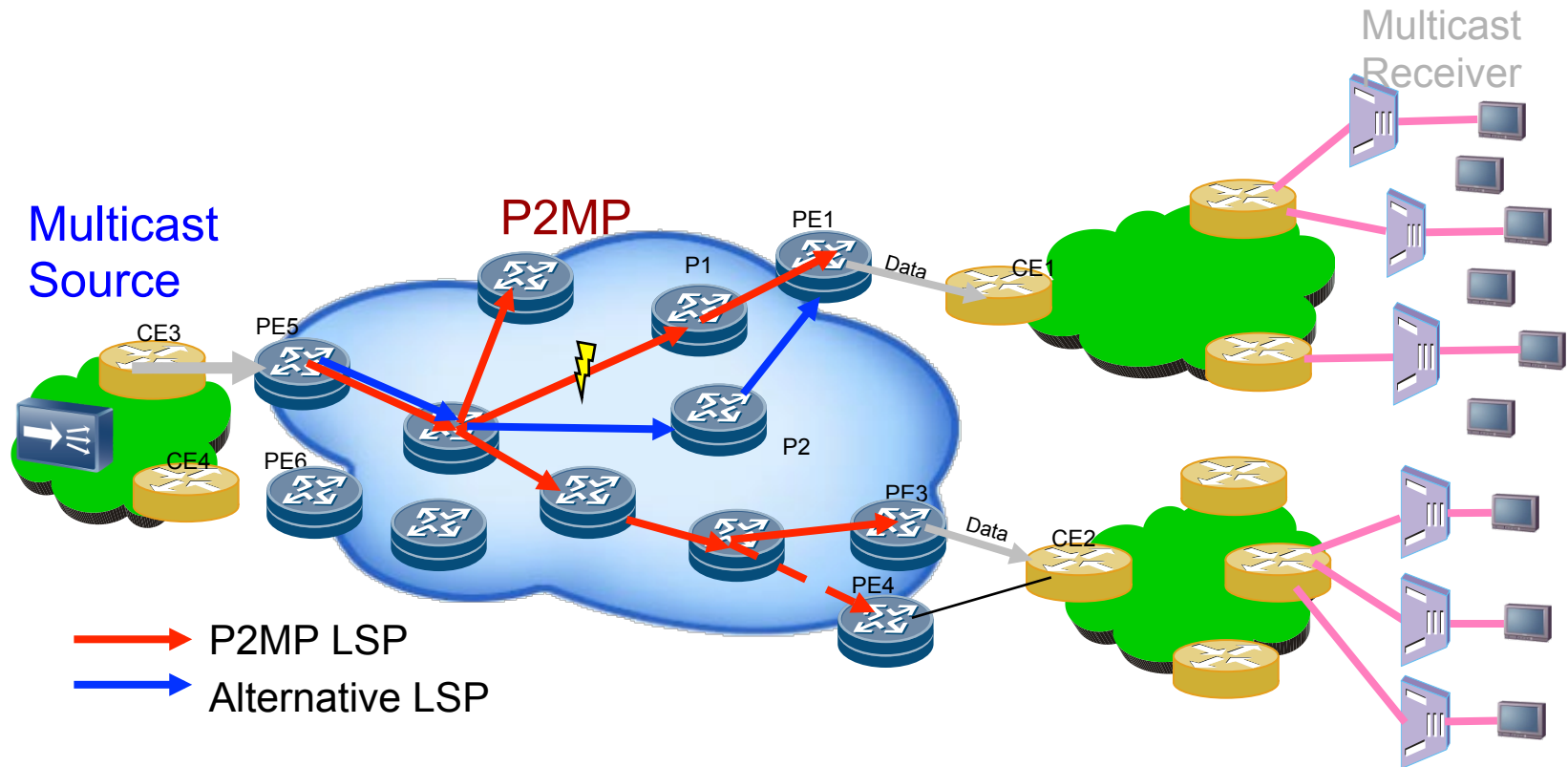
- **Alternative constraints:** Alternative constraints can be specified for the P2MP TE LSP to calculate paths to specific leaf nodes if the path with the primary constraints is not available. The P2MP TE LSP is set up with some S2L sub-LSPs using the primary constraints while the other S2L sub-LSPs using the alternative constraints.

Key Notes for Mechanisms

- Path Computation in Root Node:
  - If the path is available for the primary constraints, the alternative constrains MUST NOT be used.
  - When the alternative constraints are used, the constraints MUST be applied the whole S2L sub-LSP.
- Alternative Constraints Propagation
  - Separate Message vs. Single Message
    - Separate message: It is not necessary to introduce protocol extensions.
    - Single message: New protocol extensions is introduced. Both primary and alternative constraints SHOULD be propagated.
- Forwarding Plane
  - There is only one copy of traffic for common parts of the paths of sub-LSPs using different constraints.

Updates

- Add one co-author: Lei Chen

- Different sections to describe Method of Separate Messages and Method of Single Message based on [RFC4875].

- Detailed description of Path message processing and discussion on process of other messages for Method of Single Message.

- Correct text errors.

Next Steps

- Solicit more comments
- Request to be adopted by WG