Congruency for VPLS Mcast & Unicast Paths

(draft-sajassi-l2vpn-vpls-mcast-congruency-00.txt)

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IETF-65, Dallas
March 23, 2006

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VPLS - Providing Bridges LAN Service

- VPLS provides Bridged LAN service to both CE bridges and routers.
- One important application of VPLS is providing connectivity among Provider Bridges (either 802.1ad islands or 802.1ah islands)
- VPLS needs to provide multipoint Ethernet connectivity to the same degree as provided by Provider Bridges.
- VPLS shall not break or impede the operation of bridges when providing connectivity among them - specially when connecting Provider Bridges (.1ad or .1ah bridges)
- Operation impact to Provider bridges are lot more pronounced than Customer bridges (.1q bridges) because of aggregation of many customers by Provider Bridges

Current VPLS Mcast Proposals

Two Proposals:

1. Ingress replication over PWs
2. Building Mcast Tree

- First proposal guarantees congruency between unicast and multicast but it is inefficient
- Second proposal is efficient but the unicast & mcast paths are non-congruent and thus resulting in several issues

Bridging Issues when non-congruency occurs

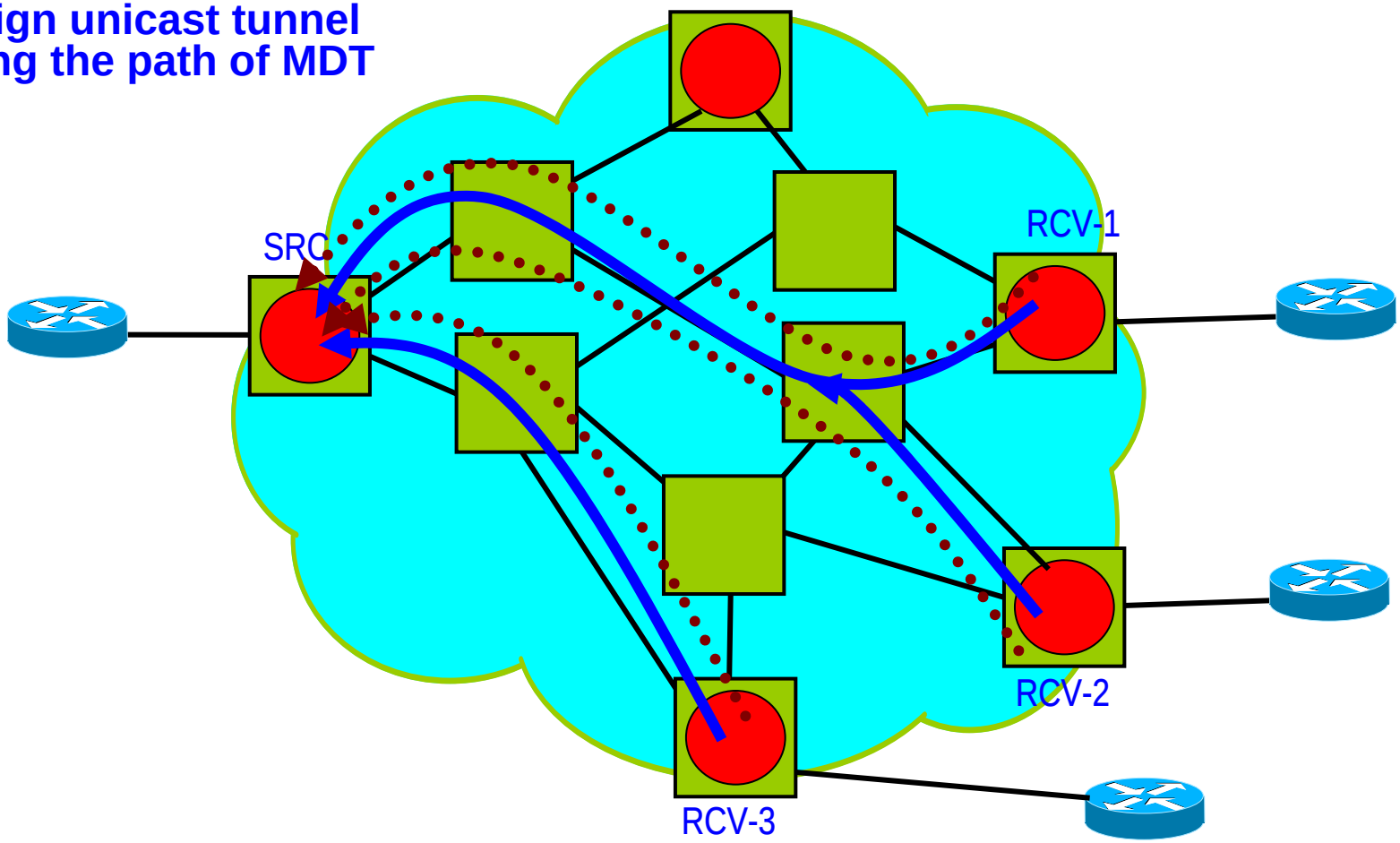
- Described in draft-sajassi-l2vpn-vpls-bridge-interop-02.txt
  - Creates Loops inside customer/provider bridged networks as the result of failure in BPDU paths
  - Black holing of customer/provider data as the result of failure in non-BPDU path
  - Impairs the OAM operation of customer/provider bridges - CFM procedures – IEEE 802.1ag
  - May result in out-of-order delivery

Proposal for Congruency

- Leverage the same tree construct as mVPN and mcast VPLS (e.g., inclusive, selective, aggregate inclusive and aggregate selective trees)
- Leverage the same tree building mechanism
  - mLDP
  - RSVP-TE
  - PIM
- Use the same mechanism for building P2P tunnels as for P2MP tunnels

Building Unicast Tunnel along the Mcast Tunnel

- **Setup MDT first**
- **Align unicast tunnel along the path of MDT**



Building MDT: using LDP-based P2MP LSP - II

- If both mcast tree and unicast tunnel can be setup from the same direction, then they can be made to align with each other
- Both P2MP & P2P tunnel LSPs are setup using receiver initiated procedures [LDP-P2MP]
- Since both P2MP and P2P tunnel LSPs are initiated from the receiver and are sent along the shortest path to the sender, they would take the same path in the core
- In case of ECMPs between two nodes in the core, the same selection criteria can be used for both P2P and P2MP LSPs to guarantee that they take the same path. Thus guaranteeing the same path for the traffic of a given VPLS instance.
  - the same ECMP identifier is used for both P2MP and P2P tunnel LSPs that belong to the same VPLS instance

Associated Cost

- Since P2P tunnel is built using the same mechanism as P2MP tunnel, there are states associated with this P2P tunnel in the P nodes
- However, these mcast states are NOT per VPLS instance but can be shared across many VPLS instances; therefore, they can scale easily

Conclusion

- For applications where both congruency and efficiency are required, this scheme can be used to deliver multipoint Ethernet service in par with bridges
- For applications where CE routers are used and non-congruency does not result in any issues, then existing schemes can be used
- This congruency scheme is built on top on the existing mcast constructs & mechanisms and only requires small modifications to mLDP or PIM for passing ECMP identifier.