Label Sharing for Fast PE Protection

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Goal: fast PE protection

- A CE is often connected to multiple PEs in order to realize a reliable VPN connection to the SP's backbone network.

- It's possible to make use of local repair to achieve a 50msec switchover.

- This draft aims to protect the egress PE, while the protection of PE-CE link is out of scope.

Sharing the label

- It's required that all egress PEs in a Redundant Group (RG) assign the same VPN route label for the routes in one VRF.

- If a packet is redirected to another egress PE, its VPN route label can be recognized.

vNH represents the CE

- A virtual router (vNH) is created in the backbone network to represent the CE.

- In a normal route propagation process, egress PEs use their own addresses as the 'BGP next hop'. In our method, we let all egress PEs use the address of the vNH as the 'BGP next hop'.

- vNH will be used as the common last hop of the tunnels.

Link metric setup

- The metrics of the virtual links between egress PEs and the vNH (M and S) are set in a way that the Point of Local Repair (Px) can always find out a Loop Free Alternative path to vNH (Pxy…PE4->vNH) .

- In the illustration figure, Sxy3+M>Sxy4+S, so that it is safe for the PLR (Px) to use its neighbor Pxy as the nexthop for traffic redirection.
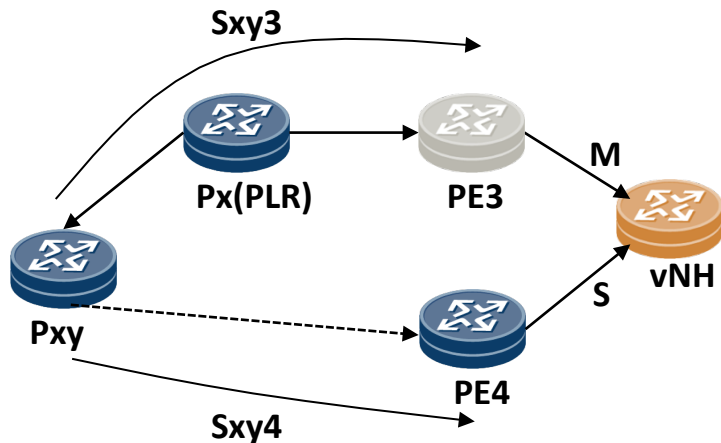
- Px: the neighbor of PE3
- Pxy: the neighbor of Px
- M: link metric from PE3 to vNH
- S: link metric from PE4 to vNH
- Sxy3: path cost from Pxy to PE3
- Sxy4: path cost from Pxy to PE4

Example figure
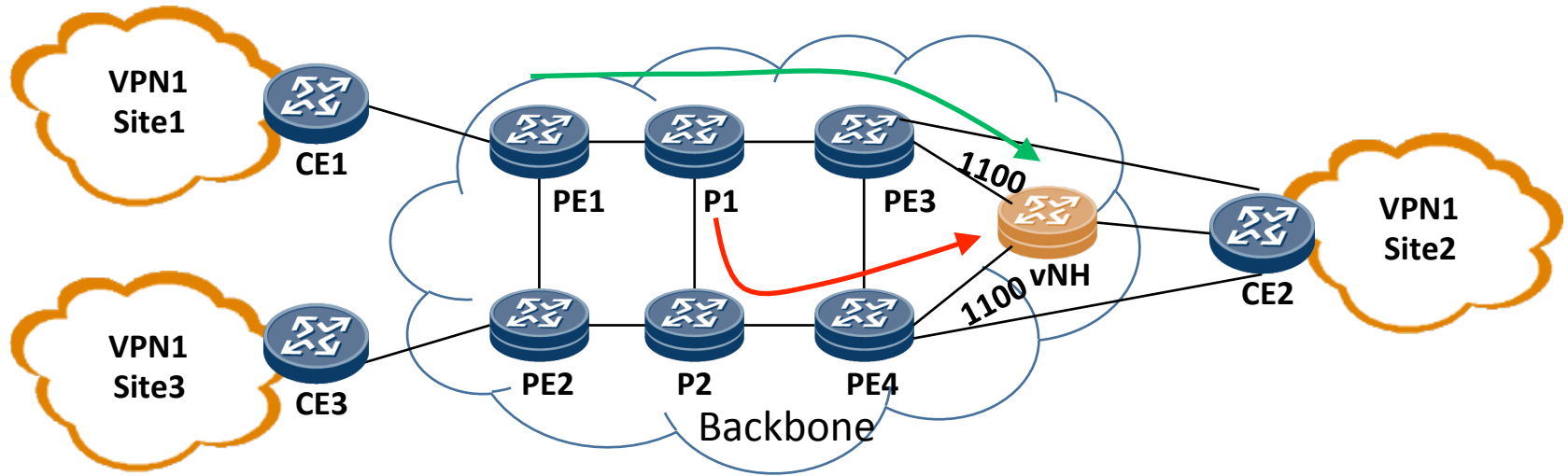
- Ingress PEs: PE1, PE2
- Egress PEs: PE3, PE4, they share the label 1100 for VRFs that CE2 is associated with.
- vNH: the virtual BGP Next Hop
- Primary tunnel: PE1->P1->PE3-vNH
- When PE3 fails, backup tunnel P1->P2->PE4->vNH can be used.
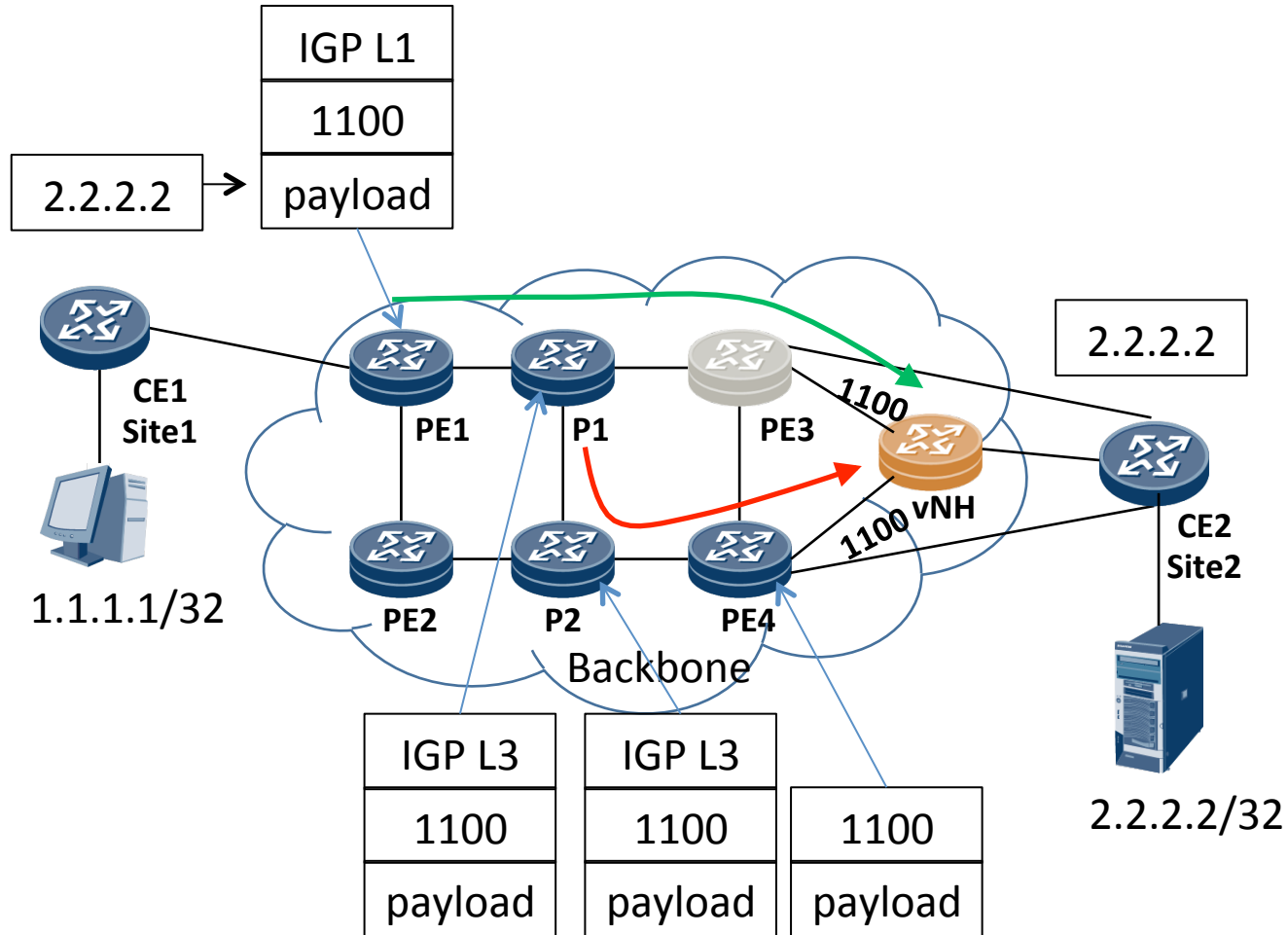
Leverage IGP FRR

- Suppose BGP/MPLS IP VPN uses LDP as the control protocol for label distribution.

- Tunnels are built based on IGP routes. The backup tunnel is computed according to LFA (Loop-Free Alternative) [RFC6571].

Example to walk through (normal case)

1.1.1.1/32

2.2.2.2/32
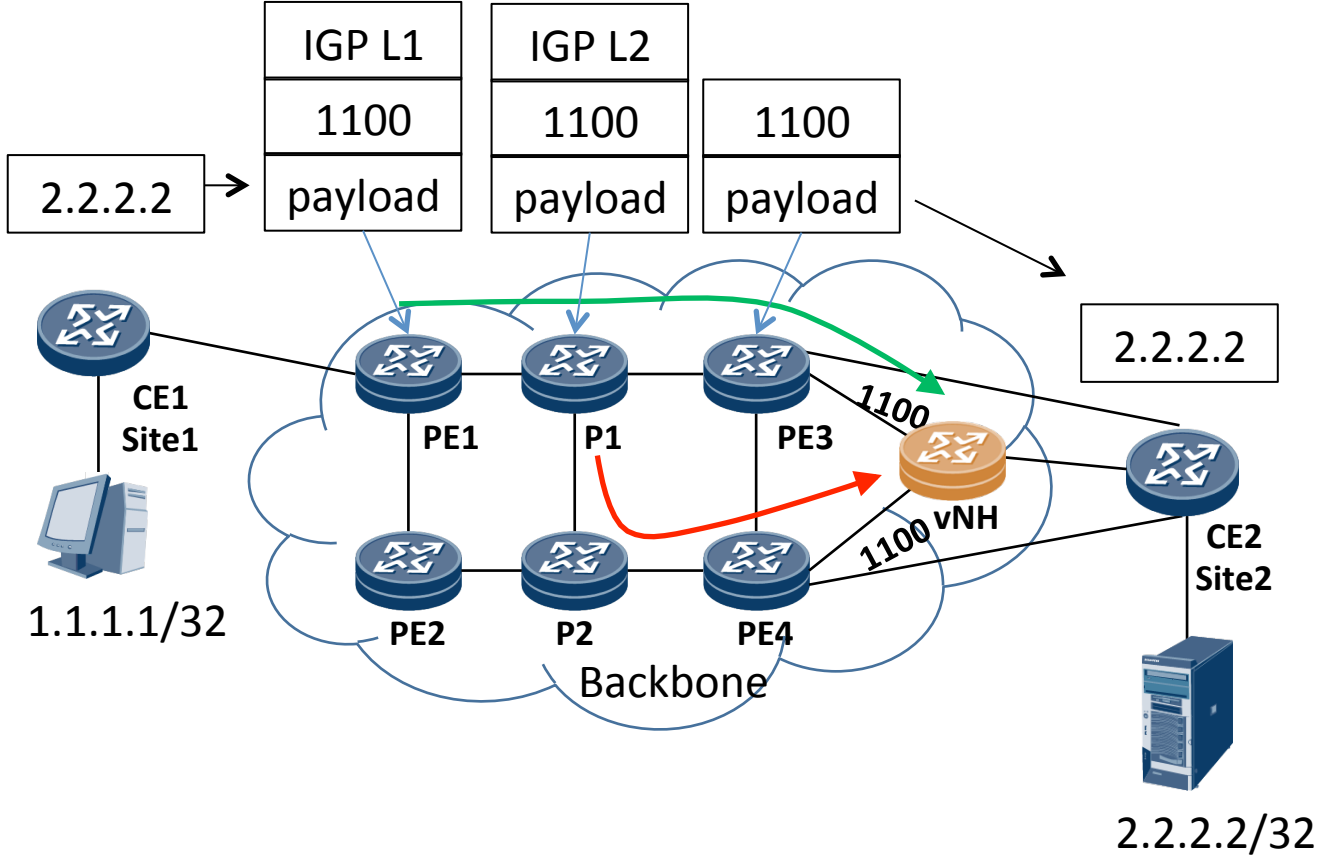
Example to walk through (PE3 fails)

Next steps

- Get directions from the WG.

- Comments are welcome.

- Ask for WG adoption based on feedbacks.

Thanks!