IPv4 NLRI with IPv6 NH
Use cases

https://datatracker.ietf.org/doc/draft-mishra-bess-ipv4nlri-ipv6nh-use-cases/

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April 28th 2020

With RFC 5549 NH encoding of IPv4 NLRI with IPv6 next hop, all "Core" & "Edge" peering can use a "single protocol only" on all peering, IPv6 AFI=2.

IPv4 AFI=1 Peering can be eliminated from all Enterprise and Service Provider networks.

BGP is a transport and so just as we stack SAFI's on an AFI on our PE-RR peering in a typical MPLS or SR environment, we can do the same with stacking both AFI=1 & AFI=2 capability onto a single IPv6 peer. So basically the IPv6 BGP peering has in the MP Reach capability exchange has advertised & received both AFI=1 & AFI=2 capabilities, and so now the IPv6 peer can advertise both IPv4 NLRI & IPV6 NLRI with IPv6 next hop as an IPv6 address as defined in RFC 5549.

****Softwire mesh framework RFC 5565 tunneling v6 over v4 transport data plane using RFC 5549 NH encoding over MPLS LDPv4 core**(VPN scenario)**

Typically in an Enterprise or Service provider Dual stacked customers edge environment over IPv4 MPLS "BGP free" core at the edge, we maintain the Dual stacked PE-CE IPv4 peering AFI/SAFI 1/1(IPV4) & 2/1 (IPV6). In the core PE-RR peering we have AFI/SAFI 1/128 (VPN-IPV4) 1/129 (MVPN) 2/128 (VPN-IPV6) 2/129 (MVPN).

Typically in an Enterprise Dual stacked customers edge environment over IPv4 MPLS "BGP free" core, where 6PE is used to connect IPv4 islands in the global table PE-CE routing, in the core we use PE-RR peering AFI/SAFI 1/1 and BGP-LU IPv6 labeled unicast AFI/SAFI 1/4.

With IPv4 address depletion issues with IXP's at their peering points which have come up in recent at NANOG 65 Montreal 2015, have proposed using RFC 5594 IPv4 NLRI encoding in IPv6 NH as a way to eliminate all IPv4 peering at the IXP POP's to save on address space as well as OPEX expenditure in maintaining both IPV4 & IPV6 peering.

Softwire mesh framework RFC 5565 tunneling v4 over v6 transport data plane using RFC 5549 NH encoding over MPLS LDPv6 or SRv6 core(VPN scenario)

With Enterprise or Service provider Dual stacked customers edge environment in Green & Brown field deployments of IPv6 transport Core using MPLS LDPv6 or SRv6 IPv6 data plane with “BGP free” core, we can now eliminate separate v4 & v6 peering so all SAFI related to AFI=1 can now be carried over AFI=2.

In the core PE-RR peering - AFI/SAFI 1/128 (VPN-IPV4) 1/129 (MVPN) would be eliminated and the IPv6 peering PE-RR already carrying IPv6 NLRI - 2/128 (VPN-IPV6) 2/129 (MVPN) would now carry as well 1/128 (VPN-IPV6) 1/129 (MVPN) per RFC 5549 IPv6 NH encoding.

At the PE-CE customer edge now AFI/SAFI 1/1 & 2/1 would now both be carried by the single one protocol IPv6 NH peering as defined in Softwire mesh framework with RFC 5549 IPv6 NH encoding.

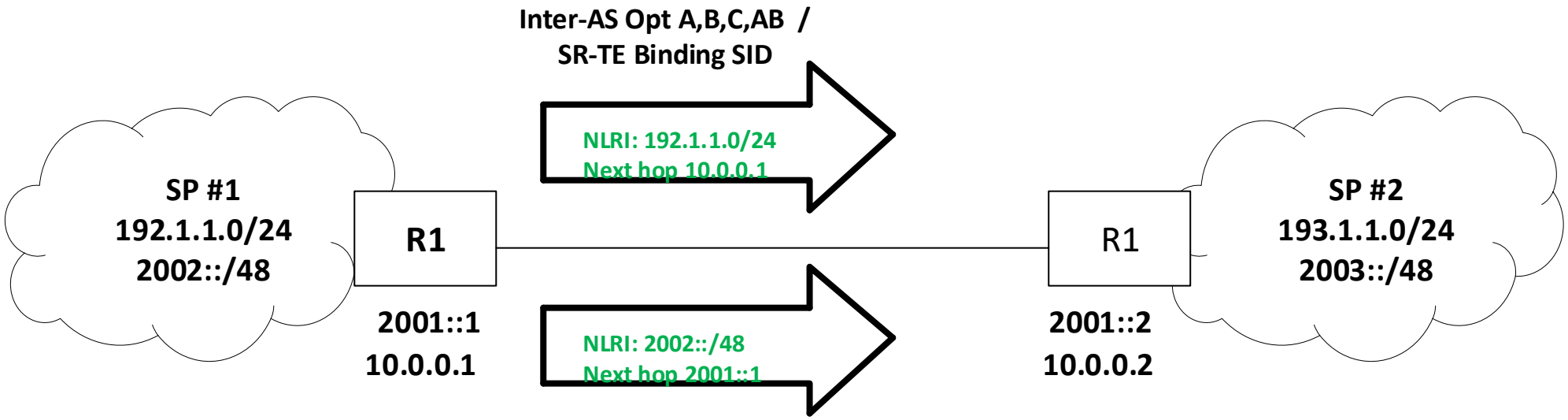
Softwire mesh framework RFC 5565 tunneling v4 over v6 transport data plane using RFC 5549 NH encoding over MPLS LDPv6 or SRv6 core(4PE scenario)

With Enterprise or Service provider Dual stacked customers edge environment in Green & Brown field deployments of IPv6 transport Core using MPLS LDPv6 or SRv6 IPv6 data plane with “BGP free” core, we can now eliminate separate v4 & v6 peering so all SAFI related to AFI=1 can now be carried over AFI=2.

In the core PE-RR peering – BGP-LU IPV4 labeled unicast (4PE) AFI/SAFI 1/4 to connect IPv4 islands over IPv6 core.

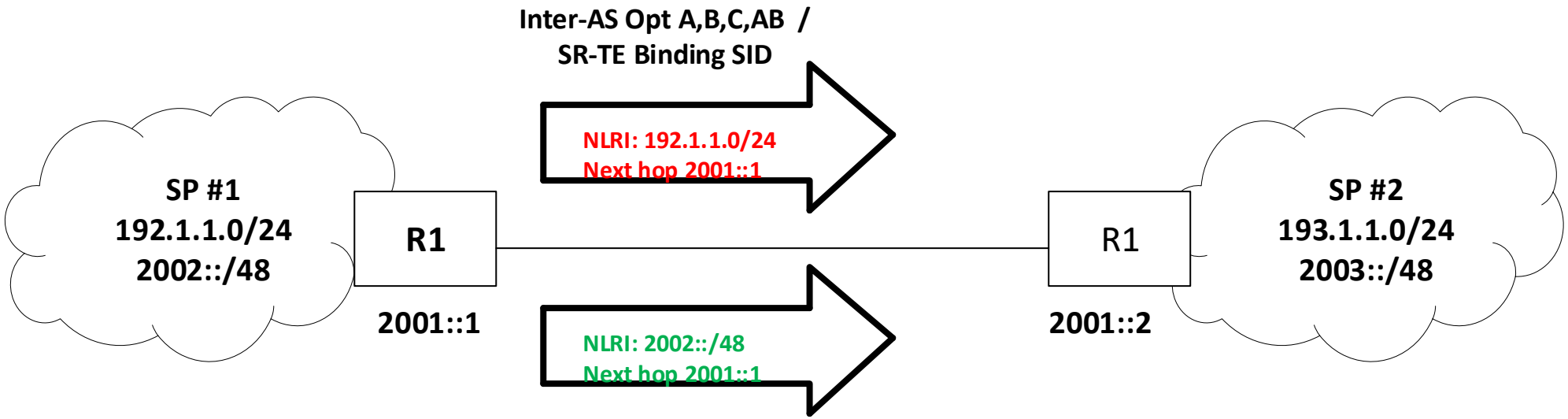
At the PE-CE customer edge now AFI/SAFI 1/1 & 2/1 would now both be carried by the single one protocol IPv6 NH peering as defined in Softwire mesh framework with RFC 5549 NH encoding.

IXP Peering has a separate IPv4 & IPv6 peer with IPv4 NH peer carrying IPv4 NLRI & IPv6 NH peer carrying IPv6 NLRI



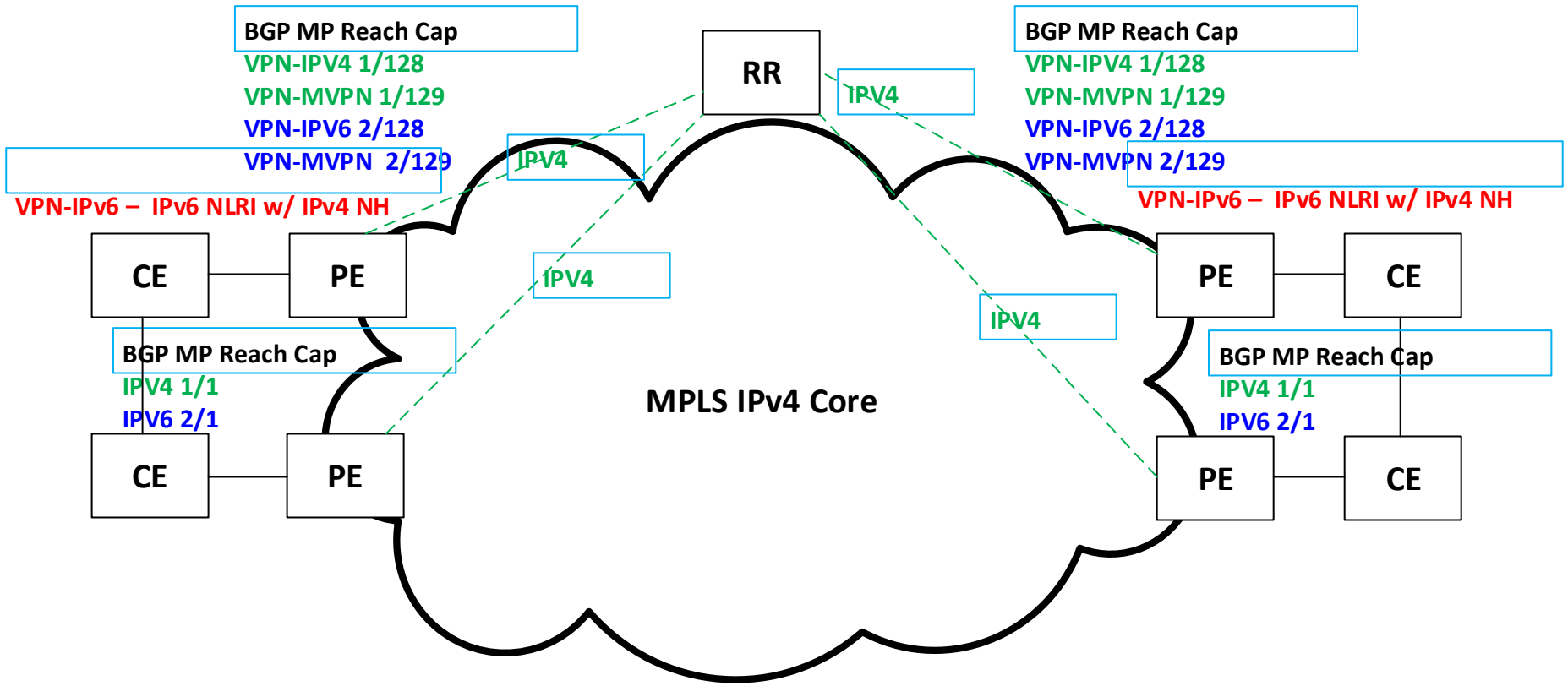
So now with RFC 5549 NH encoding schema of 16 / 32 byte IPv6 next hop both IPv4 & IPv6 NLRI can be advertised using a single IPv6 peer.

This basic concept can eliminate all IPv4 peering at the Edge and within the Core.

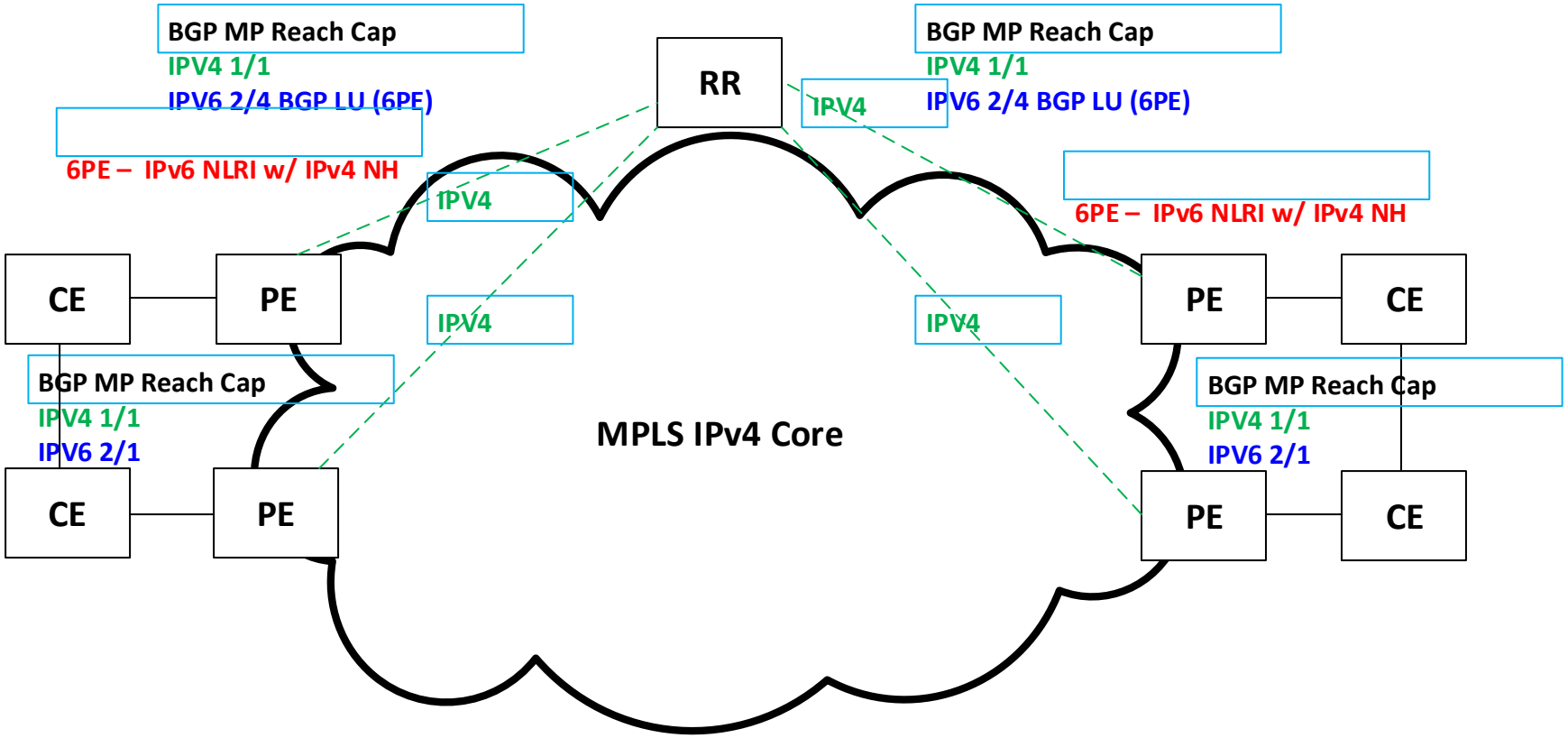


IXP Peering of all SPs would now be able to use a single IPv6 peer per SP adjacency

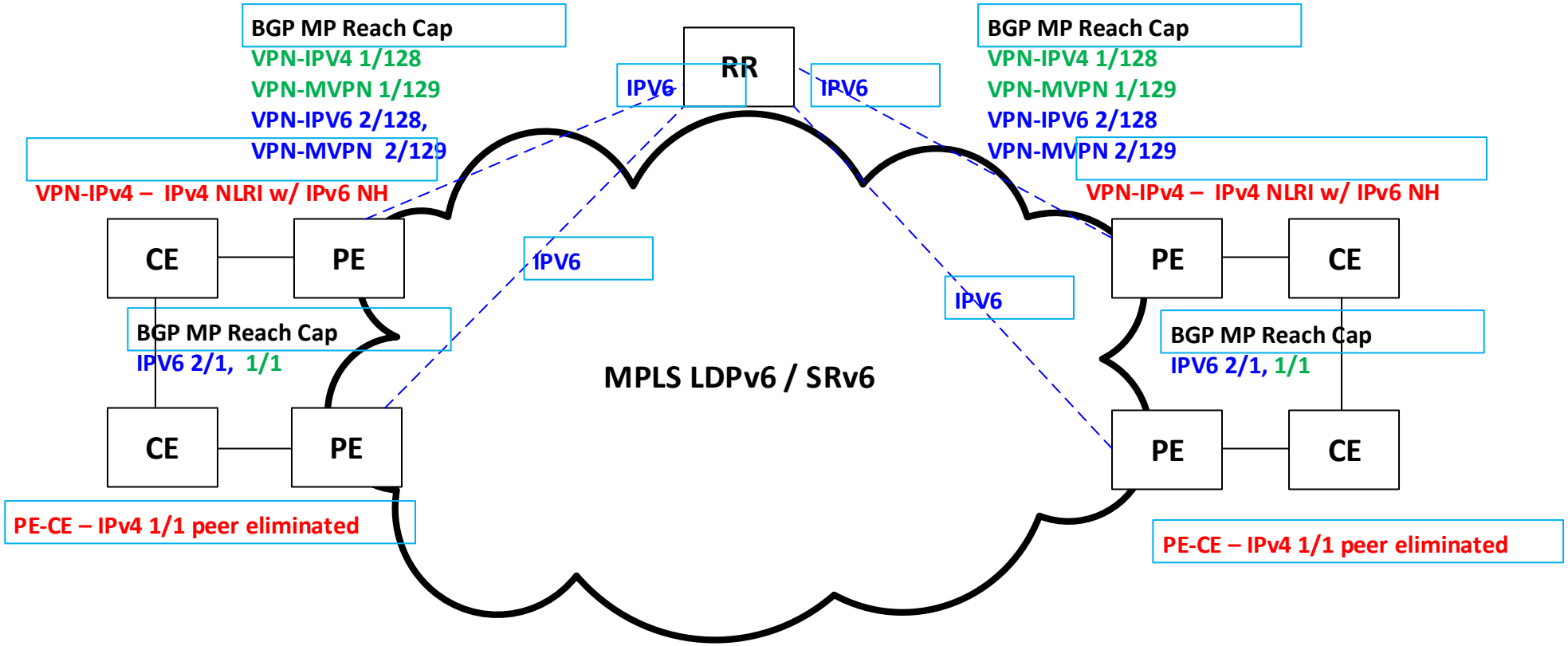
Typical MPLS IPv4 Core with Dual stacked Customers – (L3 VPN)



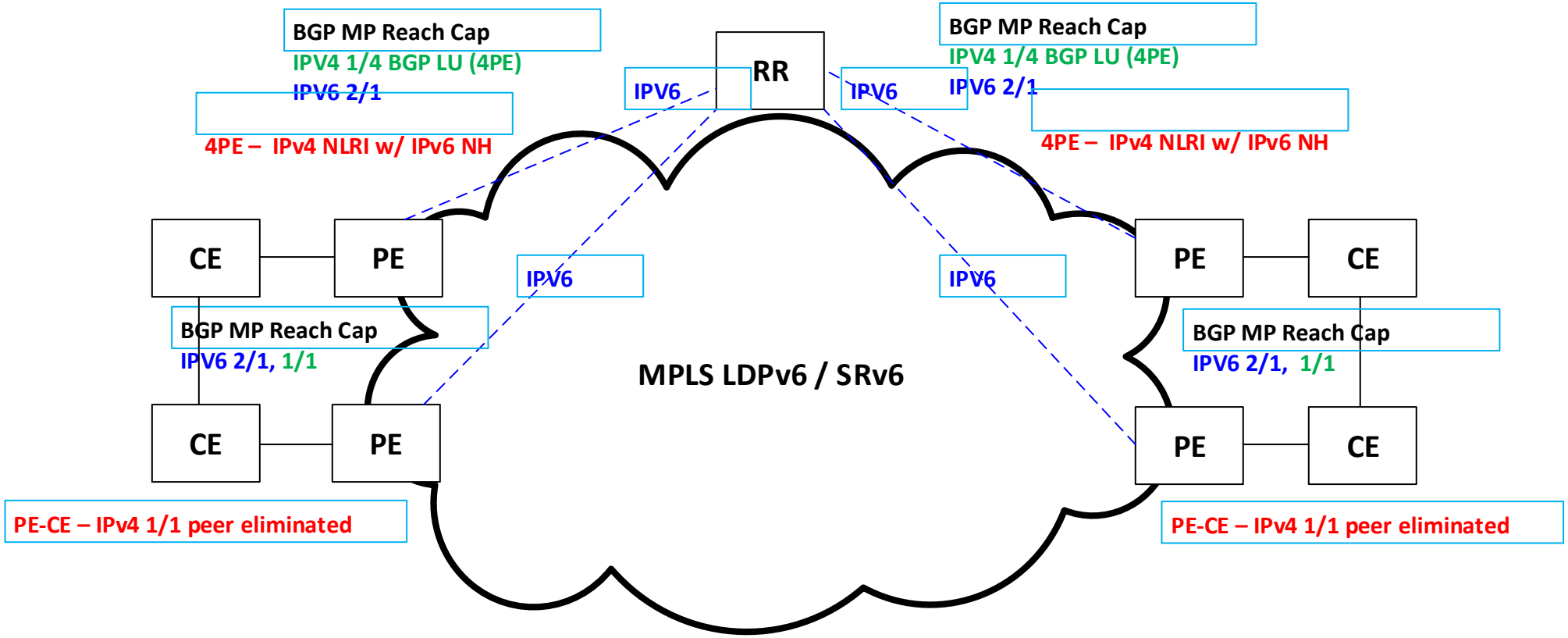
Typical MPLS IPv4 Core with Dual stacked Customers (6PE)



MPLS LDPv6 / SRv6 Core – Softwire mesh framework 4to6 (VPN)



MPLS LDPv6 / SRv6 Core – Softwire mesh framework 4to6 (4PE)




Q&A

THANK YOU