



Connect IPv4 Islands over IPv6 Core (4PE)

draft-mishra-idr-v4-islands-v6-core-4pe-08

IETF 121



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Motivation for 4PE Document

IETF standard exists for connecting IPv6 islands over an IPv4 core (**RFC 4798**), however a standard does **NOT exist** for connecting IPv4 islands over an IPv6 core.

This draft provides informational document for connecting **IPv4 islands over an IPv6 core**.

As operators migrate to a single protocol IPv6-Only core per RFC 5565 **Softwire Mesh Framework** which involves **6to4 tunnel** of IPv6 packets over an IPv4 core called “**6PE**”, and now with this draft **4to6 tunnel** of IPv4 packets over an IPv6 core now called “**4PE**”.

The name “**6PE**” termed to define the tunneling of **IPv6 labeled packets** over an **IPv4 core** and now the name “**4PE**” is termed to define the tunneling of **IPv4 labeled packets** over an **IPv6 core**.



Recap of 4PE

- 4PE routers exchange IPv4 reachability **transparently tunneled** over an IPv6 core using MP-BGP IPv6 RFC 2545 using the BGP next hop field to convey the IPv6 address of the 4PE router so that the dynamically established **IPv6 signaled MPLS LSP** can be utilized without explicit tunnel configuration. (**Signal Topmost transport label LSP**)
- 4PE uses RFC 8950 for the **16 or 32 byte next hop** encoding.
- Ingress & Egress 4PE routers have the option to **bind a label to all the IPv4 prefixes** per RFC 8277 BGP-LU, **2 Level label stack, single PE-PE LSP label with all customer prefixes unlabeled, per CE label table interface LSP with customer prefixes unlabeled.**
- 4PE provides a lot more flexibility to the network designers than its 6PE predecessor.
- 4PE design supports RFC 4364 Inter AS Option A, B, C, AB.
- 4PE design supports MPLS, SR-MPLS & SRv6 data planes.



Updates

- Chair review & comments have been integrated into the draft
- Clarified the problem being solved with this draft
- Made clear the 4PE solution
- Simplified all sections of the draft
- Simplified the SRv6 and SR-MPLS applicability sections
- Simplified all verbiage to make easier to follow

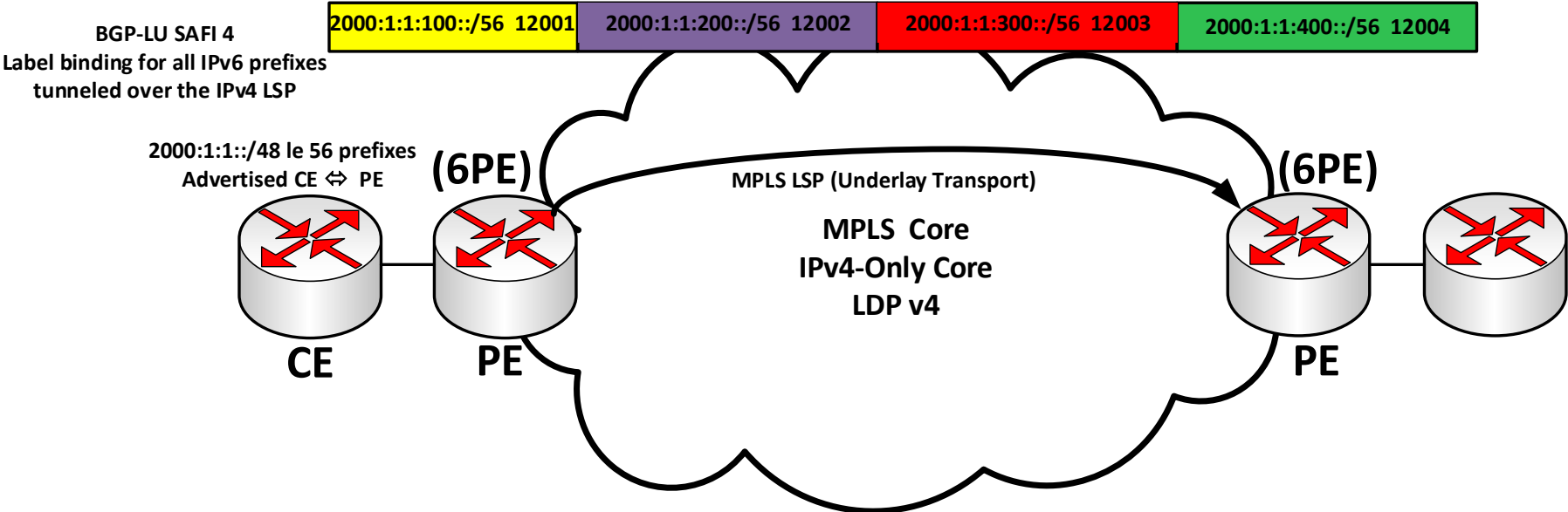


Ready for WG Adoption

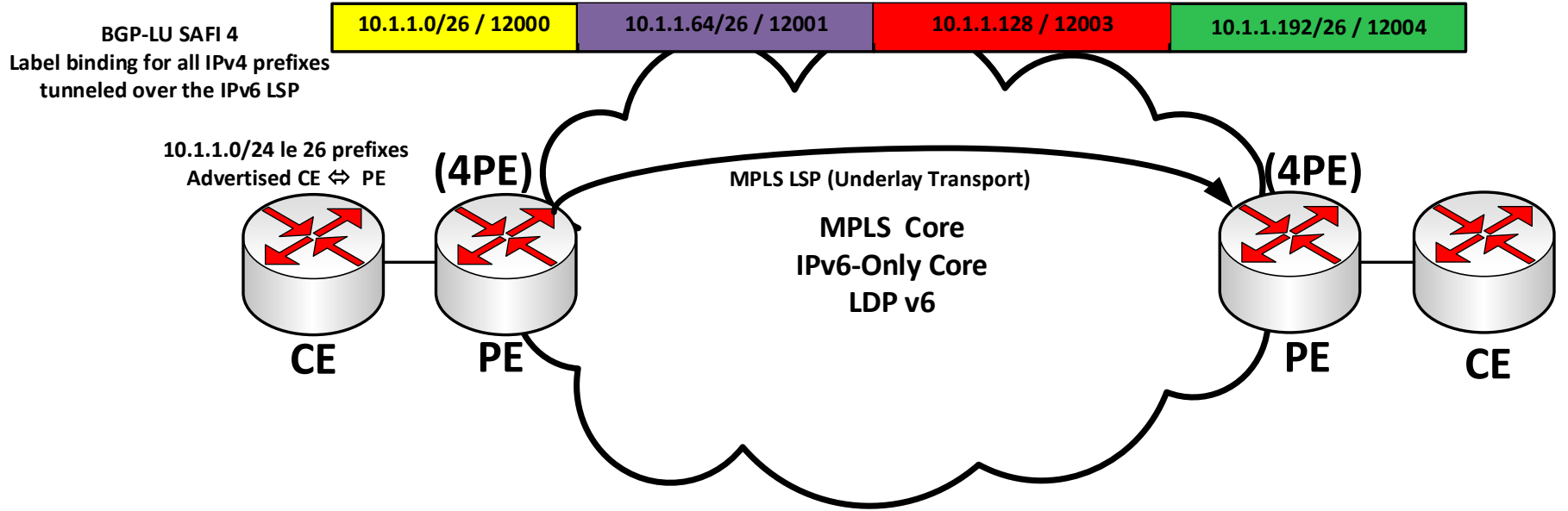
Thank You!



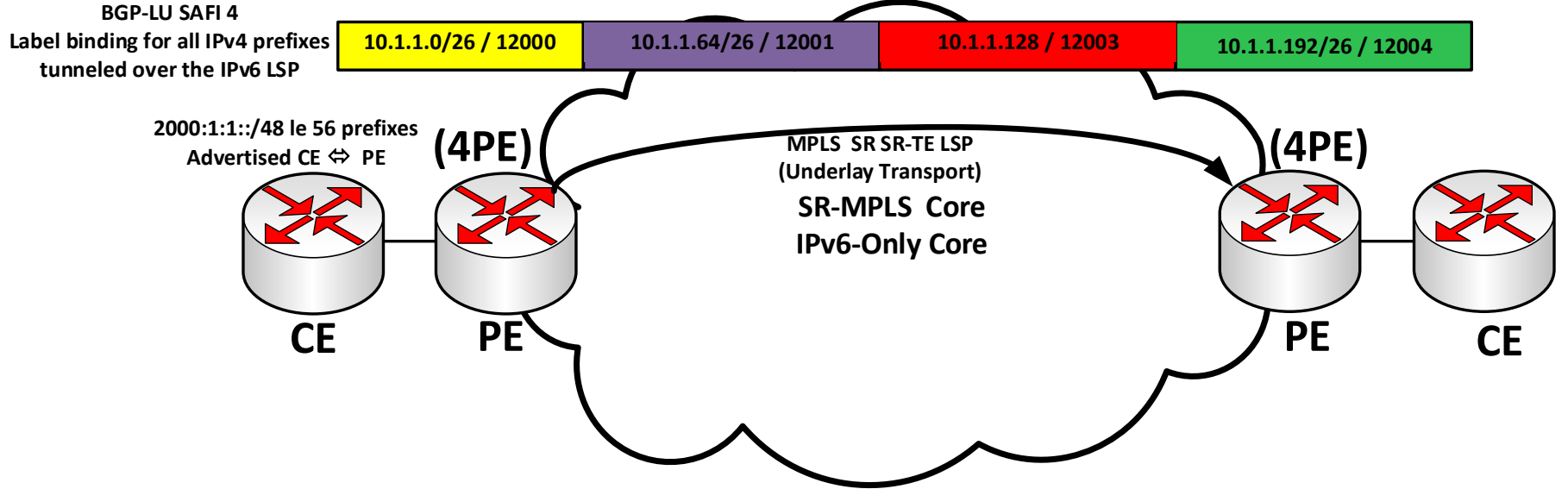
RFC 4798 –Connecting IPv6 islands over IPv4 MPLS using IPv6 Provider Edge Routers (6PE)



(4PE) –Connecting IPv4 islands over IPv6 MPLS using IPv4 Provider Edge Routers



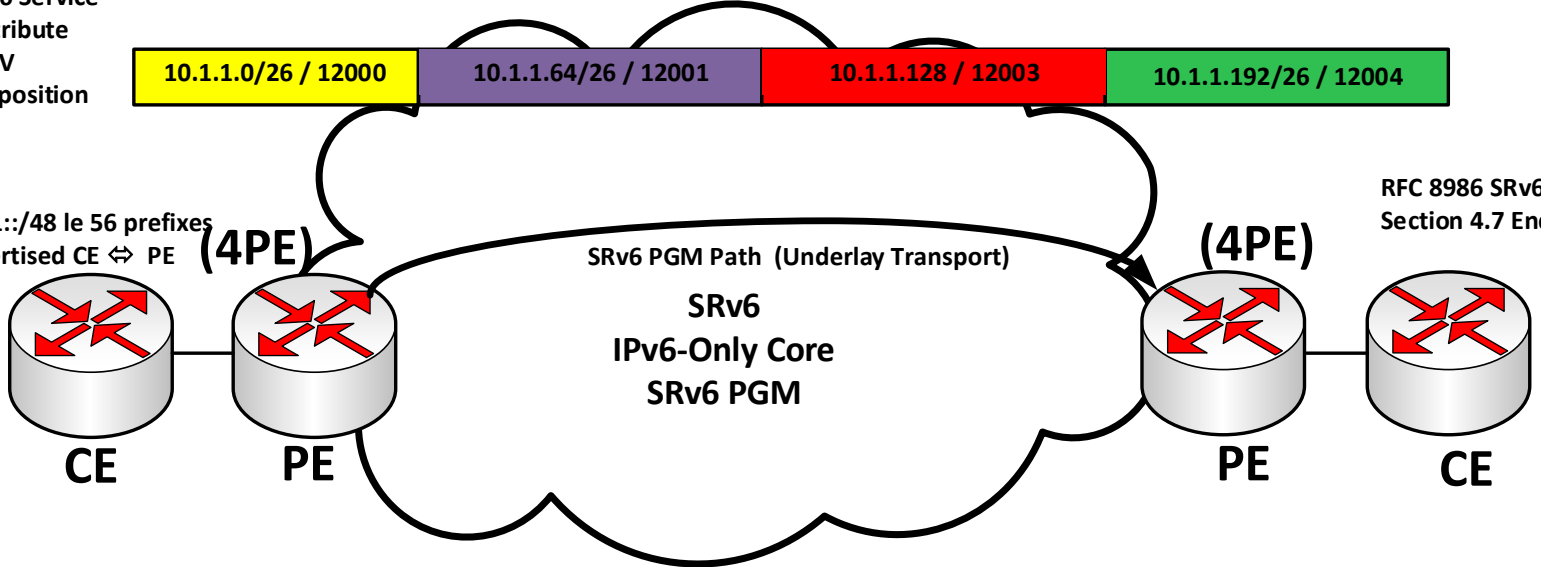
(4PE) –Connecting IPv4 islands over IPv6 SR-MPLS using IPv4 Provider Edge Routers



(4PE) –Connecting IPv4 islands over IPv6 SR-MPLS using IPv4 Provider Edge Routers

RFC 9252 BGP SRv6 Service
BGP Prefix-SID Attribute
SRv6 L3 Service TLV
MPLS labels Transposition
to Func/Arg
Section 5.3

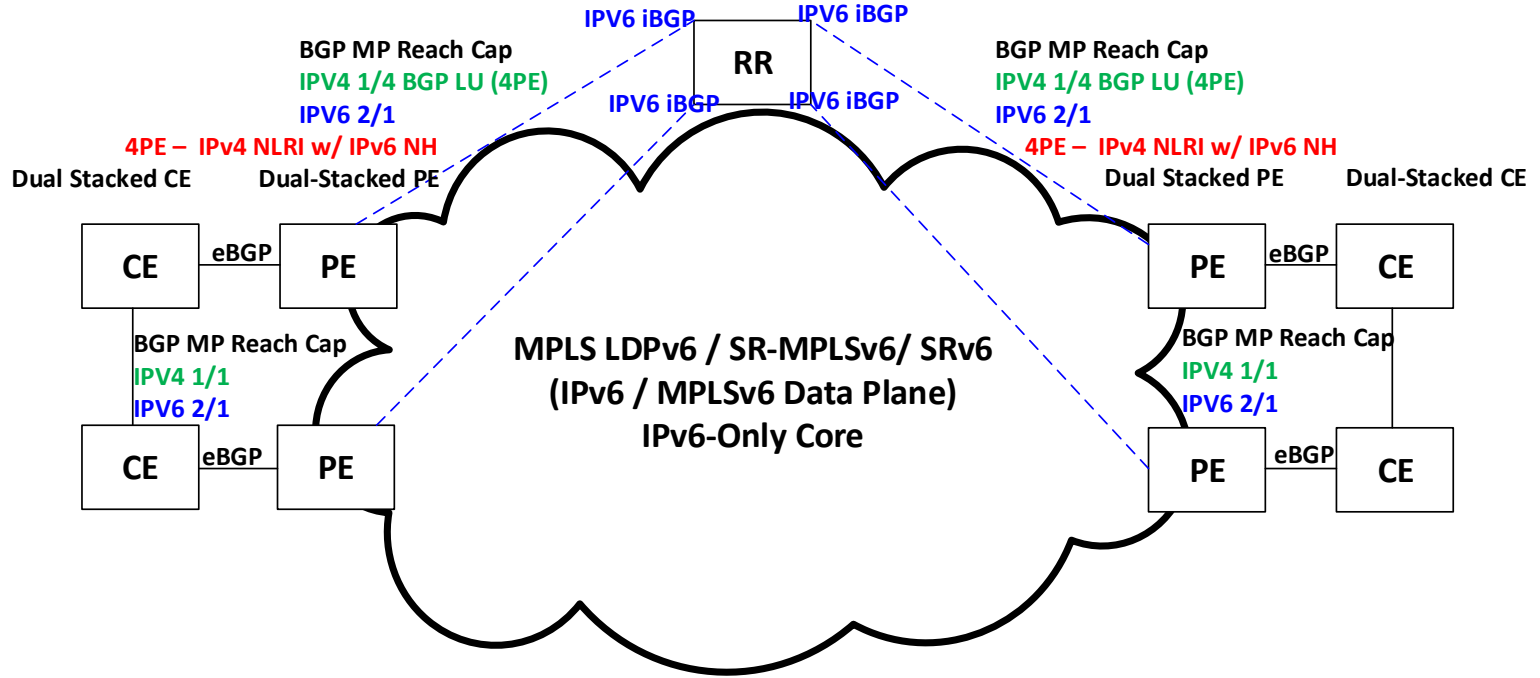
2000:1:1::/48 le 56 prefixes
Advertised CE ↔ PE



RFC 8986 SRv6 PGM
Section 4.7 End.DT4

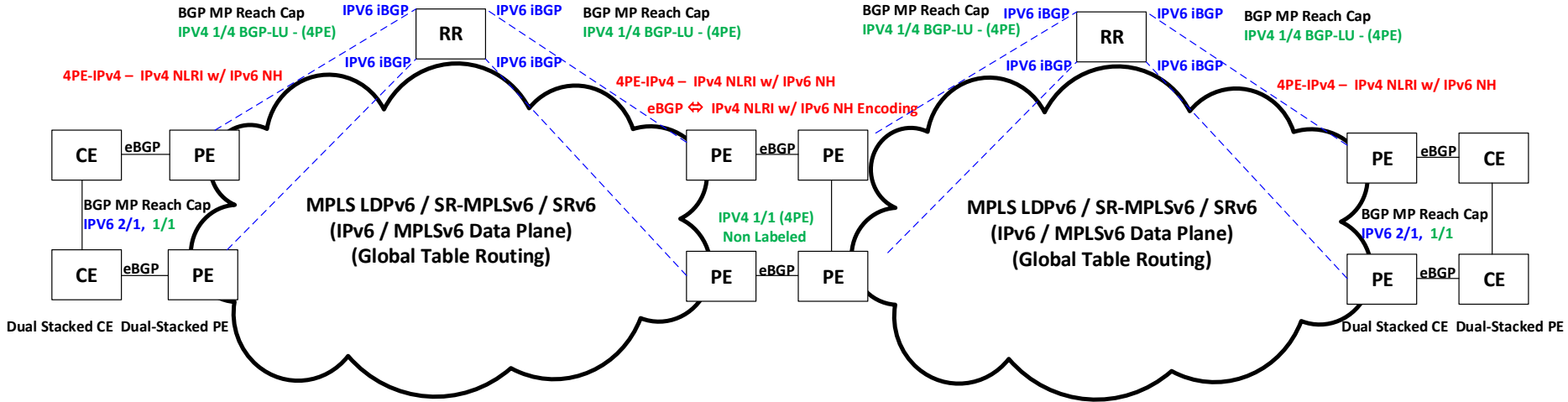
(4PE) –Control Plane & Data Plane Intra-AS

MPLS LDPv6 / SR-MPLSv6 / SRv6 – Software Mesh Framework 4to6 (4PE)
(4PE Control Plane)
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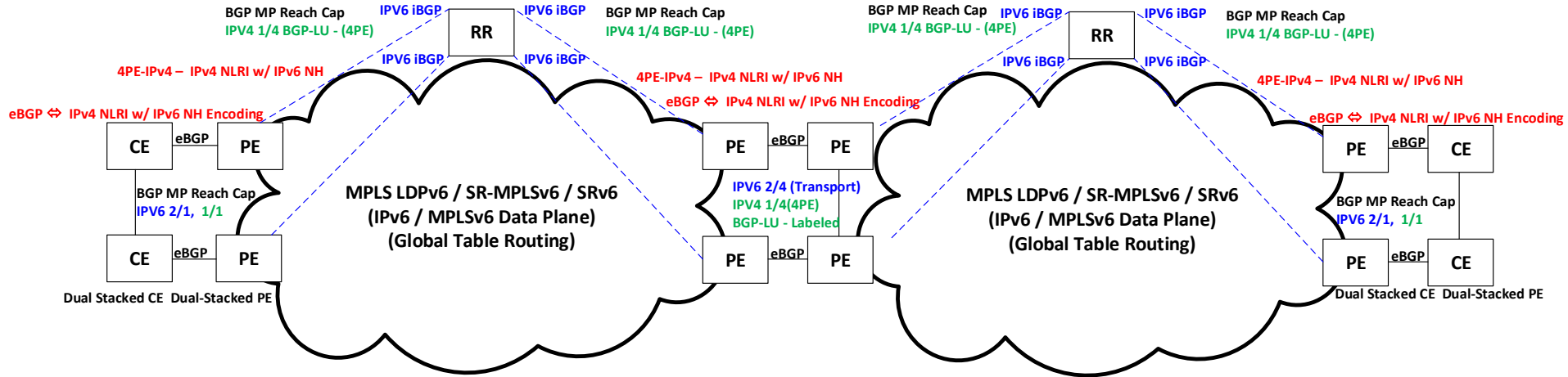
(4PE) –Control Plane & Data Plane Inter-AS Option A Procedure

(4PE) - Inter-AS Option A



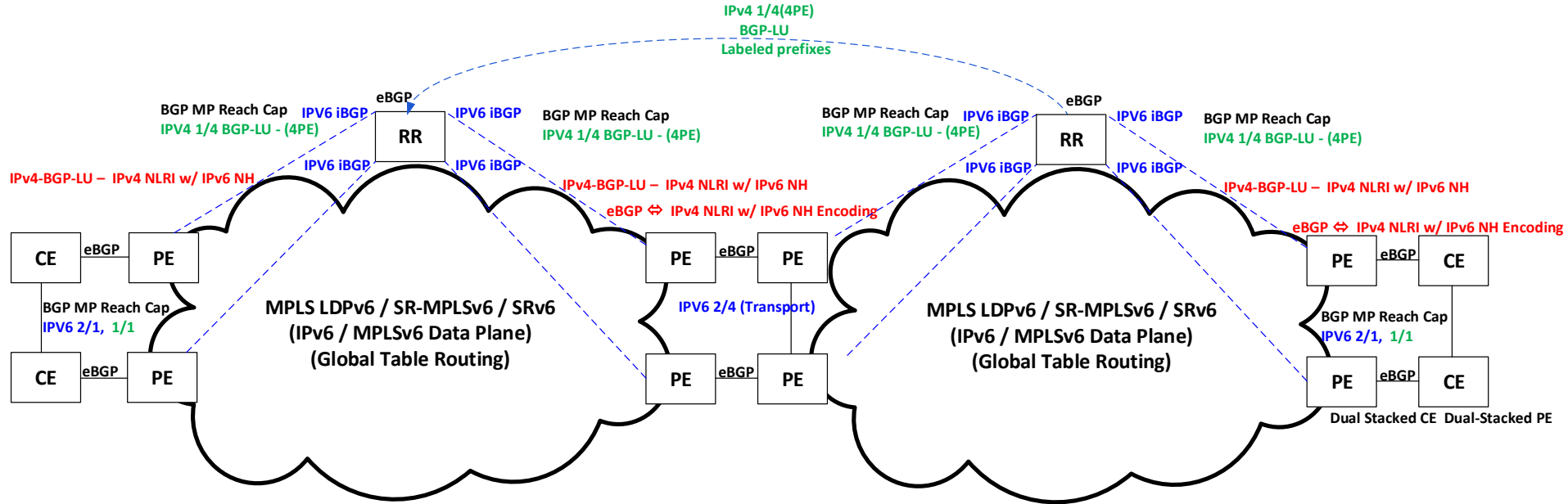
(4PE) –Control Plane & Data Plane Inter-AS Option B Procedure

(4PE) - Inter-AS Option B



(4PE) –Control Plane & Data Plane Inter-AS Option C Procedure

(4PE) - Inter-AS Option C



(4PE) –Control Plane & Data Plane Inter-AS Option AB Procedure

4PE - Inter-AS Option AB (Same as Opt B)

