E-TREE Requirements and Solution space

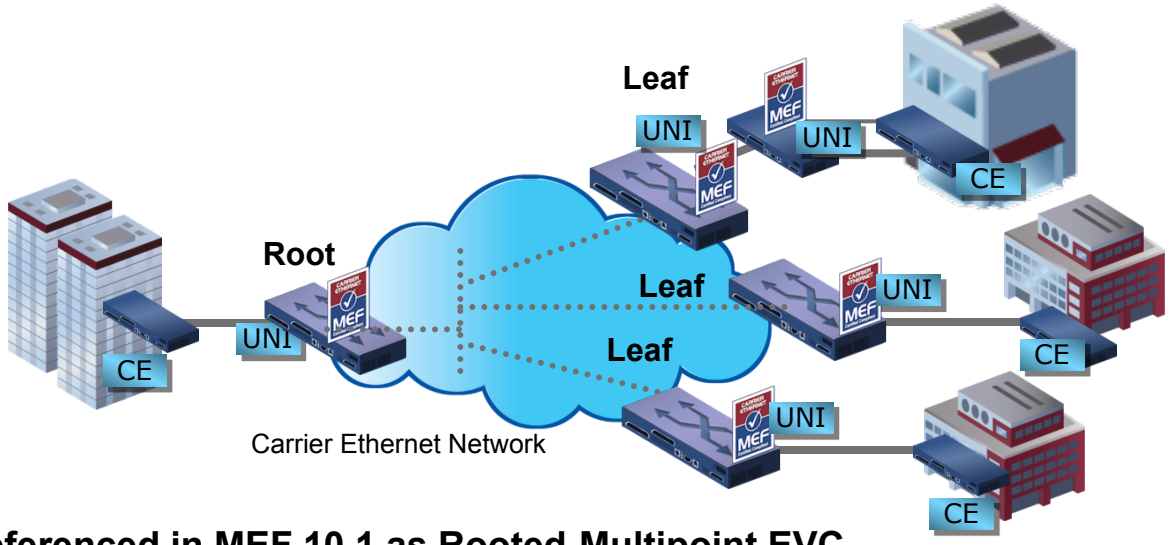
Jim Uttaro (uttaro@att.com)

Nick Delregno (nick.delregno@verizon.com)

Florin Balus (florin.balus@alcatel-lucent.com)

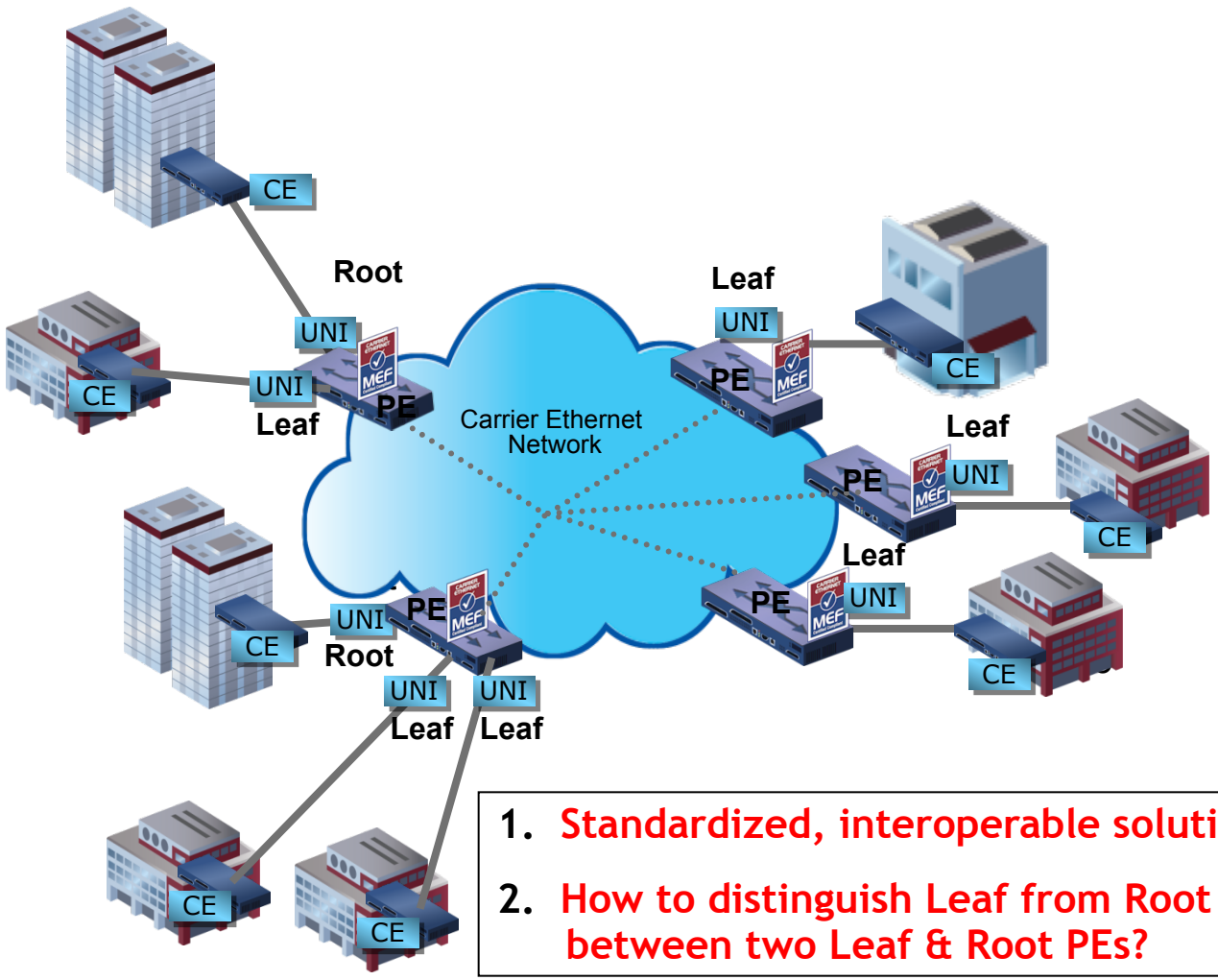
Services Using E-Tree Service Type

- **Ethernet Private Tree (EP-Tree) and Ethernet Virtual Private Tree (EVP-Tree) Services**
  - Enables Point-to-Multipoint Services with less provisioning than typical hub and spoke configuration using E-Lines
    - Provides traffic separation between users with traffic from one “leaf” being allowed to arrive at one of more “Roots” but never being transmitted to other “leaves”



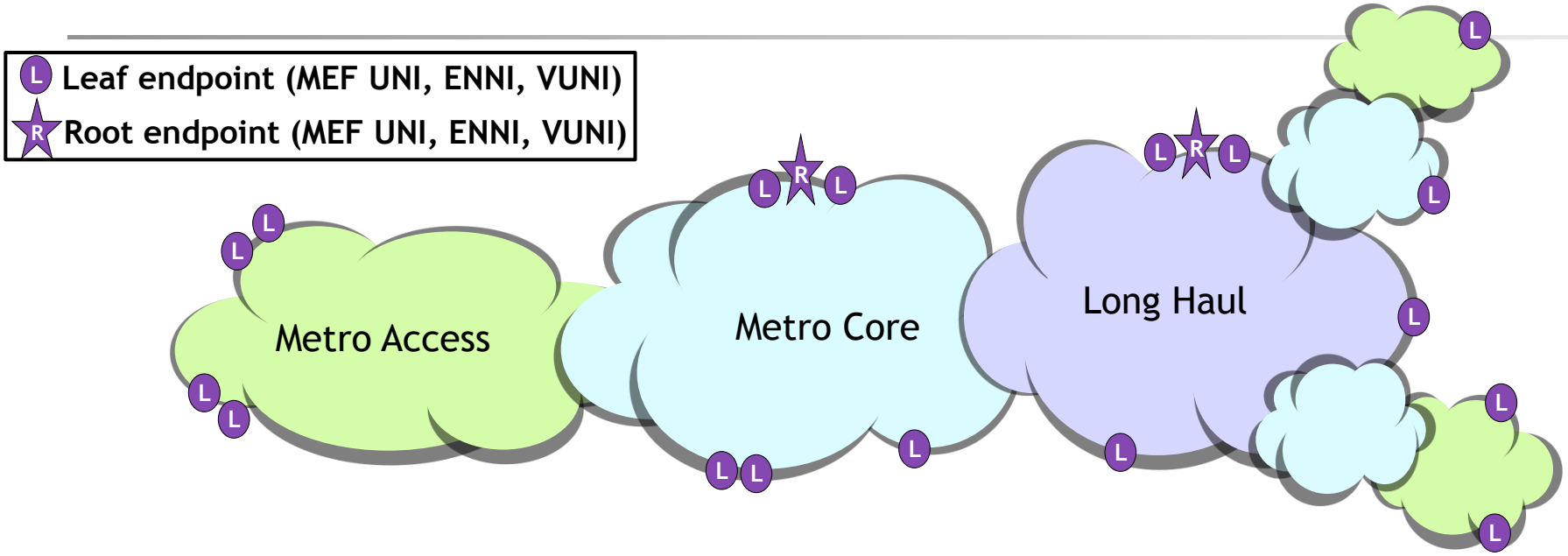
E-Tree is referenced in MEF 10.1 as Rooted-Multipoint EVC

E-TREE challenges



1. Standardized, interoperable solution for all traffic types?
2. How to distinguish Leaf from Root originated traffic between two Leaf & Root PEs?

E-Tree many scenarios: multiple technologies combined across different domains



Domains	Metro Access/Aggregation	Metro Core	Long Haul (WAN)
Possible Technologies	Native Ethernet (PB/PBB) or VPLS/PBB-VPLS (LDP/BGP)	Native Ethernet (PBB) or VPLS/PBB-VPLS (LDP/BGP)	VPLS/PBB-VPLS (LDP/BGP)
Use Case example 1	Native Ethernet PB (QinQ)	Native Ethernet (PBB)	PBB-VPLS (LDP)
Use Case example 2	Native Ethernet PB	VPLS (LDP)	
Use Case example 3	Native Ethernet PB	VPLS (BGP)	
Use Case example 4	VPLS (LDP)		VPLS (BGP)

Available technologies

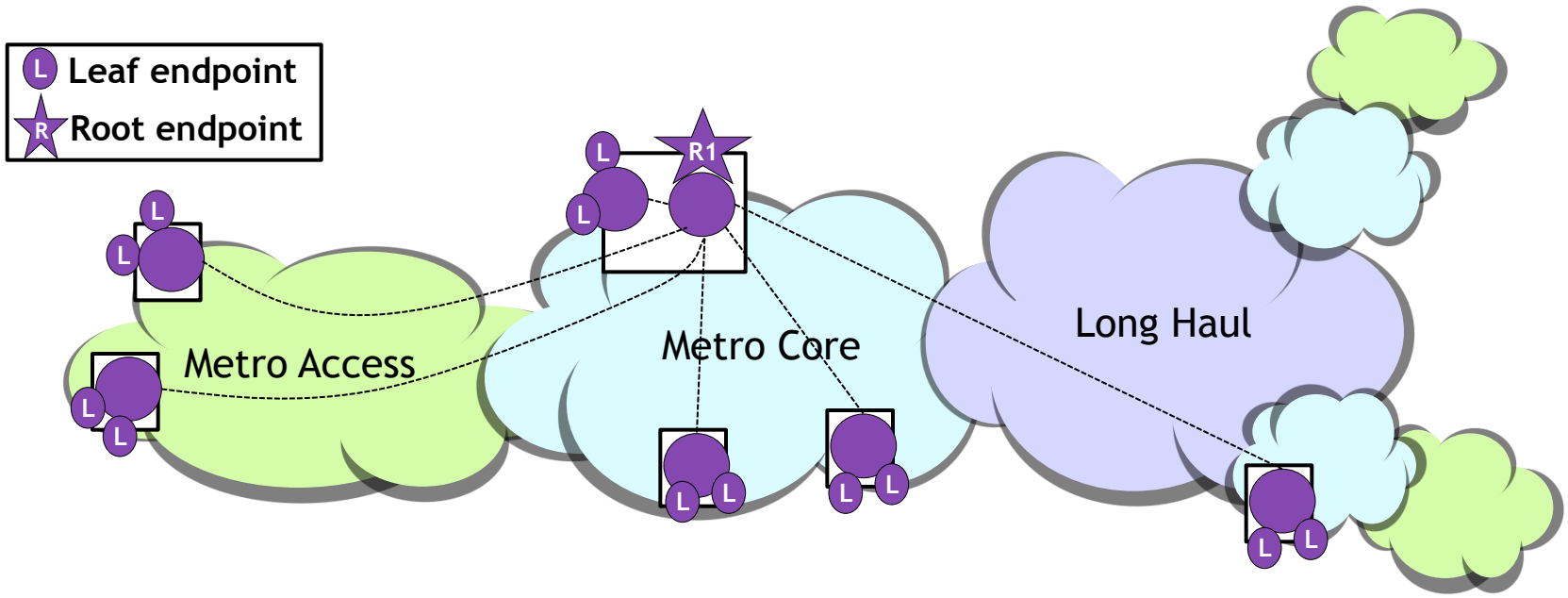
Service Data Plane

- Ethernet switching common across technologies
- QinQ SVIDs, PBB ISIDs and/or VPLS PWs as Carrier service infrastructure

Control Plane used for setting up the Service Infrastructure

- BGP - BGP VPLS or LDP VPLS with BGP-AD
- LDP - LDP VPLS with no BGP-AD
- Native Ethernet – e.g. MRP, SPB/SPBB

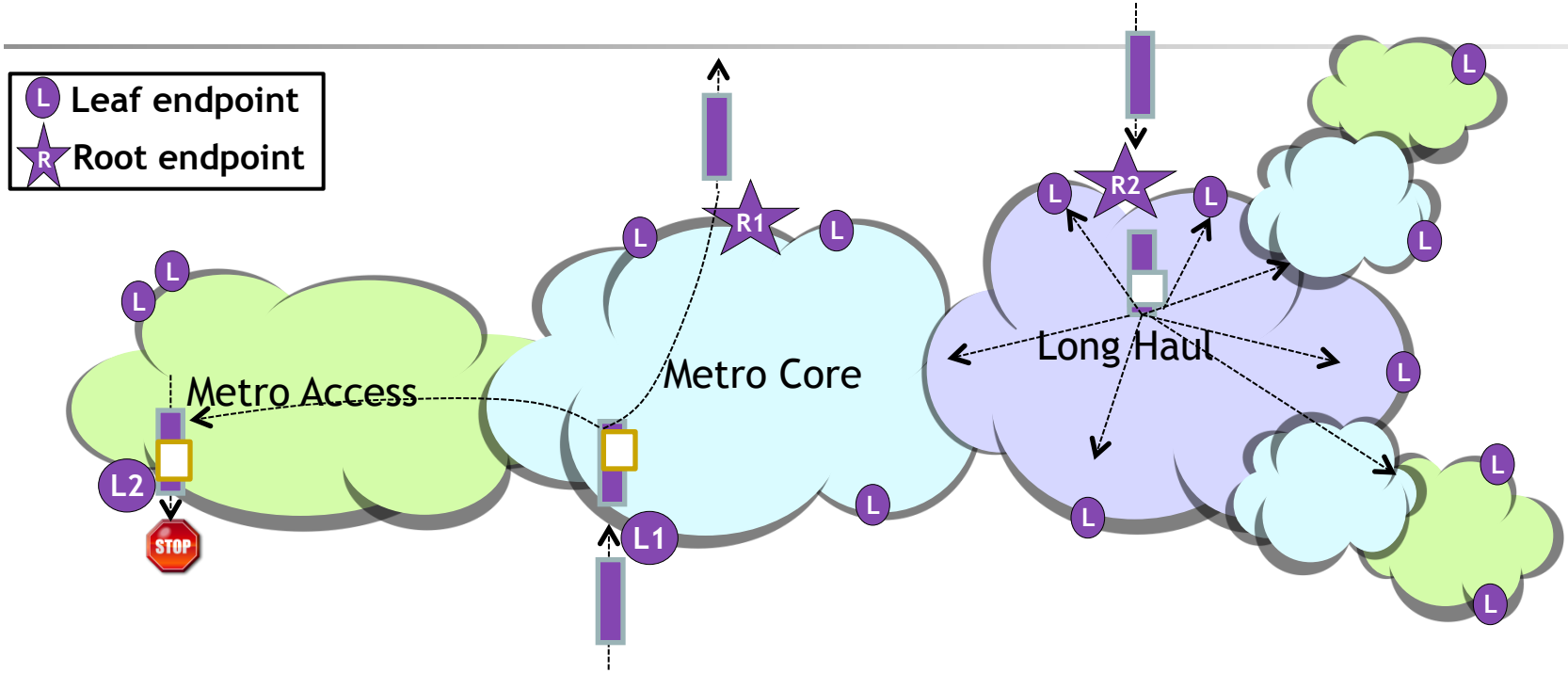
E-Tree solution option 1 – Control the PW topology



Do not build PW infrastructure between Leaf PEs (no PWs between Leaf VSIs)

- **Control the PW topology, potentially using BGP RTs**
- **BGP RT approach used already in L3 VPNs for similar functions**

E-Tree solution option 2 – use Root/Leaf Tag to filter traffic between Leaf endpoints

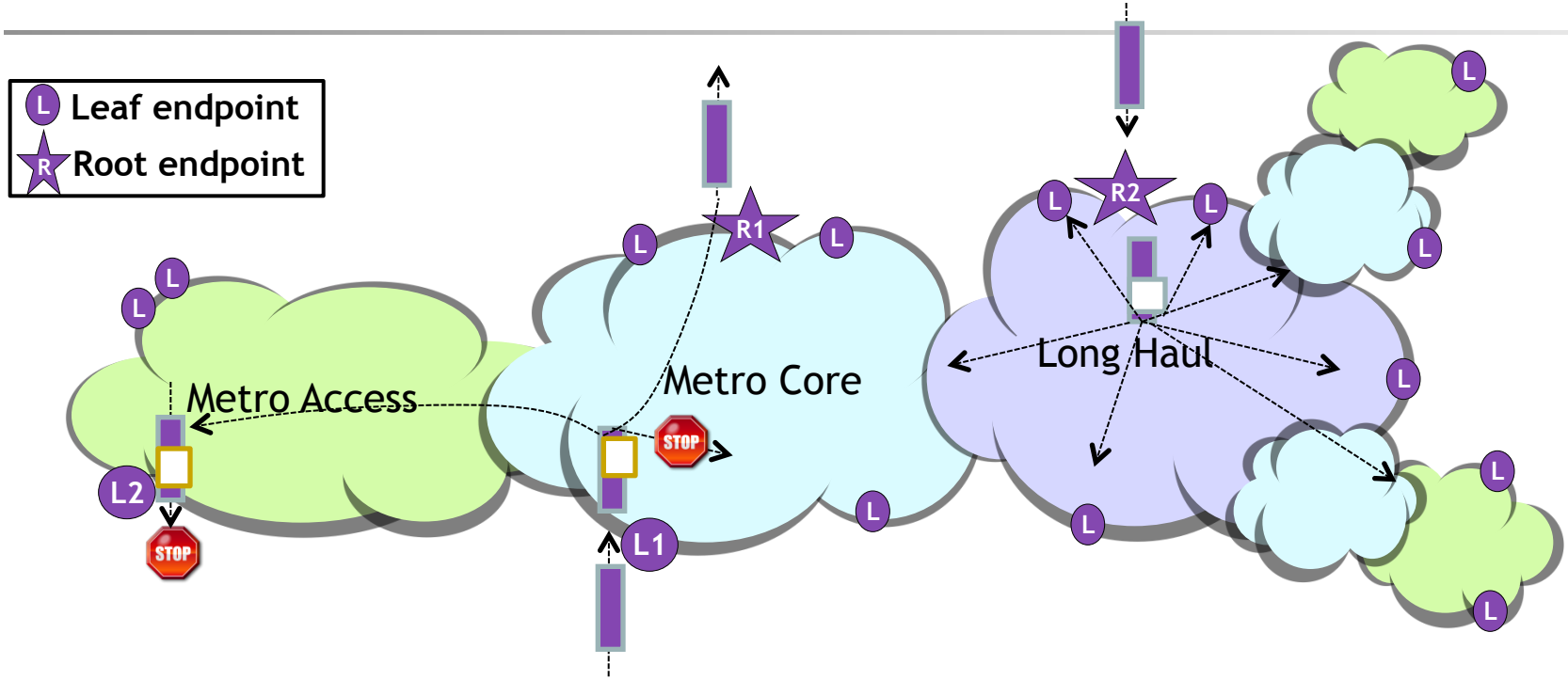


Tag traffic differently depending on the entry endpoint in the service

- **If incoming on a leaf endpoint** - add tag L, see example L1
- **If incoming on a root endpoint** - add tag R, traffic distributed everywhere, see example R2

Do not send traffic marked with tag L out on leaf endpoints, see example L2

E-Tree solution option 2 – use Root/Leaf Tag to filter traffic between Leaf endpoints



What can be used as R/L tag?

Option 2a. Use the PW information - CW bit (proposal discussed in IETF)

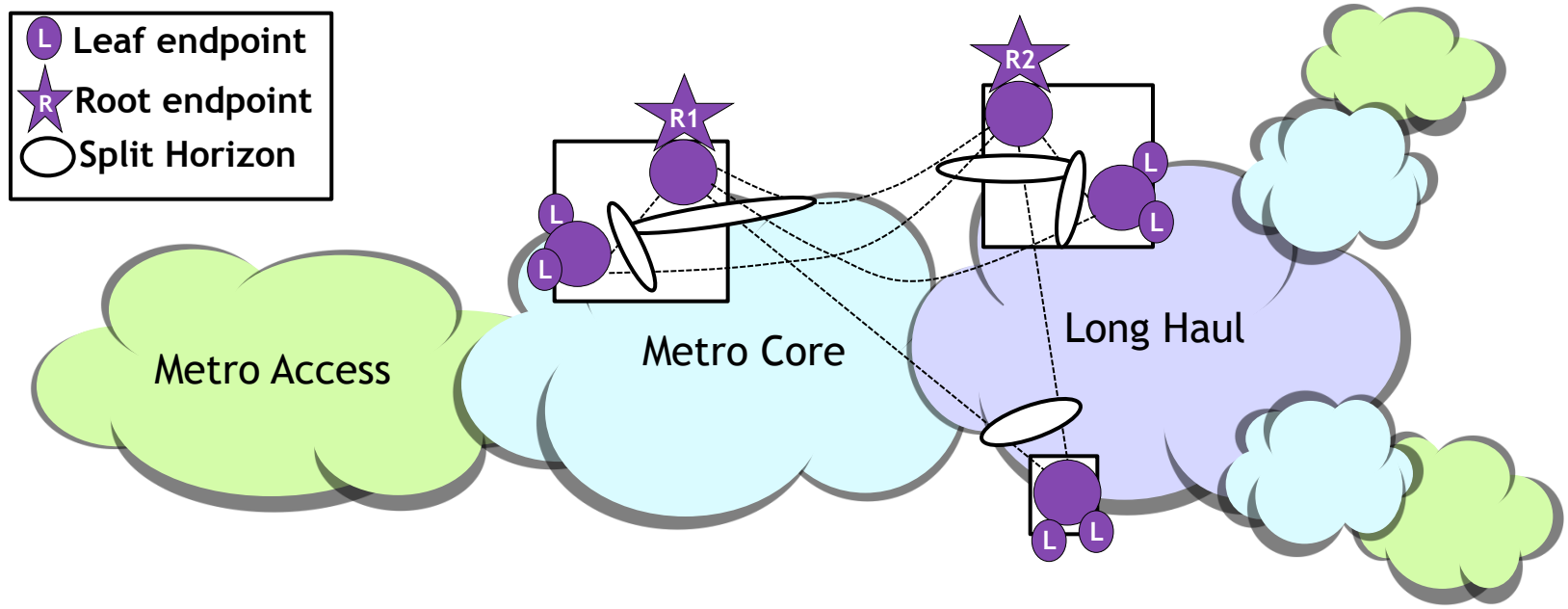
Option 2b. Use a field from the Ethernet header - VLAN (proposals discussed in IEEE, ITU-T)

Option 2a or 2b can be combined with Option 1 where available

Comparison of possible ETREE solutions

Proposed solutions	Pros	Cons
Option 1: Control PW topology	Minimal/no standard work No tag required	No support for native Ethernet (PW-only) No support for PBB-VPLS M:1 model (requires dedicated B-VPLS per service) May require standard work in L2VPN
Option 2a: PW CW bit	No overhead, re-using existing CW bit May re-use Option 1 as a complementary mechanism where available to optimize BW usage	No support for native Ethernet Challenges supporting PBB-VPLS M:1 model (requires dedicated B-VPLS per service) Requires standard work in L2VPN
Option 2b: VLAN-tag (IEEE/ITU-T)	Common for all technologies No need for interworking at gateways Supported across technologies May re-use Option 1 as a complementary mechanism where available to optimize BW usage	May require 4 bytes overhead if additional SP VLAN is inserted Requires standard work in IEEE

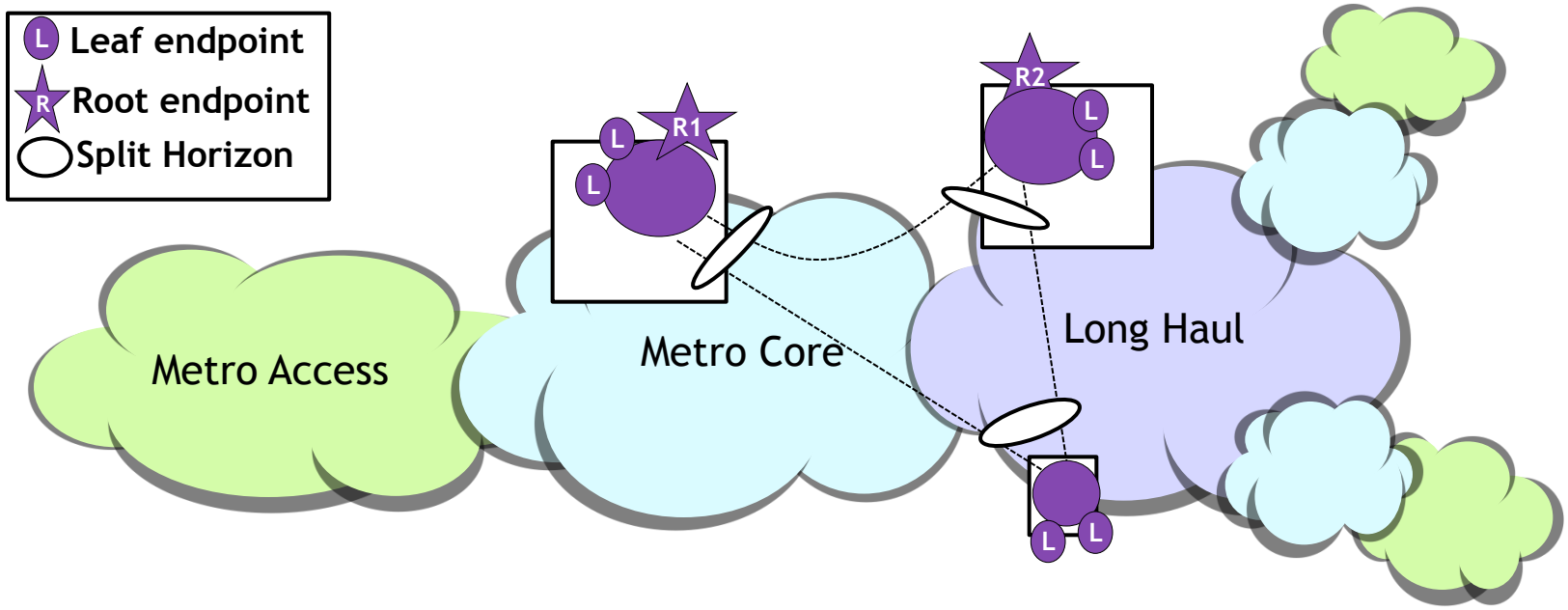
E-Tree solution for 2 (Leaf + Root) PEs using only option 1 (PW only environment)



Do not build PW infrastructure between Leaf PEs (no PWs between Leaf VSIs)

- **Control the PW topology, potentially using BGP RTs**
- **Split Horizon Groups are required to prevent loops**

E-Tree solution for 2 (Leaf + Root) PEs using option 1 + option 2b



Option 1: Do not build PW infrastructure between Leaf PEs (no PWs between Leaf VSIs)

Option 2b: Use VLAN Tag to simplify the PW topology and to support native Ethernet

To discuss

- Is IEEE proposed solution (Option 2b, VLAN-based tag) acceptable as a baseline?
  - If it is then we do not need multiple data plane based solutions
  - If not should L2VPN do a separate solution? Or should we just send a liaison to IEEE explaining L2VPN position?
- What kind of optimizations are required more than Option 1?
  - Do we need any L2VPN work here?
- Need to keep the number of ETREE solutions to common and minimal set
  - Avoid duplication and/or multiple solutions where possible.