

Trusted VPN Technologies

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Trusted VPNs

- What are trusted VPNs?
- Why choose a trusted VPN service?
- How do they work?

What are trusted VPNs?

- Virtual Private Network for which the topology and traffic flow is provisioned and maintained by the service provider.
- Trusted VPN == service
- Also known as provider provisioned VPNs
 - network based VPN vs CPE based VPN
- IETF working group – PPVPN

VPN terms

- P router – provider core router
- PE router – provider edge router, terminates customer connections
- CE router – customer edge router, sometimes referred to as CPE (customer premise equipment)
- PE-CE routing protocol – dynamic routing protocol used to carry routing information to/from the customer network
- PE-CE link – the customers connection to the provider (leased line, metro Ethernet, etc)

MPLS terms

- LSP – label switch path, connection oriented path through the network on which traffic travels
- Traffic Engineering – provisioning paths through the network to achieve specific SLA metrics
- RSVP-TE – MPLS signaling protocol used to create Traffic Engineered LSPs

Traditional “trusted VPN” technologies

- Leased lines
- Frame Relay
- ATM

State of the industry trusted VPN technologies

- Layer 2 over MPLS
 - Point-to-point (Martini)
 - ATM (AAL0 or AAL5)
 - Frame Relay
 - Ethernet
 - PPP
 - Multipoint-to-point (VPLS)
 - Ethernet only
- Layer 3 over MPLS
 - MPLS BGP VPNs (RFC2547bis)

Why choose trusted VPNs?

- Less
 - setup time
 - maintenance time
 - trouble shooting time
- More
 - statistics - traffic and uptime
 - SLA guarantees
 - flexibility

How do traditional “trusted VPNs” work?

- Large switching fabric which is separate from voice and Internet networks
- Point-to-point connections provisioned via proprietary provisioning system
- All customer traffic flows over same network

How do L2 trusted VPNs work?

- Provider must have PE-to-PE LSPs
 - signaled via RSVP-TE or LDP
- PE-CE interface is assigned only to the L2 VPN
- L2 VPN signaling

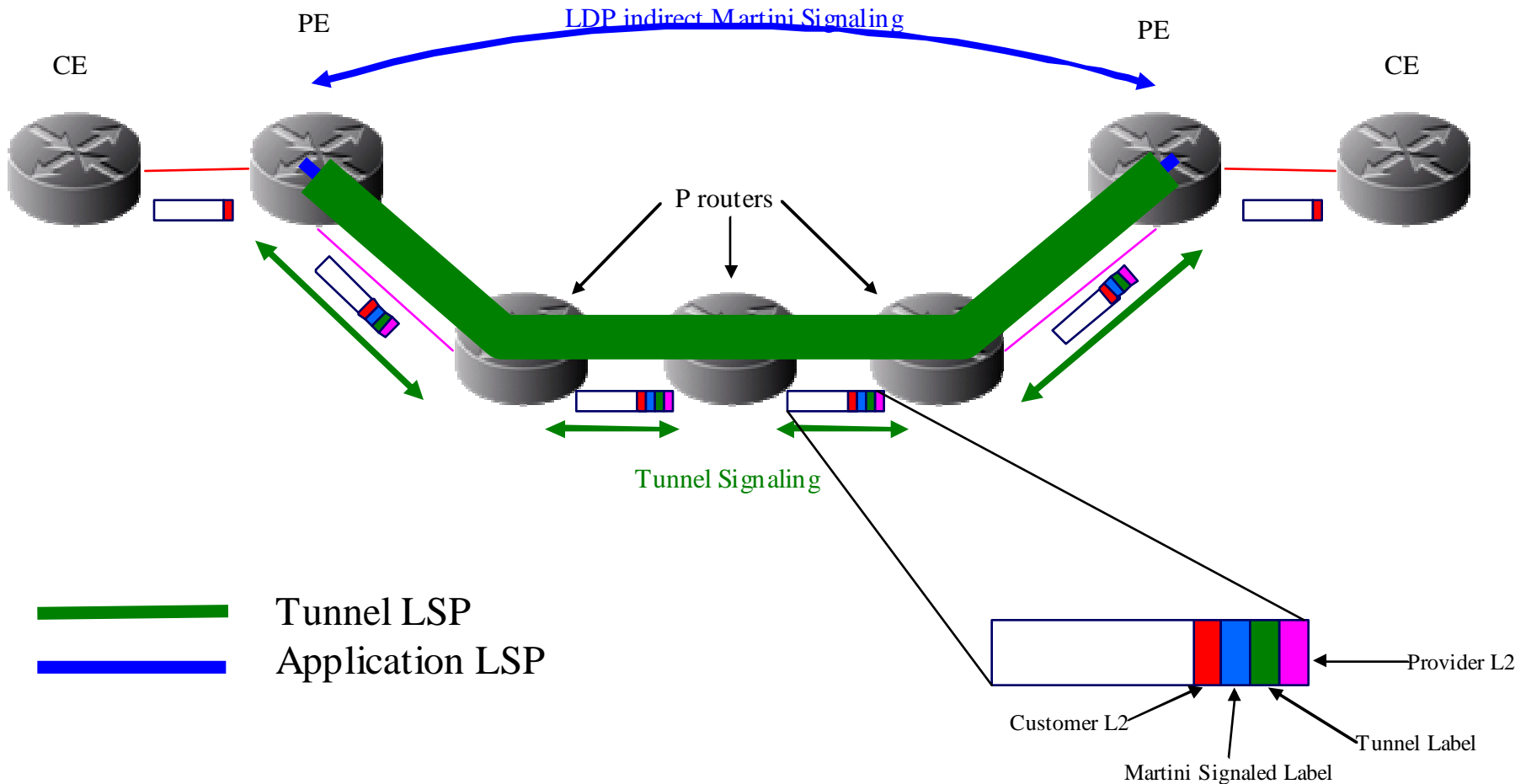
How do L2 trusted VPNs work?

- Entire L2 frame is transported across the MPLS domain and emerges as if it had never left its native form
- Typically runs on top of IP/MPLS network which is also used for providing traditional Internet service

How do L2 trusted VPNs work?

- Martini VPNs typically have the same L2 on both ends
 - some forms of translation are available
 - Ethernet <-> frame relay
 - ATM <-> frame relay
 - anything <-> IPv4
- VPLS can only be Ethernet
- Watch out for the overhead
 - 22 bytes for Ethernet L2 VPN (1.4% - 33%)

L2 trusted VPN



How do trusted L3 VPNs work?

- Provider must have PE-to-PE LSPs
- Each PE which is involved in providing the VPN service has a VRF for the customer
- PE-CE interface is assigned to the VRF
- Any routing protocol can be run over the PE-CE links

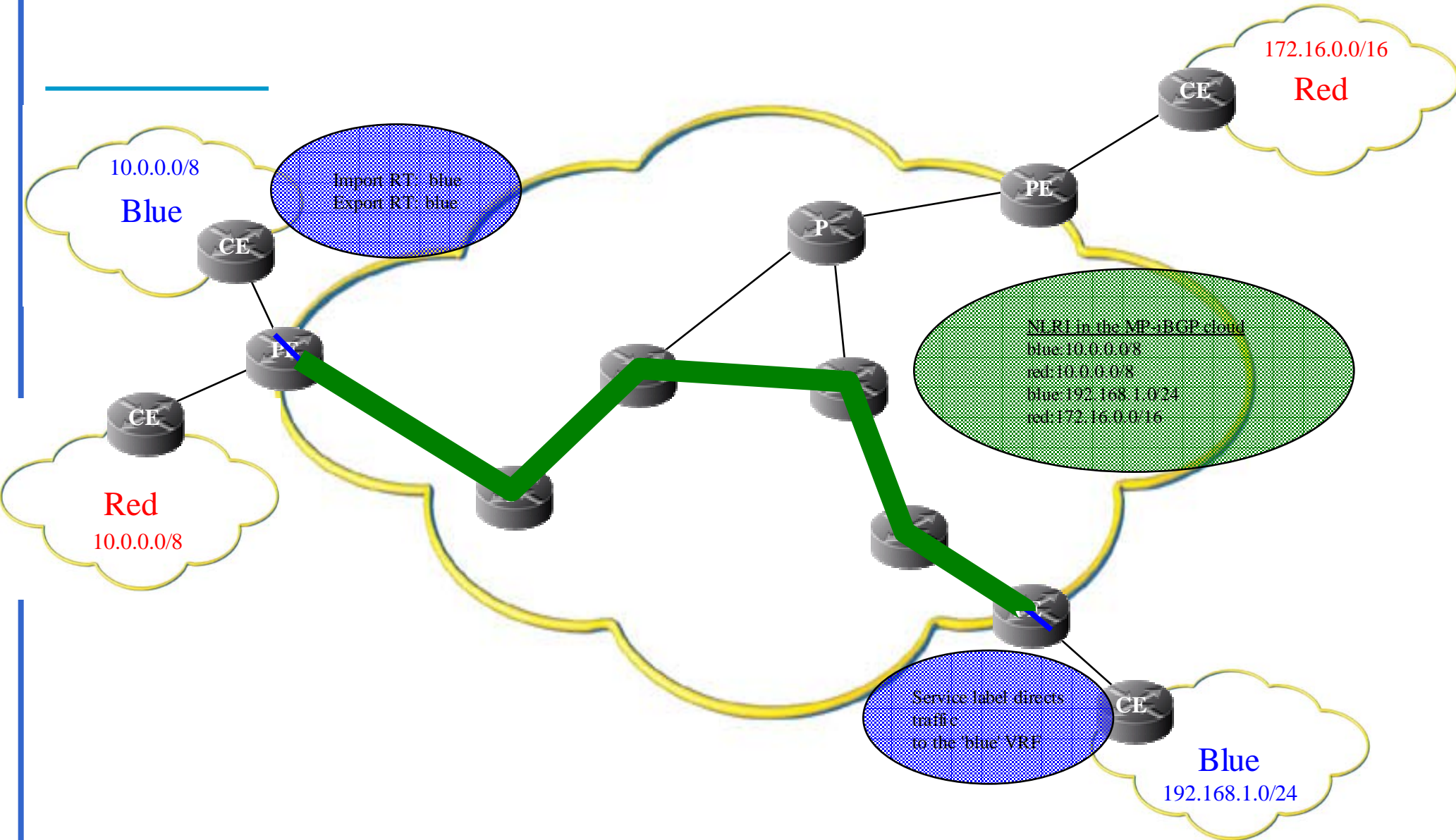
How do trusted L3 VPNs work?

- VRF routes are exported to BGP
 - tagged with export route-target
- BGP advertises VPN routes across to the other PEs via IBGP
- VPN routes with appropriate route-targets are imported into VRF from BGP
- VRF routes can be propagated to the PE-CE routing protocol

How do trusted L3 VPNs work?

- PE-CE routing protocols operate like normal for full mesh VPNs, but other topologies might require special extensions for OSPF and IS-IS
 - affects which CE equipment you can use
- Customer IP packets are “tunneled” untouched through the provider network
- Typically runs on top of IP/MPLS network which is also used for providing traditional Internet service

L3 trusted VPNs



Reason for choosing L2 VPNs

- Support any L3 protocol
- Able to maintain L2 service guarantees
- Allows providers to merge legacy “trusted VPN” networks and IP/MPLS network

Reasons for choosing L3 VPNs

- Flexible policies for exchanging VPN routes between VPNs (import/export route-targets)
- Inter-provider VPNs?
- No reason why dial up or road-warriors cannot join VPN

Additional Comments

- L2 and L3 VPNs do not affect the use of MPLS IPsec, Multicast, or IPv6 in the customer network