P2MP TE MPLS technology and its applicability

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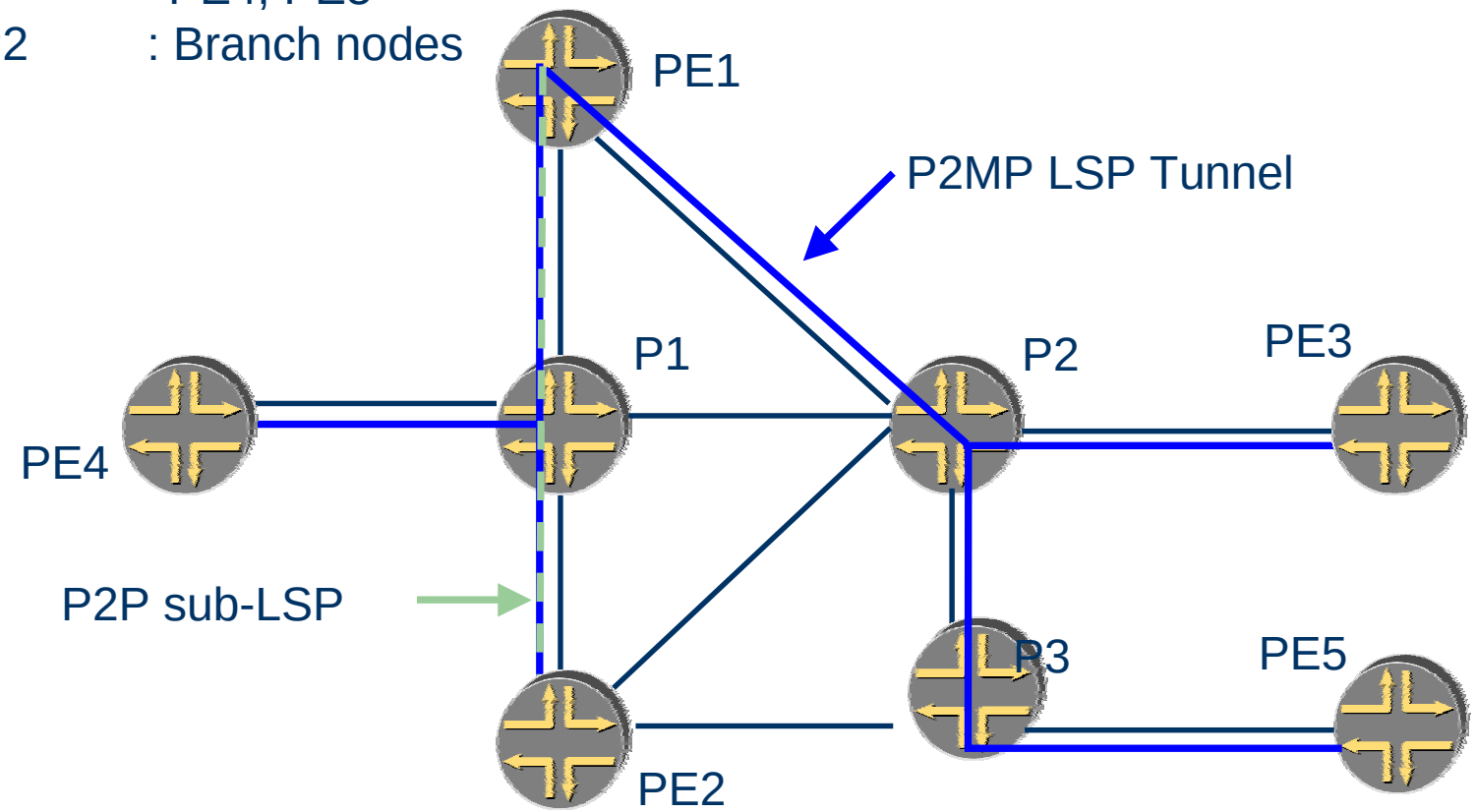
What is a P2MP TE LSP ?

- Point to Multipoint Label Switched Path (LSP)
  - Efficient traffic replication in the network
  - Application agnostic
- Set up with TE constraints
  - May involve resource reservations throughout the network
  - Determine path of these P2MP TE LSPs
- RSVP-TE Signaling
  - Enhancements to P2P (GMPLS) RSVP-TE

Solution Terminology

Ingress LSR: PE1
Egress LSR : PE2, PE3,
PE4, PE5
P1, P2 : Branch nodes



Solution Mechanism: P2MP Tunnel

- Determines set of destinations terminating the unidirectional traffic flow and for which resource reservation is required
- May comprise multiple P2MP LSP Tunnels

  (at least one)
- Identified by the P2MP SESSION Object which includes
  - P2MP ID: identifies the destination of the P2MP tunnel
  - Tunnel ID: 16 bit identifier
  - Extended Tunnel ID: local IPv4/IPv6 Address or left unspecified

Solution Mechanism: P2MP LSP Tunnel

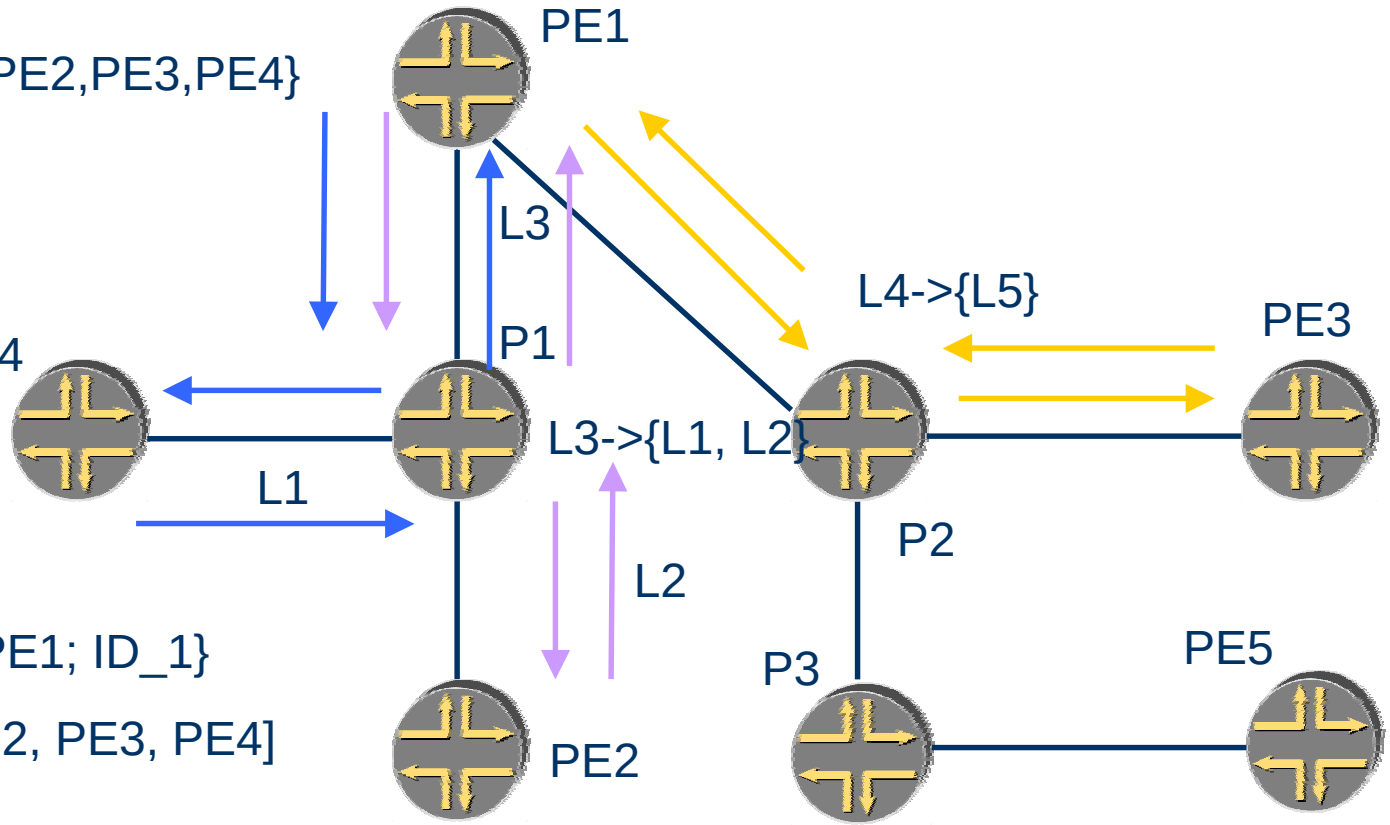
- A specific instance of a P2MP Tunnel determined by the source of the traffic flow
- May comprise multiple P2P sub-LSPs
- Identified by the P2MP Tunnel SESSION and P2MP SENDER_TEMPLATE object combination
- P2MP SENDER_TEMPLATE
  - Identifies the sender (ingress)
  - Includes
    - Source IPv4/IPv6 address
    - LSP ID

Solution Mechanism: P2P Sub-LSP

- LSP from the ingress LSR to a particular egress LSR
- A P2MP LSP Tunnel comprises multiple P2P sub-LSPs
- A P2P sub-LSP is represented by
  - P2P sub-LSP object
  - Sub-explicit route object
- P2P sub-LSP Object
  - Identifies a P2P Sub-LSP
  - Egress LSR Destination address
  - P2P sub-LSP identifier (sub-LSP ID)
- Sub-Explicit route
  - Represents the explicit route from ingress LSR to the egress LSR
  - May be compressed

Multiple Path Messages: Example

P2MP Tunnel: ID_1 {PE2,PE3,PE4}

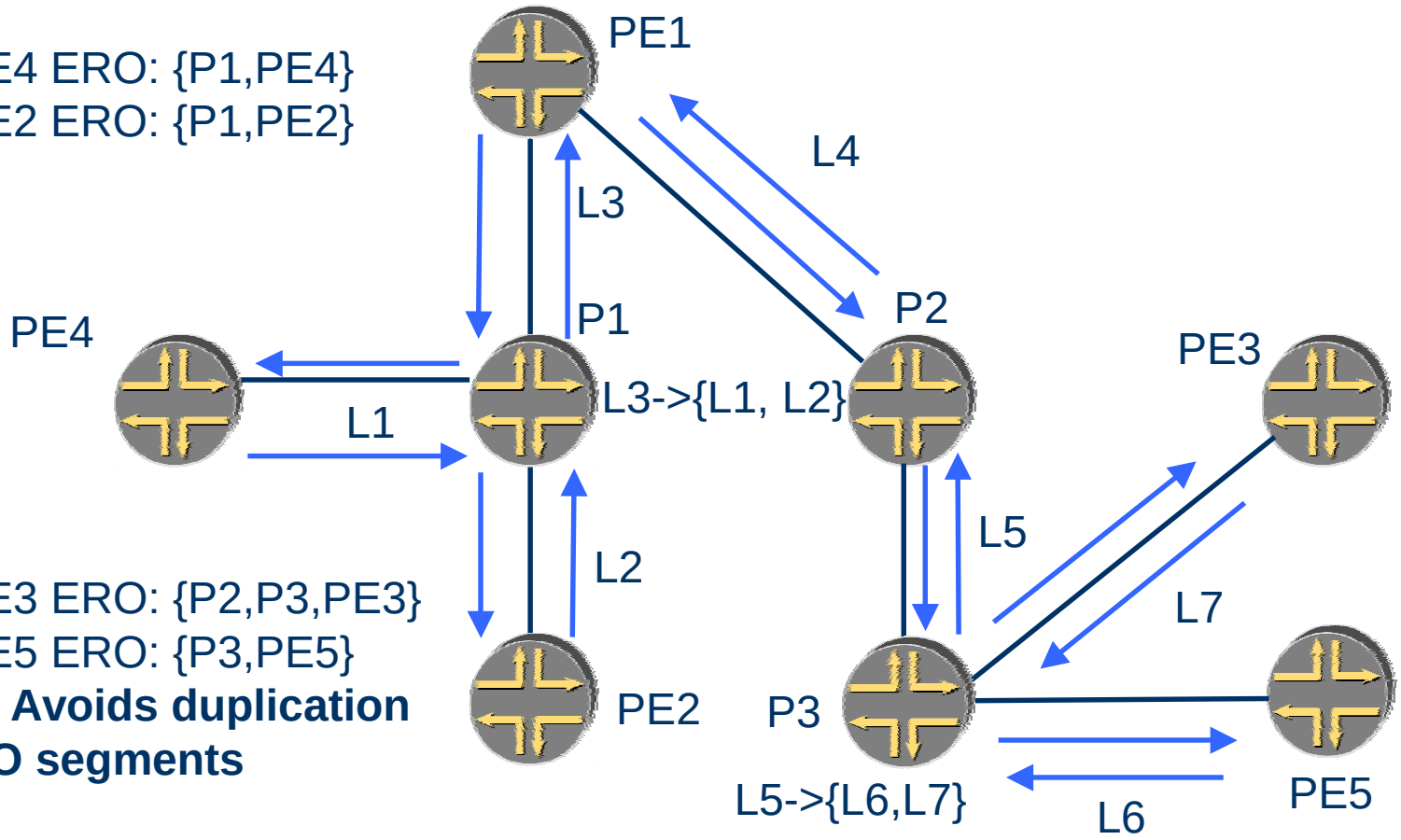


P2MP LSP Tunnel: {PE1; ID_1}

P2P sub-LSP list: [PE2, PE3, PE4]

Single Path Message: Example

P2P sub-LSP PE4 ERO: {P1,PE4}
P2P sub-LSP PE2 ERO: {P1,PE2}



P2P sub-LSP PE3 ERO: {P2,P3,PE3}
P2P sub-LSP PE5 ERO: {P3,PE5}
Compression = Avoids duplication of common ERO segments

Standards Status

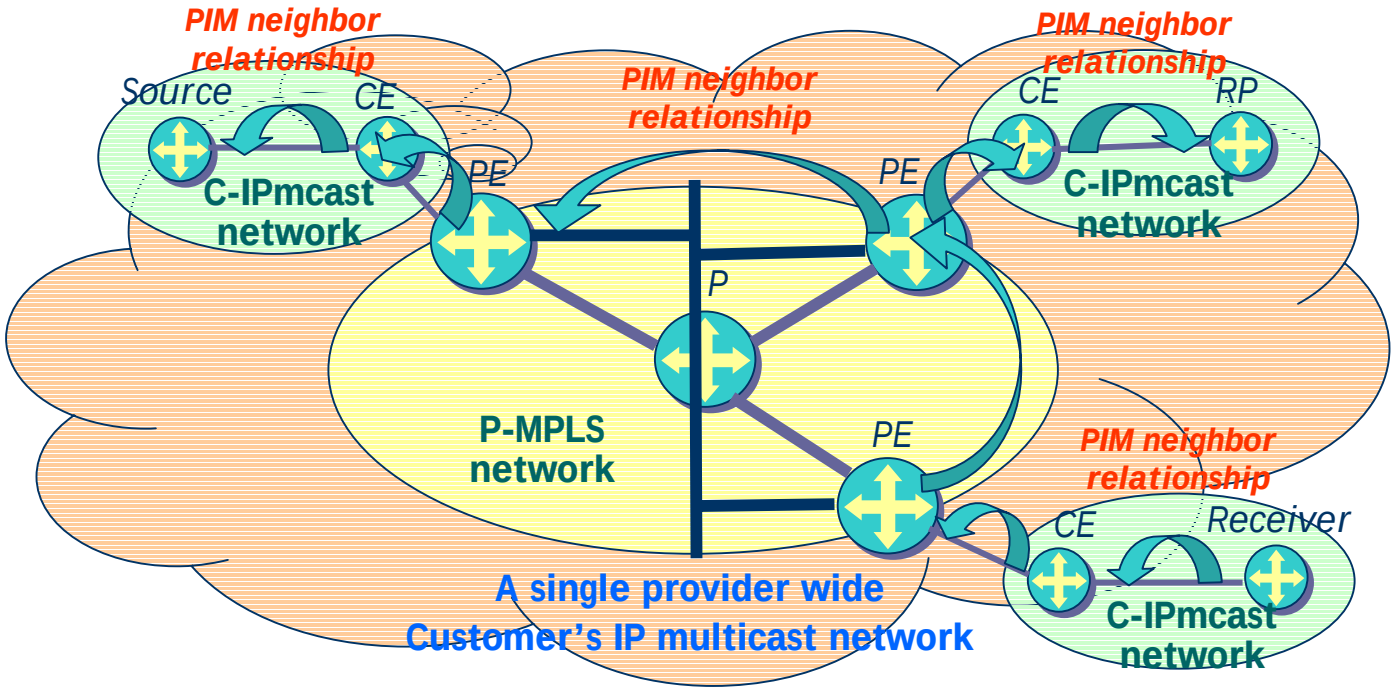
- Work done as part of the IETF MPLS WG charter
- Requirement document under last call
  - URL: <http://www.ietf.org/internet-drafts/draft-ietf-mpls-p2mp-requirement-04.txt>
  - revisited version under mailing list discussion
- Solution document (individual status)
  - URL: <http://www.ietf.org/internet-drafts/ draft-raggarwa-mpls-rsvp-te-p2mp-00.txt>
  - virtual team of ~ 30 people working on the document
  - new version was submitted for the next IETF meeting (Washington DC, Nov'04)

IP Multicast VPNs

- P2MP TE MPLS is applicable to IP Multicast VPNs.
- Because of its TE and QoS capabilities, this combination provides easy and flexible IP multicast VPN service operation for the service provider.
- MVPNs architectures proposals
  - draft-rosen-vpn-mcast-07.txt
  - draft-raggarwa-l3vpn-mvpn-vpls-mcast-00.txt
  - draft-yasukawa-l3vpn-p2mp-mcast-00.txt

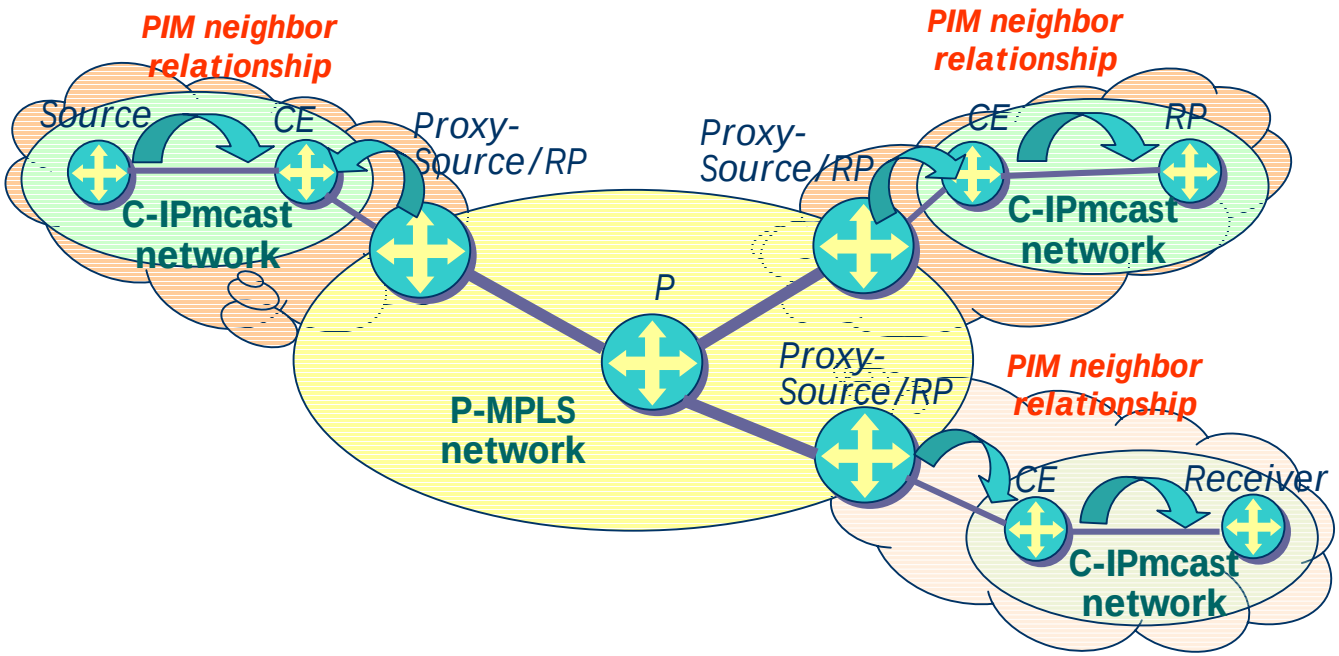
Idea 1: Solution to construct a single provider wide customer's IP multicast network

- Construct a single provider wide customer's IP multicast network by interconnecting customer's private IP multicast networks.
- PIM neighbor relationships are preserved between provider's PEs. (PIM control messages are transmitted transparently over P-MPLS network.)



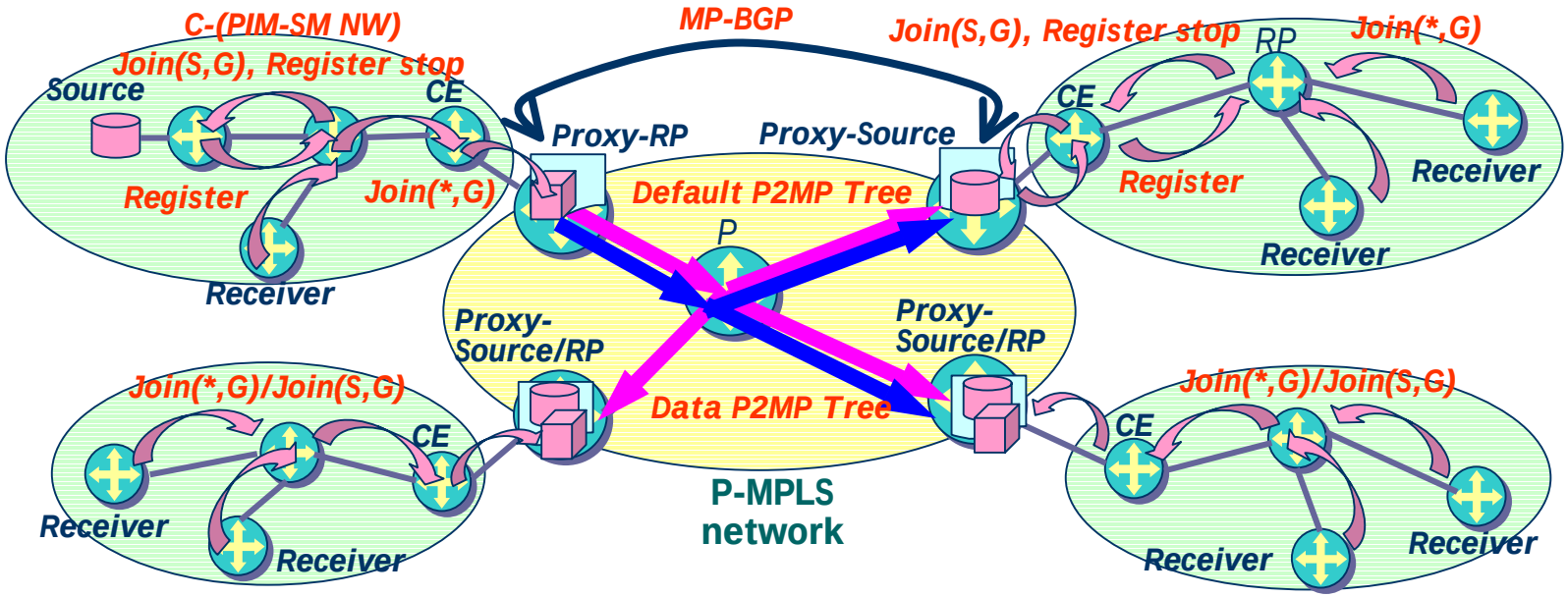
Idea 2: Solution to construct multiple independent customer's IP multicast networks

- Construct multiple independent customer's IP multicast network by making PEs to perform proxy-source/RP of original IP multicast networks.
- PIM neighbor relationships are not preserved between provider's PEs. (PIM control messages are terminated at each PE.)



BGP/MPLS IP Multicast VPNs

- Make each PE to act as Proxy-Source/RP for each customers IP multicast domain.
- Setup a default/data P2MP tree from a PE which accommodates IP multicast source to PEs which accommodate customers RP & Receivers.
- Default P2MP Tress is established when a multicast VPN info is configured on each PE.
- Data P2MP Tree is established based on traffic flow on demand basis.
- IP multicast register info is transferred by MP-BGP between PEs.



Thank you !