mRSVP-TE based mVPN

draft-hlj-l3vpn-mvpn-mrsvp-te-00

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Current Solutions

- **mGRE based solution**
  - › The earliest solution
  - › Unknown how to support QoS
  - › Unknown how to do TE
  - › Data planes are different between unicast VPN and multicast VPN (IP vs. MPLS)
- **mLDP based solution**
  - › Unified data planes for unicast VPN and multicast VPN (both are MPLS)
  - › Unknown how to support QoS
  - › Unknown how to do TE
- **P2MP RSVP-TE + BGP based solution**
  - › Need 7 new types of routes for BGP + a few new path attributes
  - › Unknown how to support customer's PIM Bootstrap
  - › Often required C-RP co-located with PE
  - › Sometimes MSDP is required between one of the PEs and the customer C-RP
  - › If customer's PIM fails, the network still supports multicast streaming (is this good or bad?)
  - › Customers need two upgrades for P2MP RSVP-TE and BGP, respectively

Why mRSVP-TE based mVPN?

- **Use mRSVP-TE described in**
  - › draft-lzj-mpls-receiver-driven-multicast-rsvp-te
- **QoS supported**
- **TE supported**
- **FRR supported**
- Data tunnel aggregation improves the scalability
- Simpler mandatory configuration and easier deployment
- **C-RP can be anywhere in customer's network**
- **C-Bootstrap is supported**
- Just upgrade one protocol! Not two or more upgrades

Details of mRSVP-TE based mVPN (1) General Ideas

- **Use MPLS MP2MP and P2MP tunnel to carry multicast traffic in MPLS network**

- **MPLS tunnels are established by mRSVP-TE**

- **All mRSVP-TE functionality can be used for mVPN**
  - › QoS
  - › Traffic Engineering
  - › Protection

- **Seamlessly integrated/Interworking with C-PIM on PE for MVPN**
  - › PIM signaling drives the MPLS tunnel establishment
  - › PIM state operation is almost same as normal PIM on PE.
  - › MPLS interface on PE has PIM enabled, and join the PIM domain
  - › MPLS interface automatically join or exist the Olist of PIM state
  - › PIM adjacency between PE for MVPN VRF

Details of mRSVP-TE based mVPN (2)
PIM Signaling

- PIM signaling over a default MP2MP tunnel (default mLSP)
- All PIM multicast message are carried over default mLSP
  › Join/Prune, Assert, Bootstrap
- All PIM unicast message are carried over P2P MPLS tunnel
  › Register, Register-stop, Graft, Graft-Ack, Candidate-RP-Adv
- All PIM modes can be supported
  › PIM-SSM, PIM-SM, PIM-DM, PIM-BIDIR
- PIM adjacency established between PE for each MVPN
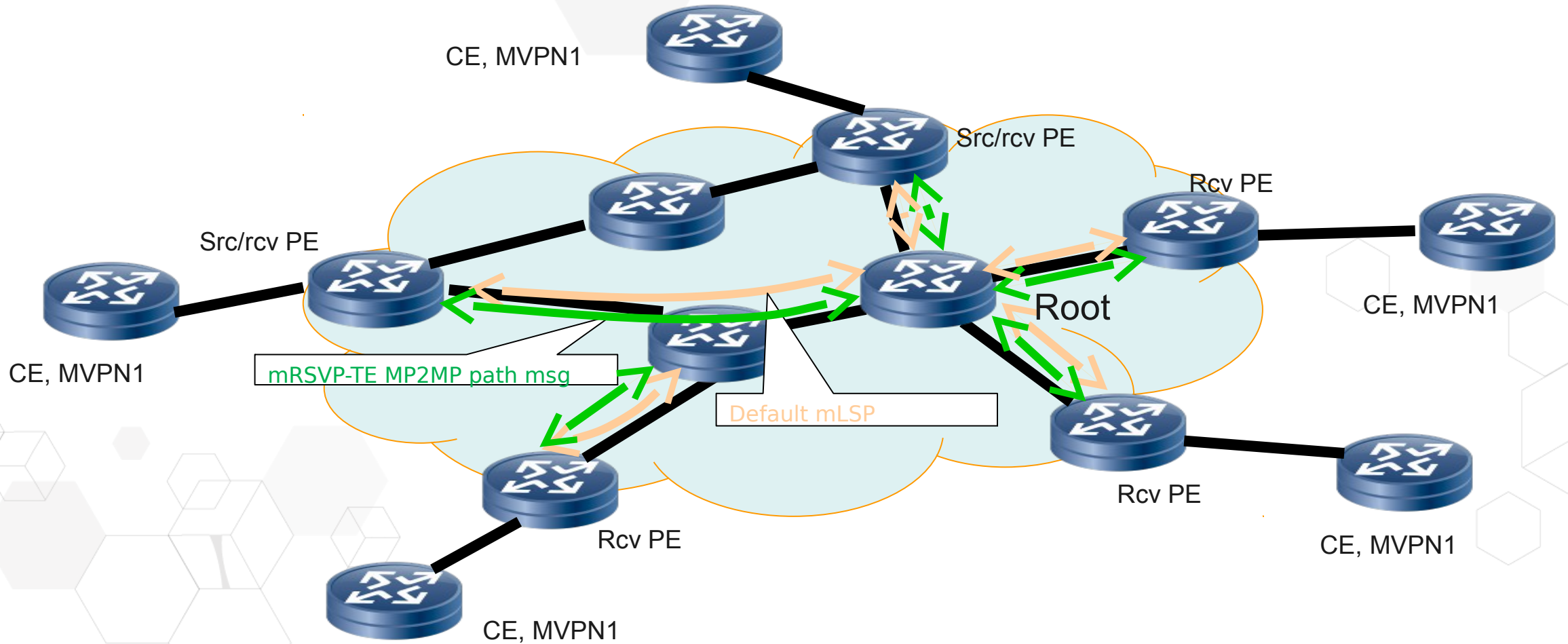- MPLS network details is invisible for PIM

Details of mRSVP-TE based mVPN (3) Default mLSP

- mLSP: Multicast Label Switched Path, equivalence of IP MDT but for MPLS
- MP2MP tunnel is setup when provisioning the MVPN on PE, with out the traffic.
- MP2MP tunnel is always up unless the MVPN is deleted
- One default mLSP per MVPN, could be group based.
- Second MP2MP tunnel for redundancy of default mLSP
- ERO or QoS can be option,
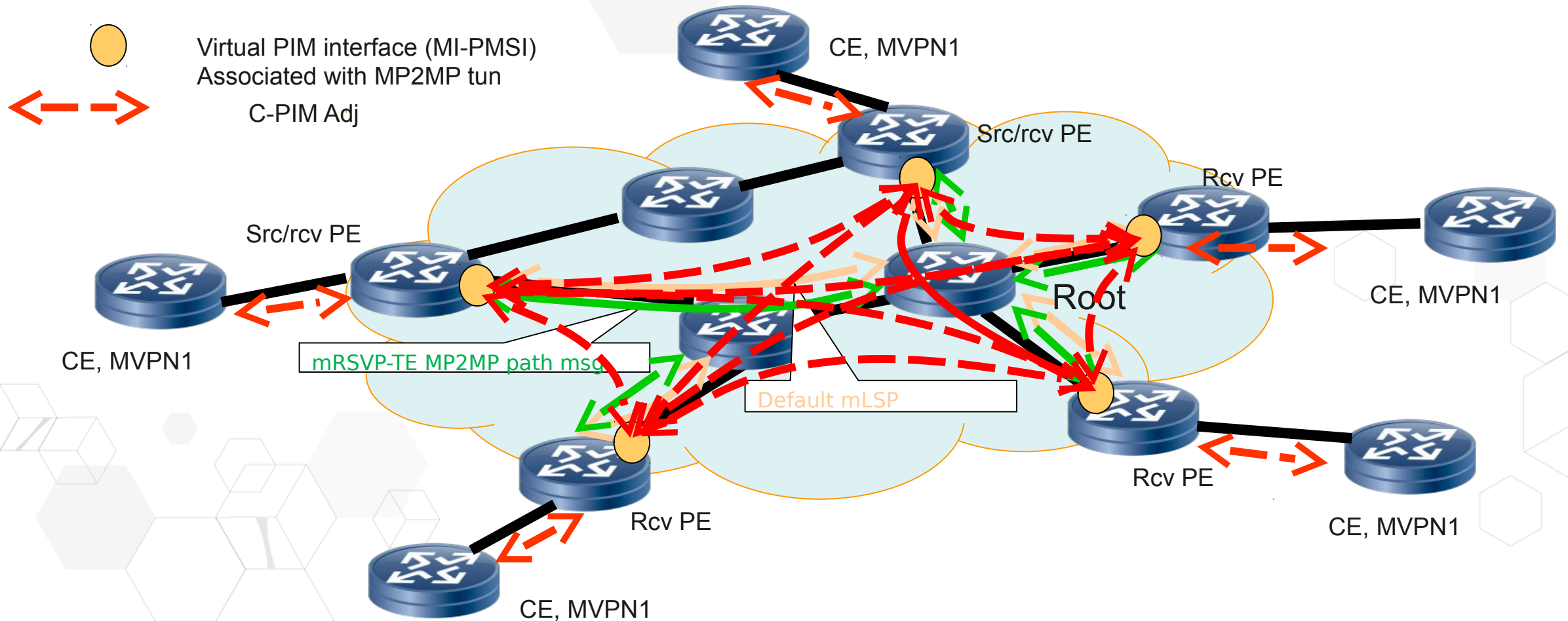- Tunnel protection can be applied

Details of mRSVP-TE based mVPN (4) Default mLSP

CE, MVPN1

Src/rcv PE

Rcv PE

Src/rcv PE

CE, MVPN1

CE, MVPN1

Root

mRSVP-TE MP2MP path msg

Default mLSP

Rcv PE

CE, MVPN1

Rcv PE

CE, MVPN1

Details of mRSVP-TE based mVPN (5) PIM adjacency between PE for MVPN

Virtual PIM interface (MI-PMSI) Associated with MP2MP tun

C-PIM Adj

CE, MVPN1

Src/rcv PE

Rcv PE

Src/rcv PE

CE, MVPN1

Root

CE, MVPN1

mRSVP-TE MP2MP path msg

Default mLSP

Rcv PE

CE, MVPN1

Rcv PE

CE, MVPN1

Details of mRSVP-TE based mVPN (6)
Data mLSP

- **Data mLSP is P2MP tunnel**
- **Data mLSP tunnel is driven by same mechanism as MDT (Rosen mGRE based mVPN)**
    - › Src PE monitor the traffic
    - › If the traffic rate is exceeding the threshold, flood the mLSP join TLV to default mLSP
    - › Rcv PE sends the P2MP path msg to Src PE, Src PE addr is from BGP NH
- **One data mLSP per PIM state (S,G),**
- **Could be multiple (S,G) for aggregation purpose**
- **ERO per data mLSP can be option**
- **QoS per data mLSP can be option**
- **Tunnel protection can be applied**

Next Steps

- Looking for feedbacks from you!
- Looking for experience and lessons you learnt from mLDP-based mVPN
- Looking for experience and lessons you learnt from BGP-based mVPN

Thanks & Questions?