MVPN Regional Segmentation

draft-zzhang-bess-mvpn-regional-segmentation

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Background: RFC7524

- MVPN/VPLS inter-area segmentation
  - *Inter-Area* P2MP Segmented *LSP*
  - A Provider tunnel consists of intra-area segments of different types and/or instances
    - ABR as RR modifies Tunnel Type/ID in PMSI Tunnel Attribute (PTA) when reflecting PMSI A-D routes to the next area
    - Also updates S-NH EC
      - Segmented Next-Hop Extended Community
      - To direct triggered Leaf A-D routes to the ABR

- RFC7524 is limited to “inter-area” and “LSP”
  - Can be applied to inter/intra-region
  - Can be applied to non-MPLS
Region vs. Area

• To modify the PTA and S-NH, typically a BGP neighbor group is used for all peers that should get the same PTA/S-NH
  • This allows segmentation at Regional Border Routers (RBRs)

• A region can be arbitrarily defined via BGP neighbor group
  • A IGP sub-area
  • An AS plus its external link
  • Several ASes

• No new signaling needed

• This concept is already adopted in draft-ietf-bess-evpn-bum-procedure-updates
Ingress Replication w/o Assisted Replication

- Within the ingress region, the A-D routes are just reflected as it is
  - PTA/S-NH not modified
- The ingress PE tracks all the receiver PEs and replicates traffic to each of them
- Inter-region segmentation can be extended to intra-region for Assisted Replication
  - PTA and S-NH modified even when PMSI A-D routes are reflected intra-region
Assisted Replication via Intra-Region Segmentation

Forwarding states on Segmentation Points:

- **SP1:**
  - $L_{SP1}$ -> $L_{SP2}$, LSP to SP2
    - $L_{PE2}$, LSP to PE2
    - $L_{PE3}$, LSP to PE3
    - $L_{PE4}$, LSP to PE4
    - $L_{PE5}$, LSP to PE5

- **SP2:**
  - $L_{SP2}$ -> $L_{PE6}$, LSP to PE6
Bud Node Support

• Bud Node
  • A RBR/SP (Segmentation Point) stitches upstream segment to downstream segments – label swap
  • A RBR may also have local receivers – IP forwarding

• An implementation typically can replicate an incoming packet for both label swapping to downstream segments and IP forwarding in local VRF

• Sometimes an implementation may not be able to do that
  • It needs one copy for label swapping and another copy for IP forwarding
Requesting Extra Copy for Local IP Forwarding

• This is only to accommodate bud nodes that need the extra copy
• Upstream tunnel being RSVP P2MP
  • RSVP P2MP signaling allows for an upstream PHOP node to send extra copy
• Upstream tunnel being IR/BIER/mLDP
  • Extra copy needs to be tunneled directly from upstream PE/RBR
  • This is requested via a Tunnel Encapsulation Attribute (TEA) in a Leaf A-D route sent from the bud node to its upstream PE/RBR
    • Sent even if Leaf Information Required flag is not set in the PMSI route
    • With a Tunnel TLV plus a Tree Label sub-TLV
      • Tree Label is used to identify the local VRF
Summary

• Inter-area segmentation in RFC 7524 extended to:
  • Inter-region, where a region is defined as a BGP Neighbor Group
  • Intra-region, for Assisted Replication

• Allow a bud node to request extra copy of traffic for local forwarding
  • In case of IR/BIER/mLDP
  • Via TEA added to Leaf A-D route

• Comments appreciated