BIER VPN

Not “BIER for VPN”

A new section in draft-ietf-bier-multicast-as-a-service

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Problem Description

• VPN customers’ BIER domains over/across the provider network
  • A provider providing VPN services to its customers
  • Some of these VPN customers run BIER

• This is not “BIER provider tunnel for MVPN/EVPN”, where:
  • Customer runs regular multicast like PIM/mLDP
  • PIM/mLDP multicast with provider tunnels being BIER
Solutions

• Customer BIER signaling in overlay via BGP (among PEs)
  • Customer BIER information advertised with VPN-IP SAFI
  • draft-ietf-bier-idr-extensions
    • It probably did not consider VPN-IP but it is fully applicable
    • VRFs are BFRs

• Customer BIER traffic natively across or tunneled over underlay
  • Ingress Replication (IR) tunneling among VRFs
    • No (customer) BIER on P routers; inefficient replication
  • Native across: P routers run BIER with per-customer BIFTs
    • Customer BIER signaling & state in underlay
    • What this presentation is about
General BIER Signaling & Calculation

• BFRs Signal BIER Information TLVs attached to BIER Prefixes
  • BFIR/BFER includes BFR-IDs in the signaling; BFTR does not
  • BIFT-ID (e.g., BIER Label) ranges included for different sub-domains
    • A BIFT-ID identifies a per-<subdomain, set> BIFT
      • A “set” is a set of BFERs in the same subdomain
      • If the number of BFERs is larger than the BitStrengLength, multiple copies need to be sent – one for each set of BFERs. Same bit in different copies is for different BFERs

• A BFR builds BIFTs based on unicast paths to the BFERs’ prefixes
  • For a particular BFER, if the unicast path’s nexthop is through a BFR neighbor, an entry is placed in the BIFT:
    • Key is (BFER’s BFR-ID % BitStringLength)
    • Nexthop is BIER label and unicast forwarding information for the neighbor
  • BFER prefix is used only to find unicast path
    • Not used in BIFT itself
BIER VPN Signaling in Underlay

• A BIER subdomain is now extended to <customer, subdomain> in underlay
  • Different customers may have overlapped subdomain-id and BFR-id
  • A BIFT is now per-<RD, subdomain, set>
    • Still identified by a BIFT-ID (e.g., a BIER label)
    • RD identifies a customer

• Underlay signaling for overlay BIER
  • P/PE routers advertise BIER Information TLV for their underlay loopback addresses, with RD added in addition to the subdomain-id
  • PEs include a “BIER proxy range sub-TLV” in the above TLV
    • To list BFR-IDs for customer BFERs reachable via this PE
      • This information is used to calculate per-<RD, subdomain, set> BIFTs
Overlay & Underlay Signaling

PE1

C-BIER IGP/BGP

PE3

C-BIER IGP/BGP

PE2

C-BIER IGP/BGP

P-BIER

Underlay P/PE IGP/BGP Signaling for P/C-BIER

Overlay PE BGP Signaling for C-BIER

C-BIER IGP/BGP
Draft Update

- [https://datatracker.ietf.org/doc/draft-ietf-bier-multicast-as-a-service/00/](https://datatracker.ietf.org/doc/draft-ietf-bier-multicast-as-a-service/00/) already talks about a provider providing BIER transport services to multiple clients
  - The clients are in the global table, and clients BFER prefixes are advertised into underlay
  - With potentially overlapped client subdomain-id and BFR-IDs
    - RDs are used to distinguish overlapped subdomain-id and BFR-IDs

- [01] adds VPN support
  - Only advertises client BFER-IDs in “BIER proxy range sub-TLV”
    - Customer BFER prefixes are not needed for BIFT calculation and not advertised
    - This VPN approach can be used for global table as well
Scaling Considerations

• Customer specific information is per-<subdomain, BFER>
  • Forwarding plane: per-customer BIFTs on P routers
    • Each entry is comparable to a unicast route to a customer BFER
    • Comparable to maintaining selective tunnels state in MVPN underlay
  • Control Plane:
    • Per-<customer, subdomain> BIER info advertisement from P/PE routers
      • Attached to underlay loopback addresses
    • Per-<customer, subdomain> BIER info from PE routers includes (BFR-ID) Proxy Range sub-TLV – for customer BFERs reachable from this PE

• For efficient replication in underlay (alternative is IR)
• Acceptable/feasible/worthy if multicast/BIER demand picks up
Comments appreciated!