BIER VPN

Not “BIER for VPN”

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

Jeffrey, Eric, Daniel, Greg, Gyan, Sandy

IETF114

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

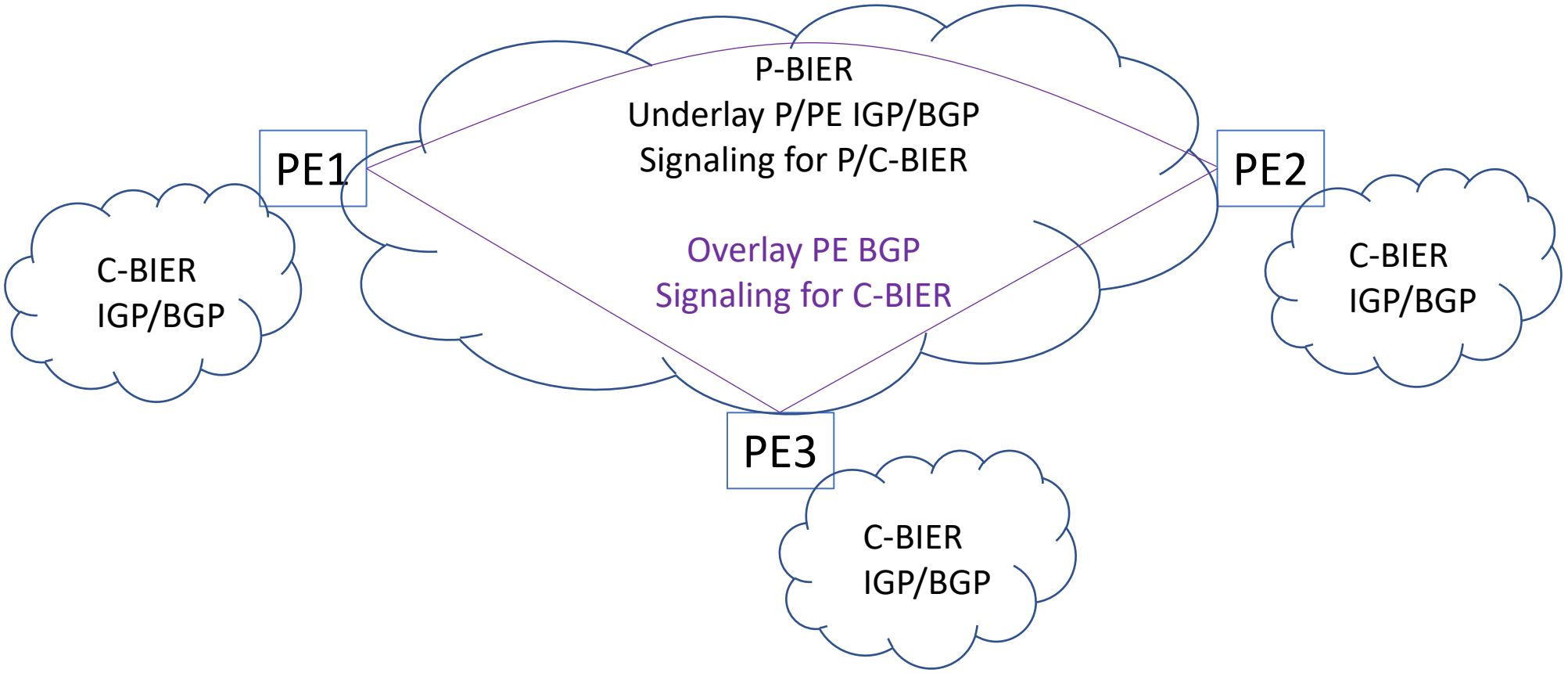
General BIER Signaling & Calculation

- 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



Draft Update

- 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!