BIER PIM Signaling

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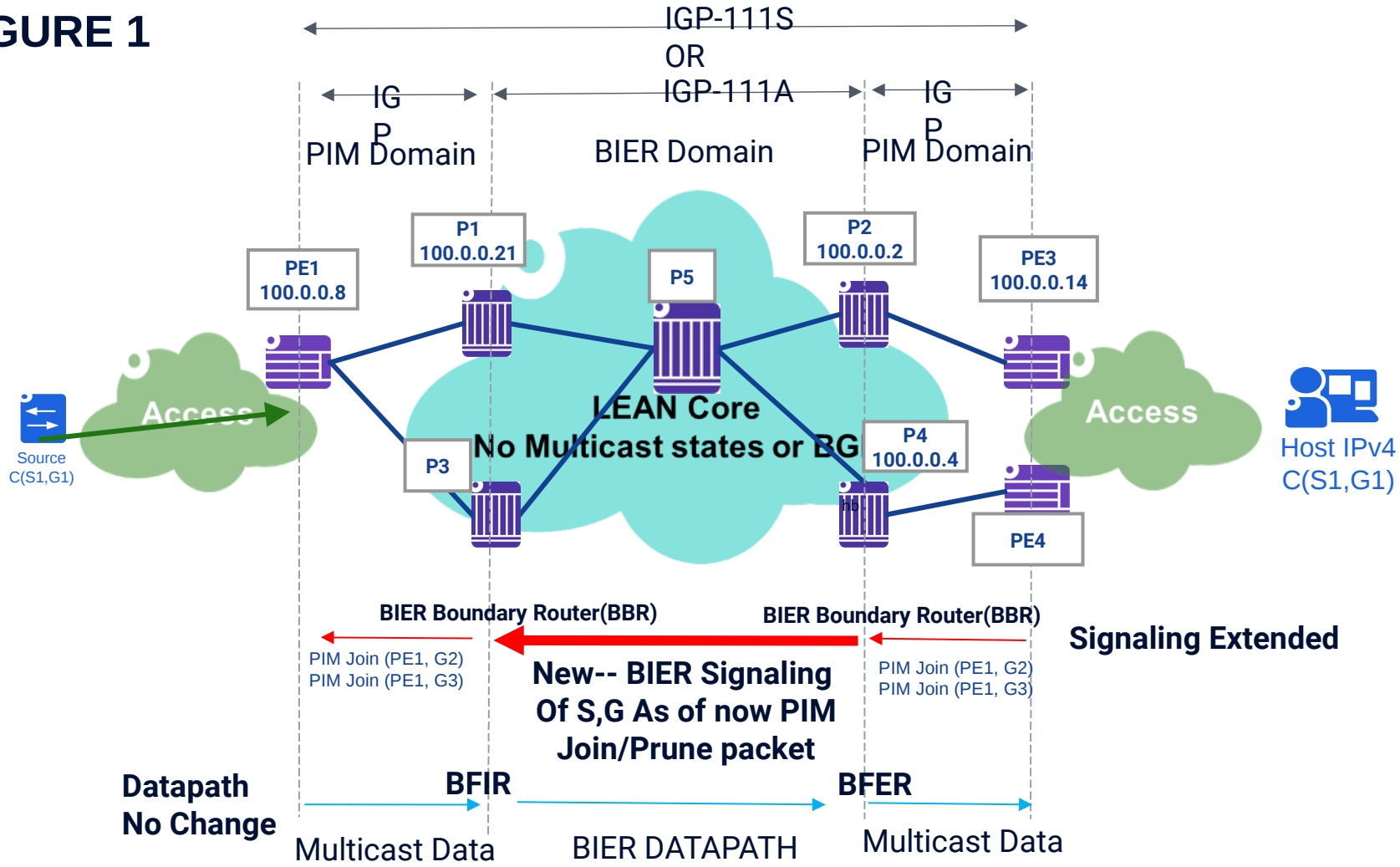
The background

- Some MNO/MSO providers are converging their core for wireless and wireline services.
  - “Lean core”, (BGP and Multicast state free) is ideal for designing a converge core via Segment Routing and BIER.
  - From multicast point of view BIER is ideal for these cores but extending it to all PEs (1000s) is operationally difficult and not necessarily desired (access networks design are proven and work fine it is core that needs to evolve)
  - Operators are concentrating with upgrade of the core historically (from PIM->mLDP tunneling, Rosen MVPN)

- Problem:
  - introduce BIER to the Core only (technology and operations) without a duplication from multi-SI to achieve the scale
  - Gradual upgrade to BIER starting with core and eventually upgrading the access to BIER aware hardware.
  - Reduce multicast states in the core and the access.

FIGURE 1


IGP-111S
OR
IGP-111A
IGP
PIM Domain
BIER Domain
IGP
PIM Domain
P1
100.0.0.21
P2
100.0.0.2
PE1
100.0.0.8
P5
PE3
100.0.0.14
Access
LEAN Core
No Multicast states or BG
Access
Source
C(S1,G1)
P3
P4
100.0.0.4
PE4
Host IPv4
C(S1,G1)
BIER Boundary Router(BBR)
BIER Boundary Router(BBR)
Signaling Extended
PIM Join (PE1, G2)
PIM Join (PE1, G3)
New-- BIER Signaling
Of S,G As of now PIM
Join/Prune packet
PIM Join (PE1, G2)
PIM Join (PE1, G3)
Datapath
No Change
BFIR
BFER
Multicast Data
BIER DATAPATH
Multicast Data

The solution PIM signaling over a BIER Core

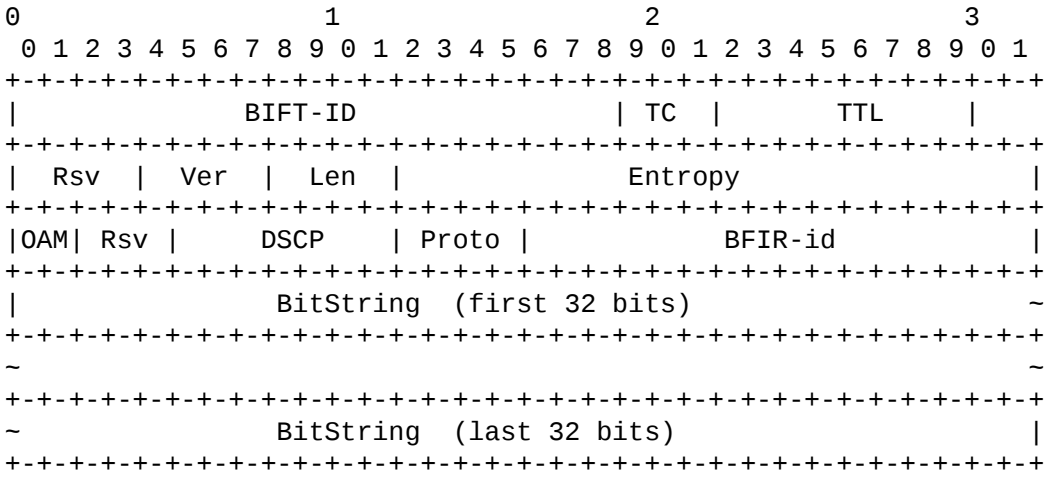
- PIM signaling through a BIER core.
  - This draft is not proposing PIM neighboring through a BIER core
  - Much like mLDP In-Band Signaling (RFC6826)
  - Concentrating on SSM and extending to ASM.

- Control plane
  - PIM is terminated at BIER Boundary Routers (BBR), PIM adjacency between routers toward the PIM Domain.
  - If the source resides on the other side of BIER Domain, PIM Joins/Prunes are signaled via BIER Domain
  - The Egress BBR keeps track of all (S,G)s arriving and the BFR-ID which has forward the Joins/Prunes for specific (S,G).
  - The Egress BBR will build a multicast tree with IIF as PIM interface and OIF as <SD, BRF-ID)

- No Changes to Data plane
  - Multicast encapsulated in BIER header

BIER Header for PIM Signaling

The BIER header will be encoded with the BFR-id of the ingress BBR(with appropriate bit set in the bitstring) and the PIM signaling packet is then encapsulated in the packet.



BIERHeader.Proto = IPv4 or IPv6

BIERHeader.BitString= Bit corresponding to the BFR-ID of the EBBR

BIERHeader.BFIR-id = BFR-Id of the Ingress BBR originating the encapsulated PIM packet, i.e. the IBBR.

Discovering the BBRs

- **The BIER Boundary Routers can be discover via many methods, depending on the network design (i.e. single area, ABR, ASBR etc...)**
- **If single area and BBRs are flooded through BIER via IGP a CSPF get for Source could return the egress BBR**
- **If the egress BBR is an ABR then the source generation of the route can be used to identify the BBR**
- **Alternately with ABR and ASBR with next-hop self even BGP can be used to resolve the egress BBR.**

Notes for Multicast state

1. All BIER Boundary Routers will build multicast states for only PEs Groups that are attached to them

2. This method offloads the “P” routers from learning multicast states and limits the BIER Boundary Routers from learning all the network multicast states.

3. Also BIER Boundary routers will be offloaded from managing BGP address families and large RIBs

Thoughts/Questions?