BIER P2MP mLDP Signaling

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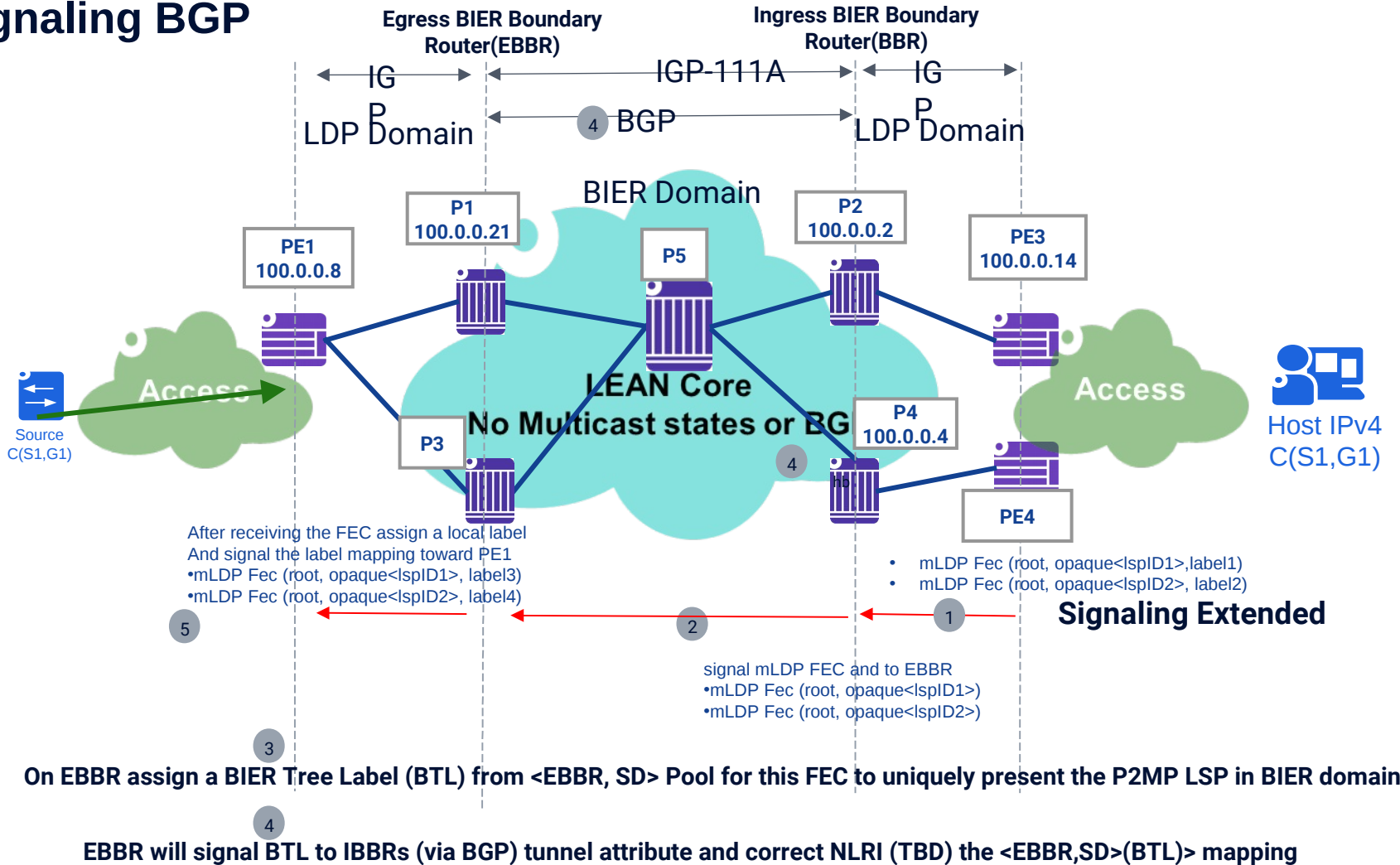
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The background

- **New Co-Aurthors**
  - **Eddie Leyton (Verizon)**
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- **Extending draft-bier-ietf-pim-signaling to mLDP**

- **Problem:**
  - **introduce BIER to a desired segment of the network with "minimal or no disruption and operational impact" to the mLDP domains.**
  - **Simplify operation by eliminating legacy multicast control plane protocols in BIER domain. With SR and BIER no more MPLS control plane.**
  - **Gradual upgrade to BIER starting with desired segment and eventually upgrading the entire network to BIER aware hardware.**
  - **There could be tight security requirements in these new "LEAN" networks. Blocking well known ports etc…**
  - **Could apply to other MPLS P2MP tunnels**

- **Identifying and stitching a P2MP LSP through a BIER core.**
  - **This draft is not proposing LDP neighboring through a BIER core**
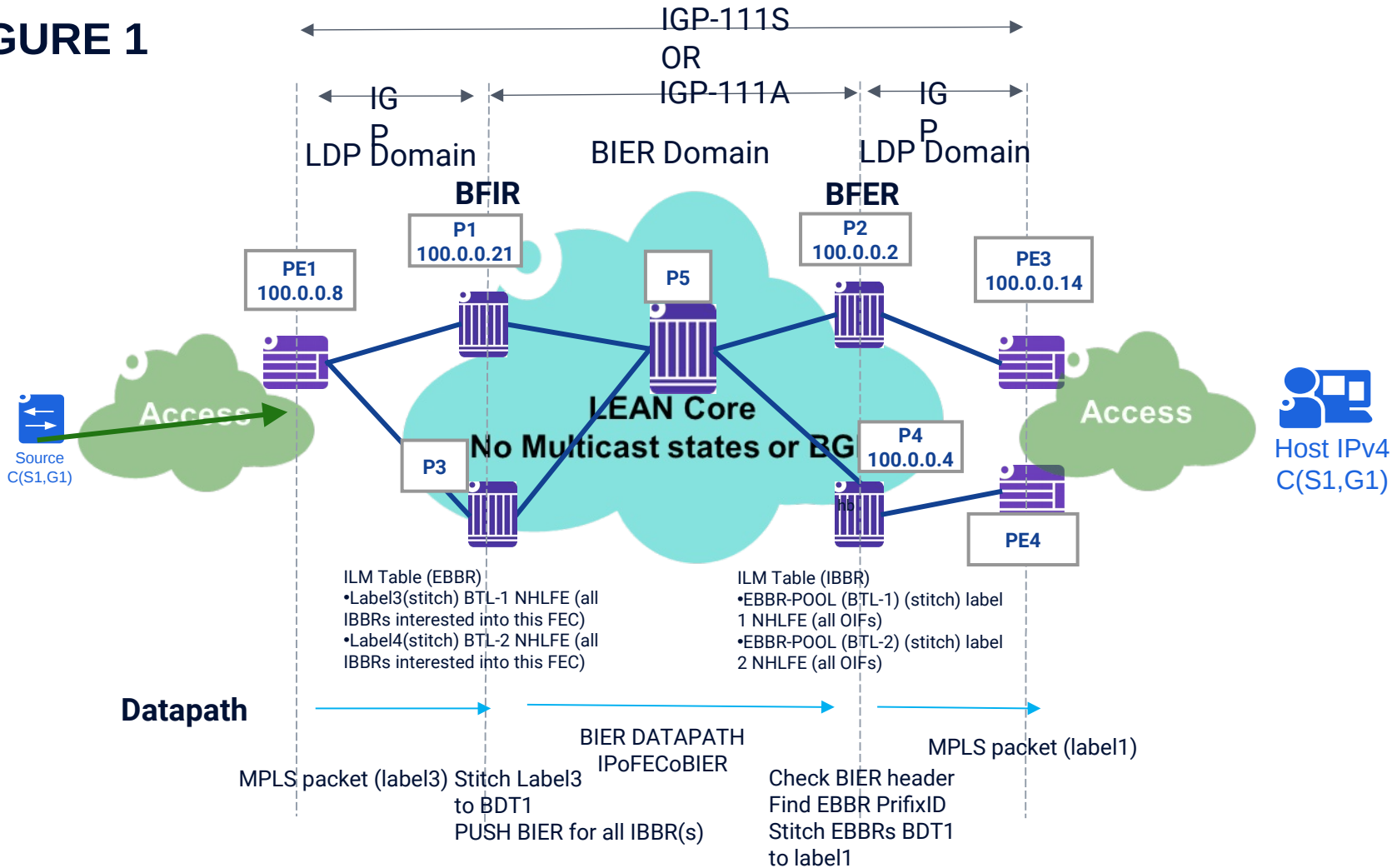 - **Much like PIM Signaling through BIER**

Signaling BGP

Egress BIER Boundary Router(EBBR)

Ingress BIER Boundary Router(BBR)

IGP Domain

IGP-111A

IGP Domain

LDP

BGP

LDP

BIER Domain

P1
100.0.0.21

P2
100.0.0.2

PE1
100.0.0.8

P5

PE3
100.0.0.14

LEAN Core
No Multicast states or BG

P4
100.0.0.4

P3

Source
C(S1,G1)

Access

Access

Host IPv4
C(S1,G1)

PE4

After receiving the FEC assign a local label
And signal the label mapping toward PE1
•mLDP Fec (root, opaque<lspID1>, label3)
•mLDP Fec (root, opaque<lspID2>, label4)

• mLDP Fec (root, opaque<lspID1>,label1)
• mLDP Fec (root, opaque<lspID2>, label2)

Signaling Extended

signal mLDP FEC and to EBBR
•mLDP Fec (root, opaque<lspID1>)
•mLDP Fec (root, opaque<lspID2>)

On EBBR assign a BIER Tree Label (BTL) from <EBBR, SD> Pool for this FEC to uniquely present the P2MP LSP in BIER domain

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EBBR will signal BTL to IBBRs (via BGP) tunnel attribute and correct NLRI (TBD) the <EBBR,SD>(BTL)> mapping

Control Plane

- Control plane
  - LDP signaling is terminated at BIER Boundary Routers (BBRs)
  - BBRs will maintain LDP adjacency toward the mLDP domain
  - On a arriving label mapping/withdraw from LDP domain, if IBBR determines the Root of the FEC resides on the other side of BIER Domain, it will signal the FEC and the FEC action to the EBBR, as an example <FEC, label mapping> or <FEC, label withdraw>
  - The EBBR can be found with using the outer root of the FEC and the procedure explained in ietf-draft-bier-pim-signaling
  - The EBBR will receive the bier signaling packet including the <FEC, label action>
    - The EBBR will assign a BIER Domain TREE Label (BTL) to identify the P2MP LSP uniquely in the BIER domain, as an example if there is no BTL assigned to this label yet.
    - For scaling considerations this BTL can be assigned per <EBBR PrefixID,SD> label pool.
    - The EBBR will have a MP-BGP adjacency to IBBR(s) and will signal the <<EBBR,SD> (BTL)> with correct (New) PTA and NLRI
  - The Egress BBR keeps track of all IBBRs that are interested in this specific FEC. It creates a tree with OIF all the IBBRs signaling this FEC
  - The Egress BBR will also generate a new mLDP label for the FEC and forward the label mapping/withdraw toward the Root in LDP domain.
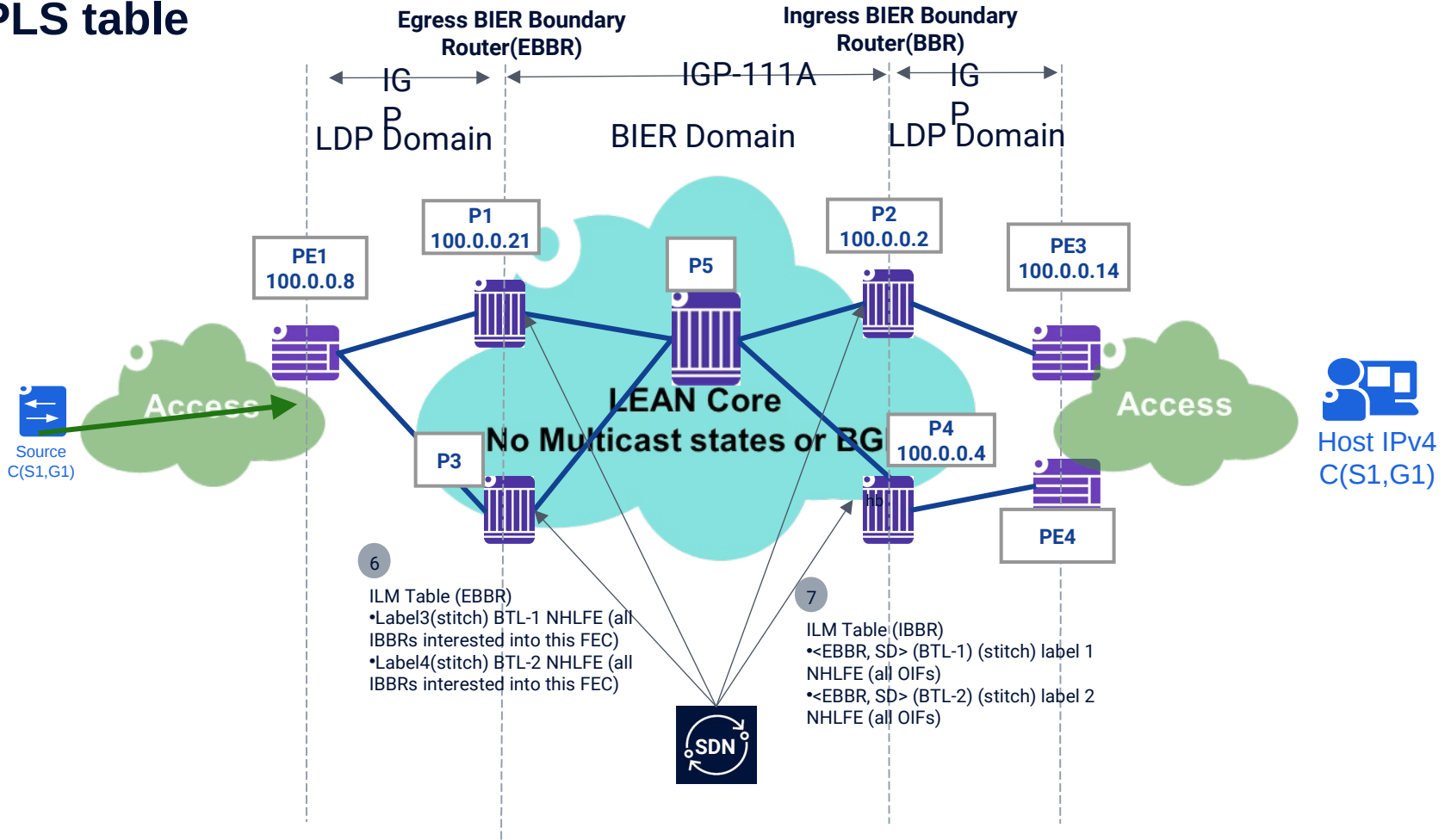
FIGURE 1

IGP-111S
OR
IGP-111A

IGP LDP Domain

BIER Domain

IGP LDP Domain

BFIR

BFER

PE1
100.0.0.8

P1
100.0.0.21

P5

P2
100.0.0.2

PE3
100.0.0.14

Source
C(S1,G1)

Access

P3

**LEAN Core
No Multicast states or BG**

P4
100.0.0.4

Access

Host IPv4
C(S1,G1)

P6

PE4

ILM Table (EBBR)
• Label3(stitch) BTL-1 NHLFE (all
IBBRs interested into this FEC)
• Label4(stitch) BTL-2 NHLFE (all
IBBRs interested into this FEC)

ILM Table (IBBR)
• EBBR-POOL (BTL-1) (stitch) label
1 NHLFE (all OIFs)
• EBBR-POOL (BTL-2) (stitch) label
2 NHLFE (all OIFs)

Datapath

BIER DATAPATH
IPoFECoBIER

MPLS packet (label1)

MPLS packet (label3) Stitch Label3
to BDT1
PUSH BIER for all IBBR(s)

Check BIER header
Find EBBR PrifixID
Stitch EBBRs BDT1
to label1

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Data Plane

- **Data plane**

  - **Single BIER domain label to represent a P2MP LSP in BIER domain**

  - **Mpls packets arrive on BFIR from LDP domain, will be stitched to BIER domain Tree label (BTL) on BFIR**

  - **BFIR has a list of all BFERs interested in the P2MP LSP and use it to build the BIER header.**

  - **BFIR will use bier forwarding to forward the P2MP LSP to all BFERs interested.**

  - **BFERs will swap the BIER domain Tree label to the corresponding P2MP LSP label and forward to the mLDP domain toward the leafs**

MPLS table

Egress BIER Boundary Router(EBBR)

Ingress BIER Boundary Router(BBR)

IGP

IGP-111A

IGP

LDP Domain

BIER Domain

LDP Domain

PE1 100.0.0.8

P1 100.0.0.21

P5

P2 100.0.0.2

PE3 100.0.0.14

P3

P4 100.0.0.4

Source C(S1,G1)

Access

LEAN Core No Multicast states or BG

Access

Host IPv4 C(S1,G1)

PE4

6

ILM Table (EBBR)
•Label3(stitch) BTL-1 NHLFE (all IBBRs interested into this FEC)
•Label4(stitch) BTL-2 NHLFE (all IBBRs interested into this FEC)

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ILM Table (IBBR)
•<EBBR, SD> (BTL-1) (stitch) label 1 NHLFE (all OIFs)
•<EBBR, SD> (BTL-2) (stitch) label 2 NHLFE (all OIFs)

SDN

The solution mLDP signaling over a BIER Core

- **On EBBR there will be a ILM entry of**
  - **Incoming label stitch to BTL with out going interface all the IBBRs interested in this FEC**
- **On IBBR there will be a ILM entry of**
  - **Incoming BTL from a specific EBBR label pool stitch to outgoing label with out going interfaces all mLDP OIFs**

Next Step

- **Define the BGP Route type and PTA**
- **Separate SDN and BGP drafts**

Thoughts/Questions?