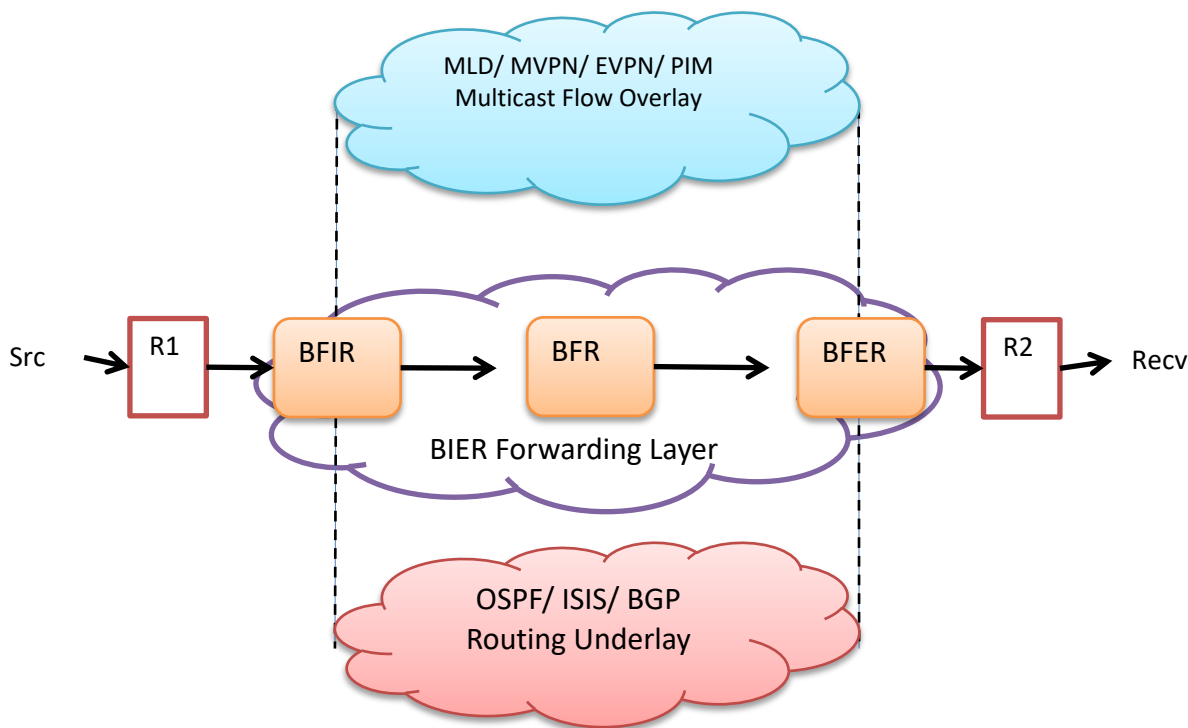# BIER in BABEL
draft-zhang-bier-babel-extensions-02

IETF106# Singapore

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Motivation

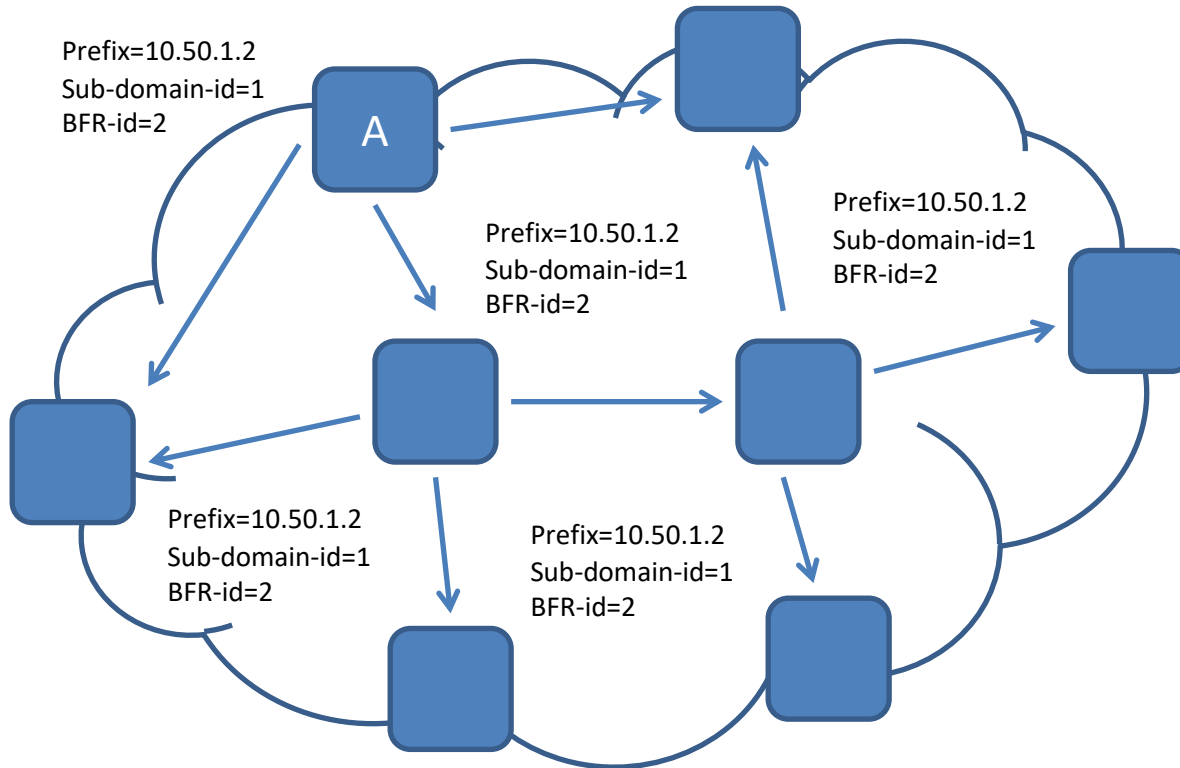Using BABEL protocol as BIER underlay protocol to build BIER forwarding layer

- BIER is a new technology which can achieve multicast forwarding without explicitly multicast distribution trees building, and it doesn't require intermediate nodes to maintain any per-flow state

- In order to forward BIER encapsulated packet, some BIER key parameters should be conveyed by the routing protocol

The BIER encapsulation functions include: MPLS, Ethernet, IPv6

Babel

- Babel defines a distance-vector routing protocol that operates in a robust and efficient fashion both in ordinary wired as well as in wireless mesh networks.

- Babel use several TLVs to carry the routing information. And Babel can also use a new sub-TLV to convey BIER information. This document defines a way to convey BIER information in Babel.

An example for BIER in Babel

Prefix=10.50.1.2
Sub-domain-id=1
BFR-id=2

A

Prefix=10.50.1.2
Sub-domain-id=1
BFR-id=2

Prefix=10.50.1.2
Sub-domain-id=1
BFR-id=2

Prefix=10.50.1.2
Sub-domain-id=1
BFR-id=2

Prefix=10.50.1.2
Sub-domain-id=1
BFR-id=2

BIER Babel extension is used to build BIER forwarding plane.

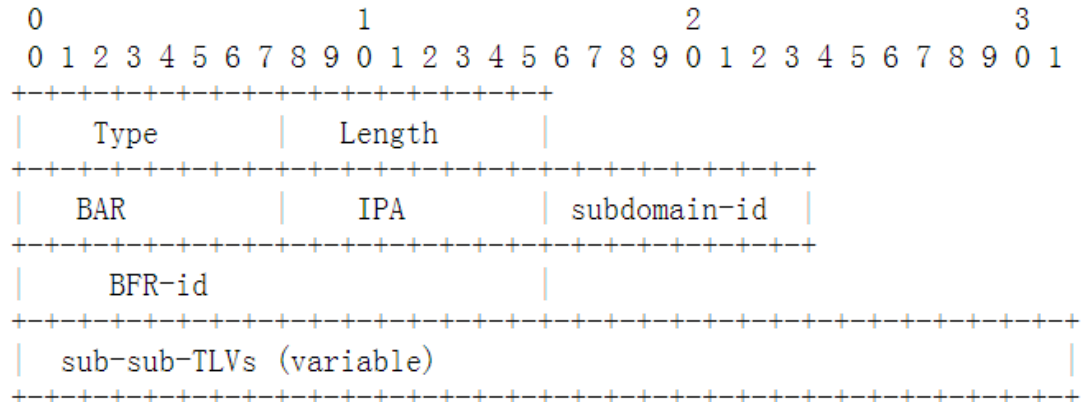BMLD is used to convey multicast information between edge nodes.

Then multicast flows can be forwarded from ingress edge node to egress edge nodes.

- The BIER information can be carried in Babel update message.
- The mandatory bit of BIER sub-TLV should be set to 0. If a router cannot recognize a sub-TLV, the router MUST ignore this unknown sub-TLV.

BMLD：BIER Ingress Multicast Flow Overlay using Multicast Listener Discovery Protocols
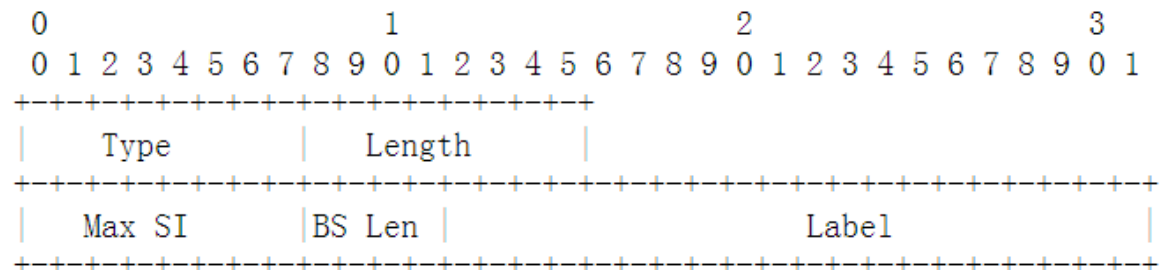draft-ietf-bier-mld

BIER in Babel signaling

- BIER sub-TLV

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |    Length     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     BAR       |     IPA       | subdomain-id  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     BFR-id                    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  sub-sub-TLVs (variable)                                  |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Different sub-sub-TLVs are carried as payload of BIER sub-TLV. e.g. MPLS, Ethernet.

The length of BIER sub-TLV: Include the length of BIER sub-TLV and potential length of the two sub-sub-TLVs.

- BIER MPLS Encapsulation sub-sub-TLV

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|     Type      |    Length     |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Max SI      | BS Len |                 Label             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Information

Existed IGP/BGP extension of BIER:

- BIER support via ISIS (RFC8401)

- OSPF Extensions for BIER (RFC8444)

- BGP Extensions for BIER (draft-ietf-bier-idr-extensions)

Still to solve：

- BIER architecture does not rely on all routers in a domain performing BFR procedures. How to support tunnels that will allow to tunnel BIER across such routers in Babel is for further study.

Implementation of BIER in Babel:

- https://github.com/SandyZhang2015/BIER_in_Babel

BIER in BABEL

- Any comments ☺

Thanks!