Path autogeneration in BIER
draft-zhang-bier-path-autogeneration-01

BIER WG

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Current BIER forwarding and BIER mpls encapsulation

> Using BIER MPLS label to identify BIFT;
> do BIER forwarding according to the BIFT;
> there always have many times lookups in the BIFT, in the worst circumstance, how many neighbors are, how many lookups are.

- It is not efficiency enough to do so many lookups…..
- The MPLS forwarding efficiency is measureable and determinate.
- Maybe a MPLS path can auto generate when the packets are forwarded according to BIER forwarding.
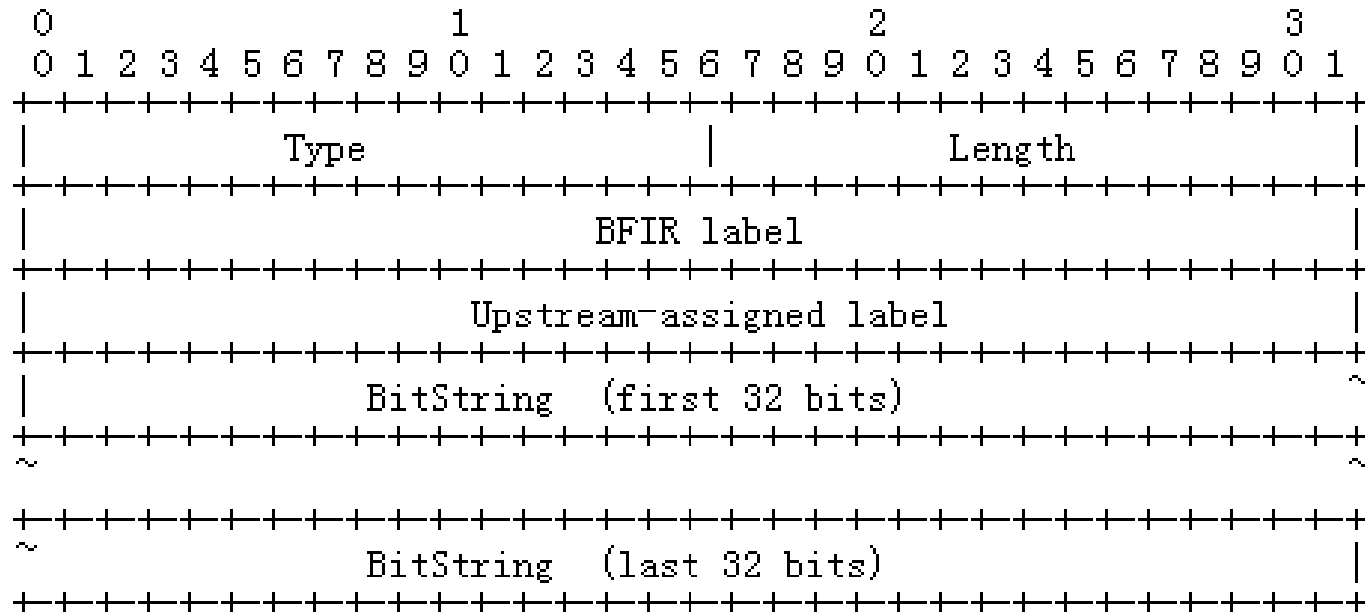
Sketch of BIER Path Autogeneration

- When the first packet is forwarded by the nodes, this data plane forwarding along the BIER(TE) path drives the mpls routing generation. Specifically, upstream assigned label is encapsulated in the added path TLV to assist subsequent nodes to generate the MPLS forwarding items;

- When the subsequent packets are received by the nodes, they are all forwarded through the MPLS forwarding items generated above.

- This method can be used with BIER forwarding and BIER TE forwarding, some specific flows can be forwarded by this way.

BIER Path Autogeneration---first packet

BIER (TE) Header
Path TLV
Payload
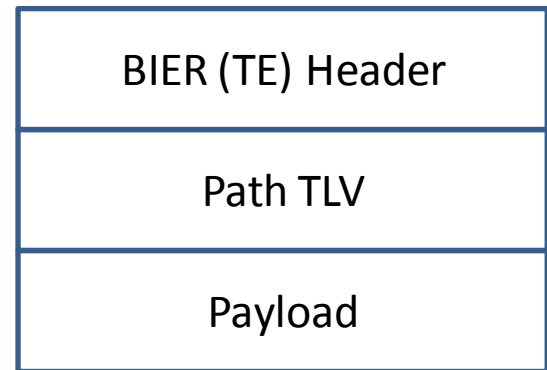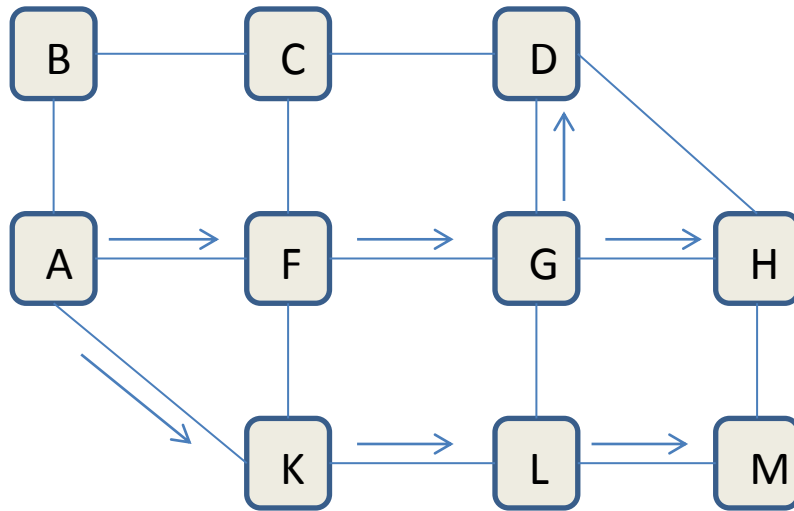
- When a packet is encapsulated by BFIR, a Path TLV is embedded between BIER(TE) header and payload.

- The BFR receives the packet, generates the MPLS forwarding items according to the Path TLV.

Path 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             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                          BFIR label                          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                    Upstream-assigned label                   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                 BitString   (first 32 bits)                 ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                                                              ~

+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                 BitString   (last 32 bits)                   |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

- A path TLV is defined to carry the two label identifier. This TLV is behind the BIER header. Of course there is a flag in the BIER header which indicates that there is path TLV behind the BIER header.

- Every bit in BitString indicates a BFER or a TE link.

- The different type indicates the establishment/withdrawn information.

- For path establishment, the BitString may be the same as the packet encapsulation of BFIR. For link withdrawn, the BitString carried in the TLV indicates that the node/link in the BitString should be withdrawn.

Upstream assigned label

- BFIR assigns one label for multicast flow, the other label is assigned to identify the BFIR itself.

- If all the flows are controlled by a controller, maybe only one unique label can indentify one or one set flows.

- These labels are not conflict with the mpls label that is defined in draft-ietf-bier-mpls-encapsulation.

BIER Path Autogeneration---subsequent packets

Mpls labels
BIER (TE) header
Payload
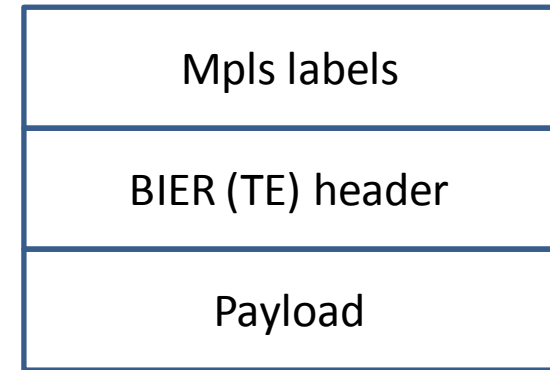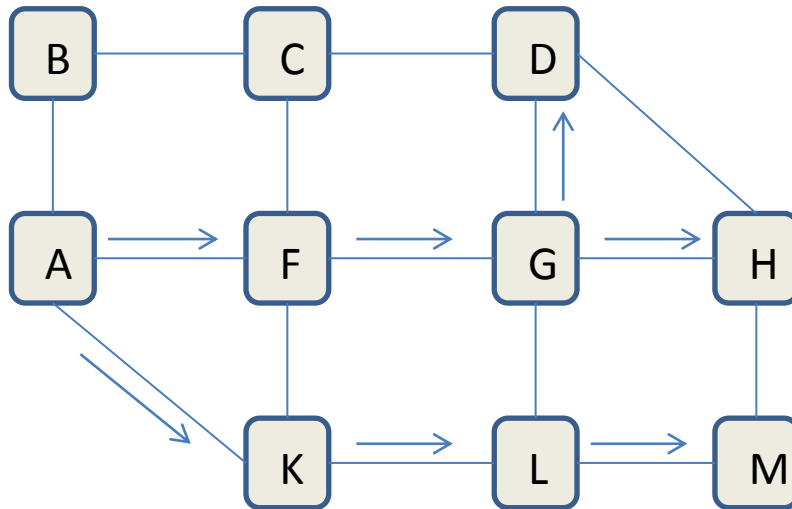
- The subsequent packets are encapsulated with mpls labels by BFIR.

- The BFR forwards straightly the packets according to the mpls labels, and the labels are not be changed.

- Any comments are welcome ☺

Thanks!