Extensions for BIER-TE with MPLS and non-MPLS Encapsulation
draft-zwx-bier-te-extensions

IETF115# BIER

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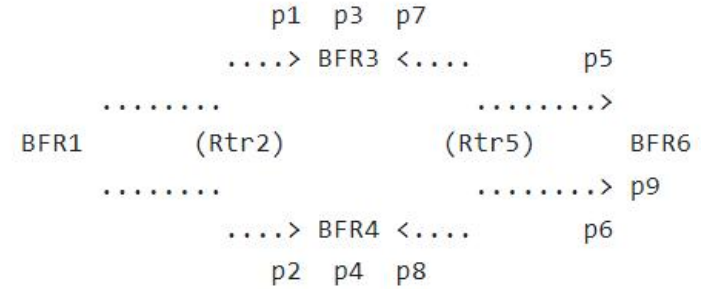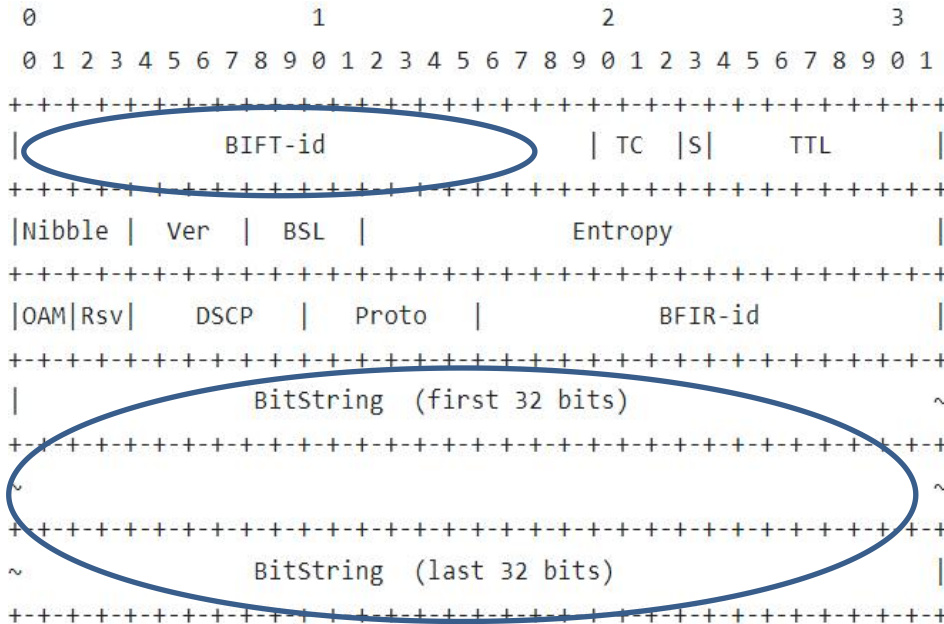
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Background

- draft-ietf-bier-te-arch:

  - BIER-TE replaces in-network autonomous path calculation by explicit paths calculated offpath by the BIER-TE controller host.

  - In BIER-TE every BitPosition of the BitString of a BIER-TE packet indicates one or more adjacencies - instead of a BFER as in BIER.

  - BIER-TE in each BFR has no routing table but only a BIER-TE Forwarding Table (BIFT) and populated with only those adjacencies to which the BFR should replicate packets to.

All the BIER encapsulation methods apply to BIER-TE:
- MPLS
- Ethernet
- BIERin6

BIER-TE (Tree Engineering for Bit Index Explicit Replication)

```
 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
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|          BIFT-id            | TC  |S|    TTL       |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|Nibble |  Ver  |  BSL  |            Entropy          |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|OAM|Rsv|   DSCP   |   Proto  |        BFIR-id        |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|          BitString  (first 32 bits)                        ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                                                            ~
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~          BitString  (last 32 bits)                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

```
                         p1   p3   p7
                    ....> BFR3 <....        p5
          ........                  ........>
BFR1        (Rtr2)               (Rtr5)      BFR6
          ........                  ........> p9
                    ....> BFR4 <....        p6
                    p2   p4   p8

(simplified) BIER-TE Bit Index Forwarding Tables (BIFT):

BFR1:    p1  -> forward_routed() to BFR3
         p2  -> forward_routed() to BFR4

BFR3:    p3  -> local_decap()
         p5  -> forward_routed() to BFR6
```
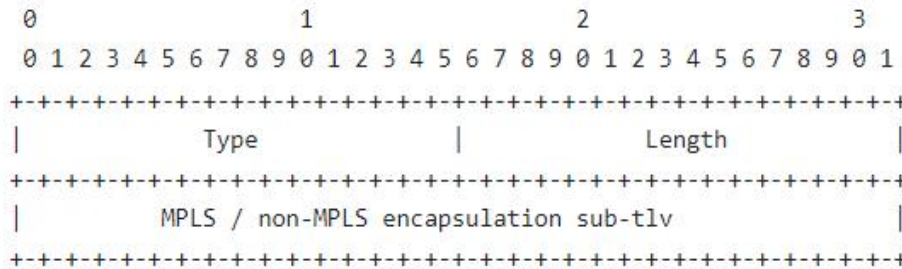
- The composition of BitString is the link BP.
- The forwarding table seems like BIER, but it's different.
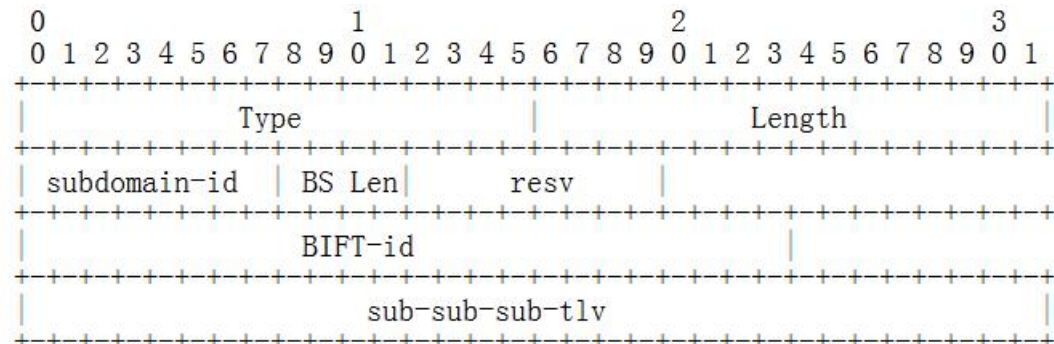- The BIFT-id field indicates the BIFT of the packet.

BIFT-id signaling

- The advertisement of draft-zwx-bier-te-isis-extensions, draft-zwx-bier-te-ospf-extensions, draft-zwx-bier-te-ospfv3-extensions works. but it does not work well in case there are many BPs need to be advertised.
- The BIFT-id is advertised associated with selected prefix.
- The BIFT-id is allocated per SD:BSL.
- The advertisement of IS-IS, OSPF and OSPFv3 are similar.

BIER-TE encapsulation sub-tlv

MPLS/non-MPLS encapsulation sub-sub-tlv

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- Any comments ☺

- Thanks!