BGP Extensions for BIER
draft-xu-idr-bier-extensions

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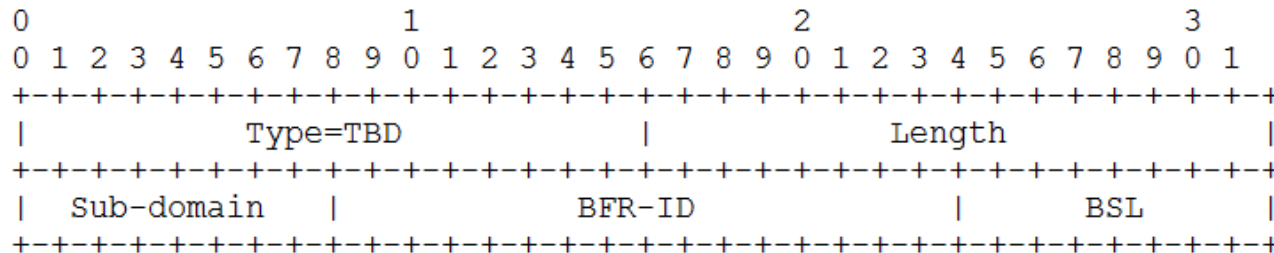
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Motivation

- **BIER is applicable in multi-tenant data center networks for efficient delivery of BUM traffic while eliminating the need for maintaining multicast states in the underlay[I-D.ietf-bier-use-cases].**
- **Since BGP has been used as a underlay routing protocol in many large multi-tenant data center networks [I-D.ietf-rtgwg-bgp-routing-large-dc], it seems necessary to extend BGP for advertising the BIER-specific information.**
  - **A new optional, transitive path attribute, referred to as the BIER attribute, can be attached to a BGP UPDATE message by the originator so as to indicate the BIER-specific information of a particular BFR which is identified by the /32 or /128 address prefix contained in the NLRI. In other words, if the BIER path attribute is present, the NLRI is treated by BIER as a "BFR-prefix".**

BIER Path Attribute

- **The attribute type code for the BIER Attribute is TBD. The value field of the BIER Attribute contains one or more BIER TLVs .**

```
 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=TBD            |            Length             |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|   Sub-domain  |            BFR-ID             |      BSL      |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
~                                                              ~
|                          Sub-TLVs                            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+........................
            Figure 1:BIER TLV
```

- **MP ~ ~ER TLV enc**

```
 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=TBD            |           Length=8            |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|               Label Range Base                |Lbl Range Size |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
        Figure 2:BIER MPLS Encapsulation sub-TLV
```
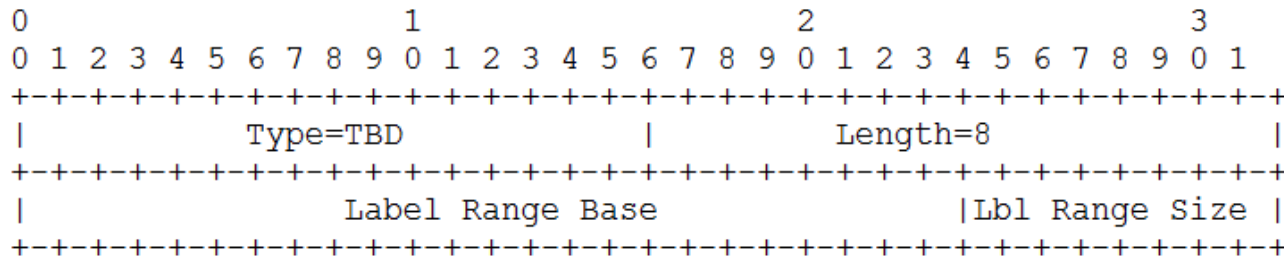
Originating BIER Attribute

- An implementation that supports the BIER attribute MUST support a policy to enable or disable the creation of the BIER attribute and its attachment to specific BGP routes.
- An implementation MAY disable the creation of the BIER attribute unless explicitly configured to do so otherwise.
- A BGP speaker MUST only attach the locally created BIER attribute to a BGP UPDATE message in which at least one of its BFR-prefixes is contained in the NLRI.

Restrictions on Sending/Receiving

- **An implementation that supports the BIER attribute MUST support a per-EBGP-session policy, that indicates whether the attribute is enabled or disabled for use on that session.**
- **The BIER attribute MUST NOT be sent on any EBGP peers for which the session policy is not configured.**
  - If an BIER attribute is received on a BGP session for which session policy is not configured, then the received attribute MUST be treated exactly as if it were an unrecognised non-transitive attribute. That is, "it MUST be quietly ignored and not passed along to other BGP peers".
- **To prevent the BIER attribute from "leaking out" of an BIER domain, each BGP router on the BIER domain MUST support an outbound route announcement policy. Such a policy MUST be disabled on each EBGP session by default unless explicitly configured.**

Deployment Considerations

- **It's assumed by this document that the BIER domain is aligned with the Administrative Domain (AD) which are composed of multiple ASes (either private or public ASes).**
  - Use of the BIER attribute in other scenarios is outside the scope of this document.
- **Since the BIER attribute is an optional, transitive path attribute, a non-BFR BGP speakers could still advertise the received route with a BIER attribute.**
  - This is desirable in the incremental deployment scenario where a BGP speaker could tunnel a BIER packet or the payload of a BIER packet to a BFER directly if the BGP next-hop of the route for that BFER is a non-BFR.
- **A BGP speaker is allowed to tunnel a BIER packet to the BGP next-hop if these two BFR-capable BGP neighbors are not directly connected (e.g., multi-hop EBGP) .**

Next Steps

- WG adoption?