BIER-MVPN/EVPN: RFC8556/9624 or RFC9573?

Jeffrey Zhang, Juniper Networks

RFC8556/9624 – Upstream-assigned labels

- RFC8556 (BIER-MVPN) and RFC9624 (BIER-EVPN) use upstream-assigned labels to identify a VPN/BD/ES
- BIER header's "proto" field is set to 2 (upstream-assigned labels)
  - The label after the BIER header is looked up in a label table for the BFIR
- RFC8296 (BIER encapsulation):

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If the BIER encapsulation's Proto field indicates that
the payload is an MPLS packet with an upstream-assigned label at the
top of the stack, the upstream-assigned label is interpreted in the
context of <BFIR-id, sub-domain-id>.
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RFC9573: DCB labels

- RFC9573 specifies a way for MVPN/EVPN to use Domain-wide Common Block (DCB) labels to identify a VPN/BD/ES
- A DCB is analogues to a common SRGB
  - A different name is used so that it is applicable in non-SR environment as well
  - Each router reserves a common block of labels from their default label space
- All PEs are provisioned with a common label (from the DCB) for a particular VPN/BD/ES
  - An incoming packet's DCB label is looked up in the default label forwarding table
  - The "proto" field in the BIER header is expected to be 1
    - At least expected by the RFC9573 co-authors

The Problem

- RFC9573 does not explicitly state that the proto field must be set to 1
- It is however implied from the following:

> One method of achieving this is to reserve a portion of the default label space for assignment by a central entity. We refer to this reserved portion as the DCB of labels. This is analogous to the concept of using identical SRGBs on all nodes, as described in [RFC8402].

- The label is not “independently allocated” by the ingress PE
  - It’s allocated by the operator for all PEs collectively
  - All PEs will look up that label in their default label table – hene “downstream-assigned”
- If the proto field is set to 2, the receiving router must look up the label in a label table associated with the BFIR
  - Per RFC8296
  - This defeats the purpose of RFC9573 DCB labels
- Interestingly, RFC8402 does not explicitly say SRGB labels are downstream-assigned either

Why RFC9573 besides RFC8556/RFC9624?

- Upstream-assigned labels do not scale well
  - https://datatracker.ietf.org/doc/html/rfc9573#name-problem-description
- Its implementation is more complex
- It is more difficult to operate/debug
- All because of those per-BFIR label tables

Next Steps

- First to reach consensus that:
  - DCB labels are downstream-assigned labels
  - The “proto” field in the BIER header needs to be set to 1 for DCB labels
- Then file an errata for RFC9573 or publish a short RFC to state the above explicitly
- Or we update RFC8296 to state:

  1: MPLS packet with top of stack label to be looked up in the default LFIB

  2: MPLS packet with top of stack label to be looked up in the context-specific LFIB for the BFIR