RBridge Aggregation

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Single AF: Loop Avoidance

• To avoid loops involving native frames, TRILL allows only a single Appointed Forwarder for one VLAN on a local link.

• Single AF means single ingress & single egress for a specific VLAN.
Purpose of Aggregation

• Provide active/active multi-homing to a specific VLAN on a local link
• Increase the reliability of TRILL edge
• Increase the access bandwidth of RBridge campus
RBridge Aggregation

- Two R Bridges use one nickname, pseudonode nickname, to ingress frames.
- Advertise virtual links (e.g., RB1-RBv, RB2-RBv)
- They can forward data frame for VLAN-x at the same time (active-active).
Two Possible Issues

• Traffic Duplication
  – Multicast frames egressed by both aggregated members

• Forwarding Loop
  – Multicast frames from the local link are egressed back to the local link by another aggregated member
Link Aggregation [802.1AX] or Hashing

• The access links of the bridge are configured as link aggregation [802.1AX].
  – A frame is transmitted by one link one time
• Choose a single member using local hashing
  – A frame goes through one RBridge one time
  – Current version of our draft adopt this solution
Frame Processing: Known Unicast

• Ingress
  – Set the nickname to the pseudonoe nickname “RBv”
  – Receiver ingresses the frame to the TRILL campus

• Egress
  – Receiver egresses the frame to the local link
Frame Processing: Multicast

• Ingress
  – If hashing matches
    • Set the nickname to “RBv” and send it
  – If not, drop it

• Egress
  – If hashing matches
    • send the frame
  – If not, drop it
Frame Processing: Unknown Unicast

• Ingress
  – The access bridge sends one copy of the frame with unknown unicast blocking technique
  – Aggregated RBRidges treat the frame as unicast

• Egress
  – Same as multicast egress
MAC Learning

- MAC addresses of the aggregated RBridges SHOULD be synchronized using ESADI.
- Before a MAC address is got from another aggregation member’s ESADI, frames destined to this MAC address will be sent as unknown unicast.
Hashing Function Configuration

• An aggregation member can only send multicast frames with a specific hashing value.
  – E.g., RB1 only sends multicast frames that the last bit of their source MAC is “0”.

```
++        +--->0--->RB1<--+
|            1--->RB2 |
|H           2--->RB3 |
|A --| ...--->RB... |
|S  | k-1--->RBk |
|H  | k--->RBk+1 |
|    | ...--->RB... |
++        +--n-1--->RBn<--+
```
Hashing under Link Failures

- When a connection to one aggregation member failed, the next member on the list takes the responsibility to send multicast frames for the aggregation.
Thanks!