VLAN Load Balancing

draft-zhang-trill-vlan-assign-01

Mingui Zhang, Dacheng Zhang

zhangmingui@huawei.com

Draft Updates

- 00 version talks about adaptive VLAN assignment for Inter-VLAN load & MAC Balancing

- 01 version adds the VLAN load balancing for a single VLAN. Link aggregation technique is addressed in the document.

Multiple Points Attachment

- Unlike STP, TRILL allows multi-access to an local link

- MPA is common in RBridge campuses
  - High east-west capacity
  - Flexibility

STP Region

Local Link

Local Link

RB1

RB2

Local Link

Local Link

for multiple VLANs
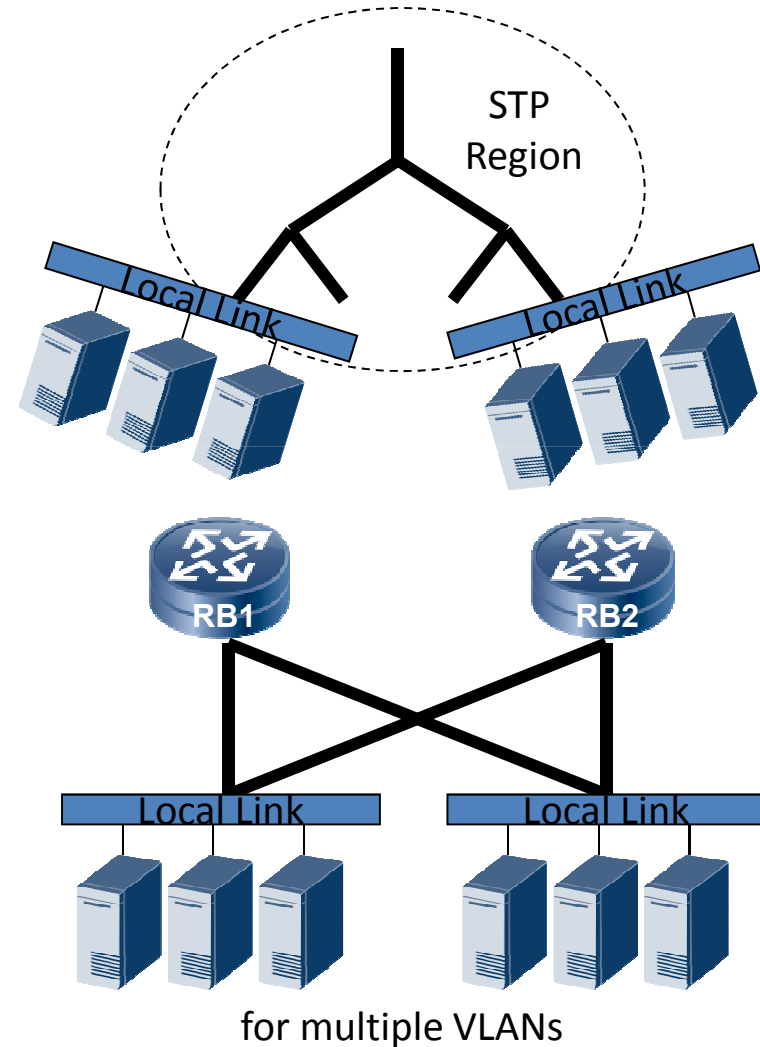
Single AF: Another Form of "Block"

- However, for loop avoidance, TRILL allows only a single Appointed Forwarder for one VLAN on a LAN link.

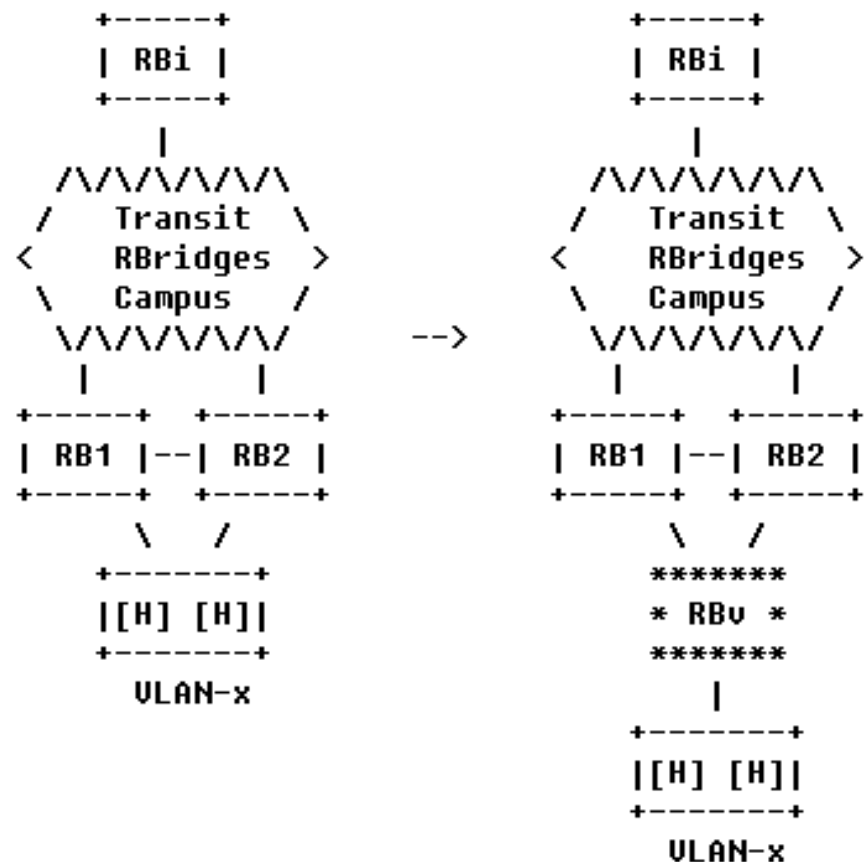- Single AF means single ingress & single egress.

for one VLAN

4
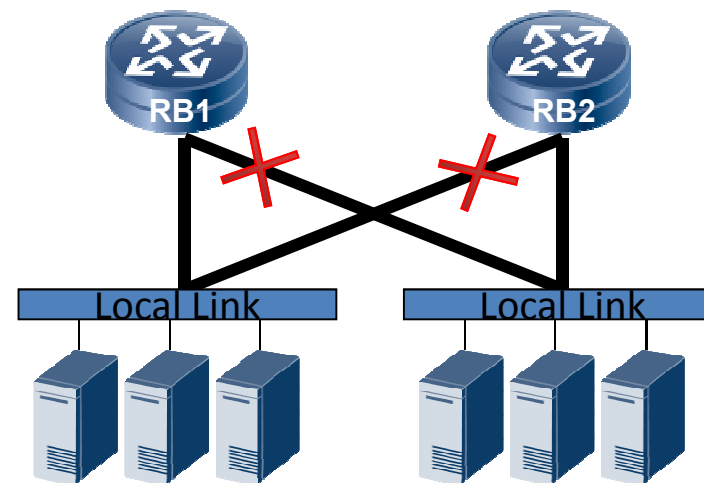
Shortcomings of "Single Forwarder"

- Reduces the access bandwidth

- Easily leads to path polarization

- The access of the LAN link to RB campus is not resilient to failures.

- Single forwarder mechanism can partition a campus [TRILL base protocol].

Link Aggregation

- Two RBridges use one nickname to ingress/egress frames.

- They can forward packets for VLAN-x at the same time.

```
   +-----+                        +-----+
   | RBi |                        | RBi |
   +-----+                        +-----+
      |                              |
   /\/\/\/\                       /\/\/\/\
  /  Transit  \                  /  Transit  \
 <  RBridges   >                <  RBridges   >
  \  Campus   /                  \  Campus   /
   \/\/\/\/                       \/\/\/\/
     |     |                        |     |
  +-----+ +-----+        -->     +-----+ +-----+
  | RB1 |-| RB2 |                | RB1 |-| RB2 |
  +-----+ +-----+                +-----+ +-----+
     \   /                          \   /
   +-------+                      *******
   |[H] [H]|                      * RBv *
   +-------+                      *******
    VLAN-x                           |
                                 +-------+
                                 |[H] [H]|
                                 +-------+
                                  VLAN-x
```

Load Balance through Hashing

- Hashing based on the header of frames
  - E.g., source MAC

- Per flow load balance avoids reordering frames.

Frame Processing

- Unicast
  - Ingress: hashing the frame onto one of the bundling members; receiver RBridge delivers the frame directly
  - Egress: receiver RBridge delivers the frame directly
- Multicast (assign to one member using hashing)
  - Ingress/Egress: if assigned, send it; if not assigned and unknown unicast, send it to peer as a unicast frame; if not assigned and broadcast/multicast, drop it
- MAC learning
  - Synchronization between peers
- Individual link failure
  - Ingress: use the peer link
  - Egress:
    - Unicast: send it to peer who will deliver the frame
    - Multicast: send it via an reserved outer VLAN as unicast, the peer will deliver the frame coming from this reserved VLAN without considering the hashing function

Instant Redirection for Link Failures

- It improves the resilience in the face of failures of individual links.

- Since reach-ability is not affected, MAC addresses are not withdrawn from the virtual link.

Thanks!