Data Plane for Resilient Network Interconnect

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Introduction

› Data paths do not depend on the applied control protocol

› How to implement the data paths within the 802.1 architecture?

› Let’s cover the most complex case
  – Overlay tunnel within the network (single tunnel between a node-pair)
  – Support both congruent and non-congruent forwarding
Forwarding within an NI bridge

1) frame received on NI port

› For example

Diagram:

- Frame received on NI port
- Active node?
  - yes
  - Forward frame to network port
  - no
  - encapsulate

Example:

Frame received on NI port
For example
Active node? no yes
Forwarding within an NI bridge
2) frame received on network port

- For example

- Frame received on network port
  - yes: Tunneled frame?
  - no: Passive node OR Network internal DA?
    - yes: Tunnel to passive?
      - yes: encapsulate
      - no: Forward frame to network port
    - no: Active node?
      - yes: decapsulate
      - no: Forward frame to an NI port
Notations for bridge component model

- Operation of frame forwarding can also be described by the bridge component model.
- Bridge component model is suitable to illustrate what needs to be implemented in the data plane.

- bridge port
- CBP
- PIP
- Ports in a LAG Group (Distributor and Collector)
- PVID
- In the member set
- In the untagged and member sets
Edge Bridge using LAG features and PBB encapsulation

- The Network is a PBN
- S-tagged NI
- LAG Distributor of the Active Gateway decides whether the Service VID is tunneled
- Single ingress to the relay from NI supports MAC learning for non-congruent services too
- Overlay tunnel between NI nodes is implemented by 802.1ah encapsulation
  - *green B-VID* is the tunnel B-VID
- NI node K is the Active Gateway for the *brown S-VID*
- NI node K is Passive for the *blue S-VID*
- Note that Gateway (re-)selection is just setting the VID member sets in the S-Components
Edge Bridge using LAG features and PBB encapsulation

Example path 1

K is
Active for brown
Passive for blue

L is
Active for blue
Passive for brown

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Edge Bridge using LAG features and PBB encapsulation

Example path 2

K is
Active for brown
Passive for blue

L is
Active for blue
Passive for brown

Note: this example is the same as shown on page 2
Edge Bridge using LAG features and PBB encapsulation

Example path 3

K is
Active for brown
Passive for blue

L is
Active for blue
Passive for brown
Edge Bridge using LAG features and PBB encapsulation

Example path 4

K is Active for brown Passive for blue

L is Active for blue Passive for brown

Network ports

NI port
Alternatively, Backbone Edge Bridge using LAG features – (example path 1)

- The Network is a PBBN

- S-tagged NI

- LAG Distributor of the Active Gateway decides whether the Service VID is tunneled

- A B-VID is used as overlay tunnel
  - green B-VID is the tunnel B-VID

- NI node K is the Active Gateway for the brown S-VID

- NI node K is Passive for the blue S-VID
Alternatively, Backbone Edge Bridge using LAG features – (example path 2)

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Edge Bridge using LAG features and generic tunneling

› The Network is a PBN

› S-tagged NI

› LAG Distributor of the Active Gateway decides whether the Service VID is tunneled

› Generic Overlay tunnel between NI nodes
  ‒ Green S-VID and grey C-VID are NI node internal VIDs only applied in the bridge component model description

› NI node K is the Active Gateway for the brown S-VID

› NI node K is Passive for the blue S-VID

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Summary

› The model presented here is proposed to be used as the data plane for the Resilient Network Interconnect

› Both congruent and non-congruent data paths can be supported by the same components

› Overlay tunneling can also be supported
  – Direct physical link between NI nodes is also covered
  – Tunneling support provides connectivity between NI nodes as long as the Network is not split

› The Gateway Selection functionality of the control protocol only has to adjust VID member set for a couple of ports