Unpaired Path Verification

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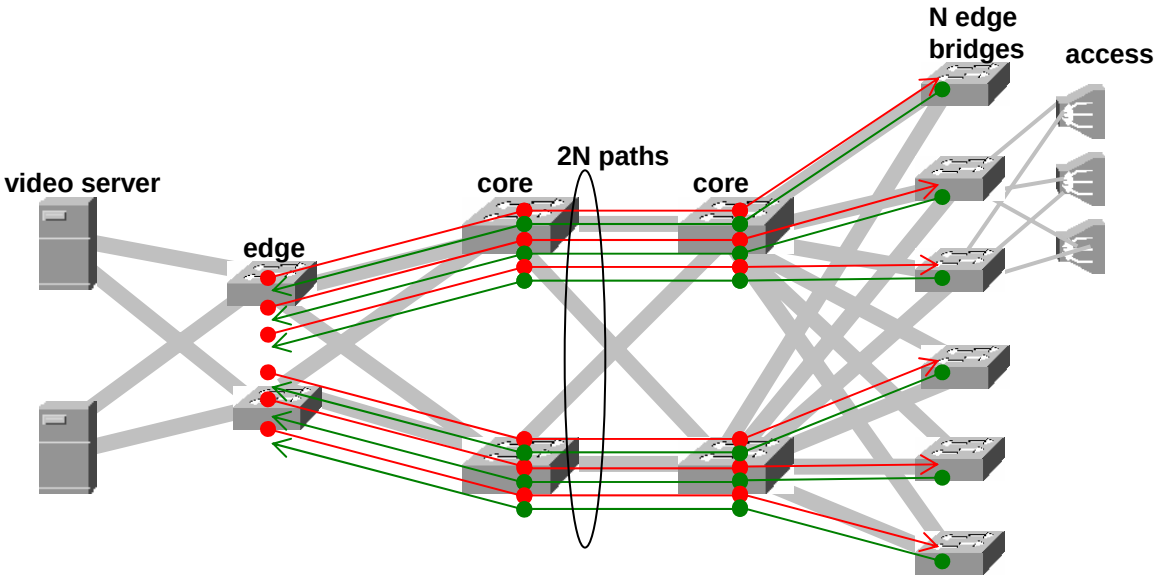
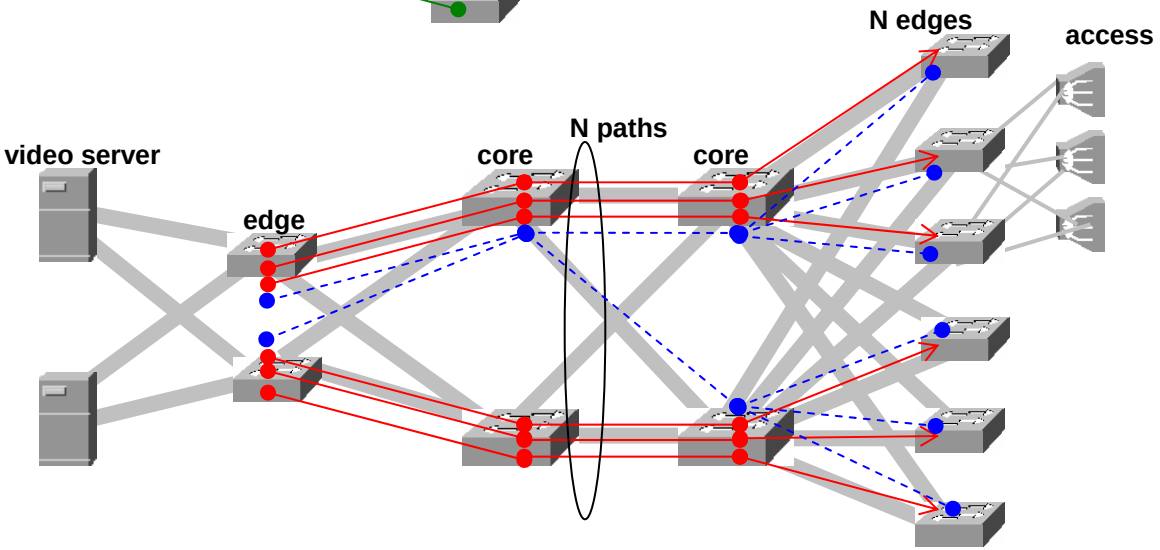
Using .1Qay Unidirectional Paths

- 802.1Qay path is defined as unidirectional entity
  - Note ‘path’ is the same as ‘ESP’
- PBB and PBB-TE operate within same network
  - Partitioned by VID
- Some applications (e.g., video-distribution, IPTV) could be well-served by
  - PBB-TE for distribution towards users
  - PB/PBB for light response load
- 50% reduction in paths to be provisioned

Paired vs. unpaired paths

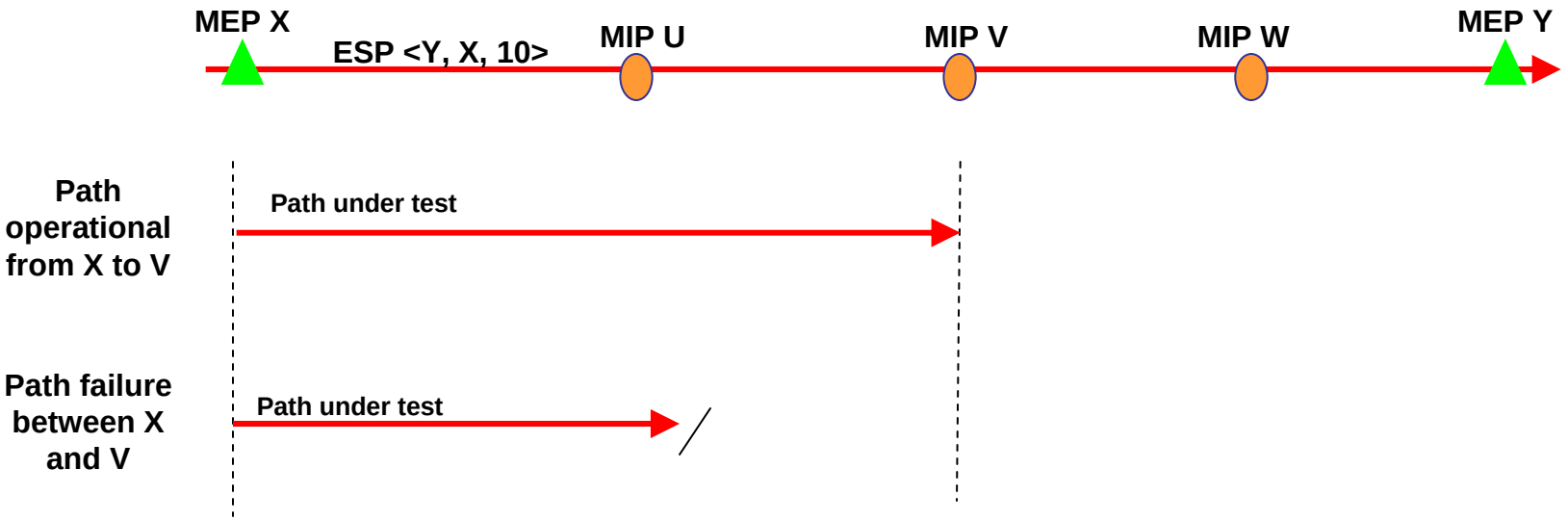


Use of ‘paired’ paths requires provisioning of 2N paths

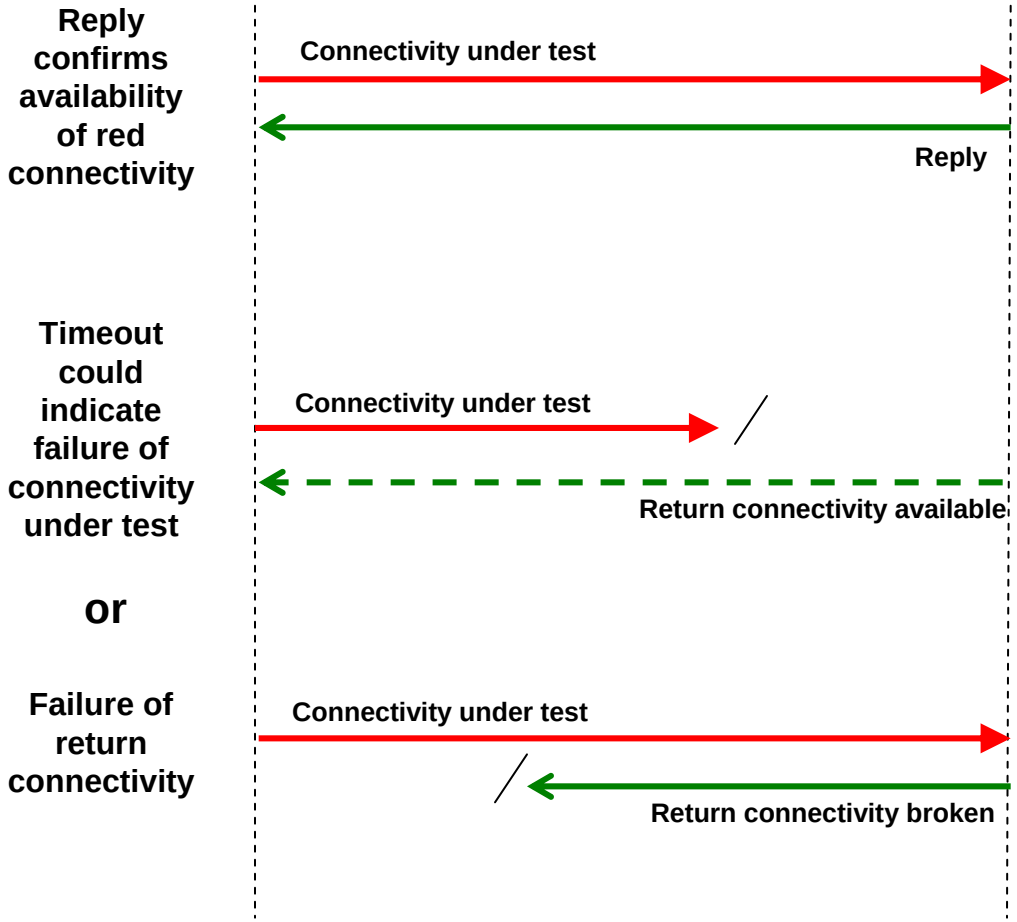


Use of ‘unpaired’ paths in forward direction requires only spanning tree in reverse direction.

Requirement: Verify unpaired path



LB can’t diagnose ‘one-way’ connectivity



Red arrow is the forward connectivity to be tested.
Green arrow shows *any* return connectivity available to carry LBR back to origin.

Problem: Timeout could indicate failure of the forward connectivity or failure of the return connectivity. Note that this observation is independent of whether the connectivity is by VLAN (CL) or path (CO). It is a statement about the Loopback operation.

An example solution

- Perform Loopback operation to verify roundtrip connectivity on a selected VLAN (could be ‘control VLAN’ reserved for this purpose).
- Perform Probe operation to verify connectivity on unpaired path (with reply on the ‘Loopback VLAN’ or ‘Control VLAN’ above).

	PBR Received	**PBR Timeout**
LBR Received	Unpaired (one-way) path verified	Unpaired path failure
LBR Timeout		Connectivity failure on VLAN; must be corrected before unpaired path can be verified

Probe Operation State Machine

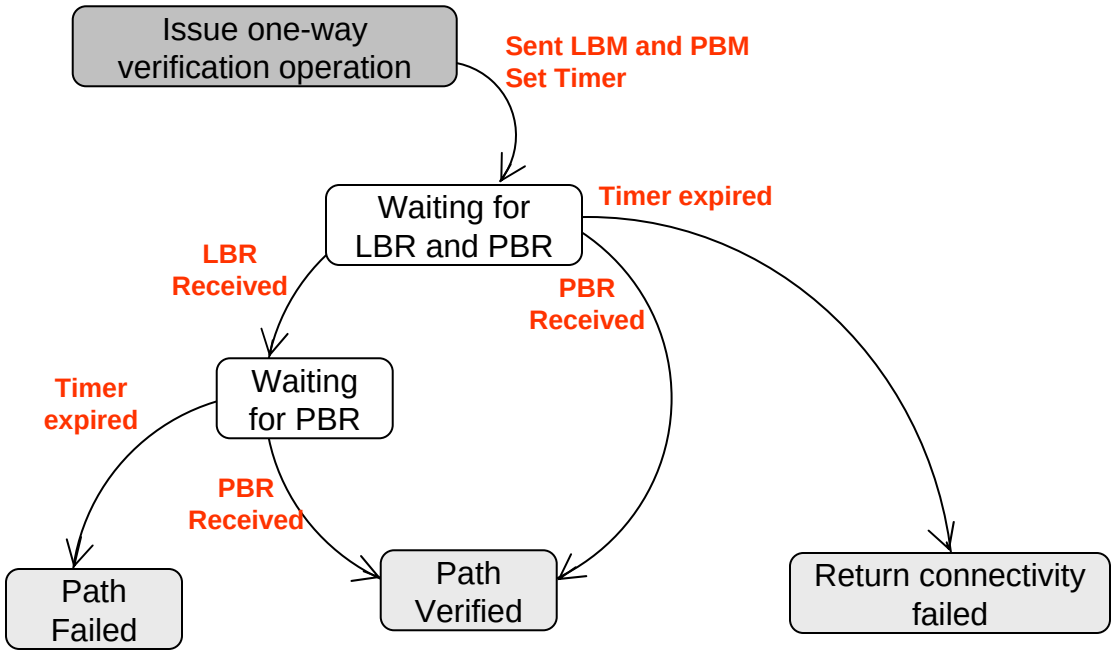
Initial State

Intermediate State

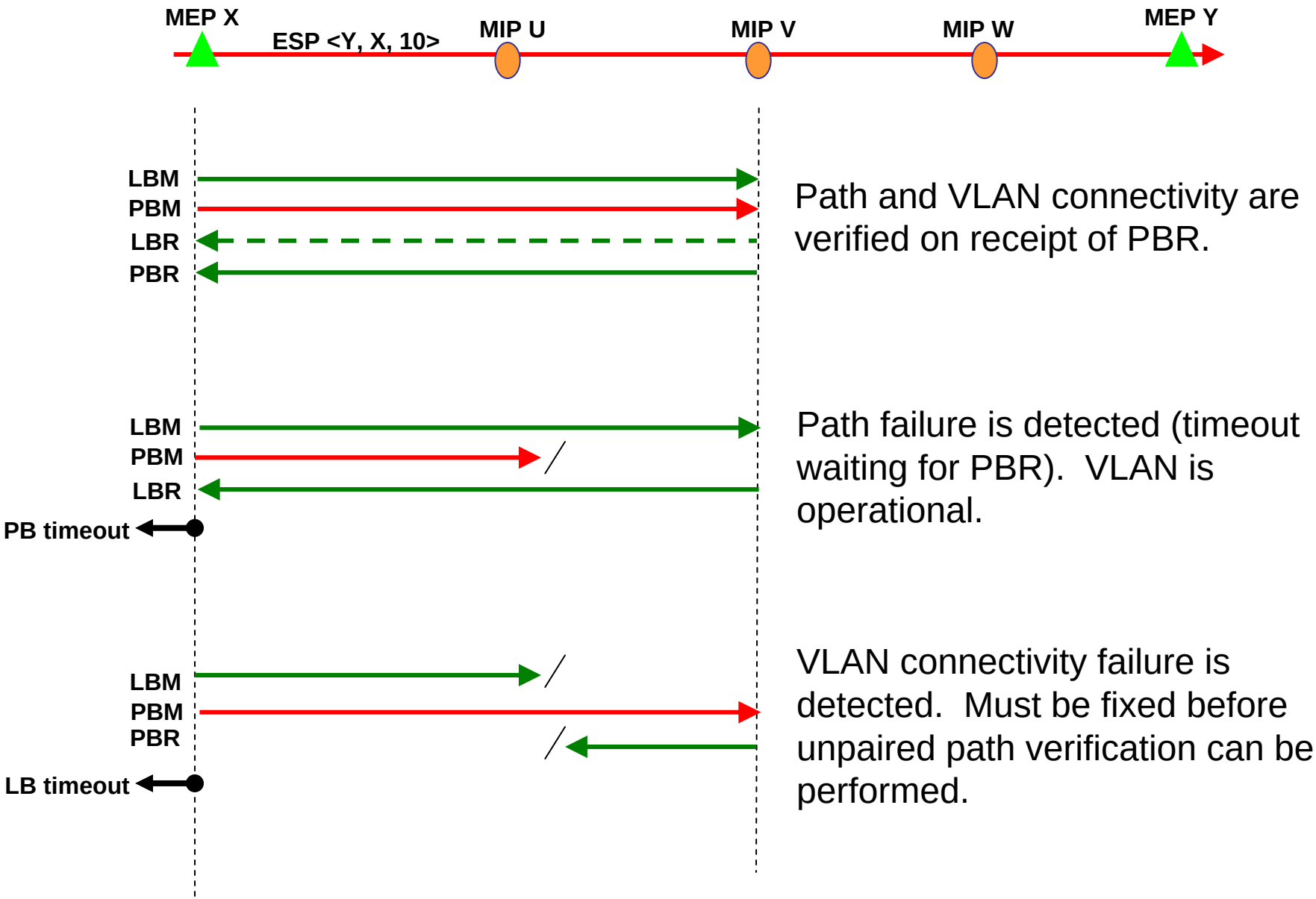
Terminal State

Events resulting in state transition shown in red.

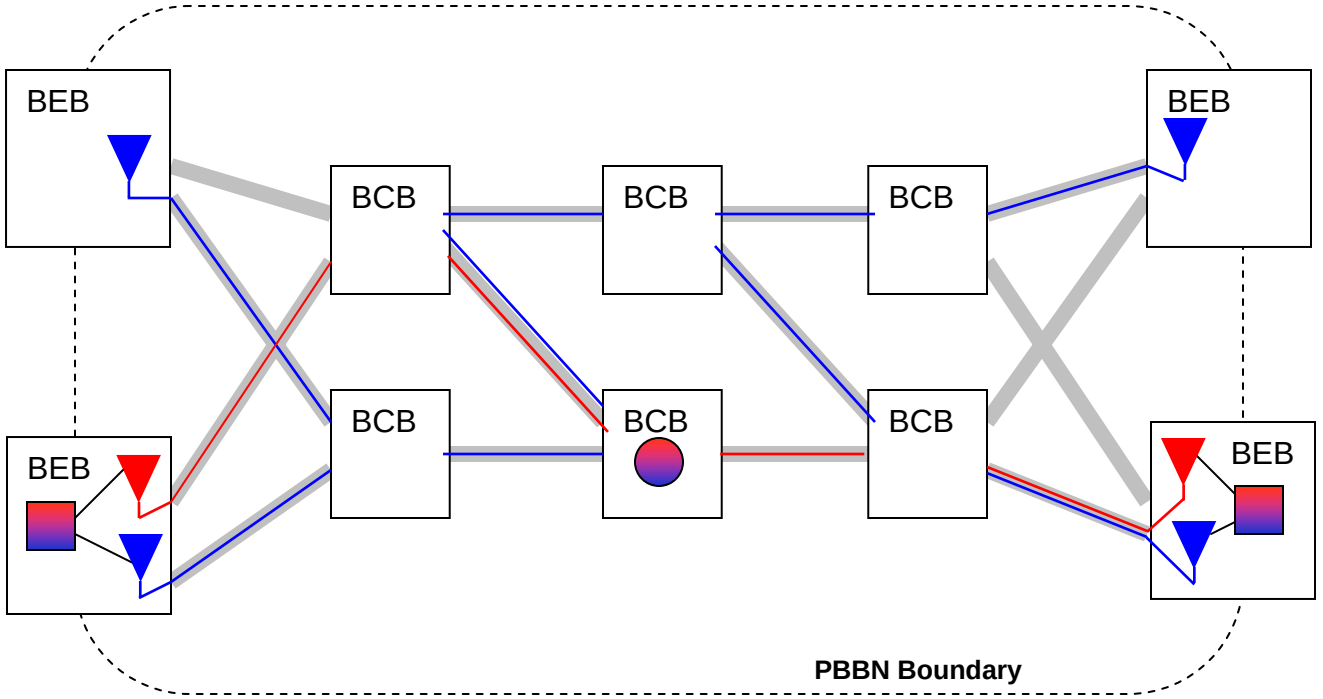
Assumption: LBR and PBR follow same route through VLAN; this route is the exact reverse of that followed by the LBM.



Probe operation



VLAN/path CFM requires coordination



Scope of paths (CO) and BVLANs (CL) is defined by the PBBN boundary. CFM performed within this boundary is secure.

BEB: Backbone Edge Bridge
BCB: Backbone Core Bridge
MEP: Maintenance End Point
MIP: Maintenance Intermediate Point

MEP on Control VLAN originates LBM

MEP on unpaired path originates PBM

Coordinator

Target MIP

Key Points…

- Some applications benefit from the use of paths that are not paired with ‘reverse paths’.
- The use of an unpaired path implies a requirement for a CFM operation to verify the connectivity of an unpaired path.
- Current PBB-TE CFM proposals extend Loopback to allow verification of path pairs but do not provide verification of an unpaired path.
- We provide an example of how this requirement can be met by a single operation that uses:
  - Loopback message/response to verify the VLAN (CL) return connectivity.
  - Probe message/response to verify the unpaired (forward) path.