PBB-TE Segment Protection

David W. Martin
Bernie St-Denis
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v01

Purpose

- **Present the need for a PBB-TE segment protection project**
- **Identify some issues for consideration**

Contents

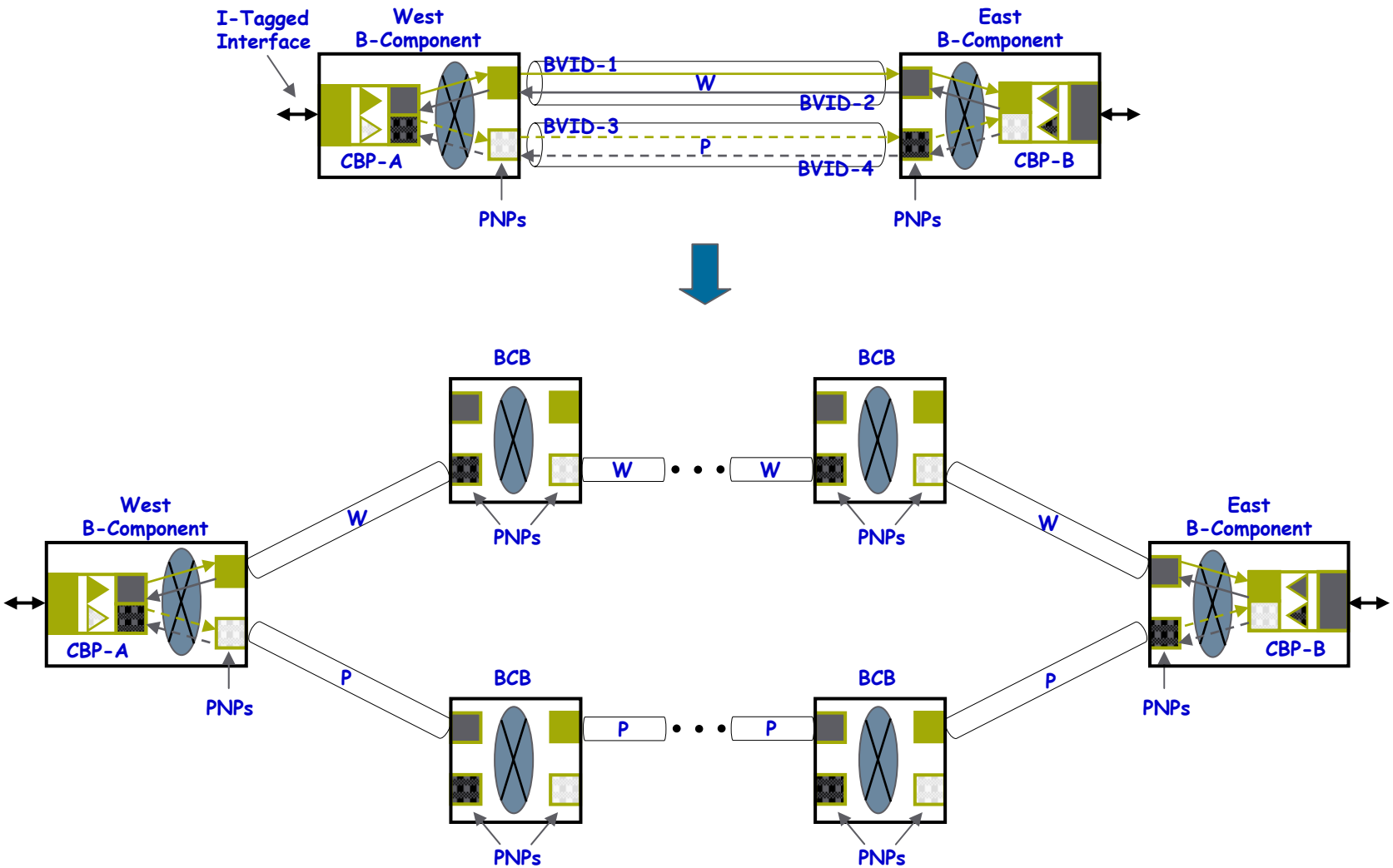
- **Problem Statement**
- **General Segment Approach**
- **Some Issues**
- **Conclusions**

Problem Statement

- **For any connection oriented end-to-end path protection scheme (aka trail protection), as the total media length and the amount of intermediate equipment increases so does the probability of simultaneous failures (i.e., within a 4hr MTTR window) along both the working and protection paths, eventually impacting the corresponding availability target (e.g., 99.999% or 5min/yr downtime)**

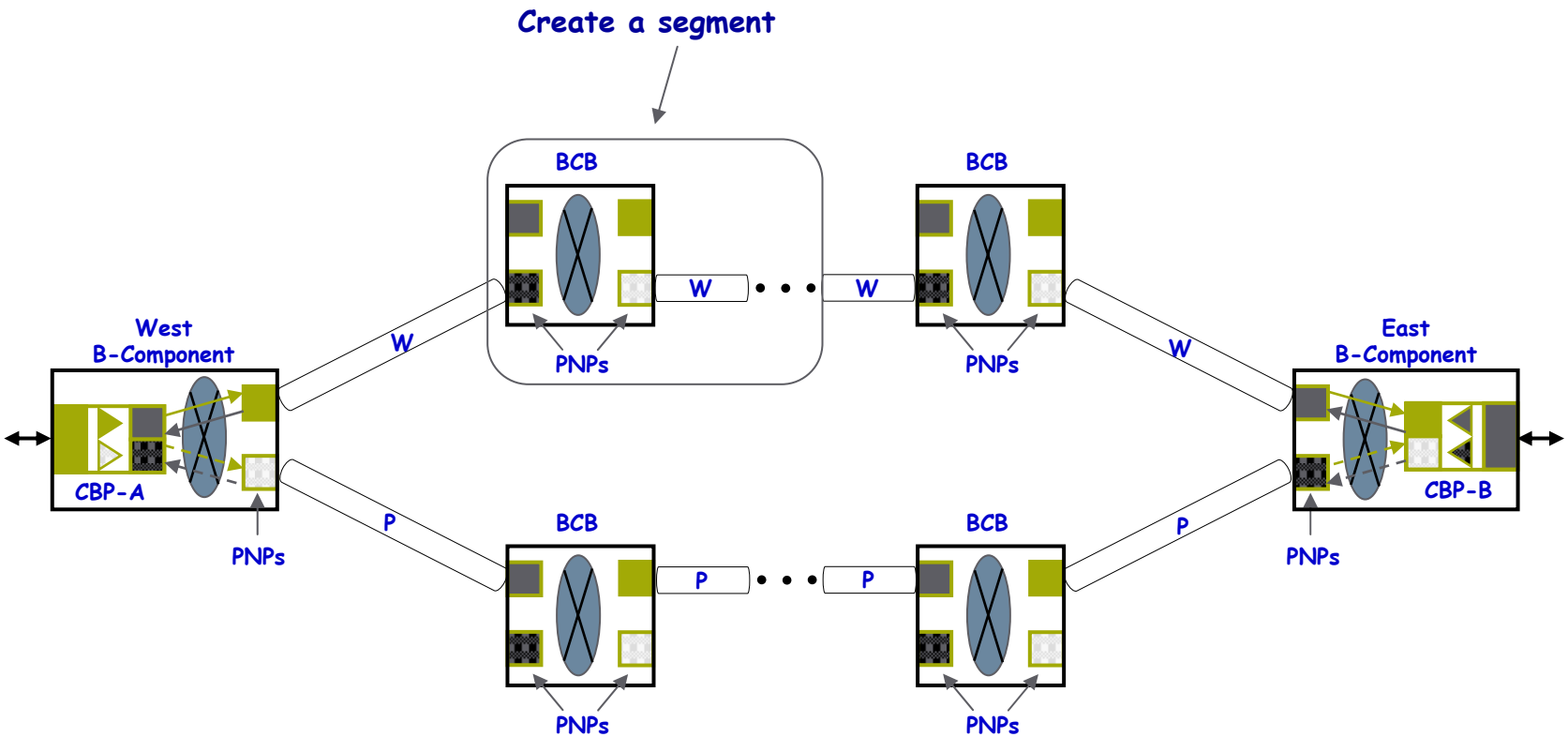
MTTR = Mean Time To Repair

Expanded View

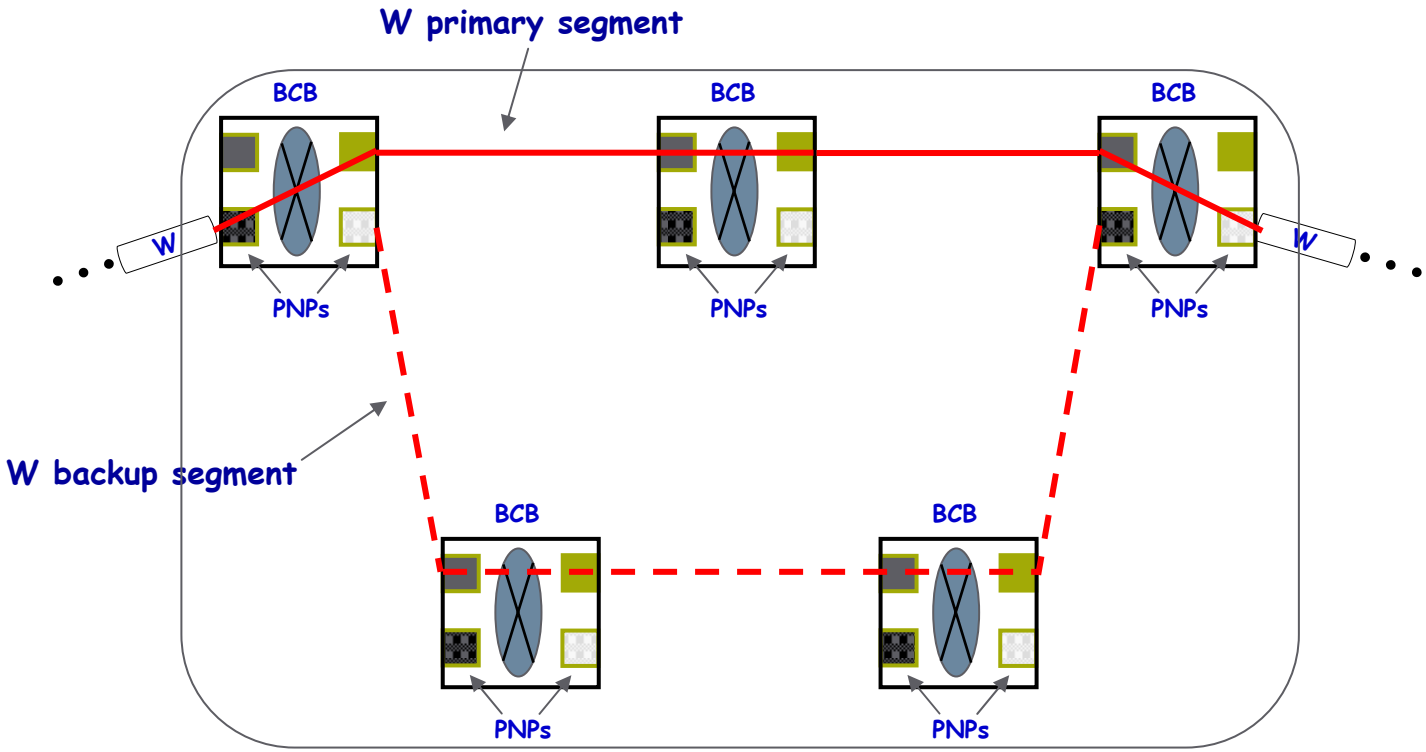


General Segment Approach

- **The general solution is to split up the end-to-end paths and provide some type of segment protection (aka sub-network connection protection)**

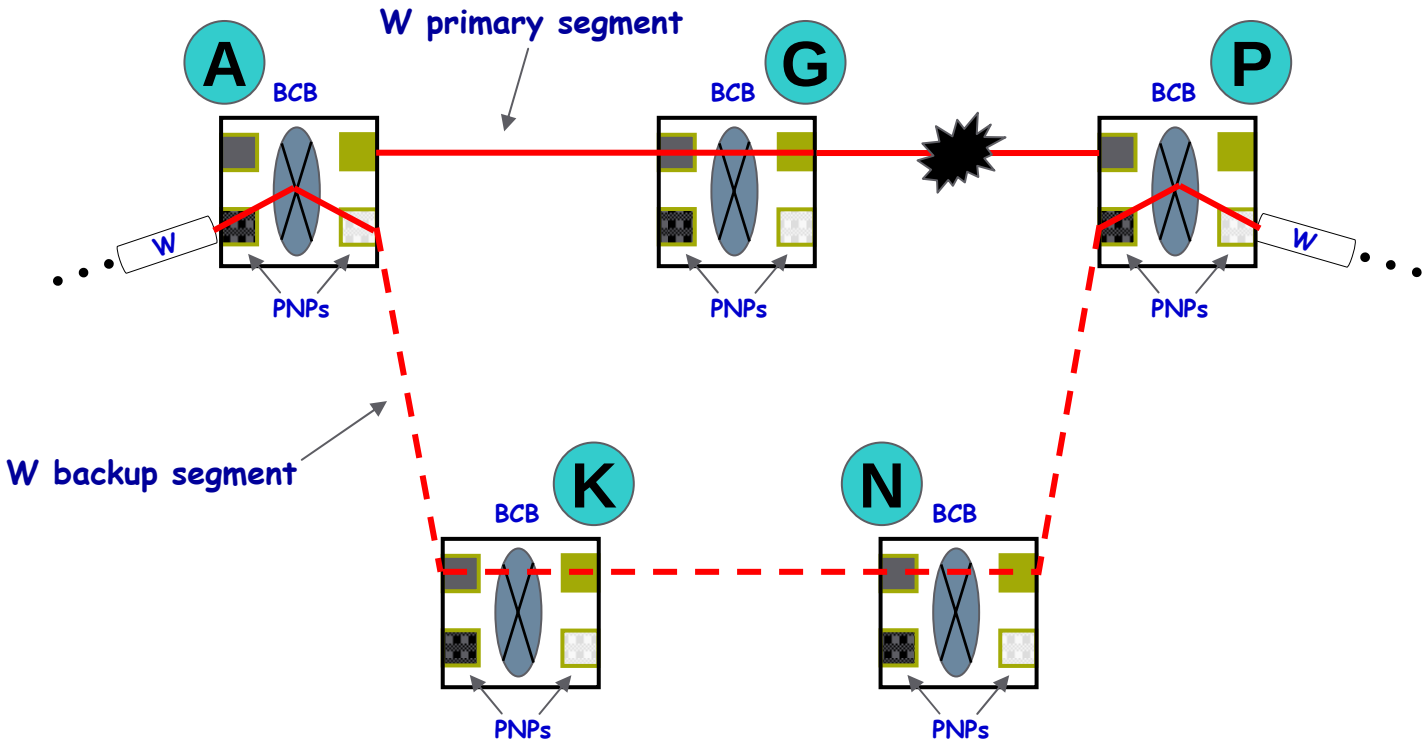


Segment Creation



- **Pre-provisioned backup segment (via FDB entries): the only requirement is that the primary segment and backup segment never cross**
- **Addition of associated PNP MAs and MEPs, running CCMs to detect a segment fault and leveraging RDI to coordinate bi-directional switching**

Segment Switch



- **Re-direction of affected TESI frames via FDB entry swap at Nodes A & P**
- **Note: PBB-TE TESI protection would still operate as currently defined, making use of the Hold-off timer (26.10.3.2.2) to allow segment protection to run first**

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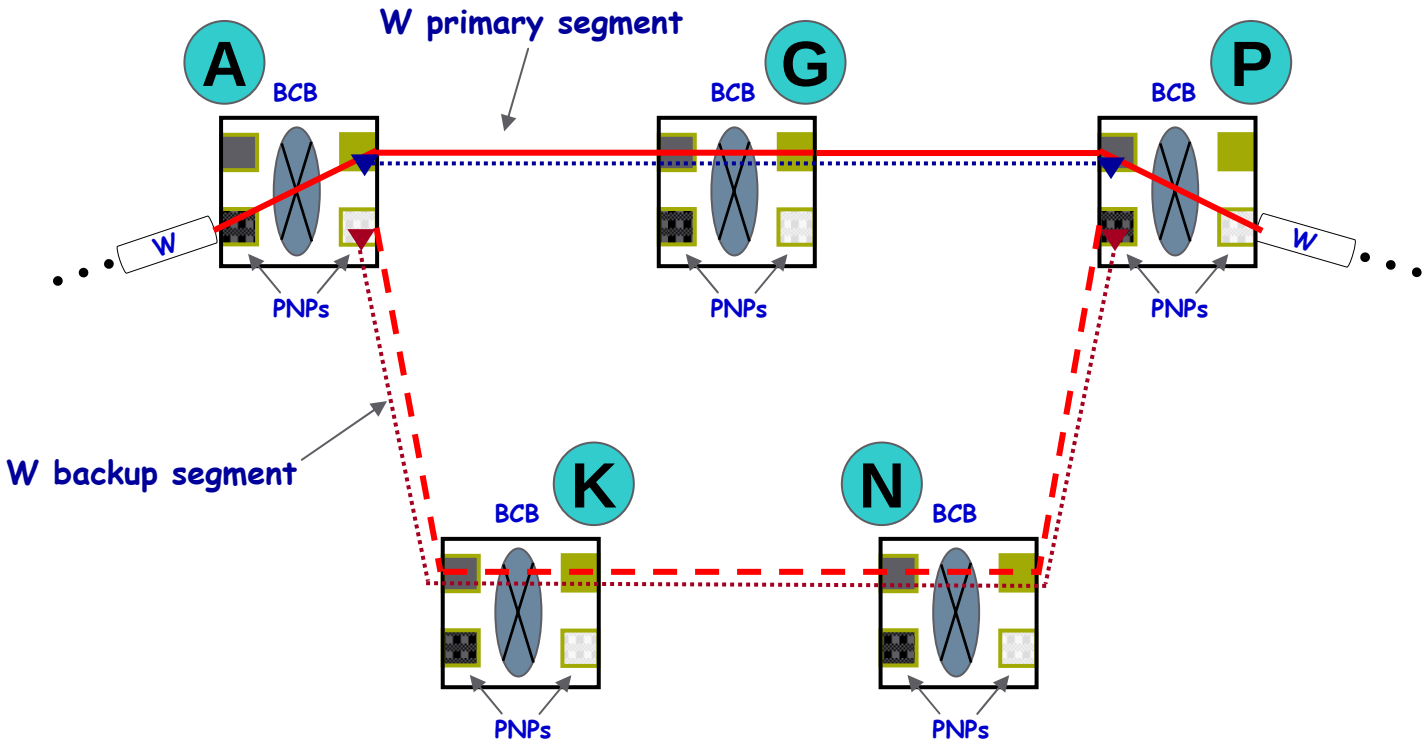
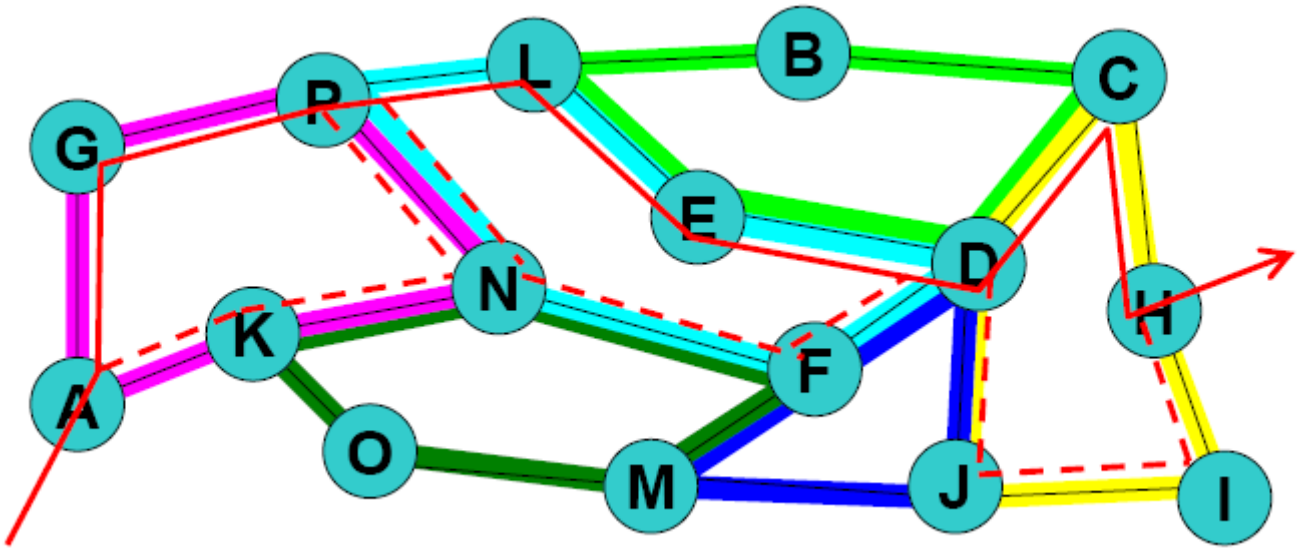
Issue 1: Segment CFM Addressing



- Need CCM integrity check of primary and backup segments, in order to trigger a segment protection switch
- Segment CCMs would use PNP MACs → different 3-tuple than end-to-end CCMs therefore different datapath (integrity check compromised?)

Issue 2: Forwarding Ambiguity

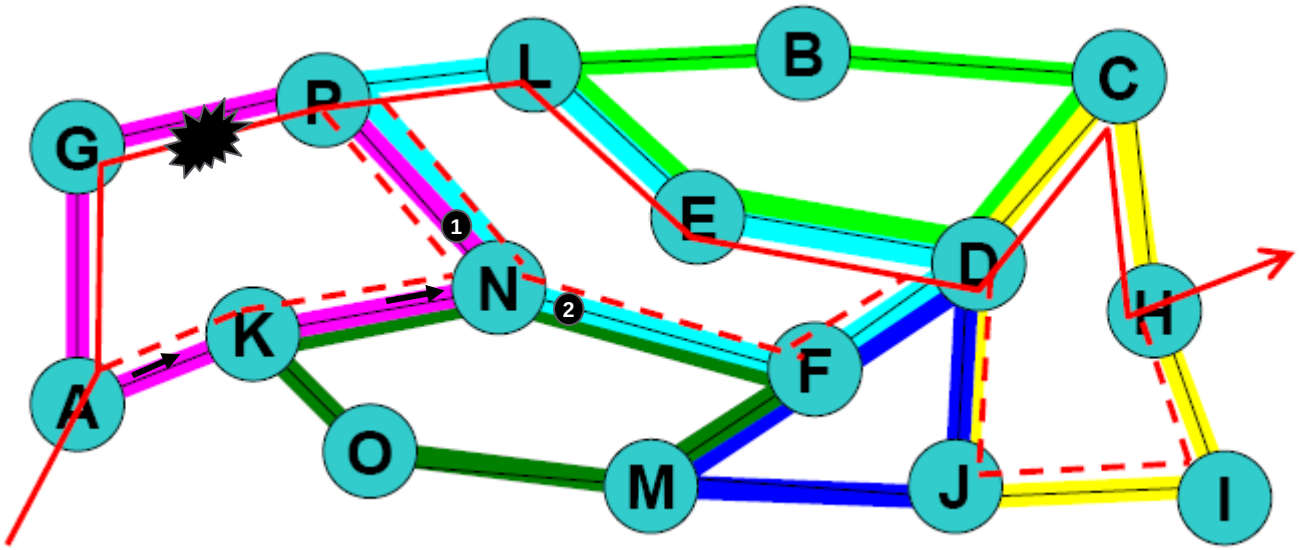


A-H ESP = <H, A, BVID>

- **Forwarding ambiguity at Node N when forwarding a frame over a backup segment…**

Sketch borrowed from p.20 of "new-sultan-fast-reroute-te-0708-v02.pdf"

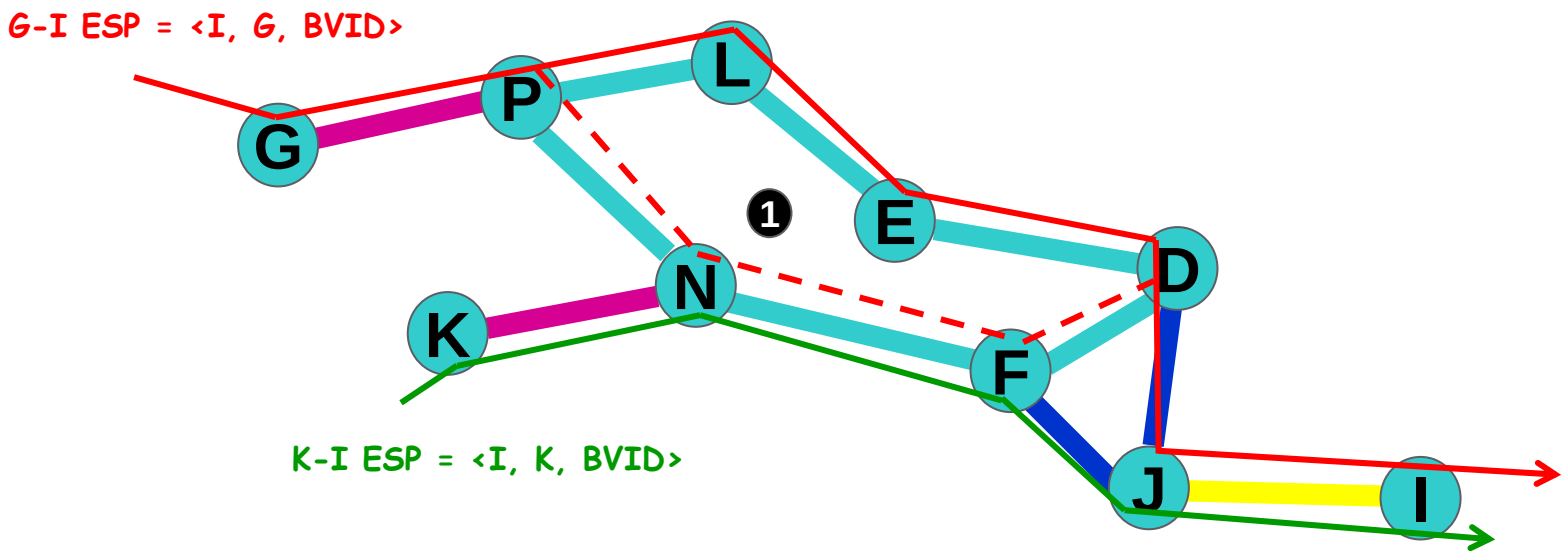
Issue 2: Forwarding Ambiguity (cont'd)



A-H ESP = <H, A, BVID>

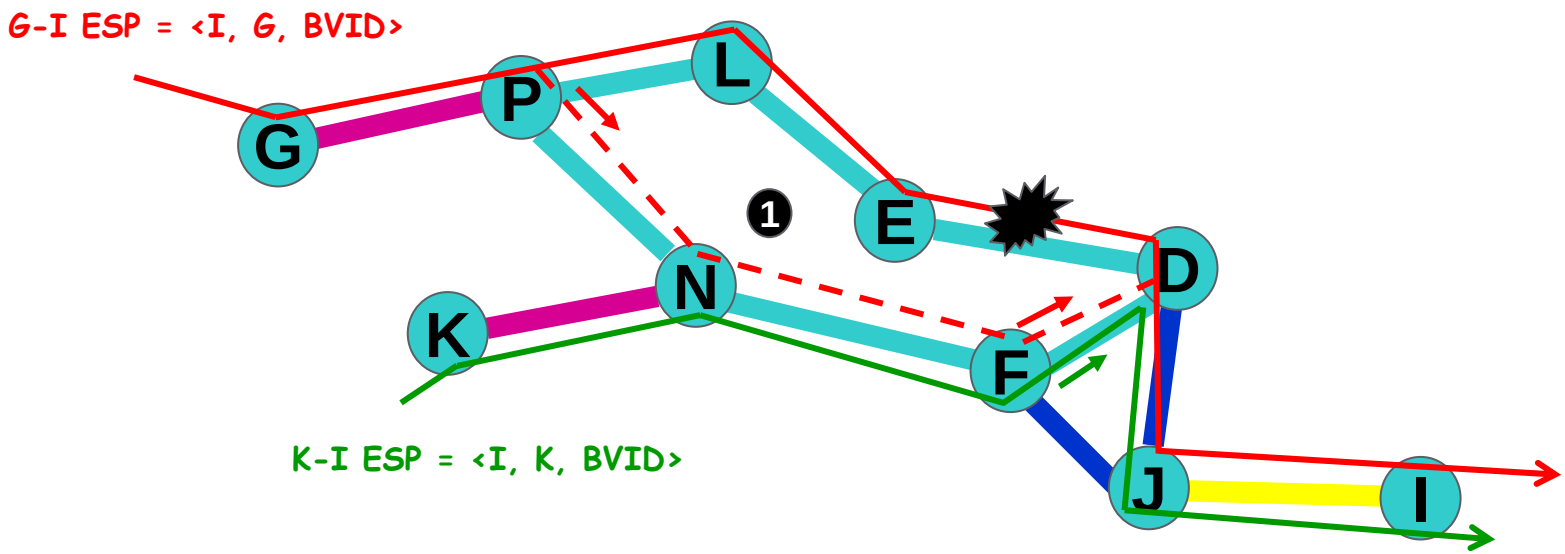
- Which egress port does Node N forward the frame to?
- Node N can only have one active FDB entry for: <H, BVID> ⇒ Port
- Could use a source port based FDB approach (generally supported?)

Issue 3: Traffic Loading Change



- **Links D-J and F-J can undergo (non-obvious) loading changes following a segment 1 protection switch…**

Issue 3: Traffic Loading Change (cont'd)



- Node F forwards frames from the backup segment towards Node D based on: <I, BVID> ⇒ Port.D
- Node F will also start forwarding green frames towards Node D (note a source port based FDB approach won't help)
- Link D-J loading will increase while link F-J loading will decrease

Conclusions

- **A new project is needed to define PBB-TE segment protection to address the expected high availability needs for “long” traffic engineered paths**
- **Careful consideration is required in determining the supported topologies**