

# Proposals for PBB-TE Segment Protection

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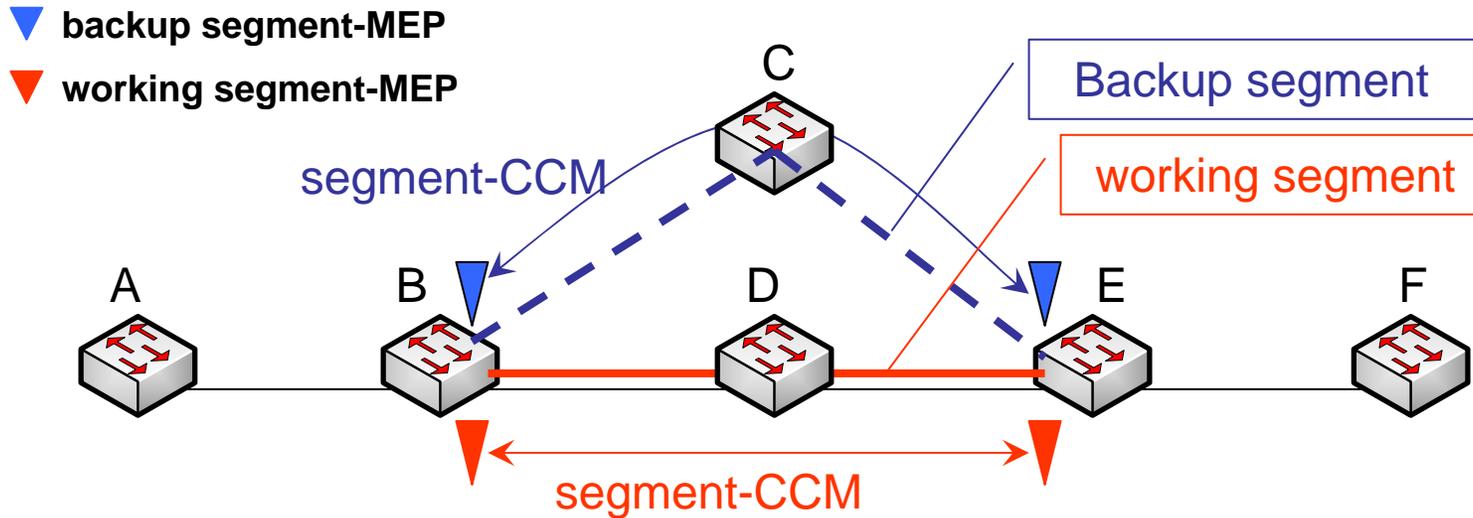
# Background review

- In “new-sultan-segment-protection-requirements-1108-v01\*”, several experts illustrated the requirements of segment protection.
- In “new-martin-PBB-TE-segment-prot-1108-v00\*”, Mr. David W. Martin presented segment entity definition, integrity issues and some segment protection options.

\* Both documents can be found from <http://ieee802.org/1/files/public/docs2008/>

# Segment protection detecting method

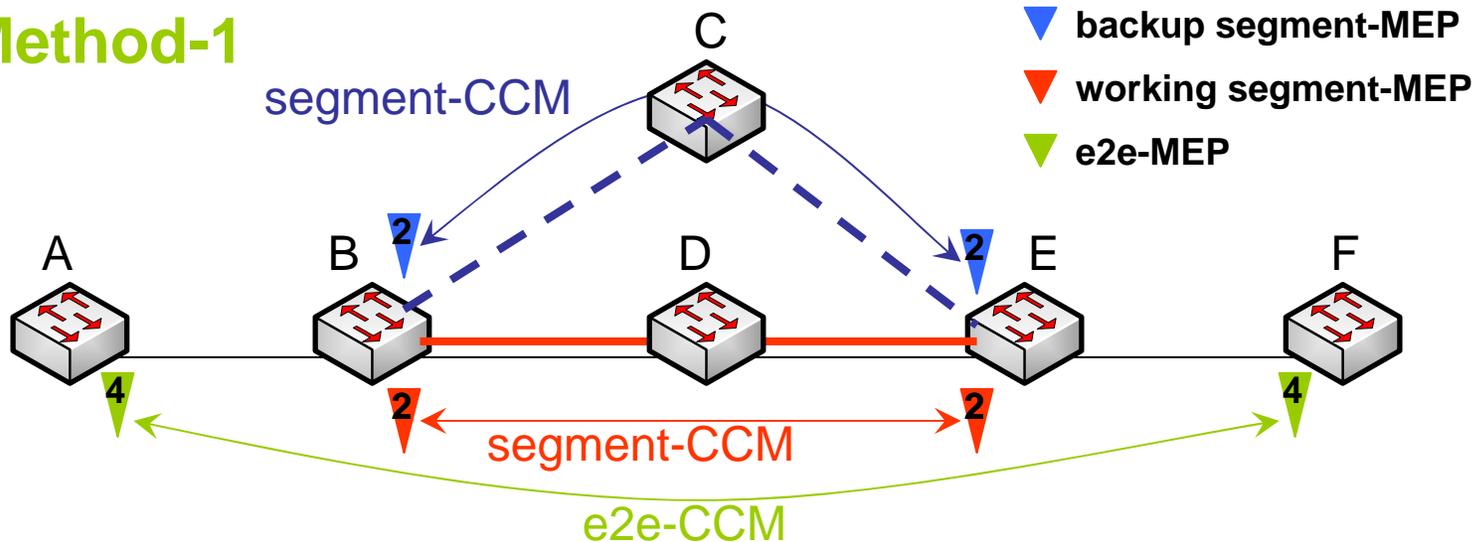
# Segment protection detecting method



- Create segment-MEPs (enhanced MIPs) at endpoints of both working and backup segment.
- Segment CCMs use ESP 3-tuple datapath  $\langle \text{ESP-DA}, \text{ESP-SA}, \text{ESP-VID} \rangle$ , not  $\langle B, E, \text{ESP-VID} \rangle$ . So MIPs will forward segment-CCMs follow e2e datapath
- Segment-CCMs are sent respectively to working segment and backup segment from segment-MEPs
- How to distinguish e2e or Segment CCMs on node B,E?

# How to distinguish e2e or segment CCM? (1)

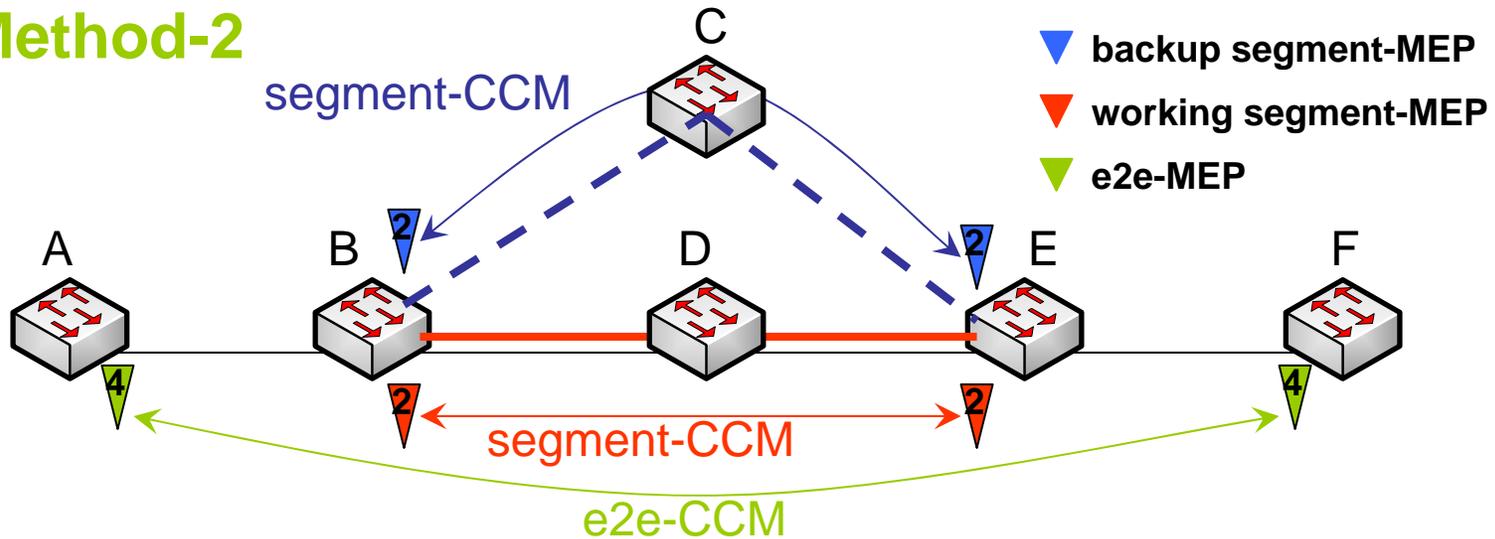
## Method-1



- Use different MD level for e2e-MEPs and segment-MEPs, e.g. the MD level of e2e-MEPs is 4 and segment-MEPs is 2
- Please note the SA and DA of segment-CCM are A and F, not B and E

# How to distinguish e2e or segment CCM ? (2)

## Method-2



Octet	
MD Level	1 (high-order 3 bits)
Version	1 (low-order 5 bits)
OpCode	2
Flags	3

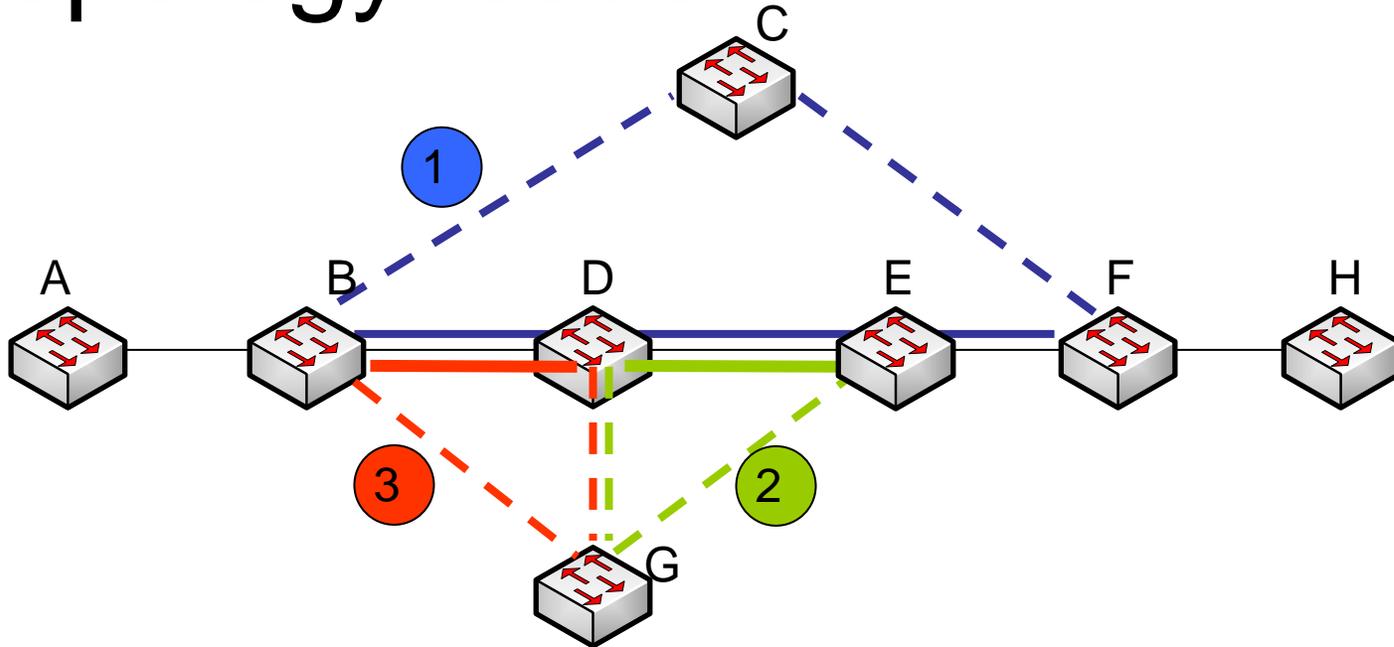
  

0	1	2	3	4	5	6	7
RDI	Reserved			CCM Interval			

Table 21-3—Common CFM Header format

- Use reserved bits in Common CFM Header
- Segment-CCMs write the bits, e2e-CCMs don't write the bits.

# Topology issue



- **SegProt1 can coexist with SegProt2 (*nested*)**
- **SegProt1 can coexist with SegProt3 (*tangent*)**
- **How can SegProt2 coexist with SegProt3 ? (*cross*)**

# Conclusion of segment protection detecting method

## Summary

- The Ethernet header of segment CCM uses <ESP-DA, ESP-SA, ESP-VID>
- e2e and segment CCM can be distinguished by the endpoint of segment

## Benefits

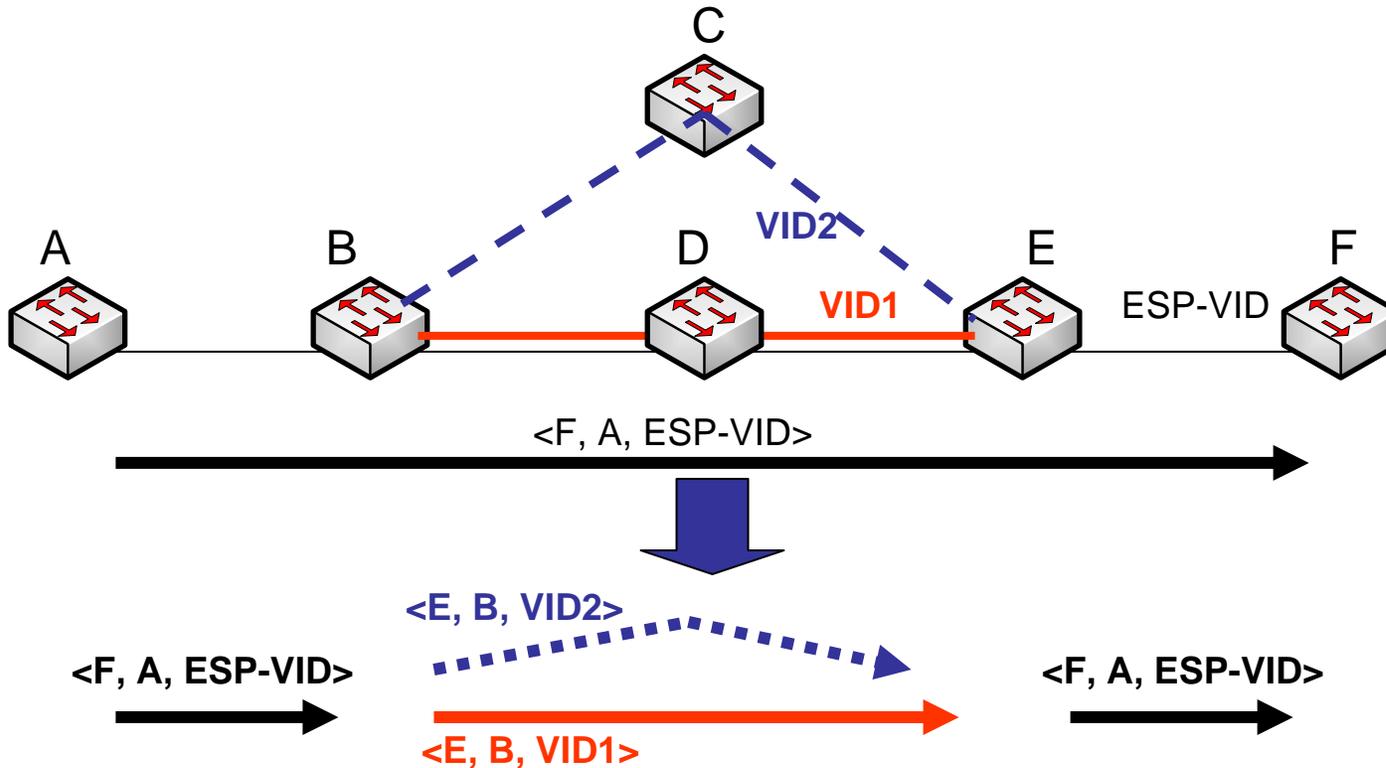
- Do not affect e2e CCM and common data frames
- Support tangent and nested cases
- Frame size is not increased

## Limitations

- Need to revise 802.1ag

# Segment-BEB model for segment protection

# Segment-BEB model



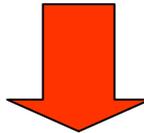
- Update BCBs at the endpoints of the segment to new BEBs. We just call it “Segment-BEB” here.
- Original <ESP 3-tuple> of a frame will be mapped to a *new* <ESP 3-tuple> within the segment and will be recovered when it leaves the segment

# Segment-BEB model (cont'd)

- Frame at segment ingress/egress

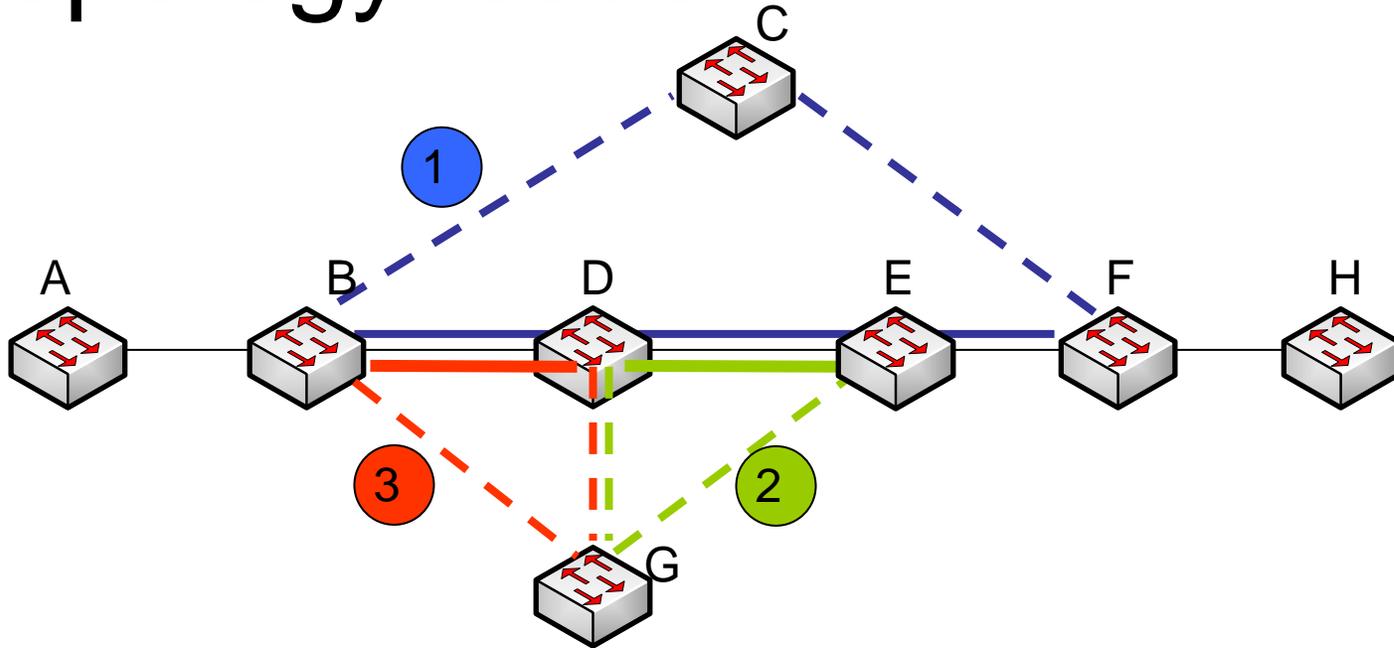


- Frame within segment



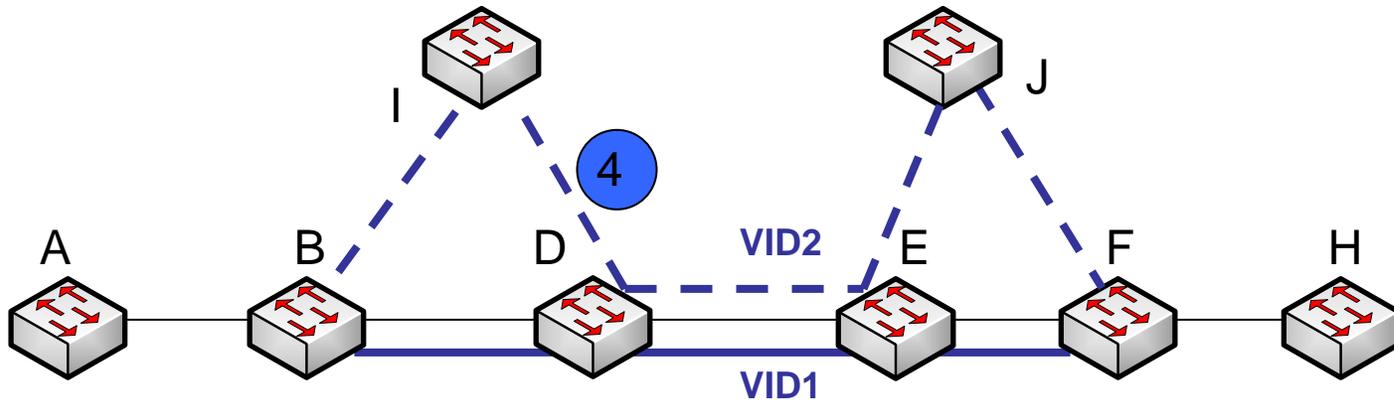
- VID2  $\neq$  VID1
- If we regard <ESP 3-tuple> as a “label” , it’s like “label-switch”
- Since a segment is a totally new TESI, segment protection is just the same as e2e protection.

# Topology issue



- **SegProt1 can coexist with SegProt2 (*nested*)**
- **SegProt2 can coexist with SegProt3 (*cross*)**
- **How can SegProt1 coexist with SegProt3? Use a SegProt priority? (*tangent*)**

# Topology issue (cont'd)



- Nodes D and E are shared by the backup and working segment of SegProt4
- The segment BEB model can support this scenario because  $VID2 \neq VID1$ .

# Conclusion of segment BEB model

## Summary

Update BCBs at the endpoints of the segment to Segment-BEBs to support <ESP 3-tuple> mapping

### Benefits

- Needn't define a new protection mechanism
- Support cross and nested cases
- Frame size is not increased

### Limitations

- Need more BVLAN-ID
- Must change the header of protected ESP frames within the segment