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 \(<\text{ESP-DA, ESP-SA, ESP-VID}>\), not \(<\text{B, E, ESP-VID}>\). 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

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

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| - Do not affect e2e CCM and common data frames  
- Support tangent and nested cases  
- Frame size is not increased | - Need to revise 802.1ag |
Segment-BEB model for segment protection
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
  
<table>
<thead>
<tr>
<th>B-DA</th>
<th>B-SA</th>
<th>B-TAG</th>
<th>I-TAG</th>
<th>S-TAG</th>
<th>C-TAG</th>
<th>PAYLOAD</th>
<th>B-FCS</th>
</tr>
</thead>
</table>

- Frame within segment
  
<table>
<thead>
<tr>
<th>SB-DA</th>
<th>SB-SA</th>
<th>SB-TAG</th>
<th>I-TAG</th>
<th>S-TAG</th>
<th>C-TAG</th>
<th>PAYLOAD</th>
<th>SB-FCS</th>
</tr>
</thead>
</table>

- VID2 ≠ 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*)
Nodes D and E are shared by the backup and working segment of SegProt4

The segment BEB model can support this scenario because VID2 ≠ VID1.
Conclusion of segment BEB model

<table>
<thead>
<tr>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Update BCBs at the endpoints of the segment to Segment-BEBs to support</td>
</tr>
<tr>
<td>&lt;ESP 3-tuple&gt; mapping</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Benefits</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>■ Needn’t define a new protection mechanism</td>
<td>■ Need more BVLAN-ID</td>
</tr>
<tr>
<td>■ Support cross and nested cases</td>
<td>■ Must change the header of protected ESP frames within the</td>
</tr>
<tr>
<td>■ Frame size is not increased</td>
<td>segment</td>
</tr>
</tbody>
</table>