The Resilience for BIER Networks
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Overview

• Discuss the resilience use cases for BIER-specific networks.

• Explore the requirements of BIER resilience.

• Propose solutions for BIER, including the protection mechanisms and detection methods.
Requirements

- The listed requirements MUST be supported with any type of transport layer over which BIER layer can be realized.

- BIER protection type MAY be defined and configured from a centralized controller or management network including BIER end-to-end protection and link/node protection and related information.

- It is required to support the failure detection and notification mechanisms.

- It is required to support the fast protection switching for the BIER packets within the limited time.
Use Case 1: End-to-End 1+1 Protection

- The multicast traffic MUST be sent across the network through the two disjoint paths and the BFERs need to receive the flows transiting from one of the paths.

- Path-1: BFIR->A->B->C->BFER1/BFER2
- Path-2: BFIR->F->E->D->BFER1/BFER2

2018-10-31 BIER resilience
Use Case 2: End-to-End 1:1 Protection

- The BFIR will send multicast flows from the working path and switch onto the backup path when failures occur.

- Working Path: BFIR -> A -> B -> C -> BFER1/ BFER2
- Backup Path: BFIR -> F -> E -> D -> BFER1/ BFER2
Use Case 3: BIER Local Protection

- The backup link should be provided and the traffic is switched onto the pre-established backup path to get packets to the downstream node when the BIER link fails.

- Protect BIER Link: From BFIR to BFR-A
- Backup Link: Pre-established Link from BFIR to BFR-A

![BIER Domain Diagram]

BFIR → A → B → BFER1

BFIR → F → E → BFER2

Backup Link from BFIR to BFR-A
# Resilience Solutions for BIER

<table>
<thead>
<tr>
<th>Use case</th>
<th>Protection Mechanism</th>
<th>Detection Method</th>
<th>Failure Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>End-to-End 1+1 Protection</td>
<td>Send traffic across two disjoint end-to-end paths</td>
<td>BIER P2MP BFD</td>
<td>Receive the flows transiting from the no-failure path</td>
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<tr>
<td>End-to-End 1:1 Protection</td>
<td>Protect from backup end-to-end path</td>
<td>BIER P2MP Active Tail BFD</td>
<td>Switch onto the backup end-to-end path</td>
</tr>
<tr>
<td>BIER Local Protection</td>
<td>Protect from backup BIER link</td>
<td>BIER P2P BFD</td>
<td>Switch onto the backup link</td>
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<td></td>
<td>✓ P2P/P2MP P2P/P2MP or SR tunnel</td>
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<td></td>
<td>✓ TI-LFA</td>
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Next Step

- Further research directions:
  - More resilience use cases
  - BIER P2MP active tail
  - BIER P2P BFD

- Comments and discussion
Thanks!