BFD Extension for DetNet Remote Defect Indication (RDI)

draft-huang-detnet-rdi-00

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November, 2022  IETF 115
Background

• Deterministic Networking (DetNet) – reliable packet delivery service

• Strict QoS REQUIREMENTS of DetNet
  1. Deterministic bounded end-to-end latency
     • IP neglects latency → leave it to transport+ layer
     • Best-effort delivery aggravates the situation
  2. Strict packet loss ratio
     • Lossy underlay network
     • DetNet applies Service Protection to eliminate loss
  3. Upper bound of out-of-order packet delivery
     • Packet Ordering Function (POF) to preserve order
Motivation

• DetNet **OAM** requires quick defect detection and dissemination
  • Detection of **violation**
  • Dissemination -- Remote Defect Indication (RDI)

• Existing practice: Bidirectional Forwarding Detection (**BFD**)  
  • Forwarding plane  
  • **Detect** and **report** failures

*Not specific for DetNet-domain defects*
Looking at DetNet-Specific Defects

• Detection
  • [Out of scope]

• Dissemination/Notification/RDI
  • Latency and out-of-order: not defined
  • Loss: insensitive as triggered by BFD

No EXPLICIT DetNet-specific defect indicators
Define Detnet-Specific Defect Indicators

1. Ratio of out-of-order packets
2. Packet latency
3. Ratio of packet loss
RDI: BFD Extension

- BFD control packet
- “Diag” – diagnostic
  - 0-8 [RFC5880]
  - 9 [RFC6428]
  - 10-31 Reserved

### Table: BFD Diagnostic Codes

<table>
<thead>
<tr>
<th>Value</th>
<th>BFD Diagnostic Code Name</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No Diagnostic</td>
<td>[RFC5880]</td>
</tr>
<tr>
<td>1</td>
<td>Control Detection Time Expired</td>
<td>[RFC5880]</td>
</tr>
<tr>
<td>2</td>
<td>Echo Function Failed</td>
<td>[RFC5880]</td>
</tr>
<tr>
<td>3</td>
<td>Neighbor Signaled Session Down</td>
<td>[RFC5880]</td>
</tr>
<tr>
<td>4</td>
<td>Forwarding Plane Reset</td>
<td>[RFC5880]</td>
</tr>
<tr>
<td>5</td>
<td>Path Down</td>
<td>[RFC5880]</td>
</tr>
<tr>
<td>6</td>
<td>Concatenated Path Down</td>
<td>[RFC5880]</td>
</tr>
<tr>
<td>7</td>
<td>Administratively Down</td>
<td>[RFC5880]</td>
</tr>
<tr>
<td>8</td>
<td>Reverse Concatenated Path Down</td>
<td>[RFC5880]</td>
</tr>
<tr>
<td>9</td>
<td>mis-connectivity defect</td>
<td>[RFC6428]</td>
</tr>
<tr>
<td>10-31</td>
<td>Unassigned</td>
<td></td>
</tr>
</tbody>
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BFD Extension for RDI (cont’d)

- Append DetNet-specific error codes

<table>
<thead>
<tr>
<th>Value</th>
<th>BFD Diagnostic Code Name</th>
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</thead>
<tbody>
<tr>
<td>TBD1</td>
<td>Packet_Misorder_Ratio_Limit_Reached</td>
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<tr>
<td>TBD2</td>
<td>Packet_Latency_Limit_Reached</td>
</tr>
<tr>
<td>TBD3</td>
<td>Packet_Loss_Ratio_Limit_Reached</td>
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</table>
Encapsulation: IP/MPLS

IP encapsulation

MPLS encapsulation
Next Steps

• Any questions or comments
• Seeking for feedbacks on the draft

Draft Link
THANK YOU