Best Practices for Protection of SRv6 Networks

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IETF 120
Different deployment practices suitable for different SRv6 protection scenarios.

- Protection deployment can improve network stability and performance, enhance fault handling capabilities, optimize management and monitoring, and enhance deployment experience.
- Protection includes path protection, local protection, and egress service protection etc., which require different deployment strategies.
SRv6 protection strategies

- Path Protection
  - Local Protection
    - LFA/TI-LFA/Micro-Loop Avoidance
      - BFD for Interface
      - BFD/S-BFD for Neighbor
    - Liveness Check
      - SR-Policy Candidate Path Hot-standby
      - BE Backup for TE
      - Liveness Check -- BFD/S-BFD for SR-Policy
  - End-to-End Protection
    - Service FRR
  - Egress Protection
    - Local Repair
      - Liveness Check -- BFD for Egress SID/IP
    - Ingress Node Switchover

- Ingress Protection
Operational Guidance for Single-homed Scenario

Deployments:
- TI-LFA as local protection
- Multiple candidate paths switchover as end-to-end protection
- BE backup for TE

Protection of SR-BE traffics:
- TI-LFA, triggered by BFD for links and neighbors

Protection of SR-TE traffics:
- High SLA cases (end-to-end protection preferred):
  - Only candidate path switchover
- Fast traffic restoring cases (local protection preferred):
  - First, TI-LFA, triggered by BFD for links and neighbors
  - Then, Candidate path switchover, triggered by BFD/S-BFD for SR Policy
- BE backup for TE
  - Operate when multi-point faults (When link PE1-P1 & P2-PE4 both fail, SR BE path can still reach PE3)
  - Exceptions (dropping preferred): strong SLA requirements
Deployments:

- For each egress PE, same with Single-homed Scenario
  - TI-LFA as local protection
  - Multiple candidate paths switchover as end-to-end protection
  - BE backup for TE
- Ingress Node Switchover
  - Monitor the liveness of egress nodes: BFD for egress nodes, or validating IGP routes of egress nodes
  - Switchover among different egress nodes (for example, when PE3 fails, PE1 switch from SR-Policy-to-PE3 to SR-Policy-to-PE4)
Recommended BFD Time Interval

Trigger of TI-LFA:
• BFD for links and neighbors: 10ms * 3

Trigger of candidate paths switchover (primary candidate path down):
• BFD for primary candidate path of SR Policy: 50ms * 3

Trigger of BE backup for TE (all candidate paths down):
• BFD for backup candidate path of SR Policy: 100ms * 3

Trigger of egress protection:
• BFD for egress nodes: 50ms * 3

Local protection ≤ 50ms
End-to-end protection ≤ 300ms
When SRv6 Segment List compression is enabled, the repair node will check the compression capabilities of nodes along the repair path and try to use C-SIDS to encode the repair path.

**NEXT-C-SID flavor:**

<table>
<thead>
<tr>
<th>Repair List</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1-R2-End.X</td>
</tr>
<tr>
<td>Next-C-SID</td>
</tr>
<tr>
<td>R2-R3-End.X</td>
</tr>
</tbody>
</table>

**REPLACE-C-SID flavor:**

<table>
<thead>
<tr>
<th>Repair List</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1-R2-End.X</td>
</tr>
<tr>
<td>Replace-C-SID</td>
</tr>
<tr>
<td>R2-R3-End.X</td>
</tr>
</tbody>
</table>
When SRv6 Segment List compression is enabled, the converging node will check the compression capabilities of nodes along the post-convergence path and try to use C-SIDs to encode the path.

**NEXT-C-SID flavor:**

<table>
<thead>
<tr>
<th>Loop-free Post-convergence Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>R4-R3-End.X</td>
</tr>
<tr>
<td>Next-C-SID</td>
</tr>
</tbody>
</table>

**REPLACE-C-SID flavor:**

<table>
<thead>
<tr>
<th>Loop-free Post-convergence Path</th>
</tr>
</thead>
<tbody>
<tr>
<td>R4-R3-End.X</td>
</tr>
<tr>
<td>Replace-C-SID</td>
</tr>
</tbody>
</table>
Running Code

Lab Interop-test Status
Hardware devices and software implementations which have passed SRv6 protection interoperability tests hosted by China Mobile in 2021 and 2022:

• China Unitechs Unified Controller
• Huawei NE40E and NE5000E
• H3C CR16010H-FA and CR19000-8
• ZTE M6000-8S Plus and M6000-3S
• Ruijie RG-N8010-R

Both single AS domain and Inter-AS domain scenarios have passed interoperability testing.

Deployment Status
Trials of SRv6 protection in five branch networks of China Mobile in 2021 and 2022

• Beijing
• Zhejiang
• Fujian
• Guangdong
• Henan
Next Step

• Any questions or comments?
• Seeking an adoption call after revision.