RSVP-TE EXTENSIONS FOR Resilient MPLS Rings

draft-ietf-teas-rsvp-rmr-extension-01

IETF 102 (TEAS WG)

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RING LSPs: Basics

Each ring node automatically initiates two MP2P ring LSPs.

Ring LSP ‘RL1’ starts and ends on R1. The egress for RL1 is R1.

Each node can send traffic to R1 either clockwise(CW) or anticlockwise(AC) or both.

A ring of N nodes has 2N ring LSPs, not N*(N-1)!

None of these LSPs are configured!
• Ring LSPs form a loop. Ingress & Egress are same node for a ring LSPs.
• A Ring LSP is multipoint to point (MP2P) LSP
  • Each transit node of ring LSP is also an ingress node for the ring LSP.
  • The bandwidth of a ring LSP can change hop-by-hop (since it is MP2P)
RMR: Ring During Failure

- Using RL1 for illustration. Same applies to all LSPs

- Say link between N3 & N4 fails:
  - LSP failure protection
    - Local repair by failing-over to the counter-rotating counterpart sub-LSP
    - Global repair: simply propagating local-repair upstream (on other direction LSP) up to ring-LSP egress
Extensions - Session Object

RMR_TUNNEL_IPV4 Session Object

Class = SESSION, RMR_TUNNEL_IPV4 C-Type = TBD

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<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
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<tr>
<td>0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1</td>
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| Ring anchor node address |
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| Ring Flags | Ring Instance ID |
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| Ring ID |
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Ring anchor node address: IPv4 address of the anchor node. Each anchor node creates LSP to itself.

Ring Flags: 1 = Clockwise  2 = Anti-Clockwise

Ring Instance ID: A 16-bit identifier used in the SESSION. This ID is useful for graceful ring topology changes.

Ring ID: A 32-bit identifier for the ring. This number remains constant throughout the existence of ring.
### Extensions - Sender Template Object

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<tbody>
<tr>
<td>01234567890123456789012345678901</td>
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<table>
<thead>
<tr>
<th>Ring tunnel sender address</th>
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<tbody>
<tr>
<td>IPv4 loopback address of the sender</td>
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<table>
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<tr>
<th>LSP ID</th>
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<tr>
<td>A 16-bit identifier used in the SENDER_TEMPLATE</td>
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No changes to the format of SENDER_TEMPLATE and FILTER_SPEC objects. Only the semantics of these objects will slightly change. Different sender template & filter spec objects can be inserted by different nodes along the ring.
Let’s say that the CW & AC anchor LSPs are already established for node 1 – LSP1. (Green arrow LSP)
Let’s focus on the CW LSP.

Now, node 5 wants to achieve BW increase from 0G to 1G (Blue arrow LSP)

Similarly node 6 may want to increase BW (Purple arrow LSP)

Now, let’s say, node 5 wants to increase bw again from 1G to 2G
Ring LSPs: Bandwidth Management

ST1: SenderAddress-1 LSPID-1
ST5: SenderAddress-5 LSPID-1
ST6: SenderAddress-6 LSPID-1
- If sufficient BW is not available at some Downstream (say node 9), then ring node 9 will generate PathErr with the corresponding Sender Template Object.

- When ring node 5 no longer needs the bw reservation, then ring node 5 will originate a new Path message with a new Sender Template Object with 0 bw. Every downstream node will then remove bw allocated on the corresponding link.

- Note that we will not actually change any label as part of this bw increase/decrease. So, the label remains same as it is signaled initially for the anchor LSP. Only BW accounting changes when these Path messages get signaled.
Next Steps

• Identify best way to use express links.
• Need more feedback from the working group.