RSVP PROTOCOL EXTENSIONS FOR Resilient MPLS Rings
draft-deshmukh-mpls-rsvp-rmr-extension-00

IETF 98 (MPLS WG)

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MP2P Ring LSPs

- 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-to-hop (since it is MP2P)

R0---->R1---->R2---->R3---->R4---->R5---->R6---->R7---->R0  (CW LSP)
R0---->R7---->R6---->R5---->R4---->R3---->R2---->R1---->R0  (ACW LSP)
Ring LSP RL1 starts and ends on R1.

*Every node* can be an ingress for RL1.

The **egress** for RL1 is **R1**.

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

None of these LSPs are configured!
Extensions - Session Object

RMR_TUNNEL_IPv4 Session Object
Class = SESSION, RMR_TUNNEL_IPv4 C-Type = TBD

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<table>
<thead>
<tr>
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<td>Ring anchor node address</td>
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<td>Ring Flags</td>
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Ring anchor node address: IPv4 address of the anchor node. Each anchor node creates a LSP to itself.
Ring Flags : 1 = Clockwise 2 = Anti-Clockwise
MBB ID : A 16-bit identifier used in the SESSION. This "Make- before-break" (MBB) 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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<th>2</th>
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<tr>
<td>01234567890123456789012345678901</td>
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**Ring tunnel sender address**

IPv4 loopback address of the sender.

**LSP ID**

A 16-bit identifier used in the SENDER_TEMPLATE.

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.
When ring node R4 receives a Path message initiated by anchor node R1, the outgoing path message at R4 will have the above sender templates. Similarly, the corresponding RESV message will have multiple FILTER_SPEC objects corresponding to the SENDER TEMPLATE objects.
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
To increase the BW, node 5 will signal a Path message with a different sender-template object for “LSP1” towards node 1. Ring tunnel sender address = node 5; Lsp-id = 2

Node 1 will respond with Resv message for this new path if sufficient bw is available. This Resv message will have the appropriate filter-spec object. (Blue arrow LSP)

Similarly node 6 can increase BW by signaling a Path message with different sender template object with its own address. (Purple arrow LSP)

If node 5 wants to increase bw again from 1G to 2G, then it will again create a new Path message for “Lsp1” with Ring tunnel sender address = node 5 & Lsp-id = 3
Ring LSPs: Bandwidth Management

- ST1: SenderAddress-1 LSPID-1
- ST2: SenderAddress-2 LSPID-1
- ST3: SenderAddress-3 LSPID-1
- ST4: SenderAddress-4 LSPID-1
- ST5: SenderAddress-5 LSPID-2
- ST5: SenderAddress-5 LSPID-3
Ring LSPs: Bandwidth Management

- 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

- Need more feedback from the working group.
- Request for MPLS WG document.
Thank you!