RSVP-TE EXTENSIONS FOR Resilient MPLS Rings

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

IETF 102 (TEAS WG)

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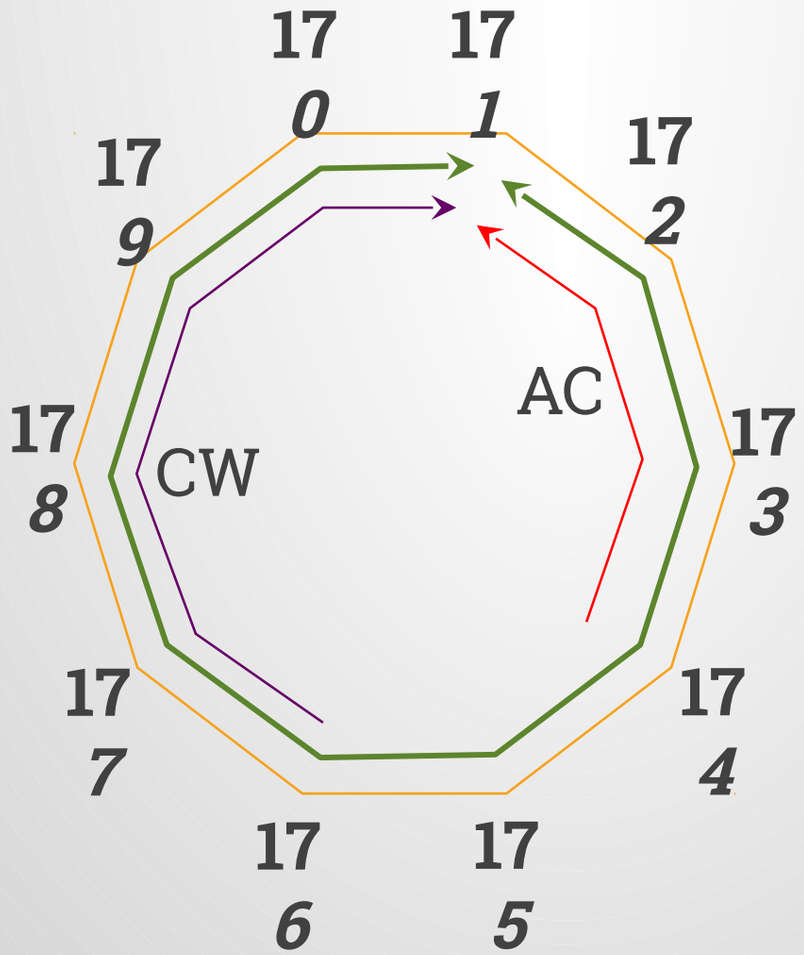
RING LSPs: Basics

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!

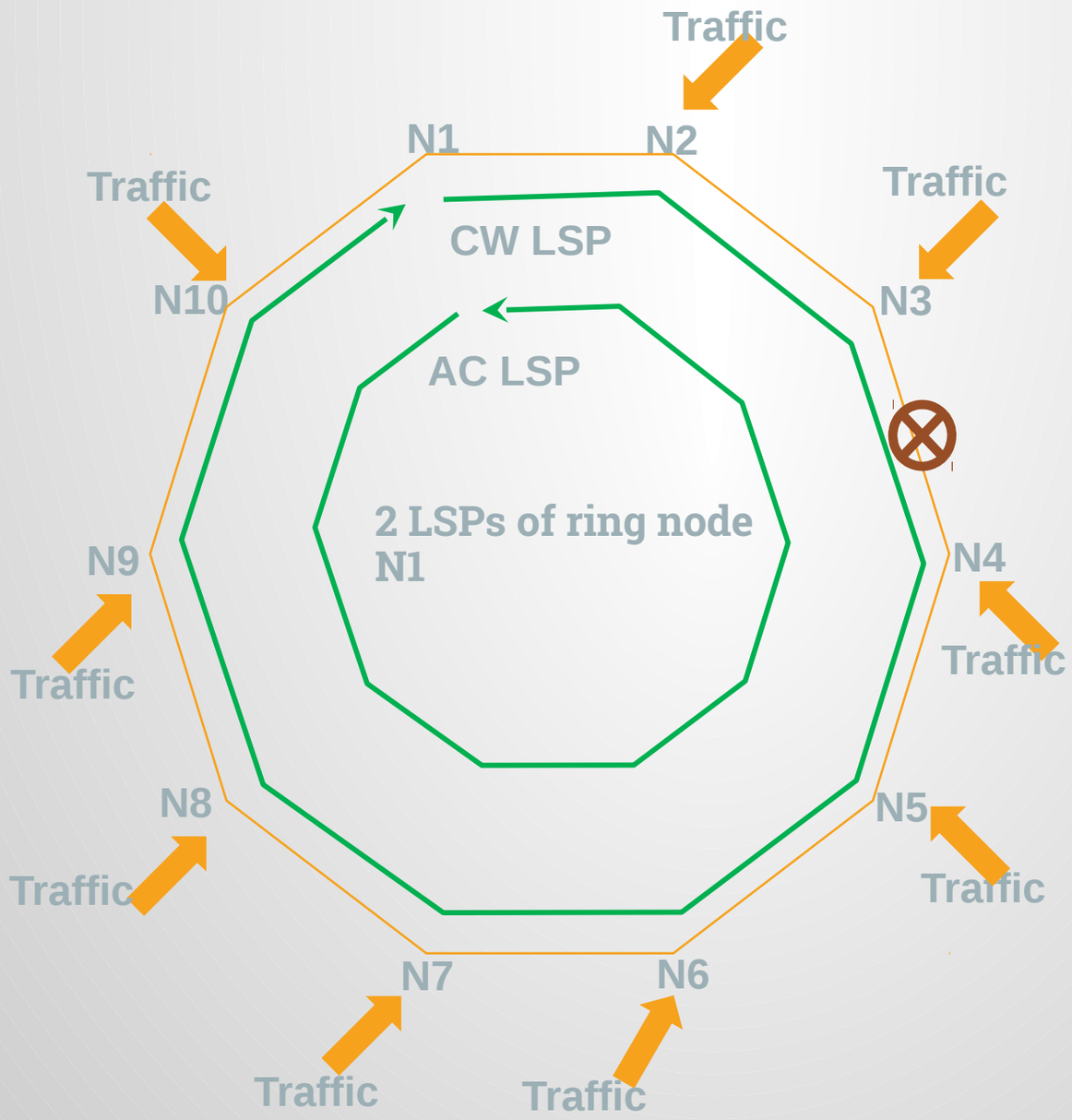
MP2P Ring LSPs

- 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-by-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)

RMR: Ring During Failure

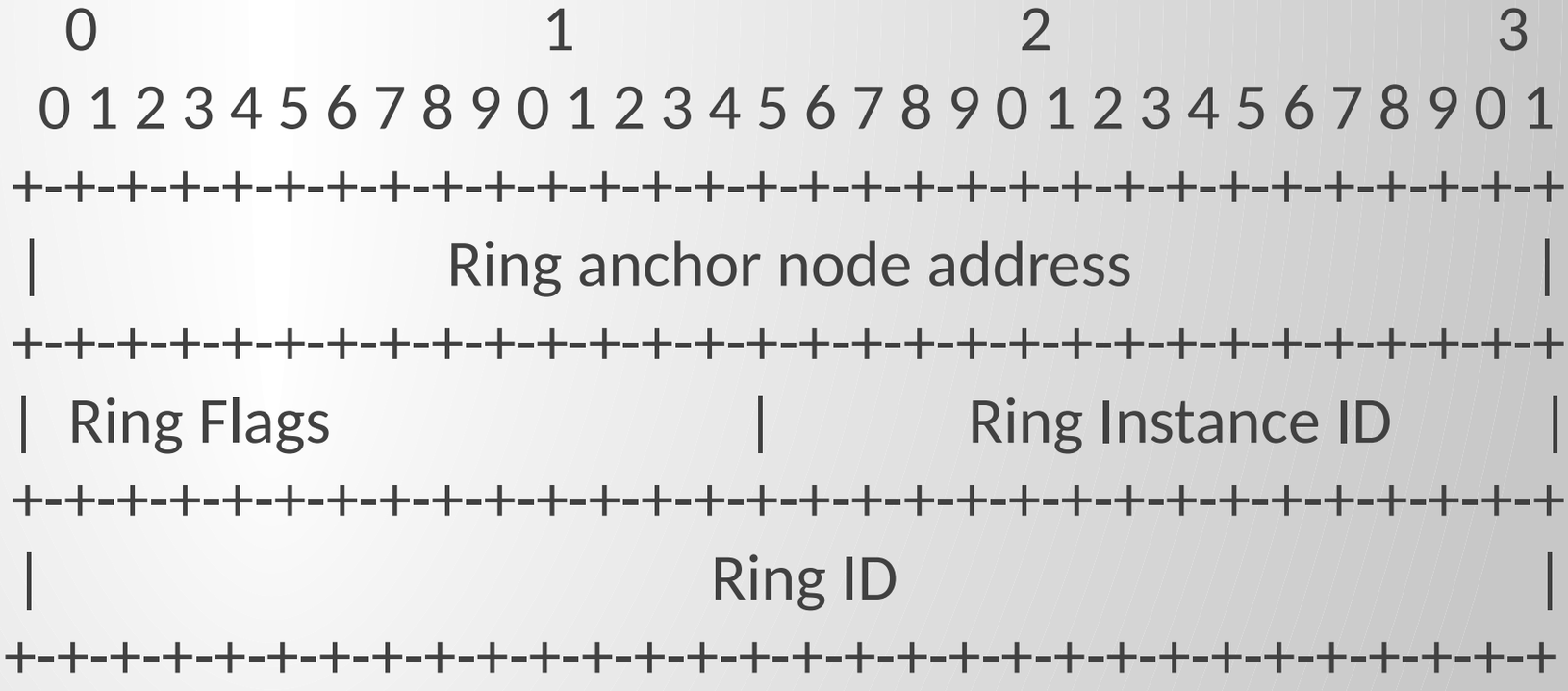


- Using RL1 for illustration. Same applies to all LSPs
- Say link between N3 & N4 fails:
- LSP failure protection
  - Local repair by failing-over to the counter-rotating counterpart sub-LSP
  - Global repair: simply propagating local-repair upstream (on other direction LSP) up to ring-LSP egress

Extensions - Session Object

RMR_TUNNEL_IPv4 Session Object

Class = SESSION, RMR_TUNNEL_IPv4 C-Type = TBD



Ring anchor node address: IPv4 address of the anchor node. Each anchor node creates LSP to itself.

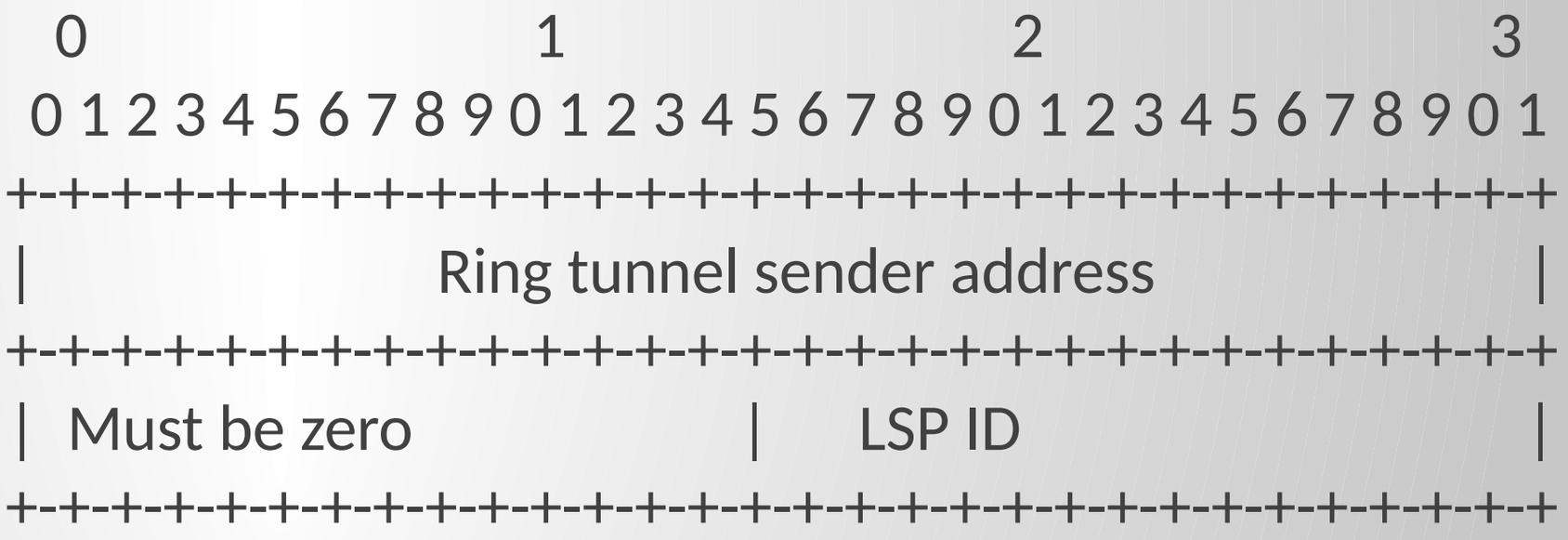
Ring Flags: 1 = Clockwise 2 = Anti-Clockwise

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

Sender Template & Filter Spec Object



Ring tunnel sender address

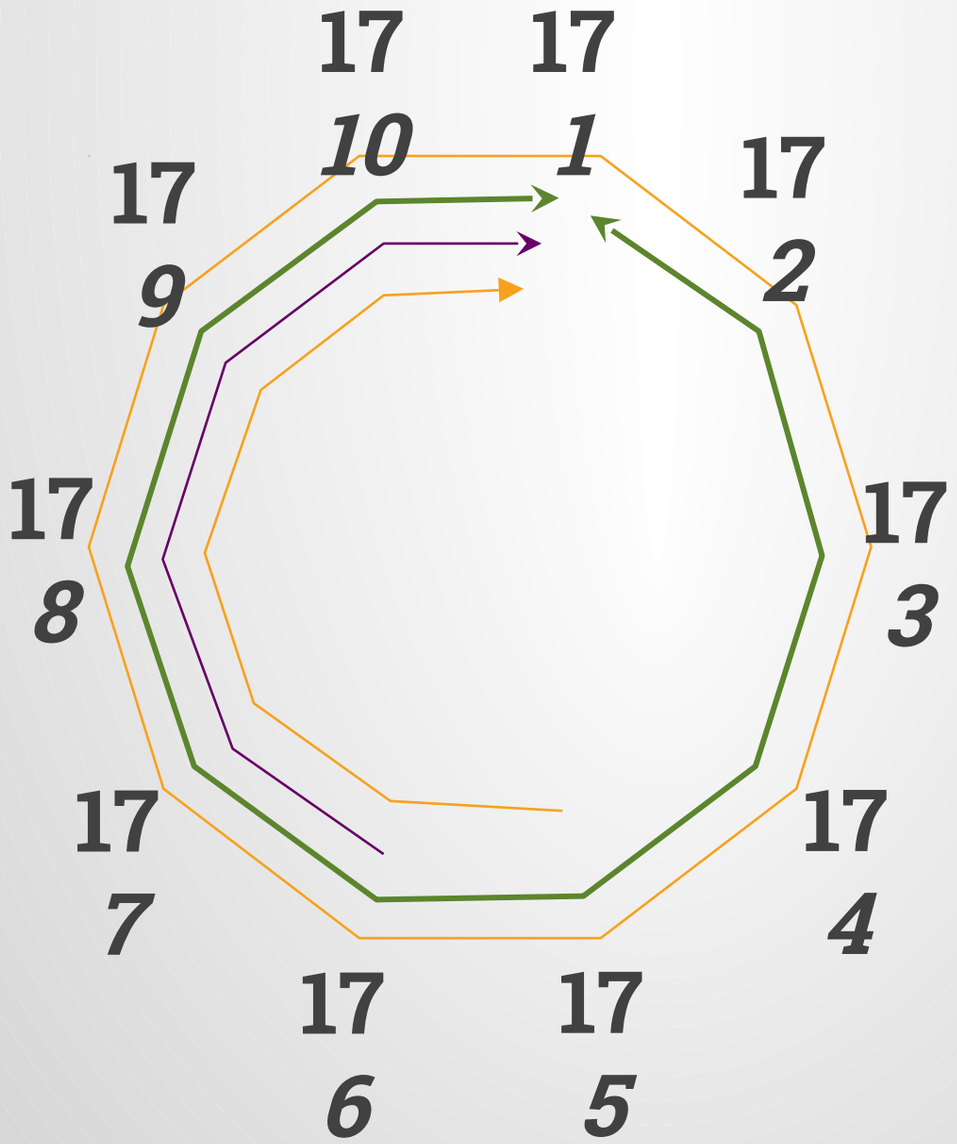
IPv4 loopback address of the sender .

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.

Ring LSPs: Bandwidth Management



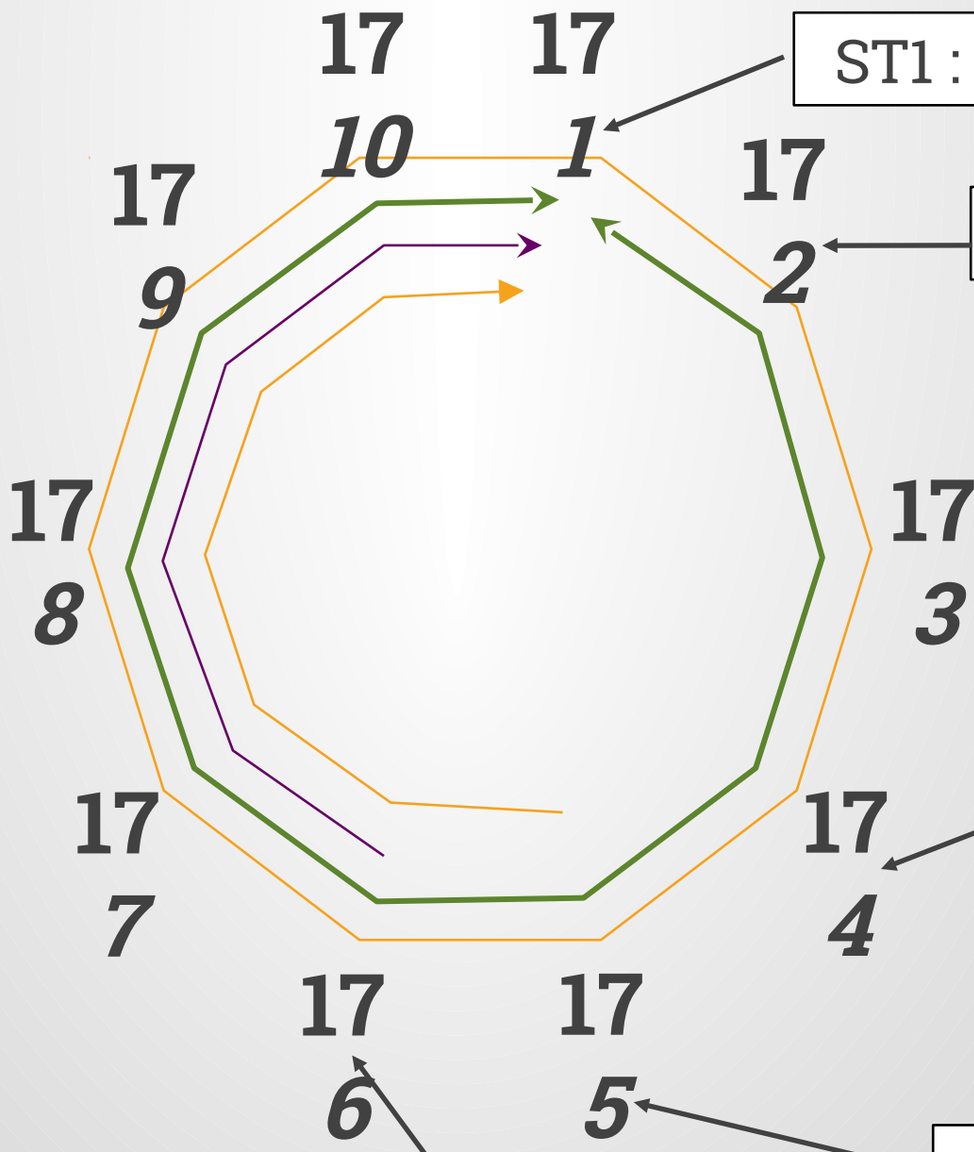
Let's say that the CW & AC anchor LSPs are already established for node 1 – LSP1. (Green arrow LSP)
Let's focus on the CW LSP.

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

ST1 : SenderAddress-1 LSPID-1

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ST1 : SenderAddress-1 LSPID-1

ST1 : SenderAddress-1 LSPID-1
ST5 : SenderAddress-5 LSPID-1

ST1 : SenderAddress-1 LSPID-1
ST5 : SenderAddress-5 LSPID-1
ST6 : SenderAddress-6 LSPID-1

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

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