MoFRR based on TILFA

draft-ietf-pim-mofrr-tilfa-00

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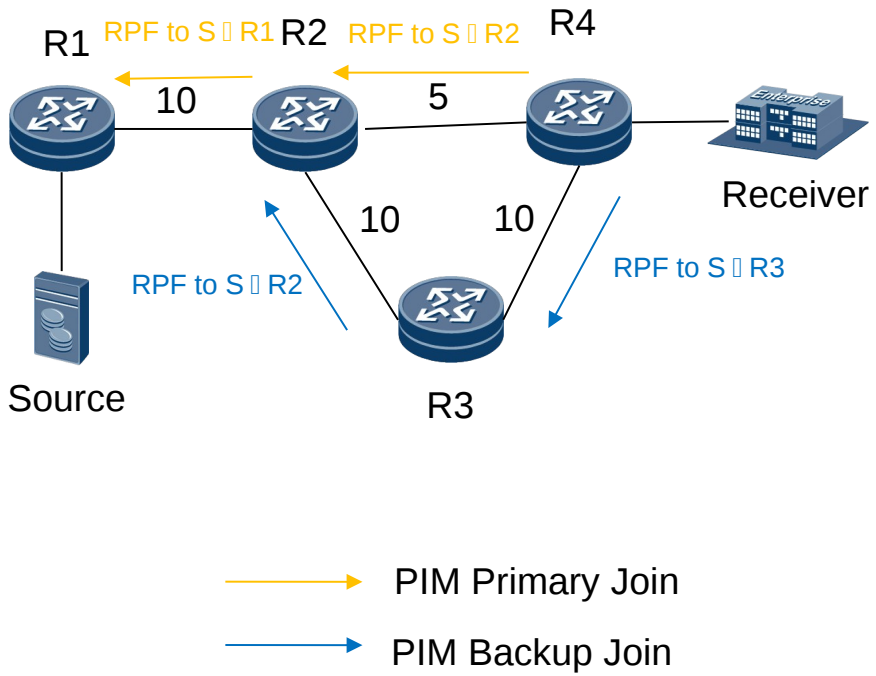
IETF114

Brief Introduction and Update

- PIM MoFRR as a protection mechanism is very important for multicast deployments, but currently can only use LFA in RFC7431 and only cover part of the network topolgies
- TILFA can help unicast FRR to achieve almost 100% network topology coverage
- Provide a new mechanism by using TILFA for PIM MoFRR with no additional extension of PIM protocol
- Update the detail of the restrictions of PIM MoFRR based on LFA/RLFA
- Accepted by WG adoption call

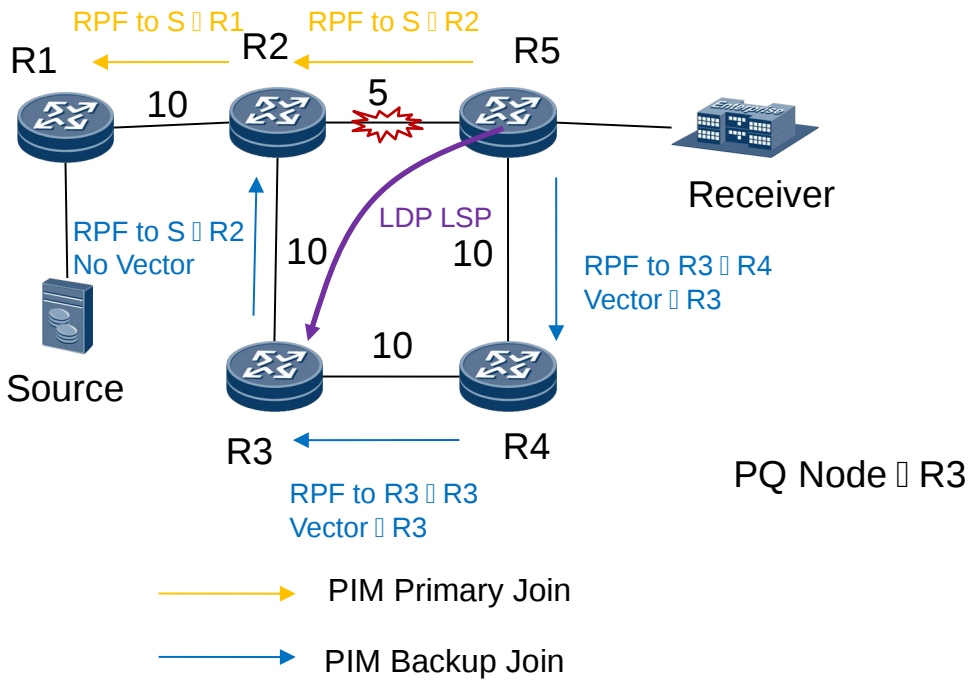
MoFRR based on LFA

- RFC7431 Section 3 describes the selection of the alternate multicast next hop according to the LFA algorithm results.
- The PIM protocol establishes a backup multicast tree according to the normal protocol procedure of RFC7761.

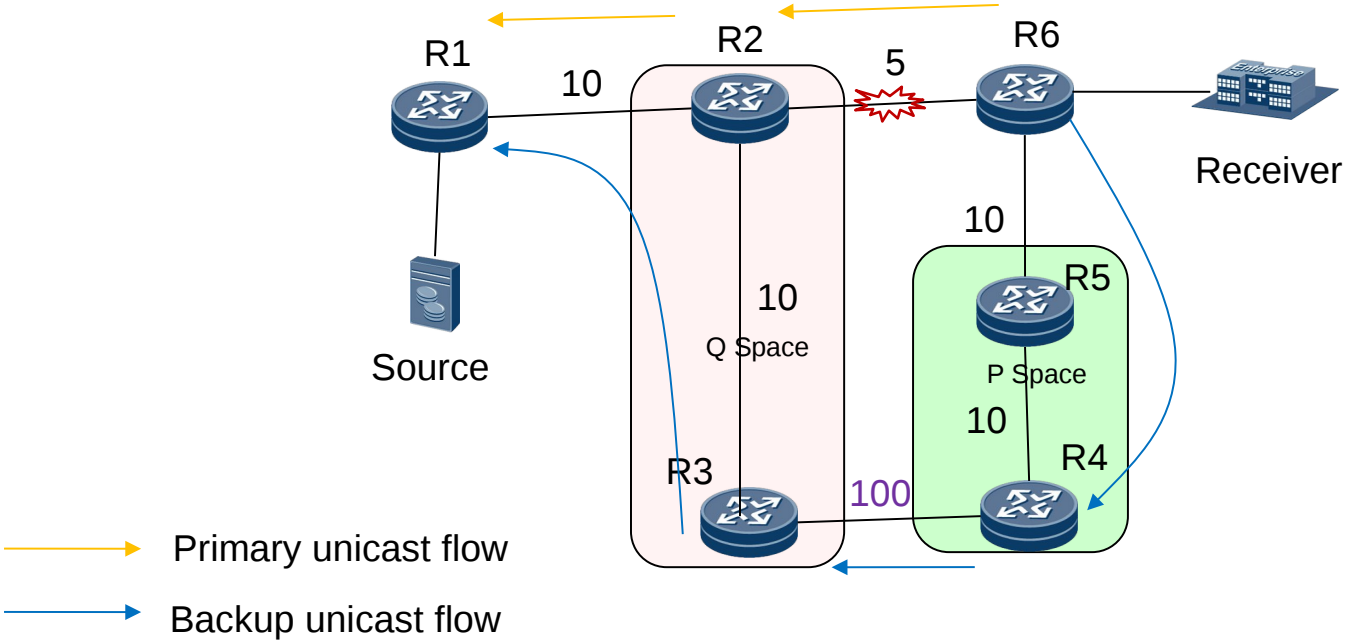


MoFRR based on RLFA

- RFC7490 extends the LFA to RLFA algorithm and can cover more network deployment scenarios through the tunnel as an alternate path.
- RFC5496 defines that the PIM Join carries the RPF Vector attribute to iteratively establish a PIM multicast tree. The backup PIM multicast tree can be established according to the RLFA algorithm result.
- The PQ node is set to the RPF Vector attribute, and the PQ node is used as the root to establish the first part of the backup PIM multicast tree. Then the second part of the backup PIM multicast tree is established from the PQ node with the multicast source as the root.

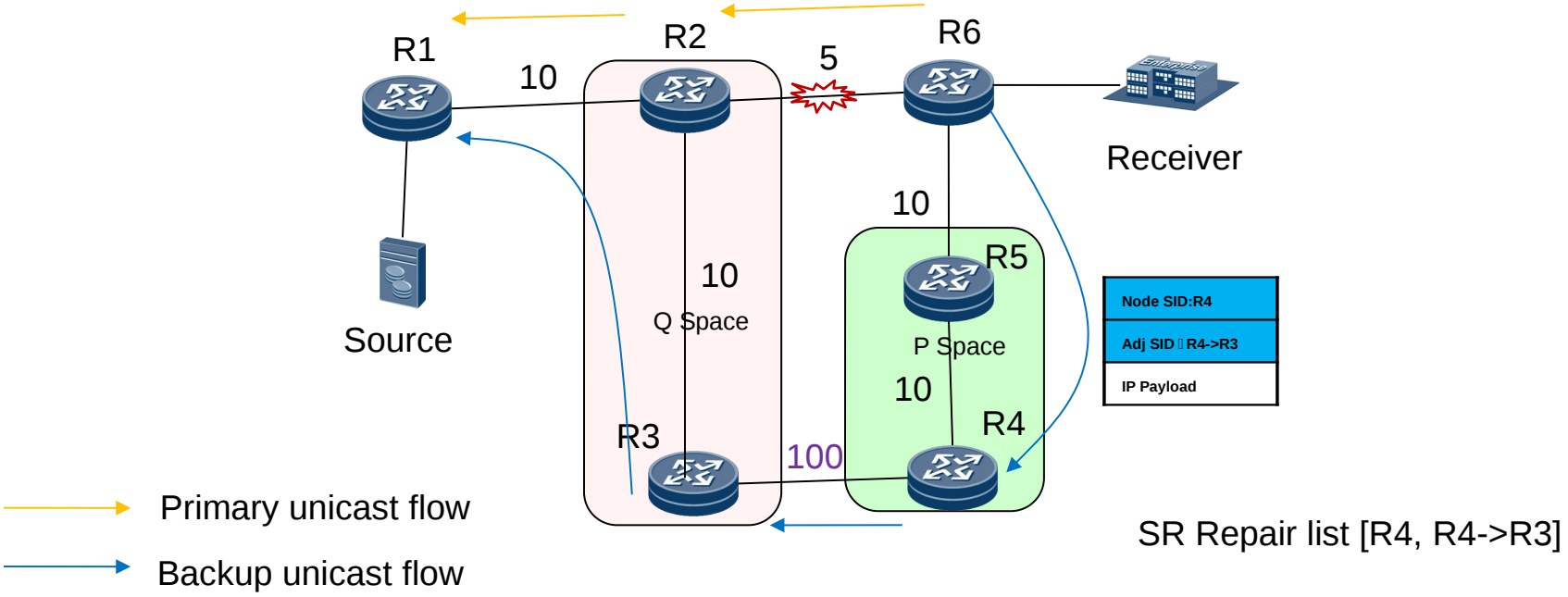


Restrictions of MoFRR based on LFA/RLFA



- LFA and RLFA algorithm are all topology dependent. MoFRR based on LFA/RLFA cannot cover all network environments.
- LFA-based MoFRR: If R6 sends the PIM Join packet directly to R5, R5 will forward it back to R6, because the shortest path from R5 to R1 is R5->R6->R2->R1.
- RLFA-based MoFRR: P space and Q space do not overlap. So, PQ node does not exist. If R6 sends the packet to R5 along with an RPF Vector of R4, it can be forwarded to R4. But, R4 will forward it back to R5, because the shortest path from R4 to R1 is R4->R5->R6->R2->R1.

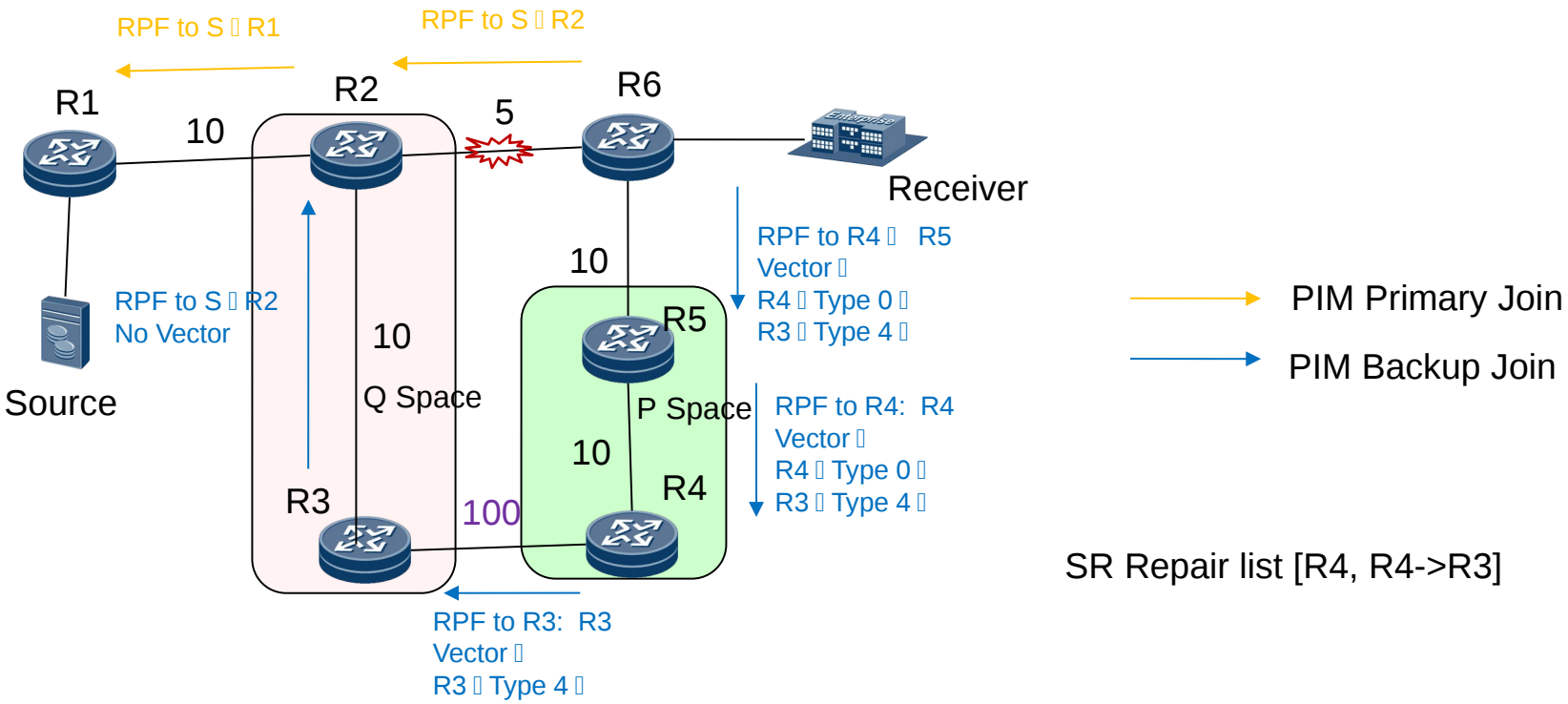
TILFA for unicast FRR in SR networks



- The draft-ietf-rtgwg-segment-routing-ti-lfa defines the FRR solution of TILFA. The unicast traffic can be protected according to the specified segment list, so that it is independent of the network topology and 100% covers various network deployment scenarios.
- The alternate path provided by the TI-LFA algorithm is actually the Segment List path, which gives the P node NodeSID, and the Adjacency SID between P-Q nodes (possibly multiple links)

How to use TILFA for PIM MoFRR

- No additional extension of PIM protocol and using the existing definitions in RFC5496 and RFC7891



- R4 is used as the normal **RPF vector attribute (Type 0**) defined in RFC5496 since R4 is the NodeSID in the SR repair list. PIM looks up the unicast routing to R4, selects RPF incoming interface and upstream, and joins hop-by-hop to establish the backup PIM multicast tree until R4. Vector R4 is removed in R4.
- R3 is used as the **explicit RPF vector attribute (Type 4)** defined in RFC7891 since R4->R3 is the AdjSID in the SR repair list. R3 is looked as the upstream PIM neighbor. The R4->R3 local interface, corresponding to neighbor R3, is looked as the RPF incoming interface. R4 sends the PIM join packet to R3. Vector R3 is removed in R3.
- After the PIM joins the node R3, PIM can look up the unicast route of the multicast source directly to select the RPF incoming interface and upstream, and so joins hop-by-hop to establish the backup PIM multicast tree.

Next Step

- More details for both SR MPLS and SRv6
- More feedback from WG