draft-ietf-pim-bier-frr-12

Review / Discussion

BIER-WG, IETF125 Shenzhen

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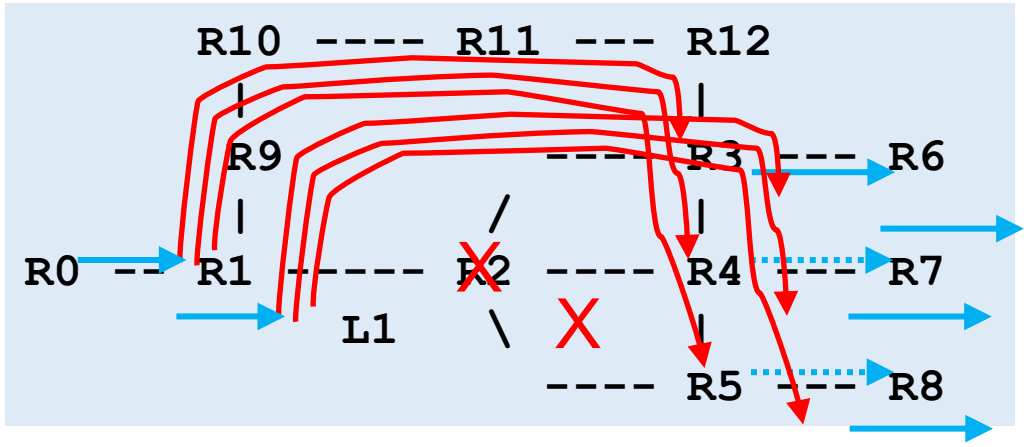
Status update -11@IETF124 -> -12@125

- Started to make document hopefully better to read by operators
  - FRR for unicast is crucial. Hope is that by explaining well how FRR only works well for BIER (but not PIM), we can directly also make BIER more attractive to networks with unicast FRR
  - Introduce, re-use all unicast FRR language / mechanisms (readability by BIER people)
- New section 2.1 Benefits
  - 2.1.1 What is BIER and how is it different/better from IP multicast
  - 2.1.2 How is BIER-FRR better than (non-existing) IP multicast FRR

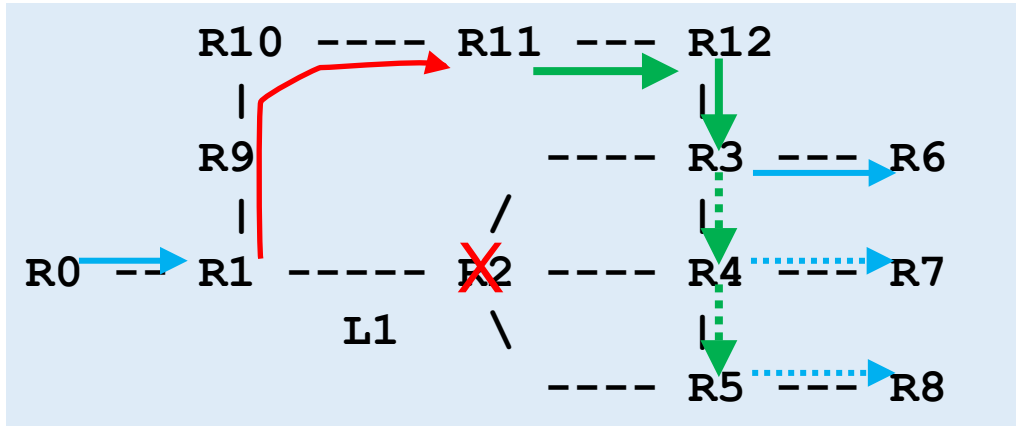
Status update -11@IETF124 -> -12@125

(PIM) IP multicast FRR node protection

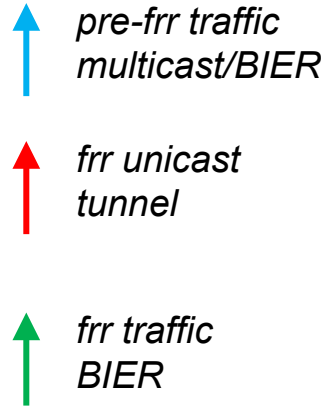


Difficult / complex to avoid FRR tunnels when R4, R5 do not even need the traffic

BIER FRR node protection



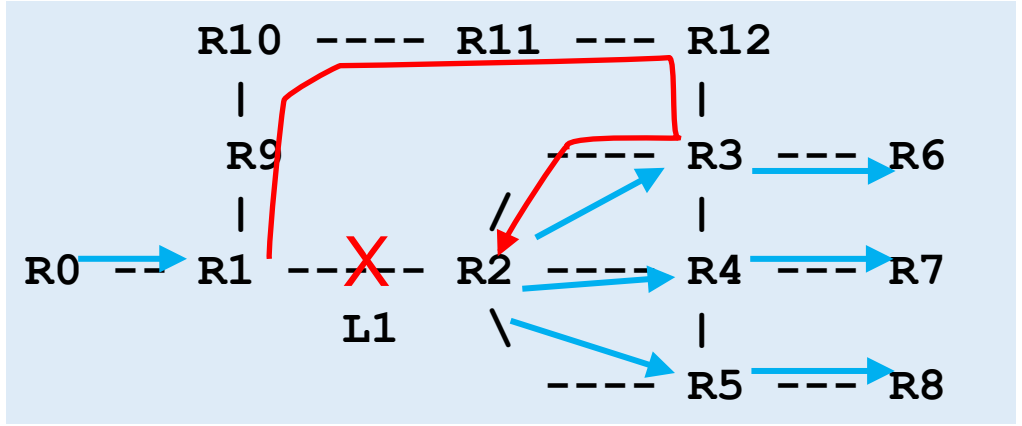
In manty topologies single tunnel copy suffices, bier forwarding/replication will do the rest - no excess traffic



New Introduction

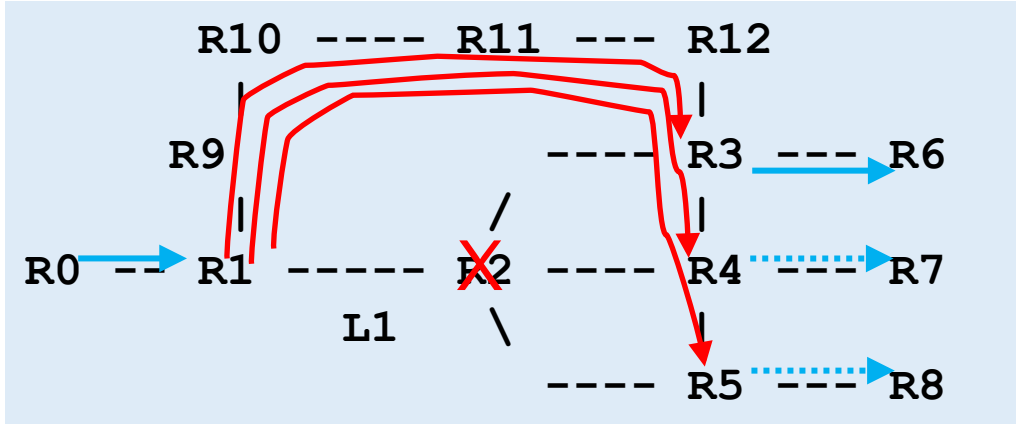
- Explain two mode: Tunnel, LFA-Based
- Tunnel mode
  - Replace “unprotected” BIER-NBR with “link protected unicast FRR adjacency”
  - Link Protection
    - Should works great. No change to behavior of BIFT. “Just a different forwarding adjacency”
    - Still requires to understand which form of unicast LFA to use for backup tunnel
  - Node Protection
    - This can not be done without impacting the BIFT.
    - Classical idea of “node protection” as considered for stateful multicast is just an undesirable special case of “LFA based” BIER-FRR
    - *TBD: This option should be removed from draft*

BIER-FRR Tunnel mode link protection



Works fine

BIER-FRR Tunnel mode node protection ?



does not really exist as a separate option

Fundamentals of (unicast) LFA - applied to BIER

- p(re) space: Nodes which can be reached from PLR (R1) ....
- (qX) space: Node can reach destination RX (X=6,7,8) ...

  q = "reverse p space" (because q is a reverse p)

- p/q ... = in pre-FRR-reconvergence routing table without passing through the point of failure (R2)

(1) LFA

- Direct neighbor (R9) is in qX space - PLR can FRR to R9 without any encap.
  Unfortunately, R9 is not in q-space for any BFER here

(2) Remote LFA

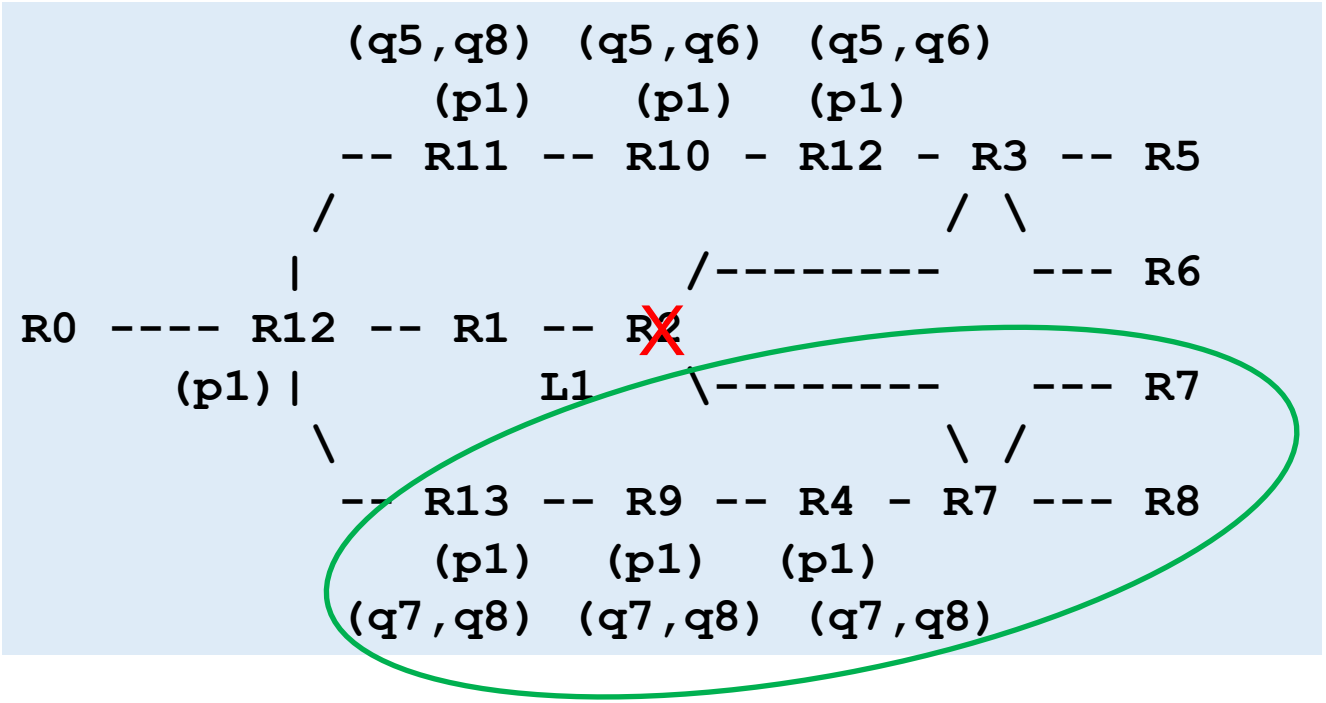
- Need simple unicast tunnel PLR <-> pq-node
- R11 for R6, R7,R8. Note that unicast would use R12 for q6,q7
- *New BIER specific optimization task in pq node calculation*

(3) Topology Independent LFA (TI-LFA)

- No single pq-node (R11 only p, R14 only q)
- PLR needs to tunnel to R11 and then "link-local" to R14
- Nothing new for BIER

Partitioned q-space

- Without failure, PLR(R1) just has one adjacency (R2) to reach R5,R6,R7,R8
- When R2 fails, we have “partitioned q-space”
  - Need to send one copy (tunneled via one of R10...R12) to reach R5, R6 – tunnel end R10,...R12
  - Need to send another copy (tunnel via one of R10...R12) to reach R7, R8 – tunnel end R13.,R9,R4



Next steps

- Explain impact of partitioned q-space (as example of generic issue)
  - Can not solve this case ideal with just “changed adjacencies”
    - Without failure, R5,R6,R7,R8 have one common adjacency (R2) and F-BM in BIFT
    - With failure, we would need R5,6 to have different adjacency/F-BM from R7,R8
    - Draft has different possible modified BIFT – but unclear if any of them is “implementable”
  - Maybe useful to include another solution option “LFA-based-no-BIFT changes”
    - Results in less optimized traffic – but avoids BIFT changes
    - R5,R6 -> BFR-Nbr: R2/Tunnel_R11
    - R7,R8 -> BFR-Nbr: R2/Tunnel_R13
    - “Terrible” result: When there is NO FRR failure R1 sends two copies to R1
    - But when R1 fails, result is perfect
    - I think this is a very viable option missed in draft so far.

Next steps

- Taken to extreme: We could simplify options, getting rid of “tunnel-based” vs “LFA-based” classification and just have two main options:
  - “FRR adjacencies” (unicast and/or BIER calculated)
  - “FRR BIFT extensions”
- -10 draft version “modified BIFT” are seen as “implementation options
  - I have tried to include one “abstracted” option – so we can hopefully move existing “implementation options” into separate chapter – make clear they are just “options” (and others may exist)
- Should really have all those pictures “NICE” (not ASCII art).
  - Document meant to be educational. Difficult enough topic. Want to promote the technology, ...
  - But still need to find a simple tool for me to create compliant SVG.
  - IETF still does not allow bitmaps. And no tool exists to convert powerpoint to compliant SVG...

The End