RIFT Multicast

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Background

• RIFT core design team realized that the flooding reduction mechanism can easily be extended to provide built-in multicast support
  • w/o additional multicast specific signaling

• This turns out to be very similar to PIM-BIDIR
  • Traffic travels north all the way and fork down south along the way

• Further considerations & discussions led to using separate multicast signaling after all
  • Elephant flow; load-balancing

• Current thinking is enhance and extend PIM-BIDIR concept with native RIFT signaling
PIM-BIDIR Background

- \((*,G)\) Joins are sent “upstream” towards a Rendezvous Point Address (RPA)
  - RPA is either on a particular router, or just an address on a LAN not bound to any router
  - The link that the RPA is on is RP Link (RPL - a loopback or a LAN interface)
  - The joins establish sub-trees rooted at the RPL routers (routers on the RPL)
  - The RPL connects the sub-trees into a tree

- Traffic flows along the tree
  - Upstream towards the RPA, eventually arriving at RPL routers
  - Along the way, traffic also forks to downstream routers from which \((*,G)\) joins are received
  - RPL routers flood all traffic to each other
    - They don’t send joins to each other
    - This is fine on a LAN
  - Traffic received on the RPL (from other RPL routers) is sent downstream as needed

- With BGP-MVPN, the provider network can be used as a RPL
  - PEs are RPL routers
  - But they can send joins towards each other, for selectively sending traffic
• No explicit RPA
  • Joins just follow the default route based on control plane hashing
  • Problem – there is no RPL (the ToFs aren’t connected)
    • See later slides

• Bidirectional (*, G-prefix) trees
  • G-prefix can be ‘G’ or ‘*’ to the two extremes, or anything in between
  • (*,*) for “mice” flows - traffic sent everywhere – even if no receivers
  • (*,G) for “elephant” flows – sent only where there are receivers for G
  • (*,G-prefix) for “giraffe” flows
    • sent where there are receivers for any group in the G-prefix
PIM-Bidir Adapted for RIFT

• Joins are done with N-PGPs
  • Consumed, merged and re-originated at every hop
• But only sent to ONE of the north neighbors
  • Chosen by downstream with hashing
    • Load balancing different groups to different upstream neighbors
    • Different downstream nodes will pick the same upstream neighbor for a particular group
      • Even if they somehow pick different upstream it will still work
      • Hash algorithm should prevent too many downstream nodes from picking the same upstream
        • So that the upstream does not have to replicate to too many downstream neighbors
• \((*,G)/(*,G\text{-prefix})/(*,*)\) forwarding state built accordingly
  • Interface list includes hashed northbound interface, and southbound interface on which a join is received
  • Traffic arriving on any of the interfaces forwarded out of others in the list
RPL Problem: disjoint sub-trees rooted at the Sub ToF

Problem: Build a meta tree (a tree of sub-trees).
Goal: connect the sub-trees

Proposal: Build a loopless a meta-tree (a tree of trees) by joins those trees via the superspine
Approach:
build a spanning tree of ToF and SubToF

The spanning tree must span all subToF and may span some or optionally all ToF nodes
Proposal: Step 1, subToF selects a parent ToF

A hash may determine a subset of ToF nodes

That subset of ToF nodes now become partial roots

SubToF nodes advertise the ID of their parent to other ToFs

Result: A set of partial trees
Proposal: Step 2, SubRoot join Main Root tree

Main Root is highest system ID of the Roots (S4 here)

- SubRoot can parent to a subToF in a tree with higher sysID

SubRoots nodes now advertise the higher sysID

Result: A subset of ToF nodes are partial root
Result a spanning structure with subset of ToF