IGP Multicast Architecture

draft-yong-rtgwg-igp-mutlicast-arch-00

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Motivation

- Trend is to decouple network IP space from service IP space in Data Center environment
  - benefit: provides networking agility and programmability to applications that are in IP and non-IP space
  - service IP space is known as overlay net, network IP as underlay net
- If network IP space is decoupled from service IP space,
  - underlay IP network itself no longer needs manual configuration
  - automatic formation of an IP network fabric can be done (i.e. underlay IP)
  - IP network fabric can be simplified by reducing protocols
- IP network fabric needs support unicast and multicast transport
  - IGP protocol already supports unicast
  - IGP protocol does not yet support multicast, simple extension will do
    - IGP LSDB has a lot of info. that can be used to build distribution tree

Motivation Cont.

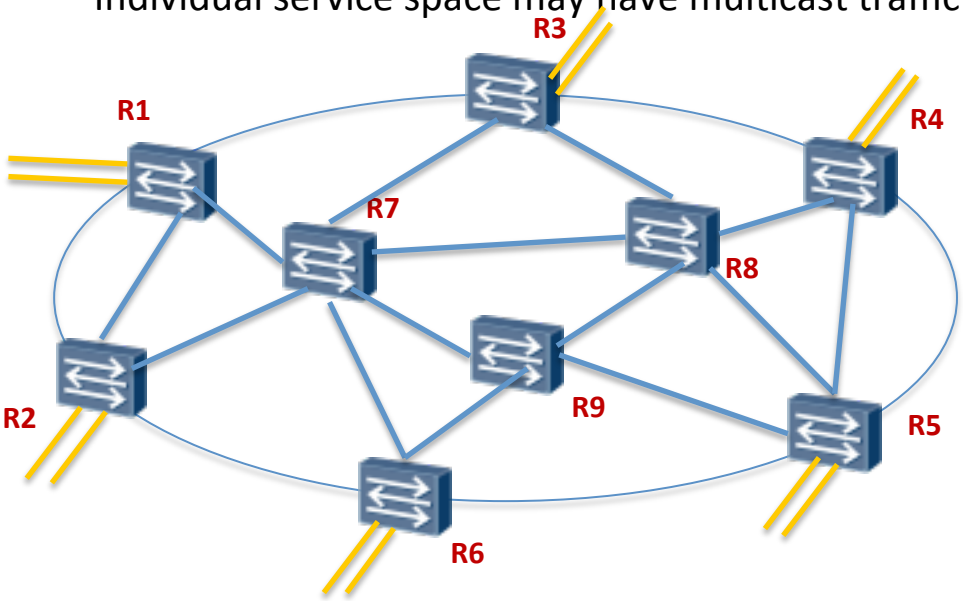
- Why this again? (we had MOSPF 20 year ago)
  - MOSPF [RFC1584] was the history, source based distribution tree only
  - since PIM won the battle, no more development on MOSPF
  - However, market now has new requirements in DC
    - require an underlay IP for overlay L2/L3 net. agility
    - require low cost and automated underlay IP fabric
- PIM concerns in this market
  - PIM based multicast solution prohibits "automation" requirement in IGP
  - PIM protocol running on top of IGP causes longer convergence time, duplicated states, and complex solution for underlay IP fabric; as optional feature
  - IGP protocol is capable of both unicast/multicast if multicast is mandate for net.
- This draft addresses IGP multicast architecture for this goal
  - automatic distribution tree build based on LSDB
  - optimal distribution according multicast group membership
  - rule based mapping at edge router b/w overlay multicast/underlay mcast tree

History

- Initially promoted in IS-IS WG
  - draft-yong-isis-ext-4-distribution-tree-02
- AD (Alia) and IS-IS WG chairs suggested to split the work into two pieces in Toronto meeting
  - Architecture goes to RTG WG
  - ISIS extension goes to IS-IS WG

IGP Multicast Architecture

- Define an IGP Multicast Domain
  - contain edge routers and transit routers
  - multicast source(s) and receiver(s) in a service space attach one (or more) edge router in the domain, do not attach to a transit router
  - IP network fabric (underlay IP) may be a IGP multicast domain
  - IGP multicast domain supports multiple service spaces (IP or non-IP)
    - Individual service space may have multicast traffic

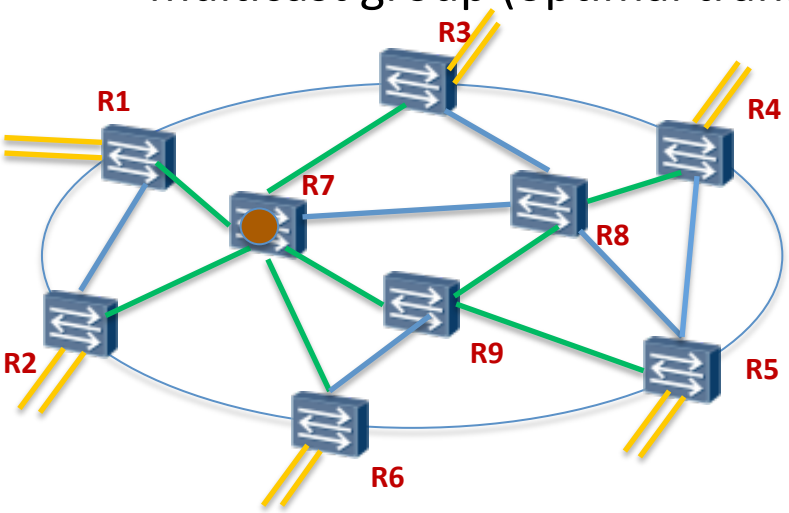


Example: A IGP Multicast Domain

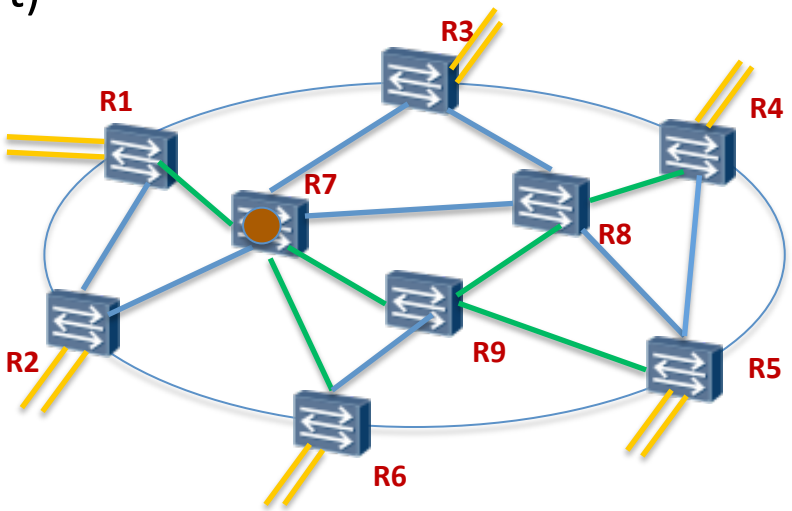
R1-R6 are edge routers
R7-R9 are transit routers

IGP Multicast Architecture

- Algorithm to build a default distribution tree in the domain
  - algorithm to select a default tree root node
  - all routers compute the identical distribution tree of the root by use of LSDB and SPF
  - the tree reaches all the edge routers in the domain and, by default, is used for all multicast groups
  - the tree pruning is done based on the edge router membership on a multicast group (optimal transport)



Default Distribution Tree (Green)



Pruned tree for (*,G) w/[R1,R4,R5,R6] (Green)

IGP Multicast Architecture

- Operators may specify other tree roots for some multicast groups
  - the same algorithm used to calculate these distribution trees
  - the tree pruning is done based on the edge router membership on the corresponding multicast group
- Multicast forwarding is along pruned tree for (*,G) in the domain
- The mapping b/w multicast family in a service space and a (*,G) is configured and/or by policy at edge routers
- Multicast receivers in service space send or reply IGMP/MLD for joining/leaving a multicast family,
  - edge router determines the membership of multicast family by IGMP/MLD
- Service multicast packets are encapsulated at ingress edge router prior to forwarding over the domain and decap. at egress
  - Ingress edge router IP address is as source IP of outer address

For detail, please read draft-yong-rtgwg-igp-mutlicast-arch

Next Step

- Solicit comments and suggestions on
  - draft-yong-rtgwg-igp-multicast-arch-00
  - draft-yong-isis-ext-4-distribution-tree-03
- Request adding this work into the WG charter