

PIM VRRP Interoperability

draft-zhou-pim-vrrp-01

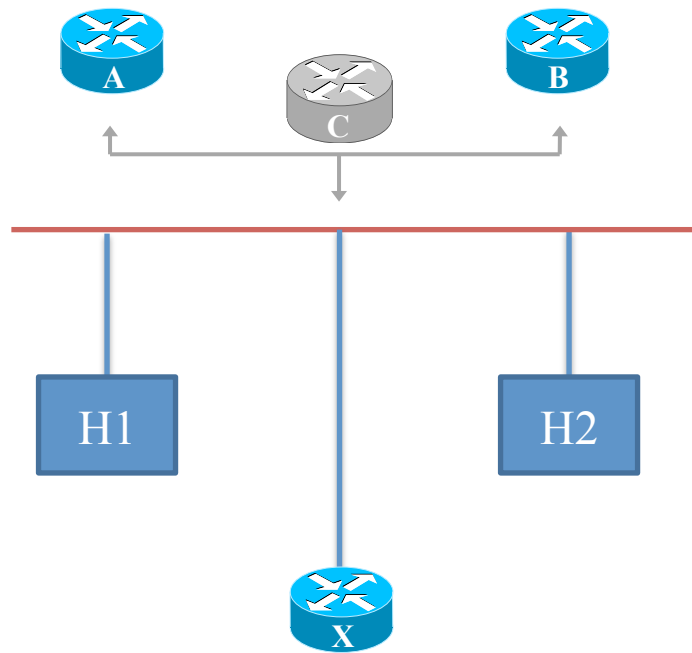
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Rationale

- PIM has no inherent redundancy capability.
- PIM operation is completely independent of First Hop Redundancy Protocols (FHRP) such as VRRP and HSRP.
- There is a need to enable IP multicast forwarding resiliency in redundant network with VRRP enabled.
 - Make Master router the DR after VRRP failover such that Master router is the one responsible for maintaining mroute states and multicast forwarding.
 - Make VRRP Master router the one responsible for processing PIM J/P messages targeting VRRP virtual IP address.

Use Case



Downstream router X has a static route with C as next-hop.

- A and B are routers running VRRP
- C is the virtual router address
- A and B need to adjust PIM DR priority depending on who is Master
- Need interaction between PIM and VRRP

Proposed Solution

- Allow PIM to track VRRP group on an interface
 - Leverage VRRP's capability to track uplink status
- PIM DR priority adjustment
 - Adjust DR priority to a configured value when becomes VRRP Master, allows DR be predictable before and after a switchover
 - Make VRRP Master the DR, process IGMP Join and start forwarding traffic

Tracking & Failover

- PIM keeps tracking VRRP state
 - Upon VRRP switchover, new Master router sends PIM Hello with new GenID using Virtual IP as source address
 - Trigger downstream routers to send PIM Join to virtual IP
 - Only Master router will process PIM Join, create mroute state and pull traffic from upstream and start forwarding
 - Backup routers ignore PIM Join/Prune messages targeting the Virtual IP

Tracking and Failover

Proposed change in rev-01

- PIM keeps tracking VRRP state
 - All passive routers:
 1. Maintain mroute states
 2. Record the GenID of current Master router
 - Upon VRRP switchover, new Master router uses the existing mroute states and recorded GenID from previous Master router in its PIM Hello message.
 - No action required on downstream routers.

Tracking and Failover

Proposed change in rev-01

- Advantages comparing to original solution:
 - This solution make switchover completely transparent to downstream routers.
 - Avoids resending PIM J/P upon switchover from downstream routers.
 - No need to re-create mroute states on new Master router.
 - Potentially faster convergence upon switchover.

PIM Assert

- If only one VRRP group, Backup routers will send a large penalty metric preference ($\text{PIM_ASSERT_INFINITY} - 1$) and make MR the Assert winner.
- If there are multiples VRRP groups configured on an interface, Assert metric preference will be ($\text{PIM_ASSERT_INFINITY} - 1$) if and only if all VRRP groups are in Backup.
- If there is at least one VRRP group in Master state on an interface, then original Assert metric preference will be used.

BiDir Group

- If only one VRRP group, Backup routers will send a large penalty metric preference in Offer (PIM_BIDIR_INFINITY_PREF- 1) and make MR the DF winner.
- If there are multiples VRRP groups configured on an interface, Offer metric preference will be (PIM_BIDIR_INFINITY_PREF- 1) if and only if all VRRP groups are in Backup.
- If there is at least one VRRP group in Master state on an interface, then original Offer metric preference to RP will be used.

Further Considerations

- Support of HSRP
 - The proposed scheme can also enable HSRP aware PIM with similar switchover and tracking mechanism described here