

Hot Standby Router Protocol (HSRP)

One Picture summary

Hot Standby Router Protocol

Basic Concepts:

- Cisco Proprietary protocol.
- HSRP states transition: Disable, Init, Listen, Speak, Standby, Active.
- One router in HSRP Primary or Active state, another in Standby HSRP state, all others in Listen HSRP State.
- HSRP Hello packets are exchanged every **3 seconds (holdtime 10 secs) using multicast 224.0.0.2 at UDP port 1985**. Only Standby HSRP router will monitor the Hello packet from Primary HSRP router.
- HSRP group ID can range from 0 to 255, most switches support only up to 16 unique HSRP group numbers. However, group id is only local significant on each interface.
- HSRPv1 is the default in IOS, HSRPv2 enables up to 4095 groups, virtual MAC is 0000.0C9F.FXXX (XXX=HSRP group), Hello packet is sent to multicast address 224.0.0.102.
- On HSRP router, virtual gateway IP address should be in the same subnet of actually physical interface Ip address.
- HSRP virtual gateway MAC address 0000.0c07.acxx, xx represents HSRP group ID.
- Make sure FHRP Active Router is the same as STP Root to avoid sub-optimal path.

HSRP Router Election:

- HSRP Primary or Active router election is based on priority value (0~255, 100 by default). Router with highest priority will become Primary router. If ties, the router with highest IP address on the HSRP involved interface will become active HSRP router.

HSRP Primary Router Preempt:

- An existing active router will stay active by default regardless of other routers' priority and IP address. Election only happens when active or standby router is removed. But this default behavior can be overridden by Preempt. (Router who boots up firstly might become Active Router by default.)
- If hello message is missed for the duration of the holdtime timer (default 10 seconds), then the active HSRP router is presumed to be down.
- Preempt action depends on your configuration, but it immediately happen by default, and the original primary will not take over immediately after it recovers.

HSRP Load Balance:

- **1 SVI can be associated with 2 HSRP Group ID whose GW IPs fall into the same VLAN, to achieve LB within one subnet.**
- HSRP LB among several VLANs is apparently supported.

Difference between HSRP / VRRP & GLBP

HSRP & VRRP have only one active router and one or more other routers in standby mode.
GLBP enables all routers in GLBP group to load balance and be active at the same time.

HSRP Configuration

```
Switch(config)# interface vlan 100
Switch(config-if)# ip address 192.168.1.10 255.255.255.0
Switch(config-if)# standby 1 priority 200
Switch(config-if)# standby 1 preempt
Switch(config-if)# standby 1 ip 192.168.1.1
Switch(config-if)# standby 1 ip 192.168.1.2 secondary
```

```
Switch(config-if)# standby 2 priority 100
Switch(config-if)# standby 2 preempt
Switch(config-if)# standby 2 ip 192.168.1.2
Switch(config-if)# standby 2 ip 192.168.1.1 secondary
```

```
//customize hello and holdtime timer, timers
configuration should also take into account other timer
parameters relevant to the network convergence, and
carefully design them as a whole.
Switch(config-if)# standby 1 timers msec 100 msec 300
```

```
//if priority is the highest, how to preempt
Switch(config-if)# standby {group ID} preempt [delay
[minimum xxx (secs)] [reload xxx (secs)]]
```

```
//plain text Authentication configure
Switch(config-if)# standby {group id} authentication
{sting}
```

```
//MD5 Authentication configure
Switch(config-if)# standby {group id} authentication md5
key-string [0 | 7] {string}
```

```
//track the interface
Switch(config-if)# standby {group id} track fa0/4 [priority
decrement value] //10 by default
```

Troubleshooting

```
Switch# show standby [brief] [vlan xx | type mod/num]
```

Virtual Router Redundancy Protocol

Basic Concepts:

- Open Standard Based & provide redundant GW IP from a group of Routers.
- A VRRP group has one master router and all other routers are in backup state.
- Support group ID 0-255, Virtual MAC: 0000.5e00.01xx.
- Virtual GW IP could be a virtual one or one of group members' real IP address.
- HSRP can track both interface and objects, but VRRP can only track objects.
- VRRP advertisement sent by VRRP Active Node to 224.0.0.18 using IP Protocol 112 every 1 second. VRRP backup router does not send but learn advertisements; therefore, VRRP master is not aware of the current backup router.
- VRRP does not support security features, like authentication, encryption etc.

VRRP Master Router Election:

- Router Priority 1-254 (100 is the default), highest Priority becomes Active Router.

VRRP Primary Router Preempt:

- Immediately preempt is enabled by default.

Difference between HSRP / VRRP & GLBP

HSRP & VRRP have only one active router and one (HSRP) or more (VRRP) other routers in standby mode. GLBP enables all routers in GLBP group to load balance and be active at the same time.

VRRP Configuration

```
Switch(config)# interface vlan 100
Switch(config-if)# ip address 192.168.1.10 255.255.255.0
Switch(config-if)# vrrp 1 priority 200
Switch(config-if)# no vrrp 1 preempt
Switch(config-if)# vrrp 1 preempt delay [xx secs]
Switch(config-if)# vrrp 1 ip 192.168.1.1
Switch(config-if)# vrrp 1 ip 192.168.1.2 secondary
Switch(config-if)# vrrp 1 authentication {string}

Switch(config-if)# vrrp 2 priority 100
Switch(config-if)# no vrrp 2 preempt
Switch(config-if)# vrrp 2 preempt delay [xx secs]
Switch(config-if)# vrrp 2 ip 192.168.1.2
Switch(config-if)# vrrp 2 ip 192.168.1.1 secondary
Switch(config-if)# vrrp 2 authentication {string}

//Alter advertise timer for Master router (1 second, by default), and learn timer for Backup router.
Switch(config-if)# vrrp 1 timers advertise msec 500
Switch(config-if)# vrrp 1 timers learn
```

Troubleshooting

```
Switch# show vrrp [brief]
```