First Hop Redundancy Protocols

Hot Standby Router Protocol
Provides default gateway redundancy using one active and one standby router; standardized but licensed by Cisco

Virtual Router Redundancy Protocol
An open-standard alternative to Cisco's HSRP, providing the same functionality

Gateway Load Balancing Protocol
Supports arbitrary load balancing in addition to redundancy across gateways; Cisco proprietary

Protocols Comparison

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Standard</th>
<th>Load Balancing</th>
<th>IPv6 Support</th>
<th>Transport</th>
<th>Default Priority</th>
<th>Default Hello</th>
<th>Multicast Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>HSRP</td>
<td>RFC 2281</td>
<td>No</td>
<td>Yes</td>
<td>UDP 1985</td>
<td>100</td>
<td>3s</td>
<td>224.0.0.2</td>
</tr>
<tr>
<td>VRRP</td>
<td>RFC 3768</td>
<td>Yes</td>
<td>No</td>
<td>IP 112</td>
<td>100</td>
<td>1s</td>
<td>224.0.0.18</td>
</tr>
<tr>
<td>GLBP</td>
<td>Cisco</td>
<td>Yes</td>
<td>Yes</td>
<td>UDP 3222</td>
<td>100</td>
<td>3s</td>
<td>224.0.0.102</td>
</tr>
</tbody>
</table>

HSRP Operation

HSRP Configuration

```
interface FastEthernet0/0
ip address 10.0.1.2 255.255.255.0
standby version {1 | 2}
standby 1 ip 10.0.1.1
standby 1 timers <hello> <dead>
standby 1 priority <priority>
standby 1 preempt
standby 1 authentication md5 key-string <password>
standby 1 track <interface> <value>
standby 1 track <object> decrement <value>
```

VRRP Operation

VRRP Configuration

```
interface FastEthernet0/0
ip address 10.0.1.2 255.255.255.0
vrrp 1 ip 10.0.1.1
vrrp 1 timers {advertise <hello> | learn}
vrrp 1 priority <priority>
vrrp 1 preempt
vrrp 1 authentication md5 key-string <password>
vrrp 1 track <interface> <value>
vrrp 1 track <object> decrement <value>
```

GLBP Operation

GLBP Configuration

```
interface FastEthernet0/0
ip address 10.0.1.2 255.255.255.0
glbl 1 ip 10.0.1.1
glbl 1 timers <hello> <dead>
glbl 1 timers redirect <redirect> <time-out>
glbl 1 priority <priority>
glbl 1 preempt
glbl 1 forwarder preempt
glbl 1 authentication md5 key-string <password>
glbl 1 load-balancing <method>
glbl 1 weighting <weight> lower <lower> upper <upper>
glbl 1 weighting track <object> decrement <value>
```

HSRP/GLBP Interface States

Speak · Gateway election in progress
Active · Active router/VG
Standby · Backup router/VG
Listen · Not the active router/VG

VRRP Interface States

Master · Acting as the virtual router
Backup · All non-master routers

GLBP Roles

Active Virtual Gateway (AVG) · Answers for the virtual router and assigns virtual MAC addresses to group members
Active Virtual Forwarder (AVF) · All routers which forward traffic for the group (may include the AVG)

GLBP Load Balancing

Round-Robin (default) · The AVG answers host ARP requests for the virtual router with the next router in the cycle
Host-Dependent · Round-robin cycling while maintaining a consistent AVF for each host
Weighted · GLBP weight determines the proportionate share of hosts handled by each AVF

Troubleshooting

show standby [brief] show vrrp [brief]
show glbp [brief] show track [brief]