

<p>Practical Exercise: Virtual Router Redundancy Protocol</p>

Deadline: none

v1.0

1 Objective

Study how VRRP and HSRP work and their suitability to provide redundant routers and redundant network services.

2 Description

The Hot Standby Routing Protocol (HSRP) and the Virtual Router Redundant Protocol (VRRP) are important solutions for High Availability (HA). Both solutions provide a virtual network address which other equipments can use to reach the external networks. An advantage over traditional routing protocols such as OSPF is that all routers belonging to the same Virtual Router will have the same IP address. Configurations based on the master/slave or active/backup concepts allow that only one is responsible for the actual routing. The others will can be used if the principal router disappears.

For this work, please arrange the network configuration depicted in Figure 1. The objective is to analyze how redundancy is achieved when internal links are broken or when connectivity with the outside network is not possible. In a real scenario the PC would be connected through two network interfaces. Due to limitations of the hardware available, only one will be used.

3 Configuration

Please configure all interfaces addresses as described in Figure 1.

Both ISP routers should have a default gateway towards each other. ISP_Router1 and ISP_Router2 should have routes to reach the 192.168.0.0/24 network. Both GW routers should have routes to reach the 10.0.0.0/24 network through the Router directly connected using a Serial Interface.

Do not configure any IP address in the Ethernet interfaces of both gateways. Instead you should create a bridge interface uniting the interfaces under a

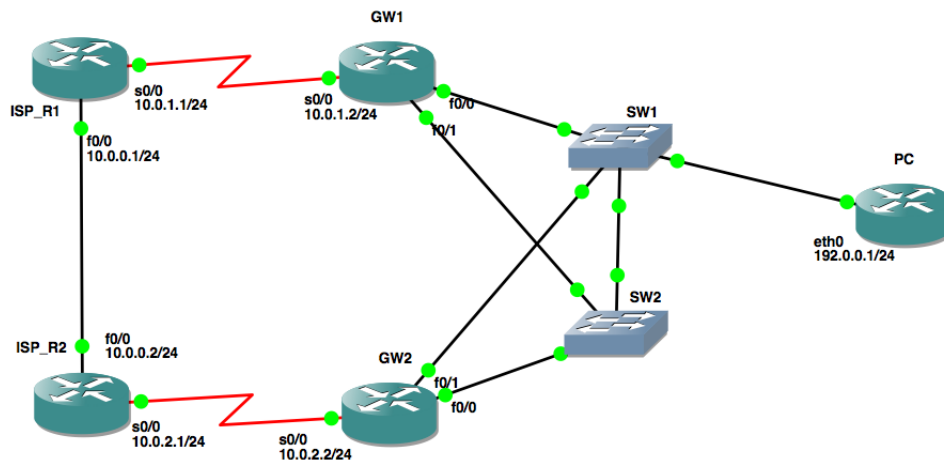


Figure 1: Redundant network access architecture

single address (see the following snippet). Instead of XXX use 252 for GW1 and 253 for GW2.

```
conf t
bridge irb

interface FastEthernet0/0
  bridge-group 1

interface FastEthernet0/1
  bridge-group 1

interface BVI1
  ip address 192.168.0.XXX 255.255.255.0

end

conf t
bridge 1 protocol ieee
bridge 1 route ip
```

After this step, the routers should have a bridged interface and the PC should be able to ping both interfaces.

4 VRRP

VRRP allows the creation of Virtual Routers. This protocol is more suited to traffic aggregation as it is unable to track interfaces. If the uplink interface is not available, the VRRP will be unable to detect it. However, it will

still enable router redundancy.

Please enable the VRRP protocol in both gateways. As they will operate as a single Virtual Router, the configuration is exactly the same in both devices. Also, do not forget to define a shared authentication key.

```
conf t

interface BVII
 vrrp 1 ip-address 192.168.0.254
 vrrp 1 priority 100
 vrrp 1 authentication text secret-shared-key
end
```

After this step, the GW devices will operate as if they were a single router with address 192.168.0.254. Using wireshark, please see what messages are sent to the network.

- What messages are sent?
- Who is the Master router, and the Slave router?
- What is the MAC address of the Virtual Router?
- What happens when you try to ping an address in the 10.0.0.0/24 network?
- What happens with you disconnect one or more cable connected to the Ethernet ports of the GW? In which conditions can you still ping?
- What happens when the serial connection is broken in the Master? What about the Slave?

5 HSRP

The HSRP is very similar to VRRP as it presents a Virtual Router to other devices. However, HSRP is tailored towards a Virtual Gateway service, while VRRP is tailored towards traffic aggregation. As in VRRP, the configuration for the Virtual Gateway should be exactly the same in all members of the hot standby group.

Remove all VRRP configuration from all GW devices, and configure HSRP.

```
conf t

interface BVI1
    standby 1 ip 192.168.0.254
    standby 1 preempt
end
```

After this step, the GW devices will operate as if they were a single gateway with address 192.168.0.254. Using Wireshark, please see what messages are sent to the network, and check what happens with the previous tests. Compare with VRRP. In particular, are there Master and Slaves? How the redundancy process operates? What is the purpose of the additional ARP packets?

After the analysis is done, please configure the HSRP to track the serial interface:

```
conf t
track 1 interface Serial0/0 ip routing

interface BVI1
    standby 1 track 1

end
```

Is there a difference with the previous tests?

6 References

- HSRP http://www.cisco.com/en/US/tech/tk648/tk362/technologies_tech_note09186a0080094a91.shtml
- VRRP http://www.cisco.com/en/US/docs/ios/ipapp/configuration/guide/ipapp_vrrp.html#wp1054924