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**Welcome
To
Network for you
FHRP**



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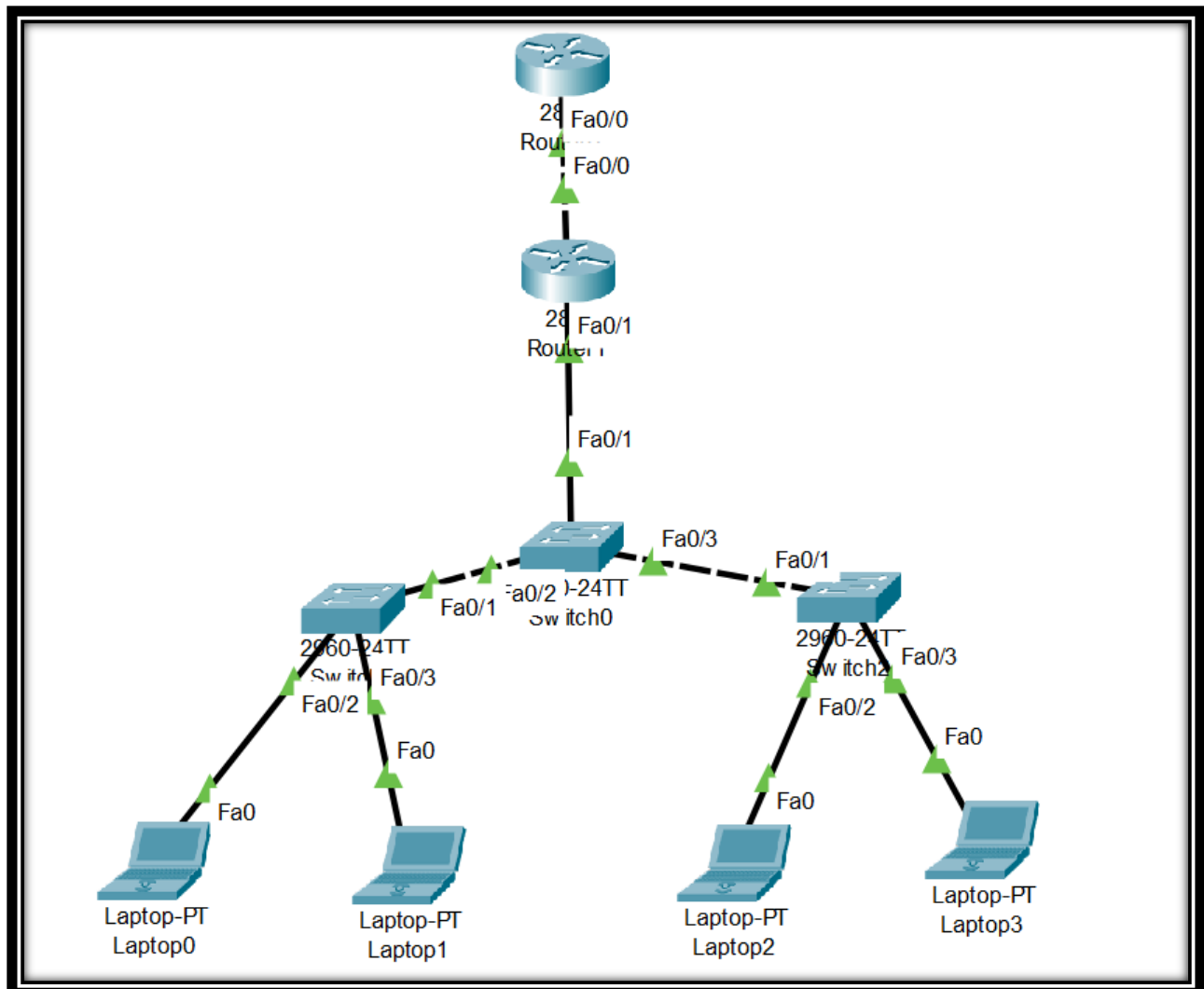
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Redundancy:

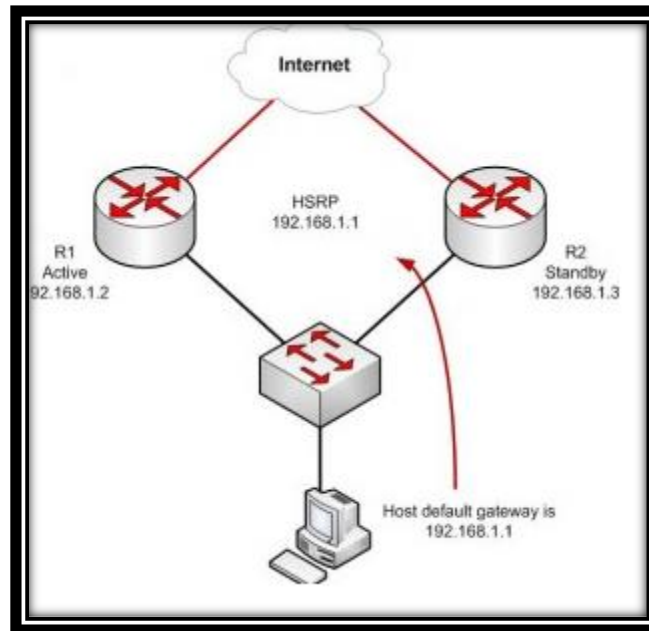
- In Today world Redundancy is very important for anything.
- Let see the below Network Infrastructure devices are a single point of failure.
- If any switch or router goes down, the Pcs will lose their net access.



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- First Hop Redundancy Protocols (FHRPs), Which Provides redundancy for the function of the default router in any subnet.
- Or In simple words we can say first hop redundancy protocols gives you the element of redundancy to support a failure and allow your hosts on that LAN to continue to communicate.
- It allows default gateway redundancy. That is having more than one default gateway enabled. If one gateway fail other gateway start running.

There are Three First hop redundancy protocols (FHRP):

1. HSRP (Hot Standby Router Protocol) --- Cisco proprietary
2. VRRP (Virtual Router Redundancy Protocol) ----- Open Standard ----- It is very similar to HSRP
3. GLBP (Gateway Load Balancing Protocol) --- Cisco proprietary ----- Supports load balancing

FHRP Working:

- Creating group of physical gateway using Layer 3 device router or Switches.
- Agree to assign one Virtual IP address, which same to all first hop devices.
- Virtual IP going to use as gateway address to all LAN devices.
- The FHRP creating Virtual MAC address.
- One First hop is respond address resolution protocol request.
- It is using the Keep lives message in order to get Virtual gateway status.
- LAN devices use Virtual IP and MAC address as default gateway.

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HSRP (Hot Standby Router Protocol):

- HSRP Stands for Hot Standby Router Protocol and it is CISCO Proprietary protocol.
- There are two version of HSRP (that is HSRP v1 and HSRP V2).
- Two or more CISCO Router or Switches on LAN segment form an HSRP group.
- In HSRP, One CISCO Router or Switch assumes the function of **Active** device and other will be **Standby**.
- In HSRP, the highest priority gateway is elected as active gateway of group.
- And Active gateway is the owner of **Virtual MAC and Virtual IP address**.
- In HSRP, the **default priority is set to 100** but it can be tune from **(0-255)**.
- **Highest interface IP as the tiebreaker** and preempt option is disabled by default.
- In **HSRP Version 1 use Multicast Address 224.0.0.2** for sending the Hello traffic.
- In **HSRP Version 2 use Multicast Address 224.0.0.102** for sending the Hello traffic.
- In HSRP, the message can be **authenticated** using the clear **text or the MD5**.
- In HSRP Version 1 allows for group numbers ranging from **0-255**.
- In HSRP Version 2 allows for group numbers ranging from **0-4095**.
- HSRP Version 1 Virtual MAC 0000.0c07.acXX (XX is group no (0-225)).
- HSRP Version 2 Virtual MAC 0000.0c9f.fXXX (XXX is group no (0-4095)).
- HSRP Version 2 support IPV6 address where as HSRP Version 1 doesn't support IPV6
- HSRP Version 1 and HSRP Version 2 are not compatible with each other.
- In HSRP Version 1 and 2 Default Hello time is 3 seconds, Hold time is 10 seconds.
- On CISCO Router or Switches by default have priority 100.

HSRP State:

Initial:

- The beginning state.
- The initial state indicates that HSRP does not run.
- This state is entered via a configuration change or when an interface first comes up.

Listen:

- The Router knows the Virtual IP address.
- But the router is neither the active router nor the standby router.
- It listens for hello message from those routes.

Speak:

- The Router sends periodic Hello messages and actively participates in the election of the **active or standby router**.

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- A Router cannot enter speak state unless the router has the Virtual IP address.

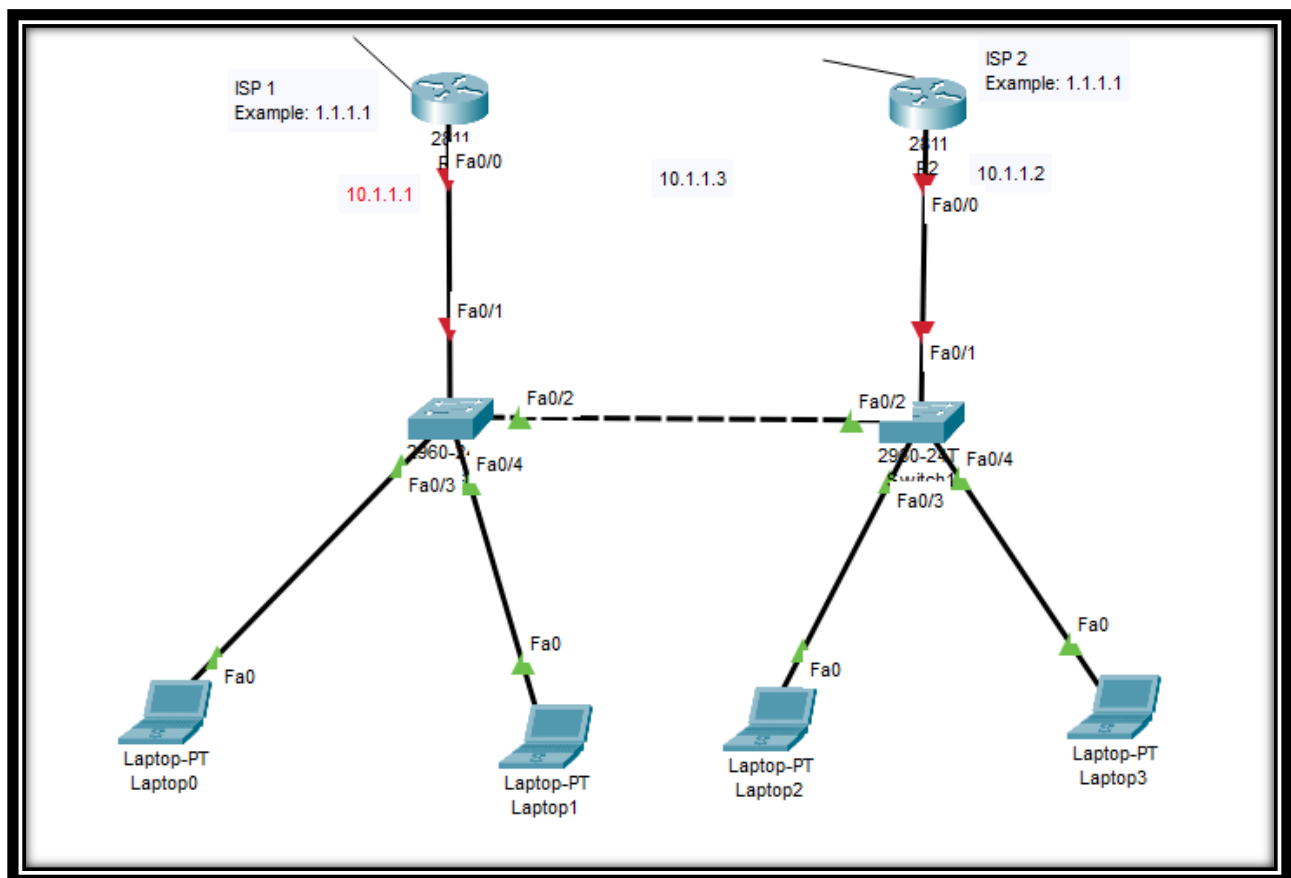
Standby:

- The Router did not become the active router but will keep sending Hello message.
- If the active router fails it will take over.

Active:

- The router will actively forward packet from clients and send Hello messages.

Lab time: HSRP



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R1 Configuration	R2 Configuration
<pre> config t hostname GW1 int f0/0 ip add 10.1.1.1 255.0.0.0 no sh int lo 0 ip add 1.1.1.1 255.0.0.0 int f0/0 standby 1 ip 10.1.1.3 </pre>	<pre> config t hostname GW2 int f0/0 ip add 10.1.1.2 255.0.0.0 no sh int lo 0 ip add 1.1.1.1 255.0.0.0 int f0/0 standby 1 ip 10.1.1.3 standby 1 priority 110 standby 1 preempt </pre>
<pre> R1#show standby R1#show standby brief R1#debug standby packets R1#debug standby events </pre>	<p>This command is use to Check HSRP.</p>

```

GW2#sh standby
FastEthernet0/0 - Group 1
  State is Active
    6 state changes, last state change 00:00:38
  Virtual IP address is 10.1.1.3
  Active virtual MAC address is 0000.0C07.AC01
  Local virtual MAC address is 0000.0C07.AC01 (v1 default)
  Hello time 3 sec, hold time 10 sec
  Next hello sent in 1.799 secs
  Preemption disabled
  Active router is local
  Standby router is 10.1.1.1
  Priority 100 (default 100)
  Group name is hsrp-Fa0/0-1 (default)
GW2#sh standby
GW2#sh standby br
GW2#sh standby brief
P indicates configured to preempt.
|
Interface  Grp  Pri  P  State  Active  Standby  Virtual IP
Fa0/0      1    100  |  Active  local   10.1.1.1  10.1.1.3
GW2#

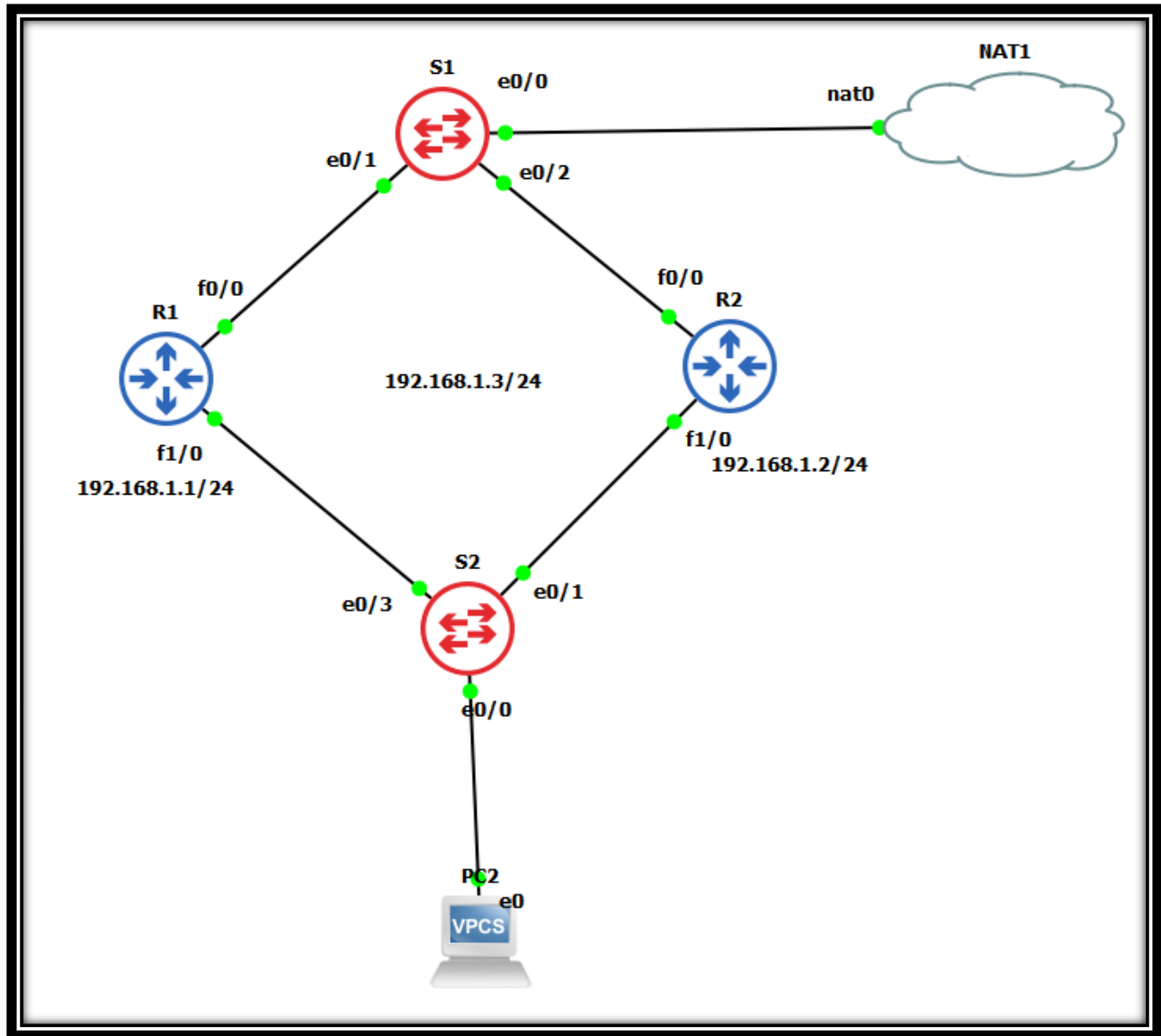
```

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Lab Time with Authentication and WAN Link:



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R1 Configuration	R2 Configuration
<pre>en config t hostname R1 int f0/0 ip add dhcp no sh int f1/0 ip add 192.168.1.1 255.255.255.0 no sh ip domain-lookup ip name-server 8.8.8.8 int f1/0 standby 1 ip 192.168.1.3 standby 1 name Group1 standby 1 authentication md5 key-string abc standby 1 preempt standby 1 priority 110 standby 1 track fastEthernet 0/0 20</pre>	<pre>en config t hostname R2 int f0/0 ip add dhcp no sh int f1/0 ip add 192.168.1.2 255.255.255.0 no sh ip domain-lookup ip name-server 8.8.8.8 int f1/0 standby 1 ip 192.168.1.3 standby 1 name Group1 standby 1 authentication md5 key-string abc standby 1 preempt</pre>

VRRP (Virtual Router Redundancy Protocol):

- VRRP stand for Virtual Router Redundancy Protocol.
- VRRP is open Standard.
- VRRP is very similar to HSRP (Host Standby Router Protocol) and can be used to create a virtual gateway.
- In VRRP Hello timer 1 second and hold time 3 seconds where as in HSRP Hello timer 3 seconds and hold timer 10 second.
- VRRP uses terms master/backup same as active/standby in HSRP.
- In VRRP, one Router or Switch assumes the function of “Master” device and other “Backup”.
- Master sends VRRP advertisements to other routers in the same group.
- VRRP uses multicast IP 244.0.0.18 for Hello mechanism and elections. – IPV4
- VRRP use the Virtual MAC address which is 0000.5E00.01XX. (XX is group no.).

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- VRRP uses own transport protocol 112.
- In VRRP the preemption is enabled by default where as in HSRP it is disabled by default.
- Preemption can be disabled using the no vrrp preempt command under interface.
- Virtual IP Address can be the same as the real IP address on the interface.
- In VRRP, the gateway becomes master using highest priority 255.
- There are 3 Versions of VRRP and Version 3 support IPV6 and IPV4. Whereas Version 2 support only IPV4.

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