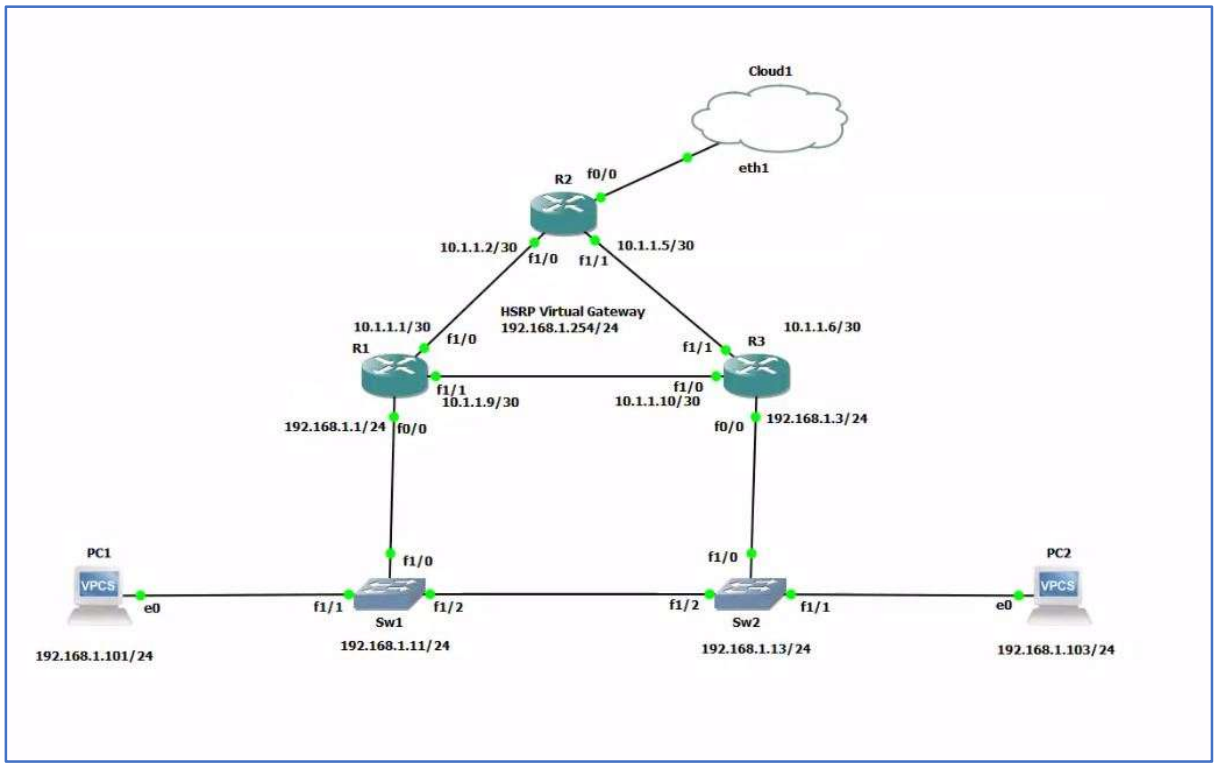
CONFIGURING HSRP IN GNS3

In this project, a network with the following topology will be created, with **HSRP** configured on R1 and R3 (192.168.1.0/24 network) and **OSPF** on all the three routers. R2 will act as an edge router, performing **NAT** and it will be configured as a **DHCP** client, obtaining its IP address from ISP.

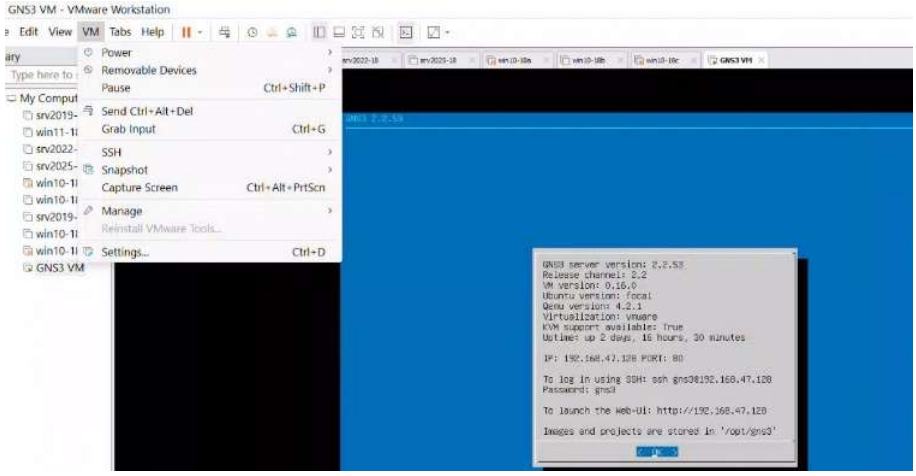


IP Addressing Scheme:

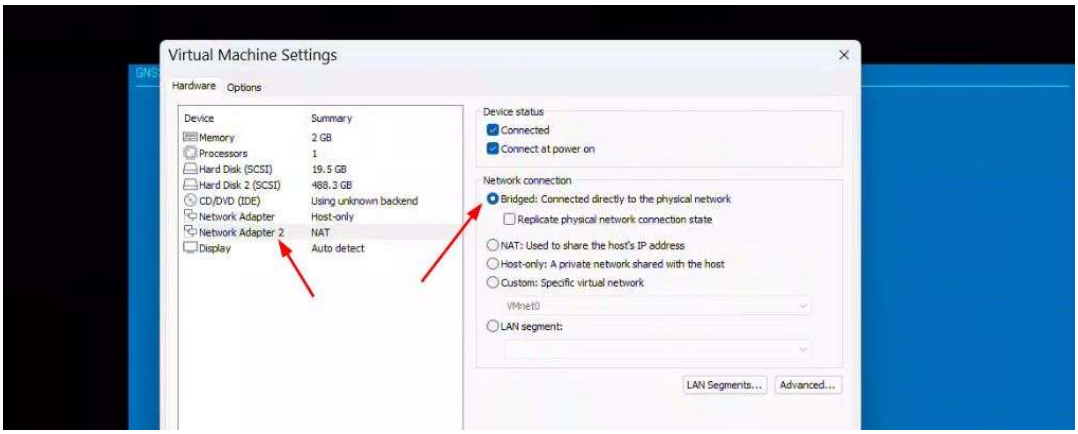
Device	Interface	IP Address	Default Gateway
R1	f0/0	10.1.1.1/24	--
	f1/0	10.1.1.1/30	--
	f1/1	10.1.1.9/30	--
R2	f0/0	DHCP	--
	f1/0	10.1.1.2/30	--
	f1/1	10.1.1.5/30	--
R3	f0/0	192.168.1.3/24	--
	f1/0	10.1.1.10/30	--
	f1/1	10.1.1.6/30	--
Sw1	SVI	192.168.1.11/24	192.168.1.254/24
Sw2	SVI	192.168.1.13/24	192.168.1.254/24
PC1	Eth0	192.168.1.101/24	192.168.1.254/24
PC2	Eth0	192.168.1.103/24	192.168.1.254/24

- **Bridging the network**

1. Open GNS3 VM in VMware Workstation and click on VM > Settings.

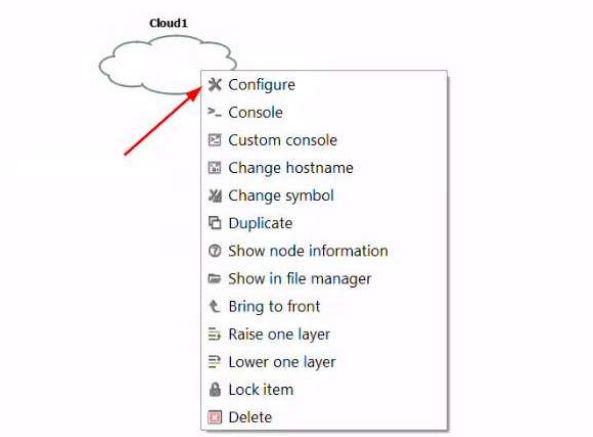


2. Click on 'Network Adapter 2' and select 'Bridged'. Click 'OK'.

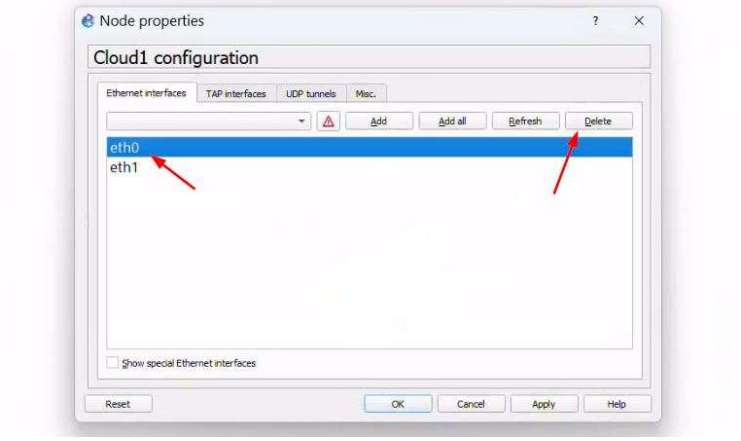


- **Creating the topology**

1. In GNS3, add a cloud to the project and right click on it. Then click ‘Configure’.



2. Select ‘eth 0’ adapter and click ‘Delete’ to remove it. Then click ‘OK’.



3. Add the network devices and configure IP addresses on all the devices as per given addressing scheme.

- **Enabling OSPF**

1. Enter the following commands on R1:
   R1(config)# router ospf 10
   R1(config-router)# network 10.1.1.0 0.0.0.3 area 0
   R1(config-router)# network 10.1.1.8 0.0.0.3 area 0
   R1(config-router)# network 192.168.1.0 0.0.0.255 area 0
   R1(config-router)# exit

```
R1(config-router)#network 10.1.1.0 0.0.0.3 area 0
R1(config-router)#network 10.1.8.0 0.0.0.3 area 0
R1(config-router)#network 192.168.1.0 0.0.0.255 area 0
R1(config-router)#exit
R1(config)#router ospf 10
R1(config-router)#no network 10.1.8.0 0.0.0.3 area 0
R1(config-router)#network 10.1.1.8 0.0.0.3 area 0
R1(config-router)#exit
```

2. Enter the following commands on R3:
   R3(config)# router ospf 10
   R3(config-router)# network 10.1.1.4 0.0.0.3 area 0
   R3(config-router)# network 10.1.1.8 0.0.0.3 area 0
   R3(config-router)# network 192.168.1.0 0.0.0.255 area 0
   R3(config-router)# exit

```
R3(config)#router ospf 10
R3(config-router)#netw
R3(config-router)#network 10.1.1.4 0.0.0.3 area 0
R3(config-router)#network 10.1.1.8 0.0.0.3 area 0
R3(config-router)#network 10.1.1.8 0.0.0.3 area 0
*Feb 10 22:55:34.026: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.1.1 on FastEth
ernet1/0 from LOADING to FULL, Loading Done
R3(config-router)#network 192.168.1.0 0.0.0.255 area 0
R3(config-router)#
*Feb 10 22:56:06.046: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.1.1 on FastEth
ernet0/0 from LOADING to FULL, Loading Done
R3(config-router)#
```

3. Enter the following commands on R2:
   R2(config)# router ospf 10
   R2(config-router)# network 10.1.1.0 0.0.0.3 area 0
   R2(config-router)# network 10.1.1.4 0.0.0.3 area 0
   R2(config-router)# exit

```
R2(config)#router ospf 10
R2(config-router)#network 10.1.1.0 0.0.0.3 area 0
R2(config-router)#network 10.1.1.0 0.0.0.3 area 0
*Feb 10 22:57:41.834: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.1.1 on FastEther
t1/0 from LOADING to FULL, Loading Done
R2(config-router)#network 10.1.1.4 0.0.0.3 area 0
R2(config-router)#
*Feb 10 22:57:55.802: %OSPF-5-ADJCHG: Process 10, Nbr 192.168.1.3 on FastEther
t1/1 from LOADING to FULL, Loading Done
R2(config-router)#exit
```

- **Configuring Default Static Route**

1. Enter the following commands on R2:
   R3(config)# ip route 0.0.0.0 0.0.0.0 10.164.0.1
   R3(config)# router ospf 10
   R3(config)# default-information originate

```
R2(config)#ip route 0.0.0.0 0.0.0.0 10.164.0.1
R2(config)#router ospf 10
R2(config-router)#def
R2(config-router)#default-i
R2(config-router)#default-information orig
R2(config-router)#default-information originate ?
  always        Always advertise default route
  metric        OSPF default metric
  metric-type   OSPF metric type for default routes
  route-map     Route-map reference
  <cr>

R2(config-router)#default-information originate
```

- **Enabling NAT**

1. Enter the following commands on R2:
   R2(config)# int f0/0
   R2(config-if)# ip nat outside
   R2(config-if)# int f1/0
   R2(config-if)# ip nat inside
   R2(config-if)# int f1/1
   R2(config-if)# ip nat inside
   R2(config-if)# exit
   R2(config)# access-list 1 permit 192.168.0.0 0.0.255.255
   R2(config)# access-list 1 permit 10.1.1.0 0.0.0.255
   R2(config)# ip nat inside source list 1 interface f0/0 overload

```
R2(config)#int f0/0
R2(config-if)#ip nat outside
R2(config-if)#int f1/0
R2(config-if)#ip nat inside
R2(config-if)#int f1/1
R2(config-if)#ip nat inside
R2(config-if)#exit
R2(config)#access-list 1 permit 192.168.0.0 0.0.255.255
R2(config)#access-list 1 permit 10.1.1.0 0.0.0.255
R2(config)#ip nat inside source list 1 interface f0/0 ov
R2(config)#ip nat inside source list 1 interface f0/0 overload
```

- **Configuring HSRP**

1. Enter the following commands on R1:
   R1(config)# int f0/0
   R1(config-if)# standby version 2
   R1(config-if)# standby 1 ip 192.168.1.254
   R1(config-if)# standby 1 priority 150
   R1(config-if)# standby 1 preempt
   R1(config-if)# end

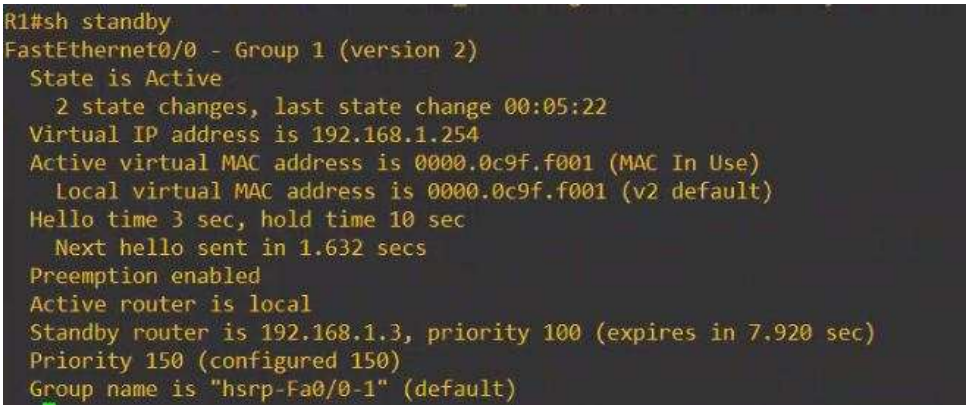
```
R1(config)#int f0/0
R1(config-if)#standby version 2
R1(config-if)#standby 1 ip 192.168.1.254
R1(config-if)#
*Feb 10 23:30:24.770: %HSRP-5-STATECHANGE: FastEthernet0/0 Grp 1 state Standby -
> Active
R1(config-if)#standby 1 priority 150
R1(config-if)#standby 1 preempt
R1(config-if)#end
```

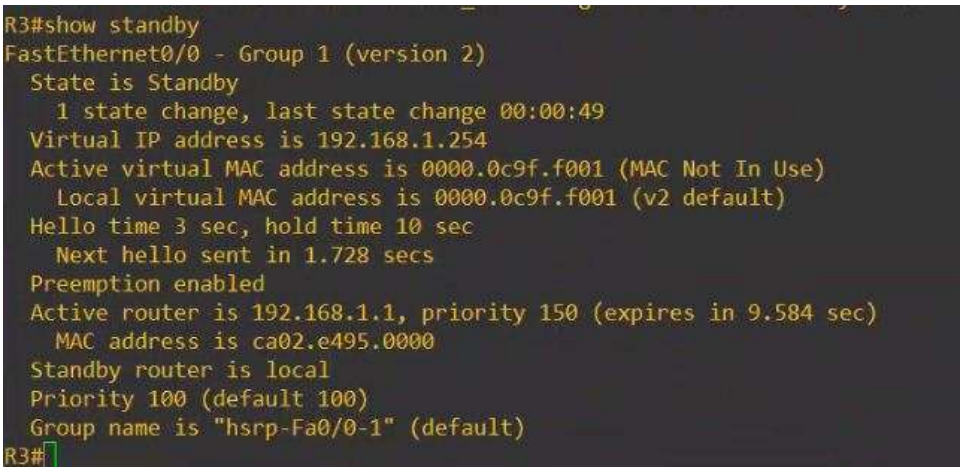
2. Enter the same commands on R3:

```
R3(config)#int f0/0
R3(config-if)#standby version 2
R3(config-if)#standby 1 ip 192.168.1.254
R3(config-if)#standby 1 priority 100
R3(config-if)#standby 1 preempt
R3(config-if)#end
R3#
*Feb 10 23:34:48.314: %HSRP-5-STATECHANGE: FastEthernet0/0 Grp 1 state Speak
 -> Standby
R3#
```

- **Verify the functioning of HSRP**

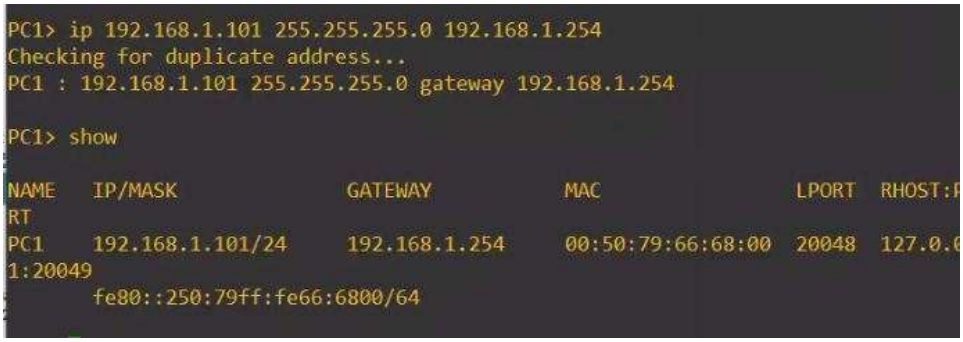
1. Run show standby command on R1 and R3 to verify their status.



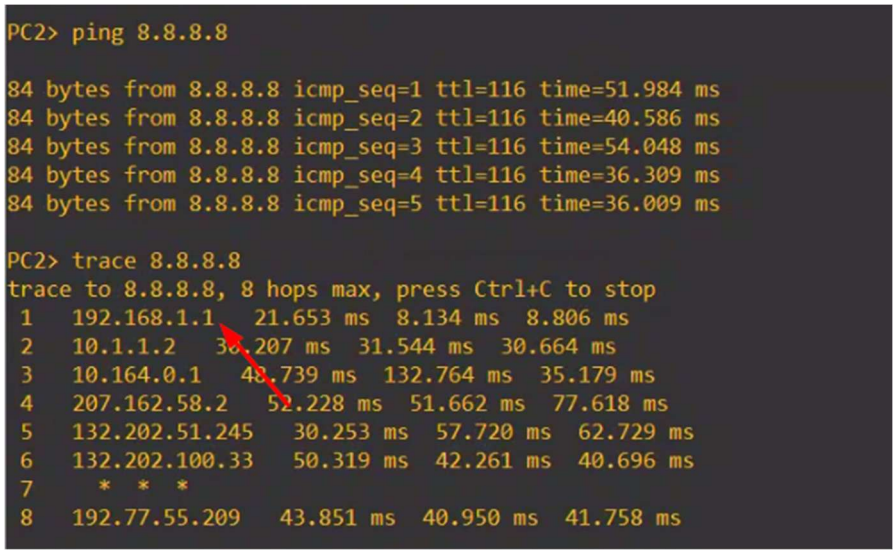


The output confirms that R1 is currently the active router and R3 is standby router.

2. Set the IP address of Virtual Router as the default gateway in PC1 and PC2.

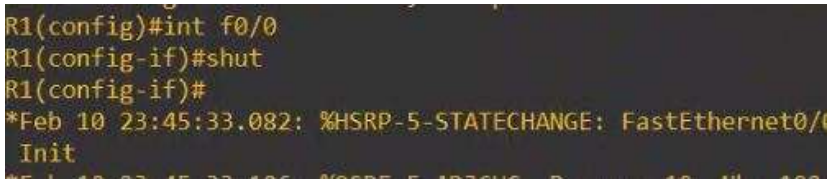


3. Verify the internet connectivity of PC2 using ping. Then use the trace command to check the next hop address.

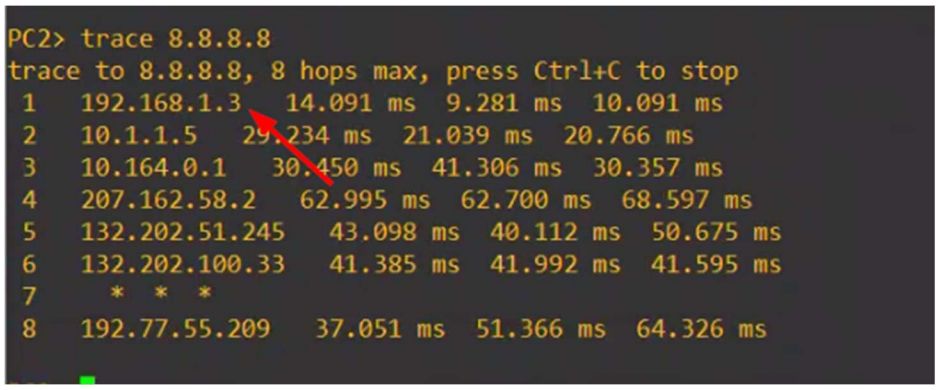


The output confirms that R1 is acting as the default router for PC2.

4. Shut interface f0/0 on R1.



5. Run the trace command again to check the next-hop address.



The output confirms that R3 is now the active router and acting as the default router for PC2.

6. Similarly, check the next-hop on PC1.

```
PC1> ping 8.8.8.8

84 bytes from 8.8.8.8 icmp_seq=1 ttl=116 time=45.482 ms
84 bytes from 8.8.8.8 icmp_seq=2 ttl=116 time=35.731 ms
84 bytes from 8.8.8.8 icmp_seq=3 ttl=116 time=45.763 ms
84 bytes from 8.8.8.8 icmp_seq=4 ttl=116 time=35.754 ms
84 bytes from 8.8.8.8 icmp_seq=5 ttl=116 time=38.193 ms

PC1> trace 8.8.8.8
trace to 8.8.8.8, 8 hops max, press Ctrl+C to stop
 1   192.168.1.3    14.321 ms  9.633 ms  10.467 ms
 2   10.1.1.5   29.925 ms  30.221 ms  32.630 ms
 3   10.164.0.1   41.835 ms  44.784 ms  40.146 ms
 4   207.162.58.2   55.552 ms  82.331 ms  38.742 ms
 5   132.202.51.245   29.327 ms  33.961 ms  30.204 ms
 6   132.202.100.33   30.993 ms  51.131 ms  51.743 ms
 7     *  *  *
 8   192.77.55.209   43.744 ms  39.516 ms  41.250 ms
```

The output confirms that R3 is the active router.

7. On R1, enter the no shut command to enable interface f0/0.

```
R1(config-if)#no shut
R1(config-if)#
*Feb 10 23:58:59.486: %HSRP-5-STATECHANGE: FastEthernet0/0 Grp 1 stat
 Active
R1(config-if)#
*Feb 10 23:59:00.162: %LINK-3-UPDOWN: Interface FastEthernet0/0, chan
o up
*Feb 10 23:59:01.162: %LINEPROTO-5-UPDOWN: Line protocol on Interface
et0/0, changed state to up
R1(config-if)#
```

8. Run the trace command again on PC1.

```
PC1> trace 8.8.8.8
trace to 8.8.8.8, 8 hops max, press Ctrl+C to stop
 1     *192.168.1.1    23.065 ms  9.088 ms
 2   10.1.1.2   29.944 ms  30.409 ms  29.367 ms
 3   10.164.0.1   45.671 ms  40.961 ms  42.920 ms
 4   207.162.58.2   61.895 ms  63.951 ms  53.215 ms
 5   132.202.51.245   41.265 ms  41.843 ms  42.889 ms
 6   132.202.100.33   41.120 ms  41.864 ms  53.711 ms
 7     *  *  *
 8   192.77.55.209   46.527 ms  41.083 ms  46.393 ms
```

The output confirms that R1 has again become the active router.