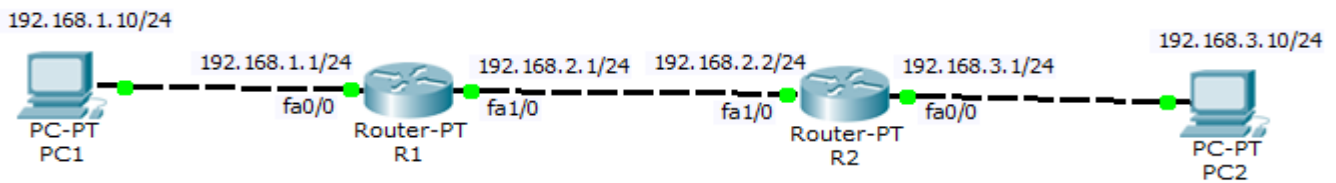


Lab 5: Configuration of Routing Protocols—Routing Information protocol (RIP)

Use the network topology and IP address information shown below to configure a dynamic routing protocol called RIP.



Device	Interface number	IP address	Subnet mask	Default gateway
PC1	Fa0	192.168.1.10	255.255.255.0	192.168.1.1
PC2	Fa0	192.168.3.10	255.255.255.0	192.168.3.1
R1	Fa0/0	192.168.1.1	255.255.255.0	-
R1	Fa1/0	192.168.2.1	255.255.255.0	-
R2	Fa0/0	192.168.3.1	255.255.255.0	-
R2	Fa1/0	192.168.2.2	255.255.255.0	-

Activity:

1. Create the network topology shown above (use generic routers)
2. Assign the IP addresses shown in the table to the interfaces of the routers and the hosts. The default gateways of the PCs are the IP addresses of the directly connected interfaces of the respective routers.

Configure PCs:

Assign the respective IP address, subnet Mask and Default gateway for the PCs

Configure router interfaces

On R1:

```
Router>
Router>en
Router#conf t
Router(config)#host R1
R1(config)#int fa 0/0
R1(config-if)#ip add 192.168.1.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#int fa 1/0
R1(config-if)#ip add 192.168.2.1 255.255.255.0
R1(config-if)#no shut
R1(config-if)#exit
R1(config)#
```

On R2:

```
Router>en
Router#conf t
Router(config)#int fa 0/0
Router(config-if)#ip add 192.168.3.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#int fa 1/0
Router(config-if)#ip add 192.168.2.2 255.255.255.0
Router(config-if)#no shut
Router(config-if)#exit
Router(config)#
```

3. Verify your configuration.

You may use **show run** or **sh ip int brief** commands to check whether interfaces of the routers are configured correctly or not.

N.B: issue the show commands from privileged mode.

On R1:

R1#sh ip int br						
Interface	IP-Address	OK?	Method	Status	Protocol	
FastEthernet0/0	192.168.1.1	YES	manual	up	up	
FastEthernet1/0	192.168.2.1	YES	manual	up	up	
Serial2/0	unassigned	YES	unset	administratively down	down	
Serial3/0	unassigned	YES	unset	administratively down	down	

Interfaces of R1 are configured with correct IP address

the interfaces are connected and not shutdown

On R2:

Router#sh ip int br						
Interface	IP-Address	OK?	Method	Status	Protocol	
FastEthernet0/0	192.168.3.1	YES	manual	up	up	
FastEthernet1/0	192.168.2.2	YES	manual	up	up	
Serial2/0	unassigned	YES	unset	administratively down	down	
Serial3/0	unassigned	YES	unset	administratively down	down	
FastEthernet4/0	unassigned	YES	unset	administratively down	down	
FastEthernet5/0	unassigned	YES	unset	administratively down	down	

4. Verify connectivity. Can PC1 ping PC2? Why?

Can PC1 ping PC2? No

Can PC1 ping 192.168.2.2? No

Can PC1 ping 192.168.3.1? No

Can PC1 ping 192.168.1.1? yes

Why can't PC1 reach PC2? **No routing protocol is configured yet. Hence, R1 does not know network 192.168.3.0/24 and R2 does not have any knowledge to reach network 192.168.1.0/24.**

5. Verify the routing table before configuration of routing protocol

If not routing protocol is configured, then each router only knows directly connected networks. That means, R1 will have only 192.168.1.0/24 and 192.168.2.0/24 networks in its routing table. Similarly, R2 knows only 192.168.2.0/24 and 192.168.3.0/24 networks.

We can verify the contents of the routing table by using **show ip route** command.

On R1:

```

R1#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C 192.168.1.0/24 is directly connected, FastEthernet0/0
C 192.168.2.0/24 is directly connected, FastEthernet1/0
R1#

```

On R2:

```

Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C 192.168.2.0/24 is directly connected, FastEthernet1/0
C 192.168.3.0/24 is directly connected, FastEthernet0/0
Router#

```

Hence, at this time R1 does not know 192.168.3.0/24 network and R2 does not know network 192.168.1.0/24.

6. Configure RIP on R1 and R2

RIP is a dynamic routing protocol which is a distance vector. The metric used by RIP is called hop (number of routers). RIP has two versions: RIP v1 and RIP v2. Though there are some technical differences between them, RIPv2 is the recommended one. The default version is RIP version 1.

To configure RIP, use **router rip** command. Then add the networks that a given router knows to the RIP network by using **network** command. That is, for R1, networks 192.168.1.0 and 192.168.2.0 should be advertised. Similarly, for R2, networks 192.168.2.0 and 192.168.3.0 should be added by using the network command.

Configure RIP V2 on R1:

```

R1#conf t
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#network 192.168.1.0
R1(config-router)#network 192.168.2.0
R1(config-router)#

```

Configure RIP V2 on R2:

```

Router#conf t
Router(config)#router rip
Router(config-router)#version 2
Router(config-router)#network 192.168.2.0
Router(config-router)#network 192.168.3.0
Router(config-router)#

```

7. Verify the configuration

To see the RIP configuration use **show run** command. Scroll down on the running-config to see the RIP configuration

On R1:

```
interface FastEthernet5/0
no ip address
shutdown
!
router rip
version 2
network 192.168.1.0
network 192.168.2.0
!
ip classless
!
```

On R2:

```
interface FastEthernet5/0
no ip address
shutdown
!
router rip
version 2
network 192.168.2.0
network 192.168.3.0
!
ip classless
!
ip flow-export version 9
```

Check the routing table of both routers

On R1:

We can see that a third entry is added with code **R**. it indicates that RIP is configured and the next hop address is automatically added. By now R1 knows how to reach to 192.168.3.0/24 network.

```
R1#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.1.0/24 is directly connected, FastEthernet0/0
C    192.168.2.0/24 is directly connected, FastEthernet1/0
R    192.168.3.0/24 [120/1] via 192.168.2.2, 00:00:05, FastEthernet1/0
R1#
```

Similarly, R2 has also learnt 192.168.1.0/24 network.

```

Router#sh ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

R 192.168.1.0/24 [120/1] via 192.168.2.1, 00:00:11, FastEthernet1/0
C 192.168.2.0/24 is directly connected, FastEthernet1/0
C 192.168.3.0/24 is directly connected, FastEthernet0/0
Router#

```

8. Verify connectivity

Since, all routers have learnt all networks, the PCs can now ping each other. If your answer to any of the following questions is No, then revise your configuration.

Can PC1 ping PC2? yes

Can PC1 ping 192.168.2.2? yes

Can PC1 ping 192.168.3.1? yes

Can PC1 ping 192.168.1.1? yes