

RIP

(Routing Information Protocol)

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Routing Information Protocol (RIP) is one of the open standard dynamic routing protocols. RIP uses the "Distance-Vector" algorithm. The "Administrative Distance" value is 120. The RIP metric is based on hop count. A lower hop count path is preferred. Routers which is running with RIP can learn 15 routers end-to-end. The protocol uses the "Bellman-Ford" algorithm to calculate routing.

RIP messages are sent on the User Datagram Protocol (UDP) 520 port. RIP messages are sent every 30 seconds. There are two different timers of RIP. One of the timers is "Invalid Timer". This timer value is 180 seconds. If the adjacent device does not send a RIP message within 180 seconds, the router will change its metric value to 16. That means the router cannot reach the adjacent device because the metric value can be at most 15 for routers. Another timer is "Flush". This timer is 240 seconds. If the neighbour device does not send a RIP message within 240 seconds. The router will remove the row of the neighbour device on its routing table.

Nowadays, RIP is not popular at all because it has many disadvantages. For many companies, OSPF (Open Shortest Path First) is preferable to RIP. RIP has two versions. RIPv1 and RIPv2. RIPv1 does not exist because it is the old version of RIP. This version of RIP can not support classless IP addresses. RIPv2 is suitable for the modern time because it can work with classful IP addresses.

Briefly Advantages of RIP:

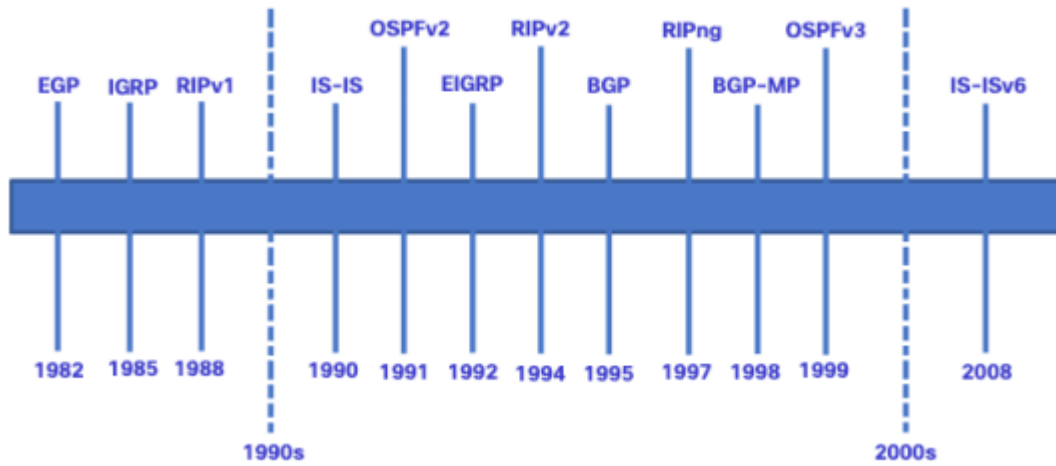
- Advisable for small networks.
- Easy to implement.
- Easy configuration

Briefly Disadvantages of RIP:

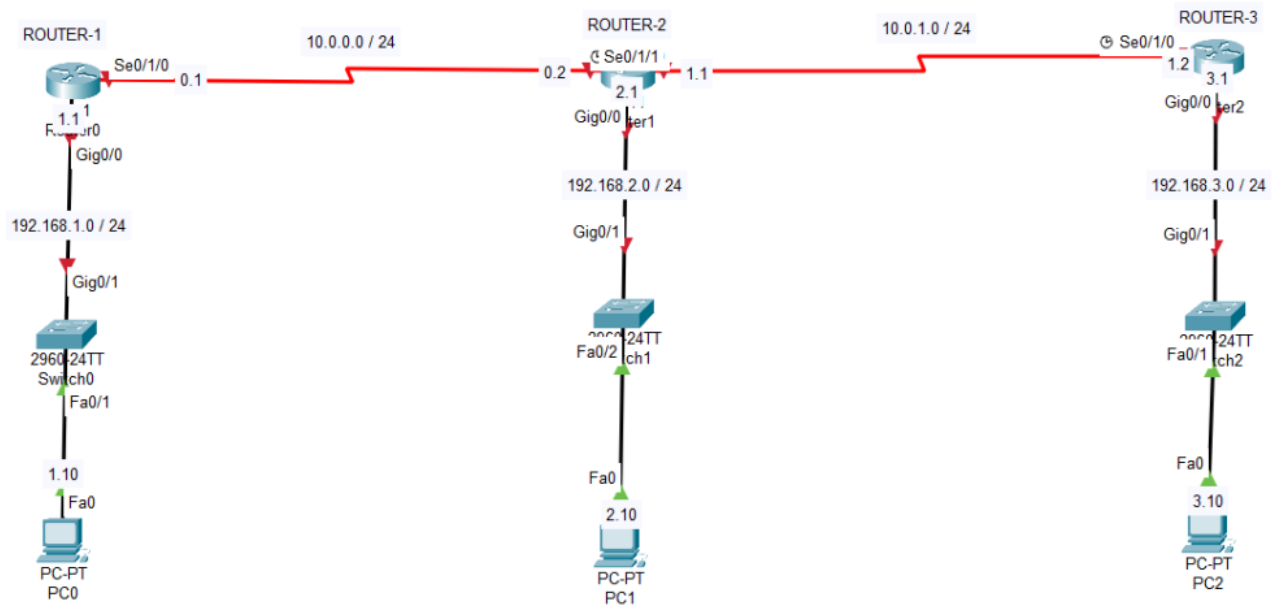
- Not enough for scalability on extensive networks.
- RIP routers can learn just 15 routers end-to-end.
- RIP messages are announced every 30 seconds, which can cause trivial traffic on the network.

RIPv1 was announced in 1988, and RIPv2 was announced after six years later. RIPv1 messages are sent to everyone(Broadcast) in the network. In RIPv2, messages are announced with Multicast address (224.0.0.9).

In the picture, you can see the debut time for different protocols.



Now, let's make a basic RIP application to understand it fully.



Let's configure it step by step for each device.

```
Router-1(config)# interface gigabitEthernet 0/0
Router-1(config-if)# ip address 192.168.1.1 255.255.255.0
Router-1(config-if)# no shutdown
Router-1(config-if)# exit
Router-1(config)#
Router-1(config)# interface serial 0/1/0
Router-1(config-if)# ip address 10.0.0.1 255.255.255.0
Router-1(config-if)# no shutdown
Router-2(config-if)# exit
Router-2(config)#
```

```
Router-2(config)# interface gigabitEthernet 0/0
Router-2(config-if)# ip address 192.168.2.1 255.255.255.0
Router-2(config-if)# no shutdown
Router-2(config-if)# exit
Router-2(config)#
Router-2(config)# interface serial 0/1/0
Router-2(config-if)# ip address 10.0.0.2 255.255.255.0
Router-2(config-if)# no shutdown
Router-2(config-if)# exit
Router-2(config)#
Router-2(config)# interface serial 0/1/1
Router-2(config-if)# ip address 10.0.1.1 255.255.255.0
Router-2(config-if)# no shutdown
Router-2(config-if)# exit
Router-2(config)#
```

```
Router-3(config)# interface gigabitEthernet 0/0
Router-3(config-if)# ip address 192.168.3.1 255.255.255.0
Router-3(config-if)# no shutdown
Router-3(config-if)# exit
Router-3(config)#
Router-3(config)# interface serial 0/1/0
Router-3(config-if)# ip address 10.0.1.2 255.255.255.0
Router-3(config-if)# no shutdown
Router-3(config-if)# exit
Router-3(config)#
```

We assigned the IP addresses on each interface. Now, we will assign RIP configuration on devices.

```
Router-1(config)# router rip
Router-1(config-router)# version 2 ( the command of selecting version of RIP )
Router-1(config-router)# network 192.168.1.0 ( It's one of the networks which will share to other RIP routers. We don't have to assign a "Subnet Mask" or Prefix value. )
Router-1(config-router)# network 10.0.0.0 ( It's one of the networks which will share to other RIP routers. )
Router-1(config-router)# no auto-summary ( It will be explained in the last part of the document. )
Router-1(config-router)# passive-interface gigabitEthernet 0/0 ( We can write this command if the related interface does not have any routers. The router will not send RIP messages to the interface with this command. So, after this command, the "gigabitEthernet 0/0" interface will not receive any RIP messages. That can prevent unnecessary traffic on our network. )
Router-1(config-router)# exit
Router-1(config-router)#
```

```
Router-2(config)# router rip
Router-2(config-router)# version 2
Router-2(config-router)# network 192.168.2.0
Router-2(config-router)# network 10.0.0.0
Router-2(config-router)# network 10.0.1.0
Router-2(config-router)# no auto-summary
Router-2(config-router)# passive-interface gigabitEthernet 0/0
Router-2(config-router)# exit
Router-2(config)#
```

```
Router-3(config)# router rip
Router-3(config-router)# version 2
Router-3(config-router)# network 192.168.3.0
Router-3(config-router)# network 10.0.1.0
Router-3(config-router)# no auto-summary
Router-3(config-router)# passive-interface gigabitEthernet 0/0
Router-3(config-router)# exit
Router-3(config)#
```

```

Router#show ip route
Codes: L - local, C - connected, S - static, 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

    10.0.0.0/8 is variably subnetted, 3 subnets, 2 masks
C       10.0.0.0/24 is directly connected, Serial0/1/0
L       10.0.0.1/32 is directly connected, Serial0/1/0
R       10.0.1.0/24 [120/1] via 10.0.0.2, 00:00:12, Serial0/1/0
    192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C       192.168.1.0/24 is directly connected, GigabitEthernet0/0
L       192.168.1.1/32 is directly connected, GigabitEthernet0/0
R       192.168.2.0/24 [120/1] via 10.0.0.2, 00:00:12, Serial0/1/0
R       192.168.3.0/24 [120/2] via 10.0.0.2, 00:00:12, Serial0/1/0

```

Router-1 - Routing Table

Auto-Summarization

This is the auto-summarization feature of RIP protocol. Let's suppose that we have a router, and this router has two interfaces. The interfaces are assigned IP addresses by the Network Specialist. One of the interfaces has a "10.0.0.0/24" and another one has a "10.0.1.0/24" address. If the feature opens, it will share the networks with other devices with summarization. Different devices will learn these networks like "10.0.0.0/8", which will be a big problem for our networks. Therefore, we should not use this feature for RIP Topology.

Lastly, let's test our topology. For ping implementation, we use the "192.168.1.10(PC-1)" device, and first, we will send a ping to its gateway. After that, our ping packet will go to "192.168.3.10(PC-3)".

```
C:\>ping 192.168.1.1

Pinging 192.168.1.1 with 32 bytes of data:

Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255
Reply from 192.168.1.1: bytes=32 time<1ms TTL=255

Ping statistics for 192.168.1.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>ping 192.168.3.10

Pinging 192.168.3.10 with 32 bytes of data:

Reply from 192.168.3.10: bytes=32 time=24ms TTL=125
Reply from 192.168.3.10: bytes=32 time=3ms TTL=125
Reply from 192.168.3.10: bytes=32 time=29ms TTL=125
Reply from 192.168.3.10: bytes=32 time=21ms TTL=125

Ping statistics for 192.168.3.10:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 3ms, Maximum = 29ms, Average = 19ms
```

Ping Test