

Configuring RIP V2

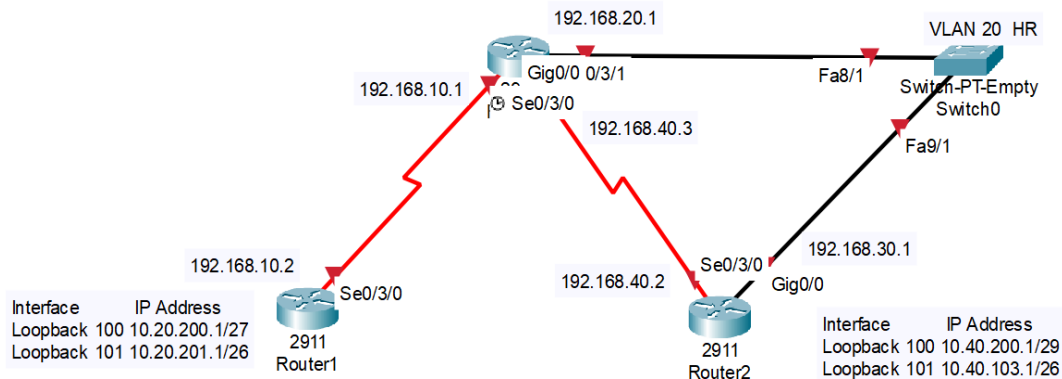


Figure 1 Topology

Routing Information Protocol version 2 (RIPv2) is an enhanced version of RIPv1 that includes support for Classless Inter-Domain Routing (CIDR) and Variable Length Subnet Masks (VLSM). Unlike RIPv1, which is a classful routing protocol, RIPv2 sends subnet mask information in its routing updates, making it more suitable for today's subnetted networks. This guide provides a step-by-step approach to configuring RIPv2 on Cisco IOS routers.

Key Differences Between RIPv1 and RIPv2

Feature	RIPv1	RIPv2
Subnet Mask	No subnet mask in updates	Includes subnet mask in updates
CIDR/VLSM Support	No	Yes
Update Destination	Broadcast (255.255.255.255)	Multicast (224.0.0.9)
Authentication	No	Yes (MD5 or plain text)
Classful/Classless	Classful	Classless

Step 1: Access the Router

Connect to your router via console or SSH:

```
Router> enable
Router# configure terminal
Router(config)#
```

Step 2: Configure IP Addresses on Interfaces

Before configuring RIP, ensure your interfaces have IP addresses configured:

```
Router(config)# interface gigabitethernet 0/0
Router(config-if)# ip address 192.168.1.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)# exit
```

```
Router(config)# interface gigabitethernet 0/1
Router(config-if)# ip address 192.168.2.1 255.255.255.0
Router(config-if)# no shutdown
Router(config-if)# exit
```

Step 3: Enable RIPv2 Routing Protocol

Enter RIP configuration mode and specify version 2:

```
Router(config)# router rip
Router(config-router)# version 2
```

Step 4: Disable Auto-summarization

By default, RIP automatically summarizes routes at classful network boundaries. Since RIPv2 is designed to support VLSM and CIDR, it's recommended to disable auto-summarization:

```
Router(config-router)# no auto-summary
```

Step 5: Advertise Networks

Specify the networks to be advertised by RIP. Note that RIP uses classful network commands, so you only specify the major network:

```
Router(config-router)# network 192.168.1.0
Router(config-router)# network 192.168.2.0
```

Step 6: Configure Passive Interfaces (Optional)

To prevent RIP updates from being sent out on interfaces where no RIP neighbors exist (such as interfaces connected to end-user networks), configure them as passive:

```
Router(config-router)# passive-interface gigabitethernet 0/2
```

Step 7: Configure Authentication (Optional but Recommended)

To secure RIP updates, configure authentication:

Step 7.1: Create a Key Chain

```
Router(config)# key chain RIP-AUTH
Router(config-keychain)# key 1
Router(config-keychain-key)# key-string MySecretKey
Router(config-keychain-key)# exit
Router(config-keychain)# exit
```

Step 7.2: Apply Authentication to the Interface

```
Router(config)# interface gigabitethernet 0/0
Router(config-if)# ip rip authentication mode md5
Router(config-if)# ip rip authentication key-chain RIP-AUTH
Router(config-if)# exit

Router(config)# interface gigabitethernet 0/1
Router(config-if)# ip rip authentication mode md5
Router(config-if)# ip rip authentication key-chain RIP-AUTH
Router(config-if)# exit
```

Step 8: Save the Configuration

Save your configuration to ensure changes persist after a router reload:

```
Router(config)# exit
Router# copy running-config startup-config
```

Step 9: Verify RIPv2 Configuration

Use the following commands to verify your RIPv2 configuration:

View RIP Configuration

```
Router# show running-config | section rip
```

Check RIP Database

```
Router# show ip rip database
```

View RIP Interfaces

```
Router# show ip protocols
```

Verify Routes

```
Router# show ip route rip
```

Check RIP Neighbors

```
Router# debug ip rip
```

Remember to disable debugging when done:

Router# undebug all

Common RIPv2 Configuration Issues and Solutions

Issue 1: Routes Not Being Advertised

Solution: Verify network statements and ensure interfaces are up/up:

Router# show ip interface brief

Issue 2: RIPv2 Routes Not Being Installed in Routing Table

Solution: Check for routing issues or better routes from other protocols:

Router# show ip route

Router# show ip protocols

Issue 3: Authentication Failures

Solution: Verify key chains and authentication modes match on all routers:

Router# show key chain

Additional RIPv2 Configuration Options

Configure Route Filtering

To filter routes, use distribute lists:

Router(config)# access-list 1 permit 192.168.10.0 0.0.0.255

Router(config)# router rip

Router(config-router)# distribute-list 1 out gigabitethernet 0/0

Adjust Timers

You can modify RIP timers to fine-tune convergence:

Router(config-router)# timers basic 30 90 180 270

The values represent update, invalid, holddown, and flush timers in seconds.

Configure Default Route Propagation

To propagate a default route in RIP:

Router(config-router)# default-information originate

You've now successfully configured RIPv2 on your Cisco IOS router. The configuration steps covered include enabling RIPv2, disabling auto-summarization, advertising networks, configuring passive interfaces, and implementing authentication. You've also learned how to verify your configuration and troubleshoot common issues.

RIPv2, while considered a legacy protocol compared to more modern routing protocols like OSPF or EIGRP, is still useful for smaller networks and remains an important fundamental skill for network engineers.

TASK#01: - Configure the hostnames on routers R1, R2 and R3 as illustrated in the topology.

R1

```
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Router1
```

R2

```
Router>en
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Router2
```

R3

```
Router>en
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Router3
```

TASK#02: Configure a back-to-back Serial connection between R1 and R3. Configure the DCE interface Serial0/3/0 in R3 to provide clocking to R1 at a clock speed of 128Kbps. Configure IP addresses 192.168.10.1 and 192.168.10.1 on R1 and R3 Serial0/3/0 interfaces respectively. Configure the Loopback interfaces on R1 and R3 with the IP addresses illustrated in the topology.

R3

```
Router3#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router3(config)#int se0/3/0
Router3(config-if)#clock rate 128000
Router3(config-if)#ip address 192.168.10.1 255.255.255.0
Router3(config-if)#no shutdown
```

```
%LINK-5-CHANGED: Interface Serial0/3/0, changed state to down
Router3(config-if)#
Router3(config-if)#
Router3(config-if)#do show controllers se0/3/0
Interface Serial0/3/0
Hardware is PowerQUICC MPC860
DCE V.35, clock rate 128000
```

```
Router3#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router3(config)#int g0/0
Router3(config-if)#ip address 192.168.20.1 255.255.255.0
Router3(config-if)#end
```

```
Router3#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router3(config)#int se0/3/1
Router3(config-if)#ip address 192.168.40.3 255.255.255.0
Router3(config-if)#no shutdown
```

```
Router3#show ip interface brief
Interface IP-Address OK? Method Status Protocol
GigabitEthernet0/0 192.168.20.1 YES manual administratively down down
GigabitEthernet0/1 unassigned YES unset administratively down down
GigabitEthernet0/2 unassigned YES unset administratively down down
Serial0/3/0 192.168.10.1 YES manual down down
Serial0/3/1 192.168.40.3 YES manual down down
Vlan1 unassigned YES unset administratively down down
noarp222#
```

R1

```
Router1>en
Router1#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router1(config)#int se0/3/0
Router1(config-if)#ip address 192.168.10.2 255.255.255.0
Router1(config-if)#no shutdown
```

```
Router1(config-if)#
%LINK-5-CHANGED: Interface Serial0/3/0, changed state to up
```

```

Router1(config-if)#
Router1(config-if)#int loopback 100

Router1(config-if)#
%LINK-5-CHANGED: Interface Loopback100, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback100, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/3/0, changed state to up

Router1(config-if)#ip address 10.20.200.1 255.255.255.224
Router1(config-if)#int loopback 101

Router1(config-if)#
%LINK-5-CHANGED: Interface Loopback101, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback101, changed state to up

Router1(config-if)#ip address 10.20.201.1 255.255.255.192
Router1(config-if)#do wr
Building configuration...
[OK]
Router1(config-if)#

Router1#show ip interface brief
Interface                IP-Address      OK? Method Status        Protocol
GigabitEthernet0/0       unassigned      YES unset  administratively down  down
GigabitEthernet0/1       unassigned      YES unset  administratively down  down
GigabitEthernet0/2       unassigned      YES unset  administratively down  down
Serial0/3/0              192.168.10.2    YES manual  up            up
Serial0/3/1              unassigned      YES unset  administratively down  down
Loopback100              10.20.200.1     YES manual  up            up
Loopback101              10.20.201.1     YES manual  up            up
Vlan1                    unassigned      YES unset  administratively down  down
-
-

Router1#show controllers se0/3/0
Interface Serial0/3/0
Hardware is PowerQUICC MPC860
DTE V.35 TX and RX clocks detected

```

R2

```

Router2>en
Router2#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router2(config)#int se0/3/0
Router2(config-if)#ip address 192.168.40.2 255.255.255.0
Router2(config-if)#no shutdown

Router2(config-if)#int g0/0
Router2(config-if)#ip address 192.168.30.1 255.255.255.0
Router2(config-if)#no shutdown

```

```
Router2(config-if)#int loopback 100

Router2(config-if)#
%LINK-5-CHANGED: Interface Loopback100, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback100, changed state to up

Router2(config-if)#ip address 10.40.200.1 255.255.255.248
Router2(config-if)#int loopback 101

Router2(config-if)#
%LINK-5-CHANGED: Interface Loopback101, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback101, changed state to up

Router2(config-if)#ip address 10.40.103.1 255.255.255.192

Router2#show ip interface brief
Interface                IP-Address      OK? Method Status      Protocol
GigabitEthernet0/0       192.168.30.1    YES manual up          up
GigabitEthernet0/1       unassigned      YES unset   administratively down down
GigabitEthernet0/2       unassigned      YES unset   administratively down down
Serial0/3/0              192.168.40.2    YES manual up          up
Serial0/3/1              unassigned      YES unset   administratively down down
Loopback100              10.40.200.1     YES manual up          up
Loopback101              10.40.103.1     YES manual up          up
Vlan1                    unassigned      YES unset   administratively down down
```

TASK#03: - Enable RIPv2 on R1 and configure RIPv2 routing for the Loopback interfaces and the Serial0/0 interface. Verify on either R1 or R2 that RIPv2 has been enabled using the appropriate commands.

R1

R2

```
Router2(config-if)#int s0/3/0
Router2(config-if)#ip address 192.10.0.2 255.255.255.0
Router2(config-if)#no shutdown

Router2(config-if)#int g0/0
Router2(config-if)#ip address 172.20.31.2 255.255.255.252
Router2(config-if)#no shutdown
```

TASK#04: - Enable RIPv2 on R1 and configure RIPv2 routing for the Loopback interfaces and the Serial interface. Verify on either R1 or R2 that RIPv2 has been enabled using the appropriate commands.

R1

```
Router1>en
Router1#config terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Router1(config)#router rip
Router1(config-router)#version 2
Router1(config-router)#network 10.0.0.0
Router1(config-router)#network 192.168.10.0
Router1(config-router)#do wr
Building configuration...
```

R2

```
Router2#config terminal
Enter configuration commands, one per line.  End with CNTL/Z
Router2(config)#router rip
Router2(config-router)#version 2
Router2(config-router)#network 192.168.30.0
Router2(config-router)#network 192.168.40.0
Router2(config-router)#network 10.0.0.0
Router2(config-router)#do wr
Building configuration...
-----
```

R3

```
Router3(config)#router rip
Router3(config-router)#version 2
Router3(config-router)#network 192.168.10.0
Router3(config-router)#network 192.168.20.0
Router3(config-router)#network 192.168.40.0
Router3(config-router)#do wr
Building configuration...
```

Verifications

```
Router2#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 3 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send Recv Triggered RIP Key-chain
GigabitEthernet0/0    22
Serial0/3/0           22
Loopback100           22
Loopback101           22
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
  10.0.0.0
  192.168.30.0
  192.168.40.0
Passive Interface(s):
Routing Information Sources:
  Gateway         Distance      Last Update
  192.168.40.3      120          00:01:44
```

```

Router3#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 1 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip

Router3#show ip protocols
Routing Protocol is "rip"
Sending updates every 30 seconds, next due in 1 seconds
Invalid after 180 seconds, hold down 180, flushed after 240
Outgoing update filter list for all interfaces is not set
Incoming update filter list for all interfaces is not set
Redistributing: rip
Default version control: send version 2, receive 2
  Interface          Send Recv Triggered RIP Key-chain
  Serial0/3/0         22
  Serial0/3/1         22
Automatic network summarization is in effect
Maximum path: 4
Routing for Networks:
  192.168.10.0
  192.168.20.0
  192.168.40.0
Passive Interface(s):
Routing Information Sources:
  Gateway         Distance      Last Update
  192.168.10.2     120           00:00:03
  192.168.40.2     120           00:00:03
Distance: (default is 120)

```

When configuring RIP routing, you must use the version 2 keyword under RIP configuration mode. By default, if RIP is enabled and this keyword is not issued, the Cisco IOS router will enable both RIPv1 and RIPv2. RIPv1 will be enabled for inbound and outbound routing updates, and RIPv2 will be enabled only for inbound routing updates. This is illustrated below for a router configured for RIP routing without the version 2 keyword:

This note provides important information about RIP version configuration behavior on Cisco IOS routers. Let me explain it in detail:

1. **Default Behavior:** When you configure RIP routing without explicitly specifying a version, Cisco routers implement a hybrid approach:
 - The router will send out (outbound) updates using RIPv1 format only
 - The router will accept (inbound) updates in both RIPv1 and RIPv2 formats
2. **Why This Matters:** This default behavior can cause problems because:
 - RIPv1 is classful and doesn't include subnet mask information in updates
 - This prevents proper support for VLSM (Variable Length Subnet Masks) and CIDR (Classless Inter-Domain Routing)
 - Routes might not propagate correctly across your network

- You lose RIPv2's benefits like multicast updates and authentication
- 3. **Solution:** To ensure your router properly uses RIPv2 for both inbound and outbound updates, you must explicitly configure the version with the "version 2" command under router configuration mode:

1. Router(config)# router rip

2. Router(config-router)# version 2

- 4. **Potential Issues:** If you don't set the version explicitly:
 - You might see unexpected routing behavior
 - Some subnets might not be properly advertised
 - Security is reduced since authentication is only available in RIPv2
 - More bandwidth is used by broadcast traffic (RIPv1) instead of multicast (RIPv2)
 - 5. **Best Practice:** Always explicitly set the RIP version to 2 when implementing RIP in modern networks to ensure consistent behavior and take advantage of RIPv2's improvements over RIPv1.
-