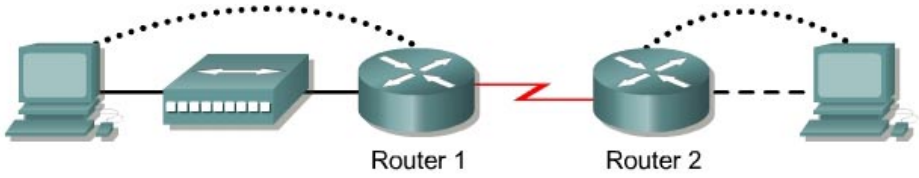
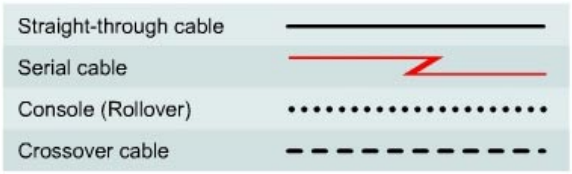
Lab 1.2.5 Verifying RIP v2 Configuration – 2500 Series



Router Designation	Router Name	FastEthernet 0 Address	Interface Type	Serial 0 Address	Subnet Mask for Both Interfaces	Enable Secret Password	Enable, VTY, and Console Passwords
Router 1	GAD	172.16.0.1	DCE	172.17.1.1	255.255.0.0	class	cisco
Router 2	BHM	172.18.0.1	DTE	172.17.1.2	255.255.0.0	class	cisco



Objective

- Configure RIP v1 and v2 on routers.
- Use **`show`** commands to verify RIP v2 operation.

Background/Preparation

Cable a network similar to the one shown in the diagram. Any router that meets the interface requirements displayed on the above diagram may be used. For example, router series 800, 1600, 1700, 2500, and 2600 or any such combination can be used. Please refer to the chart at the end of the lab to correctly identify the interface identifiers to be used based on the equipment in the lab. The configuration output used in this lab is produced from 1721 series routers. Any other router used may produce slightly different output. Perform the following steps on each router unless specifically instructed otherwise.

Start a HyperTerminal session as performed in the Establishing a HyperTerminal session lab.

Note: Go to the erase and reload instructions at the end of this lab. Perform those steps on all routers in this lab assignment before continuing.

Step 1 Configure the routers

On the routers, configure the hostnames as well as the console, virtual terminal, and enable secret passwords. Next configure the serial interface IP address and clock rate and the Fast Ethernet interface IP address. Finally configure IP host names. If there are problems performing the basic configuration, refer to the Review of Basic Configuration including RIP lab. Optional interface descriptions and message of the day banners may also be configured. Be sure to save the configurations just created.

Router 1

```
Router>enable
Router#configure terminal
Router(config)#hostname GAD
GAD(config)#enable secret class
GAD(config)#line console 0
GAD(config-line)#password cisco
GAD(config-line)#login
GAD(config-line)#line vty 0 4
GAD(config-line)#password cisco
GAD(config-line)#login
GAD(config-line)#exit
GAD(config)#interface serial 0
GAD(config-if)#ip address 172.17.1.1 255.255.0.0
GAD(config-if)#clock rate 64000
GAD(config-if)#no shutdown
GAD(config-if)#exit
GAD(config)#interface ethernet 0
GAD(config-if)#ip address 172.16.0.1 255.255.0.0
GAD(config-if)#no shutdown
GAD(config-if)#exit
GAD(config)#ip host BMH 172.18.0.1 172.17.1.2
```

Router 2

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

BHM(config)#enable secret class
BHM(config)#line console 0
BHM(config-line)#password cisco
BHM(config-line)#login
BHM(config-line)#line vty 0 4
BHM(config-line)#password cisco
BHM(config-line)#login
BHM(config-line)#exit
BHM(config)#interface serial 0
BHM(config-if)#ip address 172.17.1.2 255.255.0.0
BHM(config-if)#no shutdown
BHM(config-if)#exit
BHM(config)#interface ethernet 0
BHM(config-if)#ip address 172.18.0.1 255.255.0.0
BHM(config-if)#no shutdown
BHM(config-if)#exit
BHM(config)#ip host GAD 172.16.0.1 172.17.1.1
```

Step 2 Configure the routing protocol on the GAD router

Go to the correct command mode and configure RIP routing on the GAD router according to the chart.

```
GAD(config)#router rip
GAD(config-router)#network 172.16.0.0
GAD(config-router)#network 172.17.0.0
GAD(config-router)#exit
GAD(config)#exit
```


Step 3 Save the GAD router configuration

Any time that changes are correctly made to the running configuration, they should be saved to the startup configuration. Otherwise, if the router is reloaded or power cycled, the changes that are not saved in the startup configuration will be lost.

```
GAD#copy running-config startup-config
Destination filename [startup-config]?[Enter]
```

Step 4 Configure the routing protocol on the BHM router

Go to the correct command mode and configure RIP routing on the BHM router according to the chart.

```
BHM(config)#router rip
BHM(config-router)#network 172.18.0.0
BHM(config-router)#network 172.17.0.0
BHM(config-router)#exit
BHM(config)#exit
```

Step 5 Save the BHM router configuration

```
BHM# copy running-config startup-config
Destination filename [startup-config]?[Enter]
```

Step 6 Configure the hosts with the proper IP address, subnet mask, and default gateway

```
Host connected to router GAD
IP Address:        172.16.0.2
Subnet mask:       255.255.0.0
Default gateway:   172.16.0.1

Host connected to router BHM
IP Address:        172.18.0.2
Subnet mask:       255.255.0.0
Default gateway:   172.18.0.1
```

Step 7 Verify that the internetwork is functioning by pinging the FastEthernet interface of the other router

a. From the host attached to the GAD, ping the other host attached to the BHM router. Was the ping successful? Yes

b. From the host attached to the BHM, ping the other host attached to the GAD router. Was the ping successful? Yes

b. If the answer is no for either question, troubleshoot the router configurations to find the error. Then do the pings again until the answer to both questions is yes.

Step 8 Show the routing tables for each router

a. From the enable privileged EXEC mode, examine the routing table entries using command **show ip route** command on each router.

```
GAD#show 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, * - candidate
           default
        U - per-user static route, o - ODR, P - periodic downloaded
           static route
        T - traffic engineered route

    Gateway of last resort is not set

    C    172.17.0.0/16 is directly connected, Serial0
    C    172.16.0.0/16 is directly connected, Ethernet0
    R    172.18.0.0/16 [120/1] via 172.17.0.2, Serial0

    BHM#show 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    172.17.0.0/16 is directly connected, Serial0
    C    172.18.0.0/16 is directly connected, Ethernet0
    R    172.16.0.0/16 [120/1] via 172.17.1.1, 00:00:27, Serial0
```

b. What are the entries in the GAD routing table?

```
C    172.17.0.0/16 is directly connected, Serial0
C    172.16.0.0/16 is directly connected, Ethernet0
R    172.18.0.0/16 [120/1] via 172.17.0.2, Serial0
```

c. What are the entries in the BHM routing table?

```
C    172.17.0.0/16 is directly connected, Serial0
C    172.18.0.0/16 is directly connected, Ethernet0
R    172.16.0.0/16 [120/1] via 172.17.1.1, 00:00:27, Serial0
```

Step 9 Enable RIP v2 routing

Enable version 2 of the RIP routing protocol on both of the routers, GAD and BHM.

```
GAD(config)#router rip
GAD(config-router)#version 2
GAD(config-router)#exit
GAD(config)#exit

BHM(config)#router rip
BHM(config-router)#version 2
BHM(config-router)#exit
BHM(config)#exit
```

Step 10 Show the routing tables

a. Show the routing tables on both routers again.

```
GAD#show 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, * - candidate
       default
     U - per-user static route, o - ODR, P - periodic downloaded
       static route
     T - traffic engineered route

Gateway of last resort is not set

C    172.17.0.0/16 is directly connected, Serial0
C    172.16.0.0/16 is directly connected, Ethernet0
R    172.18.0.0/16 [120/1] via 172.17.0.2, Serial0

BHM#show 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    172.17.0.0/16 is directly connected, Serial0
C    172.18.0.0/16 is directly connected, Ethernet0
R    172.16.0.0/16 [120/1] via 172.17.1.1, 00:00:45, Serial0
```

a. b. Have they changed now that RIP v2 is now being used instead of RIP v1? No

c. What is the difference between RIP v2 and RIP v1? RIPv2 supports VLSM and RIPv1 does not

c. What must be done in order to see a difference between RIP v2 and RIP v1?

Change the subnet mask of the interfaces

Step 11 Change the Ethernet IP subnet mask on the GAD router

a. Change the subnet mask on router GAD from a default Class B mask (255.255.0.0) to a default Class C mask (255.255.255.0). Use the same IP address.

```
GAD(config)#interface ethernet 0
GAD(config-if)#ip address 172.16.0.1 255.255.255.0
GAD(config-if)#exit
```

b. How does this change affect the address for the Ethernet interface?

The IP address of the interface remains the same, but it belongs to a smaller subnet.

Step 12 Show the GAD routing table

a. Show the GAD routing table.

```
GAD#show 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, * - candidate
           default
        U - per-user static route, o - ODR, P - periodic downloaded
           static route
        T - traffic engineered route

Gateway of last resort is not set

C    172.17.0.0/16 is directly connected, Serial0
     172.16.0.0/24 is subnetted, 1 subnets
C    172.16.0.0 is directly connected, Ethernet0
R    172.18.0.0/16 [120/1] via 172.17.1.2, Serial0
```

b. Has the output changed with the addition of a subnetted IP address? Yes

a. How has it changed? There is a new route to the subnet 172.16.0.0/24.

Step 13 Show the BHM routing table

a. Show the BHM routing table.

```
BHM#show 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    172.17.0.0/16 is directly connected, Serial0
R    172.16.0.0/16 [120/1] via 172.17.1.1, 00:00:24, Serial0
     172.18.0.0/24 is subnetted, 1 subnets
C    172.18.0.0 is directly connected, Ethernet0
```

b. Has the output changed with the addition of a subnetted IP address? Yes

Step 14 Change the network addressing scheme

Change the addressing scheme of the network to a single Class B network with a 255.255.255.0 (default Class C) mask.

a. On the BHM router:

```
BHM(config)#interface serial 0
BHM(config-if)#ip address 172.16.1.2 255.255.255.0
BHM(config-if)#exit
BHM(config)#interface ethernet 0
BHM(config-if)#ip address 172.16.3.1 255.255.255.0
BHM(config-if)#exit
BHM(config)#exit

BHM(config)#router rip
BHM(config-router)#no network 172.18.0.0
BHM(config-router)#no network 172.17.0.0
```



```
BHM(config-router)#network 172.16.1.0
BHM(config-router)#network 172.16.3.0
BHM(config-router)#exit
```

b. On the GAD router:

```
GAD(config)#interface serial 0
GAD(config-if)#ip address 172.16.1.1 255.255.255.0
GAD(config-if)#exit

GAD(config)#router rip
GAD(config-router)#no network 172.17.0.0
GAD(config-router)#network 172.16.1.0
GAD(config-router)#exit
```

Step 15 Show the routing table

a. Show the GAD routing table.

```
GAD#show 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, * - candidate
       default
       U - per-user static route, o - ODR, P - periodic downloaded
       static route
       T - traffic engineered route

Gateway of last resort is not set

172.16.0.0/24 is subnetted, 3 subnets
C       172.16.0.0 is directly connected, Ethernet0
C       172.16.1.0 is directly connected, Serial0
R       172.16.3.0 [120/1] via 172.16.1.2, Serial0
```

b. Has the output changed with the addition of subnetted IP addresses? Yes

a. How has it changed?

There are 2 subnets, two of which are directly connected, and the subnet 172.16.3.0 is learned through RIP via interface Serial 0.

Step 16 Show the routing table

a. Show the BHM routing table.

```
BHM#show 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
```



```
172.16.0.0/24 is subnetted, 3 subnets
R       172.16.0.0 [120/1] via 172.16.1.1, 00:00:05, Serial0
C       172.16.1.0 is directly connected, Serial0
C       172.16.3.0 is directly connected, Ethernet0
```

b. Has the output changed with the addition of a subnetted IP address? Yes

Step 17 Change the host configurations

Change the host configuration to reflect the new IP addressing scheme of the network

```
Host connected to router GAD
IP Address:        172.16.0.2
Subnet mask:       255.255.0.0
Default gateway:   172.16.0.1

Host connected to router BHM
IP Address:        172.16.3.2
Subnet mask:       255.255.0.0
Default gateway:   172.16.3.1
```

Step 18 Ping all of the interfaces on the network from each host

a. Were all of the interfaces still able to be pinged? Yes

b. If not, troubleshoot the network and ping again.

Step 19 Use show ip route to see different routes by type

a. Enter **show ip route connected** on the GAD router.

b. What networks are displayed?

```
172.16.0.0/24 is subnetted, 3 subnets
C       172.16.0.0 is directly connected, Ethernet0
C       172.16.1.0 is directly connected, Serial0
```

c. What interface is directly connected?

```
C       172.16.0.0 is directly connected, Ethernet0
C       172.16.1.0 is directly connected, Serial0
```

d. Enter **show ip route rip**

```
172.16.0.0/24 is subnetted, 3 subnets
R       172.16.3.0 [120/1] via 172.16.1.2, Serial0
```

e. List the routes listed in the routing table?

```
R       172.16.3.0 [120/1] via 172.16.1.2, Serial0
```

f. What is the administrative distance? 120

g. Enter **show ip route connected** on the BHM router.

h. What networks are displayed?

```
172.16.0.0/24 is subnetted, 3 subnets
C       172.16.1.0 is directly connected, Serial0
C       172.16.3.0 is directly connected, Ethernet0
```

i. What interface is directly connected?

```
C       172.16.1.0 is directly connected, Serial0
C       172.16.3.0 is directly connected, Ethernet0
```

j. Enter **show ip route rip**

k. List the routes listed in the routing table?

```
172.16.0.0/24 is subnetted, 3 subnets
R       172.16.0.0 [120/1] via 172.16.1.1, 00:00:15, Serial0
```

Step 20 Use the show IP protocol command

a. Enter **show ip protocol** on the GAD router.

```
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
   Incoming update filter list for all interfaces is
   Redistributing: rip
   Default version control: send version 2, receive version 2
      Interface         Send  Recv  Triggered RIP  Key-chain
      Ethernet0         2     2
      Serial0           2     2
   Routing for Networks:
      172.16.0.0
   Routing Information Sources:
      Gateway         Distance      Last Update
      172.17.1.2           120      00:13:21
      172.16.1.2           120      00:00:24
      172.17.0.2           120      00:35:08
   Distance: (default is 120)
```

b. When will the routes be flushed? 240 seconds

c. What is the default distance listed for RIP? 120 seconds

Step 21 Remove the version 2 option

Use the **no version** command to return the router to the default RIP configuration.

```
GAD(config)#router rip
GAD(config-router)#no version 2
GAD(config-router)#exit

BHM(config)#router rip
BHM(config-router)#no version 2
BHM(config-router)#exit
```

Step 22 Show the routing table

a. Show the GAD routing table.

```
GAD#show 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, * - candidate
       default
       U - per-user static route, o - ODR, P - periodic downloaded
       static route
       T - traffic engineered route

Gateway of last resort is not set

172.16.0.0/24 is subnetted, 3 subnets
C       172.16.0.0 is directly connected, Ethernet0
C       172.16.1.0 is directly connected, Serial0
R       172.16.3.0 [120/1] via 172.16.1.2, Serial0
```

b. Has the output changed now that version 2 of RIP was removed? No

Step 23 Show the routing table

a. Show the BHM routing table.

```
BHM#show 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

172.16.0.0/24 is subnetted, 3 subnets
R       172.16.0.0 [120/1] via 172.16.1.1, 00:00:01, Serial0
C       172.16.1.0 is directly connected, Serial0
C       172.16.3.0 is directly connected, Ethernet0
```

b. Has the output changed now that version 2 of RIP was removed? No

Once the previous steps are completed, log off by typing **exit**, and turn the router off. Then remove and store the cables and adapter.

Erasing and reloading the router

Enter into the privileged EXEC mode by typing **enable**.

```
Router>enable
```

If prompted for a password, enter **class**. If that does not work, ask the instructor for assistance.

At the privileged EXEC mode, enter the command **erase startup-config**.

```
Router#erase startup-config
```

The responding line prompt will be:

```
Erasing the nvram filesystem will remove all files! Continue?
[confirm]
```

Press **Enter** to confirm.

The response should be:

```
Erase of nvram: complete
```

Now at the privileged EXEC mode, enter the command **reload**.

```
Router#reload
```

The responding line prompt will be:

```
System configuration has been modified. Save? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Proceed with reload? [confirm]
```

Press **Enter** to confirm.

In the first line of the response will be:

```
Reload requested by console.
```

After the router has reloaded the line prompt will be:

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

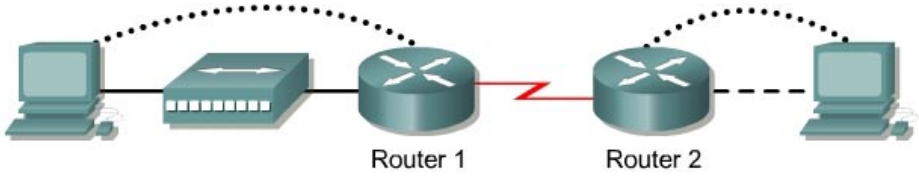
```
Press RETURN to get started!
```

Press **Enter**.

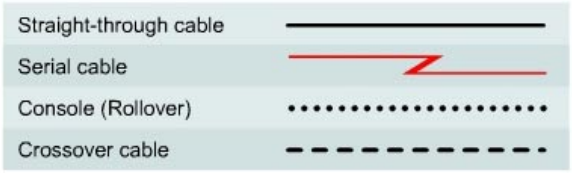
Now the router is ready for the assigned lab to be performed.

Router Interface Summary				
Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)		
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
1700	FastEthernet 0 (FA0)	FastEthernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
2600	FastEthernet 0/0 (FA0/0)	FastEthernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)
In order to find out exactly how the router is configured, look at the interfaces. This will identify what type and how many interfaces the router has. There is no way to effectively list all of the combinations of configurations for each router class. What is provided are the identifiers for the possible combinations of interfaces in the device. This interface chart does not include any other type of interface even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in IOS command to represent the interface.				

Lab 1.2.5 Verifying RIP v2 Configuration – 2600 Series



Router Designation	Router Name	FastEthernet 0 Address	Interface Type	Serial 0 Address	Subnet Mask for Both Interfaces	Enable Secret Password	Enable, VTY, and Console Passwords
Router 1	GAD	172.16.0.1	DCE	172.17.1.1	255.255.0.0	class	cisco
Router 2	BHM	172.18.0.1	DTE	172.17.1.2	255.255.0.0	class	cisco



Objective

- Configure RIP v1 and v2 on routers.
- Use **show** commands to verify RIP v2 operation.

Background/Preparation

Cable a network similar to the one shown in the diagram. Any router that meets the interface requirements displayed on the above diagram may be used. For example, router series 800, 1600, 1700, 2500, and 2600 or any such combination can be used. Please refer to the chart at the end of the lab to correctly identify the interface identifiers to be used based on the equipment in the lab. The configuration output used in this lab is produced from 1721 series routers. Any other router used may produce slightly different output. Perform the following steps on each router unless specifically instructed otherwise.

Start a HyperTerminal session as performed in the Establishing a HyperTerminal session lab.

Note: Go to the erase and reload instructions at the end of this lab. Perform those steps on all routers in this lab assignment before continuing.

Step 1 Configure the routers

On the routers, configure the hostnames as well as the console, virtual terminal, and enable secret passwords. Next configure the serial interface IP address and clock rate and the Fast Ethernet interface IP address. Finally configure IP host names. If there are problems performing the basic configuration, refer to the Review of Basic Configuration including RIP lab. Optional interface descriptions and message of the day banners may also be configured. Be sure to save the configurations just created.

Router 1

```
Router>enable
Router#configure terminal
```



```
Router(config)#hostname GAD
GAD(config)#enable secret class
GAD(config)#line console 0
GAD(config-line)#password cisco
GAD(config-line)#login
GAD(config-line)#line vty 0 4
GAD(config-line)#password cisco
GAD(config-line)#login
GAD(config-line)#exit
GAD(config)#interface serial 0/0
GAD(config-if)#ip address 172.17.1.1 255.255.0.0
GAD(config-if)#clock rate 64000
GAD(config-if)#no shutdown
GAD(config-if)#exit
GAD(config)#interface fastEthernet 0/0
GAD(config-if)#ip address 172.16.0.1 255.255.0.0
GAD(config-if)#no shutdown
GAD(config-if)#exit
GAD(config)#ip host BMH 172.18.0.1 172.17.1.2
```

Router 2

```
Router>enable
Router#configure terminal
Router(config)#hostname BHM
BHM(config)#enable secret class
BHM(config)#line console 0
BHM(config-line)#password cisco
BHM(config-line)#login
BHM(config-line)#line vty 0 4
BHM(config-line)#password cisco
BHM(config-line)#login
BHM(config-line)#exit
BHM(config)#interface serial 0/0
BHM(config-if)#ip address 172.17.1.2 255.255.0.0
BHM(config-if)#no shutdown
BHM(config-if)#exit
BHM(config)#interface fastEthernet 0/0
BHM(config-if)#ip address 172.18.0.1 255.255.0.0
BHM(config-if)#no shutdown
BHM(config-if)#exit
BHM(config)#ip host GAD 172.16.0.1 172.17.1.1
```

Step 2 Configure the routing protocol on the GAD router

Go to the correct command mode and configure RIP routing on the GAD router according to the chart.

```
GAD(config)#router rip
GAD(config-router)#network 172.16.0.0
GAD(config-router)#network 172.17.0.0
GAD(config-router)#exit
GAD(config)#exit
```

Step 3 Save the GAD router configuration

Any time that changes are correctly made to the running configuration, they should be saved to the startup configuration. Otherwise, if the router is reloaded or power cycled, the changes that are not saved in the startup configuration will be lost.

```
GAD#copy running-config startup-config
Destination filename [startup-config]?[Enter]
```

Step 4 Configure the routing protocol on the BHM router

Go to the correct command mode and configure RIP routing on the BHM router according to the chart.

```
BHM(config)#router rip
BHM(config-router)#network 172.18.0.0
BHM(config-router)#network 172.17.0.0
BHM(config-router)#exit
BHM(config)#exit
```

Step 5 Save the BHM router configuration

```
BHM# copy running-config startup-config
Destination filename [startup-config]?[Enter]
```

Step 6 Configure the hosts with the proper IP address, subnet mask, and default gateway

```
Host connected to router GAD
IP Address:        172.16.0.2
Subnet mask:       255.255.0.0
Default gateway:   172.16.0.1

Host connected to router BHM
IP Address:        172.18.0.2
Subnet mask:       255.255.0.0
Default gateway:   172.18.0.1
```

Step 7 Verify that the internetwork is functioning by pinging the FastEthernet interface of the other router

a. From the host attached to the GAD, ping the other host attached to the BHM router. Was the ping successful? Yes

b. From the host attached to the BHM, ping the other host attached to the GAD router. Was the ping successful? Yes

c. If the answer is no for either question, troubleshoot the router configurations to find the error. Then do the pings again until the answer to both questions is yes.

Step 8 Show the routing tables for each router

a. From the enable privileged EXEC mode, examine the routing table entries using command **show ip route** command on each router.

```
GAD#show 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, * - candidate
        default
     U - per-user static route, o - ODR, P - periodic downloaded
        static route
     T - traffic engineered route
```



```
Gateway of last resort is not set

C    172.17.0.0/16 is directly connected, Serial0/0
C    172.16.0.0/16 is directly connected, fastEthernet0/0
R    172.18.0.0/16 [120/1] via 172.17.0.2, Serial0/0

BHM#show 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    172.17.0.0/16 is directly connected, Serial0/0
C    172.18.0.0/16 is directly connected, fastEthernet0/0
R    172.16.0.0/16 [120/1] via 172.17.1.1, 00:00:27, Serial0/0
```

b. What are the entries in the GAD routing table?

```
C    172.17.0.0/16 is directly connected, Serial0/0
C    172.16.0.0/16 is directly connected, fastEthernet0/0
R    172.18.0.0/16 [120/1] via 172.17.0.2, Serial0/0
```

c. What are the entries in the BHM routing table?

```
C    172.17.0.0/16 is directly connected, Serial0/0
C    172.18.0.0/16 is directly connected, fastEthernet0/0
R    172.16.0.0/16 [120/1] via 172.17.1.1, 00:00:27, Serial0/0
```

Step 9 Enable RIP v2 routing

Enable version 2 of the RIP routing protocol on both of the routers, GAD and BHM.

```
GAD(config)#router rip
GAD(config-router)#version 2
GAD(config-router)#exit
GAD(config)#exit

BHM(config)#router rip
BHM(config-router)#version 2
BHM(config-router)#exit
BHM(config)#exit
```

Step 10 Show the routing tables

a. Show the routing tables on both routers again.

```
GAD#show 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, * - candidate
```



```
        default
      U - per-user static route, o - ODR, P - periodic downloaded
        static route
      T - traffic engineered route

Gateway of last resort is not set

C    172.17.0.0/16 is directly connected, Serial0/0
C    172.16.0.0/16 is directly connected, fastEthernet0/0
R    172.18.0.0/16 [120/1] via 172.17.0.2, Serial0/0

BHM#show 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    172.17.0.0/16 is directly connected, Serial0/0
C    172.18.0.0/16 is directly connected, fastEthernet0/0
R    172.16.0.0/16 [120/1] via 172.17.1.1, 00:00:45, Serial0/0
```

b. Have they changed now that RIP v2 is now being used instead of RIP v1? No

c. What is the difference between RIP v2 and RIP v1? RIPv2 supports VLSM and RIPv1 does not

d. What must be done in order to see a difference between RIP v2 and RIP v1?

Change the subnet mask of the interfaces.

Step 11 Change the Fast Ethernet IP subnet mask on the GAD router

a. Change the subnet mask on router GAD from a default Class B mask (255.255.0.0) to a default Class C mask (255.255.255.0). Use the same IP address.

```
GAD(config)#interface fastethernet 0
GAD(config-if)#ip address 172.16.0.1 255.255.255.0
GAD(config-if)#exit
```

b. How does this change affect the address for the FastEthernet interface?

The IP address of the interface remains the same, but it belongs to a smaller subnet.

Step 12 Show the GAD routing table

a. Show the GAD routing table.

```
GAD#show 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, * - candidate
        default
      U - per-user static route, o - ODR, P - periodic downloaded
        static route
```



```
        T - traffic engineered route

Gateway of last resort is not set

C    172.17.0.0/16 is directly connected, Serial0/0
     172.16.0.0/24 is subnetted, 1 subnets
C    172.16.0.0 is directly connected, FastEthernet0/0
R    172.18.0.0/16 [120/1] via 172.17.1.2, Serial0/0
```

b. Has the output changed with the addition of a subnetted IP address? Yes

c. How has it changed? There is a new route to the subnet 172.16.0.0/24.

Step 13 Show the BHM routing table

a. Show the BHM routing table.

```
BHM#show 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    172.17.0.0/16 is directly connected, Serial0/0
R    172.16.0.0/16 [120/1] via 172.17.1.1, 00:00:24, Serial0/0
     172.18.0.0/24 is subnetted, 1 subnets
C    172.18.0.0 is directly connected, FastEthernet0/0
```

b. Has the output changed with the addition of a subnetted IP address? Yes

Step 14 Change the network addressing scheme

Change the addressing scheme of the network to a single Class B network with a 255.255.255.0 (default Class C) mask.

a. On the BHM router:

```
BHM(config)#interface serial 0/0
BHM(config-if)#ip address 172.16.1.2 255.255.255.0
BHM(config-if)#exit
BHM(config)#interface fastethernet 0/0
BHM(config-if)#ip address 172.16.3.1 255.255.255.0
BHM(config-if)#exit
BHM(config)#exit

BHM(config)#router rip
BHM(config-router)#no network 172.18.0.0
BHM(config-router)#no network 172.17.0.0
BHM(config-router)#network 172.16.1.0
BHM(config-router)#network 172.16.3.0
BHM(config-router)#exit
```


b. On the GAD router:

```
GAD(config)#interface serial 0/0
GAD(config-if)#ip address 172.16.1.1 255.255.255.0
GAD(config-if)#exit

GAD(config)#router rip
GAD(config-router)#no network 172.17.0.0
GAD(config-router)#network 172.16.1.0
GAD(config-router)#exit
```

Step 15 Show the routing table

a. Show the GAD routing table.

```
GAD#show 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, * - candidate
          default
       U - per-user static route, o - ODR, P - periodic downloaded
          static route
       T - traffic engineered route

Gateway of last resort is not set

172.16.0.0/24 is subnetted, 3 subnets
C       172.16.0.0 is directly connected, FastEthernet0/0
C       172.16.1.0 is directly connected, Serial0/0
R       172.16.3.0 [120/1] via 172.16.1.2, Serial0/0
```

b. Has the output changed with the addition of subnetted IP addresses? Yes

c. How has it changed?

There are 2 subnets, two of which are directly connected, and the subnet 172.16.3.0 is learned through RIP via interface Serial 0/0.

Step 16 Show the routing table

a. Show the BHM routing table.

```
BHM#show 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

172.16.0.0/24 is subnetted, 3 subnets
R       172.16.0.0 [120/1] via 172.16.1.1, 00:00:05, Serial0/0
C       172.16.1.0 is directly connected, Serial0/0
```



```
C       172.16.3.0 is directly connected, FastEthernet0/0
```

b. Has the output changed with the addition of a subnetted IP address? Yes

Step 17 Change the host configurations

Change the host configuration to reflect the new IP addressing scheme of the network

```
Host connected to router GAD
IP Address:        172.16.0.2
Subnet mask:       255.255.0.0
Default gateway:   172.16.0.1

Host connected to router BHM
IP Address:        172.16.3.2
Subnet mask:       255.255.0.0
Default gateway:   172.16.3.1
```

Step 18 Ping all of the interfaces on the network from each host

a. Were all of the interfaces still able to be pinged? Yes

b. If not, troubleshoot the network and ping again.

Step 19 Use show ip route to see different routes by type

a. Enter **show ip route connected** on the GAD router.

b. What networks are displayed?

```
172.16.0.0/24 is subnetted, 3 subnets
C       172.16.0.0 is directly connected, FastEthernet0/0
C       172.16.1.0 is directly connected, Serial0/0
```

c. What interface is directly connected?

```
C       172.16.0.0 is directly connected, FastEthernet0/0
C       172.16.1.0 is directly connected, Serial0/0
```

d. Enter **show ip route rip**

```
172.16.0.0/24 is subnetted, 3 subnets
R       172.16.3.0 [120/1] via 172.16.1.2, Serial0/0
```

e. List the routes listed in the routing table?

```
172.16.3.0 [120/1] via 172.16.1.2, Serial0/0
```

f. What is the administrative distance? 120

g. Enter **show ip route connected** on the BHM router.

h. What networks are displayed?

```
172.16.0.0/24 is subnetted, 3 subnets
C       172.16.1.0 is directly connected, Serial0/0
C       172.16.3.0 is directly connected, FastEthernet0/0
```

i. What interface is directly connected?

```
C       172.16.1.0 is directly connected, Serial0/0
```

C 172.16.3.0 is directly connected, FastEthernet0/0

j. Enter **show ip route rip**

k. List the routes listed in the routing table?

```
172.16.0.0/24 is subnetted, 3 subnets
R       172.16.0.0 [120/1] via 172.16.1.1, 00:00:15, Serial0/0
```


Step 20 Use the show IP protocol command

a. Enter **show ip protocol** on the GAD router.

```
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
   Incoming update filter list for all interfaces is
   Redistributing: rip
   Default version control: send version 2, receive version 2
      Interface         Send  Recv  Triggered RIP  Key-chain
      FastEthernet0/0   2     2
      Serial0/0         2     2
   Routing for Networks:
      172.16.0.0
   Routing Information Sources:
      Gateway         Distance      Last Update
      172.17.1.2            120      00:13:21
      172.16.1.2            120      00:00:24
      172.17.0.2            120      00:35:08
   Distance: (default is 120)
```

b. When will the routes be flushed? 240 seconds

c. What is the default distance listed for RIP? 120 seconds

Step 21 Remove the version 2 option

Use the **no version** command to return the router to the default RIP configuration.

```
GAD(config)#router rip
GAD(config-router)#no version 2
GAD(config-router)#exit

BHM(config)#router rip
BHM(config-router)#no version 2
BHM(config-router)#exit
```

Step 22 Show the routing table

a. Show the GAD routing table.

```
GAD#show 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, * - candidate
          default
       U - per-user static route, o - ODR, P - periodic downloaded
          static route
       T - traffic engineered route

Gateway of last resort is not set

172.16.0.0/24 is subnetted, 3 subnets
C       172.16.0.0 is directly connected, FastEthernet0/0
C       172.16.1.0 is directly connected, Serial0/0
R       172.16.3.0 [120/1] via 172.16.1.2, Serial0/0
```

b. Has the output changed now that version 2 of RIP was removed? No

Step 23 Show the routing table

a. Show the BHM routing table.

```
BHM#show 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

172.16.0.0/24 is subnetted, 3 subnets
R       172.16.0.0 [120/1] via 172.16.1.1, 00:00:01, Serial0/0
C       172.16.1.0 is directly connected, Serial0/0
C       172.16.3.0 is directly connected, FastEthernet0/0
```

b. Has the output changed now that version 2 of RIP was removed? No

Once the previous steps are completed, log off by typing **exit**, and turn the router off. Then remove and store the cables and adapter.

Erasing and reloading the router

Enter into the privileged EXEC mode by typing **enable**.

```
Router>enable
```

If prompted for a password, enter **class**. If that does not work, ask the instructor for assistance.

At the privileged EXEC mode, enter the command **erase startup-config**.

```
Router#erase startup-config
```

The responding line prompt will be:

```
Erasing the nvram filesystem will remove all files! Continue?
[confirm]
```

Press **Enter** to confirm.

The response should be:

```
Erase of nvram: complete
```

Now at the privileged EXEC mode, enter the command **reload**.

```
Router#reload
```

The responding line prompt will be:

```
System configuration has been modified. Save? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Proceed with reload? [confirm]
```

Press **Enter** to confirm.

In the first line of the response will be:

```
Reload requested by console.
```

After the router has reloaded the line prompt will be:

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Press RETURN to get started!
```

Press **Enter**.

Now the router is ready for the assigned lab to be performed.

Router Interface Summary				
Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)		
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
1700	FastEthernet 0 (FA0)	FastEthernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
2600	FastEthernet 0/0 (FA0/0)	FastEthernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)
In order to find out exactly how the router is configured, look at the interfaces. This will identify what type and how many interfaces the router has. There is no way to effectively list all of the combinations of configurations for each router class. What is provided are the identifiers for the possible combinations of interfaces in the device. This interface chart does not include any other type of interface even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in IOS command to represent the interface.				

