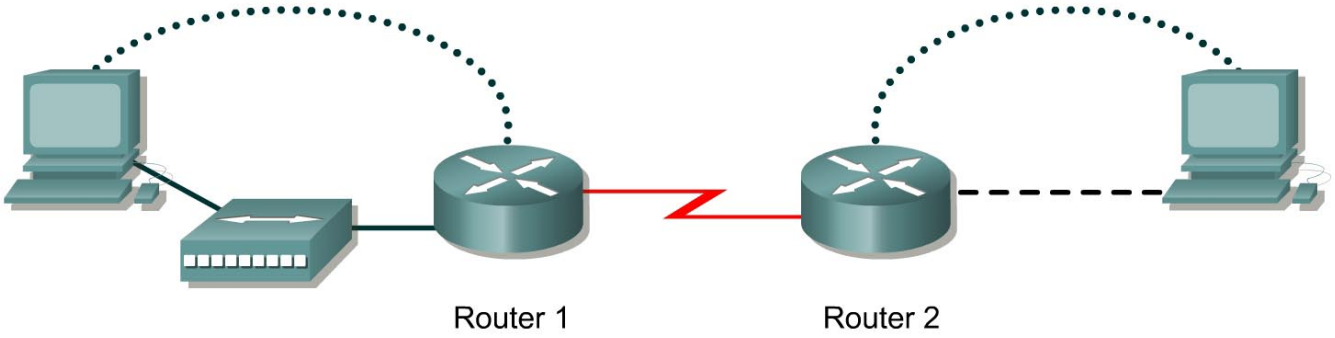
Lab 7.2.6 Troubleshooting RIP – Instructor Version 2500



Router Designation	Router Name	Fast Ethernet 0 Address	Interface type	Serial 0 Address	Subnet mask for both interfaces	Enable secret password	Enable, VTY and console password
Router 1	GAD	172.16.0.1	DCE	172.17.0.1	255.255.0.0	class	cisco
Router 2	BHM	172.18.0.1	DTE	172.17.0.2	255.255.0.0	class	cisco

Objective

- Set up an IP addressing scheme using class B networks.
- Configure RIP on routers.
- Observe routing activity using the **`debug ip rip`** command.
- Examine routes using the **`show ip route`** command.

Background/Preparation

Cable a network similar to the one in the diagram. Any router that meets the interface requirements displayed in the above diagram, such as 800, 1600, 1700, 2500, 2600 routers, or a combination, may 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 a slightly different output. The following steps are intended to be executed 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

a. On the routers, enter the global configuration mode and configure the hostname as shown in the chart. Then configure the console, virtual terminal and enable passwords. If there is a problem doing this, refer to the Configuring Router Passwords lab. Next configure the interfaces according to the chart. If there is a problem doing this, refer to the Configuring Host Tables lab. Finally configure the RIP routing. This is covered in the Configuring RIP lab if help is needed. Do not forget to save the configurations to the startup configuration file.

Step 2 Configure the hosts with the proper IP address, subnet mask and default gateway

Step 3 Make sure that routing updates are being sent

a. Type the command **`debug ip rip`** and the privileged EXEC mode prompt. Wait for at least 45 seconds.

b. Was there any output from the debug command? Yes

c. What did the output show ? It showed the updates occurring.

d. To turn off specific debug commands type the **no** option, for example **`no debug ip rip events`**. To turn off all debug commands type **`undebug all`**.

Step 4 Show the routing tables for each router

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

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, 00:00:03, Serial0
```

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

```
C    172.17.0.0/16 is directly connected, Serial0
R    172.16.0.0/16 [120/1] via 172.17.0.1, 00:00:19, Serial0
C    172.18.0.0/16 is directly connected, Ethernet0
```

Step 5 Show the RIP routing table entries for each router

a. Enter **`show ip route rip`**

b. List the routes listed in the routing table?

```
GAD =   172.18.0.0/16 [120/1] via 172.17.0.2, 00:00:03, Serial0
BHM  =  172.16.0.0/16 [120/1] via 172.17.0.1, 00:00:19, Serial0
```

c. What is the administrative distance? 120

Step 6 Verify that the internetwork is functioning by pinging the ~~Fast~~Ethernet interface of the other router

a. From the host attached to GAD, is it possible to ping the BHM router ~~Fast~~Ethernet interface?

Yes

b. From the host attached to BHM, is it possible to ping the GAD router ~~Fast~~Ethernet interface?

Yes

c. If the answer is no for either question, troubleshoot the router configurations using **`show ip route`** to find the error. Also check the workstation IP settings. Then do the pings again until the answer to both questions is yes.

Upon completion of the previous steps, log off by typing **exit** and turn the router off.

Erasing and reloading the router

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

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

```
Router>enable
```

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**.

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	Interface #5
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 the type of router as well as 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.					


```
GAD#show running-config
version 12.0
service timestamps debug datetime
service timestamps log uptime
no service password-encryption
!
hostname GAD
!
enable secret 5 $1$EQ.1$kkilqajASc4CE6/Bx6nlC/
!
ip subnet-zero
!
interface Ethernet0
 ip address 172.16.0.1 255.255.0.0
 no ip directed-broadcast
!
interface Serial0
 ip address 172.17.0.1 255.255.0.0
 no ip directed-broadcast
 no ip mroute-cache
 no fair-queue
 clockrate 56000
!
interface Serial1
 no ip address
 no ip directed-broadcast
 shutdown
!
router rip
 network 172.16.0.0
 network 172.17.0.0
!
no ip classless
ip http server
!
line con 0
 exec-timeout 0 0
 password cisco
 login
 transport input none
line aux 0
 password cisco
 login
line vty 0 4
 password cisco
 login
!
end


BHM#show running-config
!
version 12.0
no service timestamps debug uptime
no service timestamps log uptime
!
hostname BHM
!
enable secret 5 $1$w9fl$pbVyqWdDZ60OH1bQN2f7K.
```



```
!
!
interface Ethernet0
 ip address 172.18.0.1 255.255.0.0
 no ip directed-broadcast

!
interface Serial0
 ip address 172.17.0.2 255.255.0.0
 no ip directed-broadcast
 no fair-queue
!
interface Serial1
 no ip address
 no ip directed-broadcast
 shutdown
!
!
router rip
 network 172.17.0.0
 network 172.18.0.0
!
ip classless
!
line con 0
 password cisco
 login
 transport input none
line aux 0
line vty 0 4
 password cisco
 login
!
end
```

```
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 172.17.0.1, 00:00:19, Serial0
C    172.18.0.0/16 is directly connected, Ethernet0
BHM#
```



```
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, 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    172.16.0.0/16 is directly connected, Ethernet0
R    172.18.0.0/16 [120/1] via 172.17.0.2, 00:00:03, Serial0
```

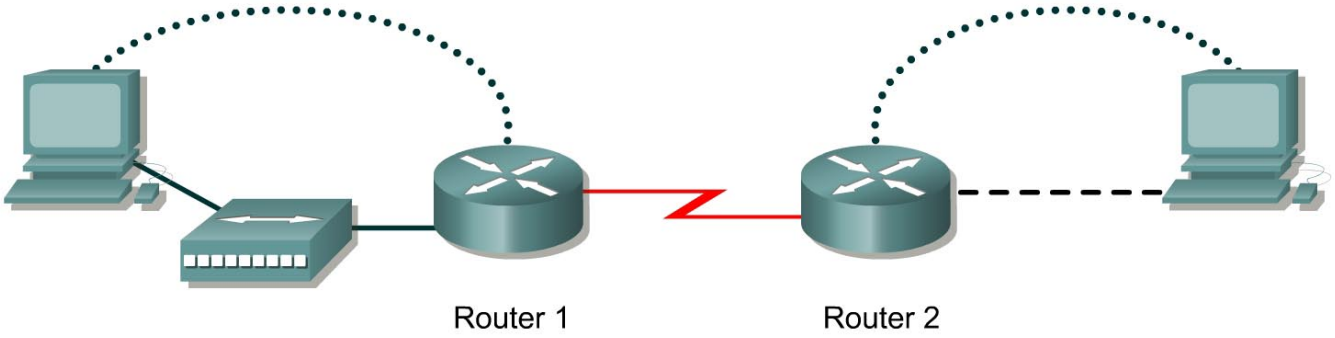
```
GAD#debug ip rip
GAD#
  (This has service time-stamp debug date )

Jun  7 17:00:01: RIP: sending v1 update to 255.255.255.255 via Ethernet0
(172.16.0.1)
Jun  7 17:00:01: RIP: build update entries
Jun  7 17:00:01:         network 172.17.0.0 metric 1
Jun  7 17:00:01:         network 172.18.0.0 metric 2
Jun  7 17:00:01: RIP: sending v1 update to 255.255.255.255 via Serial0
(172.17.0.1)
Jun  7 17:00:01: RIP: build update entries
Jun  7 17:00:01:         network 172.16.0.0 metric 1
Jun  7 17:00:08: RIP: received v1 update from 172.17.0.2 on Serial0
Jun  7 17:00:08:      172.18.0.0 in 1 hops
```

```
BHM#debug ip rip
  (This has no service time-stamp debug date)

RIP: sending v1 update to 255.255.255.255 via Ethernet0 (172.18.0.1)
RIP: build update entries
        network 172.16.0.0 metric 2
        network 172.17.0.0 metric 1
RIP: sending v1 update to 255.255.255.255 via Serial0 (172.17.0.2)
RIP: build update entries
        network 172.18.0.0 metric 1
RIP: received v1 update from 172.17.0.1 on Serial0
     172.16.0.0 in 1 hops
```


Lab 7.2.6 Troubleshooting RIP – Instructor Version 2600



Router Designation	Router Name	Fast Ethernet 0 Address	Interface type	Serial 0 Address	Subnet mask for both interfaces	Enable secret password	Enable, VTY and console password
Router 1	GAD	172.16.0.1	DCE	172.17.0.1	255.255.0.0	class	cisco
Router 2	BHM	172.18.0.1	DTE	172.17.0.2	255.255.0.0	class	cisco

Straight-through cable	
Serial cable	
Console (Rollover)	
Crossover cable	

Objective

- Set up an IP addressing scheme using class B networks.
- Configure RIP on routers.
- Observe routing activity using the **`debug ip rip`** command.
- Examine routes using the **`show ip route`** command.

Background/Preparation

Cable a network similar to the one in the diagram. Any router that meets the interface requirements displayed in the above diagram, such as 800, 1600, 1700, 2500, 2600 routers, or a combination, may 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 a slightly different output. The following steps are intended to be executed 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

a. On the routers, enter the global configuration mode and configure the hostname as shown in the chart. Then configure the console, virtual terminal and enable passwords. If there is a problem doing this, refer to the Configuring Router Passwords lab. Next configure the interfaces according to the chart. If there is a problem doing this, refer to the Configuring Host Tables lab. Finally configure the RIP routing. This is covered in the Configuring RIP lab if help is needed. Do not forget to save the configurations to the startup configuration file.

Step 2 Configure the hosts with the proper IP address, subnet mask and default gateway

Step 3 Make sure that routing updates are being sent

a. Type the command **`debug ip rip`** and the privileged EXEC mode prompt. Wait for at least 45 seconds.

b. Was there any output from the debug command? Yes

c. What did the output show ? It showed the updates occurring.

d. To turn off specific debug commands type the **no** option, for example **`no debug ip rip events`**. To turn off all debug commands type **`undebug all`**.

Step 4 Show the routing tables for each router

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

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, 00:00:03, Serial0/0
```

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

```
C    172.17.0.0/16 is directly connected, Serial0/0
R    172.16.0.0/16 [120/1] via 172.17.0.1, 00:00:19, Serial0/0
C    172.18.0.0/16 is directly connected, FastEthernet0/0
```

Step 5 Show the RIP routing table entries for each router

a. Enter **`show ip route rip`**

b. List the routes listed in the routing table?

```
GAD =   172.18.0.0/16 [120/1] via 172.17.0.2, 00:00:03, Serial0/0
BHM  =  172.16.0.0/16 [120/1] via 172.17.0.1, 00:00:19, Serial0/0
```

c. What is the administrative distance? 120

Step 6 Verify that the internetwork is functioning by pinging the FastEthernet interface of the other router

a. From the host attached to GAD, is it possible to ping the BHM router FastEthernet interface?

Yes

b. From the host attached to BHM, is it possible to ping the GAD router FastEthernet interface?

Yes

c. If the answer is no for either question, troubleshoot the router configurations using **`show ip route`** to find the error. Also check the workstation IP settings. Then do the pings again until the answer to both questions is yes.

Upon completion of the previous steps, log off by typing **exit** and turn the router off.

Erasing and reloading the router

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

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

```
Router>enable
```

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**.

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	Interface #5
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 the type of router as well as 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.					


```
GAD#show running-config
version 12.0
service timestamps debug datetime
service timestamps log uptime
no service password-encryption
!
hostname GAD
!
enable secret 5 $1$EQ.1$kkilqajASc4CE6/Bx6nlC/
!
ip subnet-zero
!
interface FastEthernet0/0
 ip address 172.16.0.1 255.255.0.0
 no ip directed-broadcast
!
interface Serial0/0
 ip address 172.17.0.1 255.255.0.0
 no ip directed-broadcast
 no ip mroute-cache
 no fair-queue
 clockrate 56000
!
interface Serial0/1
 no ip address
 no ip directed-broadcast
 shutdown
!
router rip
 network 172.16.0.0
 network 172.17.0.0
!
no ip classless
ip http server
!
line con 0
 exec-timeout 0 0
 password cisco
 login
 transport input none
line aux 0
 password cisco
 login
line vty 0 4
 password cisco
 login
!
end
```



```
BHM#show running-config
!
version 12.0
no service timestamps debug uptime
no service timestamps log uptime
!
hostname BHM
!
enable secret 5 $1$w9fl$pbVyqWdDZ60OH1bQN2f7K.
!
!
interface FastEthernet0/0
 ip address 172.18.0.1 255.255.0.0
 no ip directed-broadcast

!
interface Serial0/0
 ip address 172.17.0.2 255.255.0.0
 no ip directed-broadcast
 no fair-queue
!
interface Serial0/1
 no ip address
 no ip directed-broadcast
 shutdown
!
!
router rip
 network 172.17.0.0
 network 172.18.0.0
!
ip classless
!
line con 0
 password cisco
 login
 transport input none
line aux 0
line vty 0 4
 password cisco
 login
!
end
```



```
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 172.17.0.1, 00:00:19, Serial0/0
C    172.18.0.0/16 is directly connected, FastEthernet0/0
BHM#
```

```
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, 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    172.16.0.0/16 is directly connected, FastEthernet0/0
R    172.18.0.0/16 [120/1] via 172.17.0.2, 00:00:03, Serial0/0
GAD#
```

```
GAD#debug ip rip
(This has service time-stamp debug date )

Jun  7 17:00:01: RIP: sending v1 update to 255.255.255.255 via FastEthernet0/0
(172.16.0.1)
Jun  7 17:00:01: RIP: build update entries
Jun  7 17:00:01:         network 172.17.0.0 metric 1
Jun  7 17:00:01:         network 172.18.0.0 metric 2
Jun  7 17:00:01: RIP: sending v1 update to 255.255.255.255 via Serial0/0
(172.17.0.1)
Jun  7 17:00:01: RIP: build update entries
Jun  7 17:00:01:         network 172.16.0.0 metric 1
Jun  7 17:00:08: RIP: received v1 update from 172.17.0.2 on Serial0/0
Jun  7 17:00:08:      172.18.0.0 in 1 hops
```



```
BHM#debug ip rip
This has no service time-stamp debug date)

RIP: sending v1 update to 255.255.255.255 via FastEthernet0/0 (172.18.0.1)
RIP: build update entries
        network 172.16.0.0 metric 2
        network 172.17.0.0 metric 1
RIP: sending v1 update to 255.255.255.255 via Serial0/0 (172.17.0.2)
RIP: build update entries
        network 172.18.0.0 metric 1
RIP: received v1 update from 172.17.0.1 on Serial0/0
     172.16.0.0 in 1 hops
```

