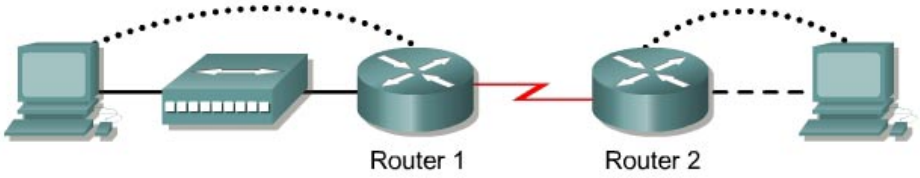
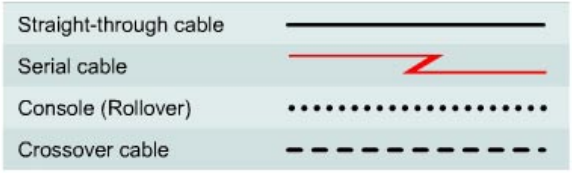
Lab 1.2.6 Troubleshooting RIP v2 using `debug - 2500 Series`



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 v2 on both routers
- Use debug commands to verify proper RIP operation and analyze data transmitted between routers.

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.


```
Router1
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

Router2
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 proper 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 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 proper 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 debug IP options

a. At the privileged EXEC mode type **debug ip ?**.

```
cache       IP cache operations
dhcp        Dynamic Host Configuration Protocol
eigrp       IP-EIGRP information
error       IP error debugging
ftp         FTP dialogue
html        HTML connections
http        HTTP connections
icmp        ICMP transactions
igrp        IGRP information
interface   IP interface configuration changes
```



```
mpacket     IP multicast packet debugging
nat         NAT events
ospf        OSPF information
packet      General IP debugging and IPSO security transactions
peer        IP peer address activity
policy      Policy routing
rip         RIP protocol transactions
routing     Routing table events
rtp         RTP information
security    IP security options
socket      Socket event
tcp         TCP information
tempacl     IP temporary ACL
udp         UDP based transactions
```

b. Which routing protocols can use debug commands? eigrp, igrp, ospf, rip

Step 9 Show the debug IP RIP options

a. At the privileged EXEC mode type **debug ip rip ?**.

```
database   RIP database events
events     RIP protocol events
trigger    RIP trigger extension
```

b. How many options are available for **debug ip rip ?**? 3

Step 10 Show the RIP routing updates

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

b. What are the three operations that take place listed in the rip debug statements?

Receive routing update Send an update Build update entries

c. Turn off debugging by typing either **no debug ip rip** or **undebug all**.

Step 11 Enable RIP Version 2 Routing

Enable version 2 of the RIP routing protocol on the GAD router only.

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

Step 12 Start the debug function again on the GAD router

a. Does a problem occur now that we have RIP v2 on the GAD router? Yes

b. What is the problem? _____

Step 13 Clear the routing table

a. Instead of waiting for the routes to time out, type **clear ip route *.** Then type **show ip route**.

b. What has happened to the routing table? The route to 172.18.0.1 is no longer there

b. Will it be updated to include RIP routes if the debug output says the update is ignored? No

Step 14 Start the debug RIP function

a. Start the debug RIP function on the BHM router again by typing **debug ip rip**.

b. Does a problem occur now that RIP v2 is on the GAD router? Yes

c. What is the problem? It is rejecting updates from GAD because of the version difference.

Step 15 Clear the routing table

a. Instead of waiting for the routes to time out, type **clear ip route *.** Then type **show ip route**.

b. What has happened to the routing table? Route to 172.16.0.0/24 is no longer there.

c. Does a problem occur now that RIP v2 is on the GAD router? No

d. Turn off debugging by typing either **no debug ip rip** or **undebug all**.

Step 16 Enable RIP version 2 routing

Enable version 2 of the RIP routing protocol on the BHM router.

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

Step 17 Use the debug function to see packet traffic on a router

a. Use the **debug** function to see packet traffic on the GAD router by typing **debug ip packet** at the privileged EXEC mode.

b. When an RIP update is sent how many source addresses are used? 2

c. Why are multiple source addresses used? One for each network the router will send and receive updates with.

d. What is the source address used? 172.16.0.1 and 172.17.1.1

e. Why is this address used? It is the originating interface from which the packet is sent.

Step 18 Start the debug RIP database function again on the BHM router

a. Start the RIP database debugging by typing **debug ip rip database**, then clear the routing table by typing **clear ip route *.**

b. Are the old routes in the table deleted? Yes

c. Are new routes added back into the table? Yes

d. What does the last entry in the **debug** output say? RIP-DB: Adding new rndb entry 172.18.0.0/16

e. Turn off debugging by typing either **no debug ip rip** or **undebug all**.

Step 19 Use the debug events function to see routing updates

a. Use the **debug** function to see routing updates by typing **debug ip rip events** in privileged EXEC mode on the BHM router.

b. What interfaces are the routing updates sent on? Ethernet 0 and Serial 0

c. How many routes are in the routing updates being sent? 2

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:

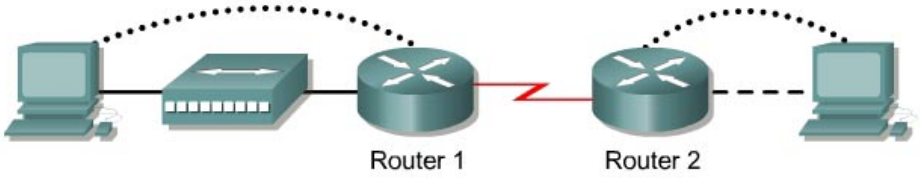
```
Press RETURN to get started!
```

Press **Enter**.

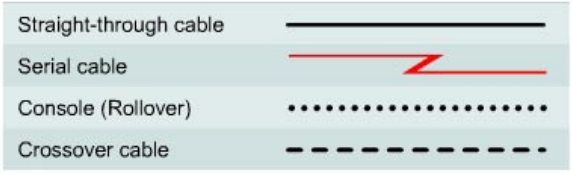
Now the router is ready for the assigned lab to be performed.

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 1.2.6 Troubleshooting RIP v2 using `debug - 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 v2 on both routers
- Use debug commands to verify proper RIP operation and analyze data transmitted between routers.

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.


```
Router1
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

Router2
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 proper 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 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 proper 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 debug IP options

a. At the privileged EXEC mode type **debug ip ?**.

```
cache       IP cache operations
dhcp        Dynamic Host Configuration Protocol
eigrp       IP-EIGRP information
error       IP error debugging
ftp         FTP dialogue
html        HTML connections
http        HTTP connections
icmp        ICMP transactions
igrp        IGRP information
interface   IP interface configuration changes
```



```
mpacket     IP multicast packet debugging
nat         NAT events
ospf        OSPF information
packet      General IP debugging and IPSO security transactions
peer        IP peer address activity
policy      Policy routing
rip         RIP protocol transactions
routing     Routing table events
rtp         RTP information
security    IP security options
socket      Socket event
tcp         TCP information
tempacl     IP temporary ACL
udp         UDP based transactions
```

b. Which routing protocols can use debug commands? eigrp, igrp, ospf, rip

Step 9 Show the debug IP RIP options

a. At the privileged EXEC mode type **debug ip rip ?**.

```
database  RIP database events
events    RIP protocol events
trigger   RIP trigger extension
```

b. How many options are available for **debug ip rip ?**? 3

Step 10 Show the RIP routing updates

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

b. What are the three operations that take place listed in the rip debug statements?

Receive routing update Send an update Build update entries

c. Turn off debugging by typing either **no debug ip rip** or **undebug all**.

Step 11 Enable RIP Version 2 Routing

Enable version 2 of the RIP routing protocol on the GAD router only.

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

Step 12 Start the debug function again on the GAD router

a. Does a problem occur now that we have RIP v2 on the GAD router? Yes

b. What is the problem? It does not accept updates from BHM because of the version difference.

Step 13 Clear the routing table

a. Instead of waiting for the routes to time out, type **clear ip route *.** Then type **show ip route**.

b. What has happened to the routing table? The route to 172.18.0.1 is no longer there.

c. Will it be updated to include RIP routes if the debug output says the update is ignored? No

Step 14 Start the debug RIP function

a. Start the debug RIP function on the BHM router again by typing **debug ip rip**.

b. Does a problem occur now that RIP v2 is on the GAD router? Yes

c. What is the problem? It is rejecting updates from GAD because of the version difference.

Step 15 Clear the routing table

a. Instead of waiting for the routes to time out, type **clear ip route *.** Then type **show ip route**.

b. What has happened to the routing table? Route to 172.16.0.0/24 is no longer there.

c. Does a problem occur now that RIP v2 is on the GAD router? No

d. Turn off debugging by typing either **no debug ip rip** or **undebug all**.

Step 16 Enable RIP version 2 routing

Enable version 2 of the RIP routing protocol on the BHM router.

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

Step 17 Use the debug function to see packet traffic on a router

a. Use the **debug** function to see packet traffic on the GAD router by typing **debug ip packet** at the privileged EXEC mode.

b. When an RIP update is sent how many source addresses are used? 2

c. Why are multiple source addresses used? One for each network the router will send and receive updates with.

d. What is the source address used? 172.16.0.1 and 172.17.1.1

e. Why is this address used? It is the originating interface from which the packet is sent.

Step 18 Start the debug RIP database function again on the BHM router

a. Start the RIP database debugging by typing **debug ip rip database**, then clear the routing table by typing **clear ip route *.**

b. Are the old routes in the table deleted? Yes

c. Are new routes added back into the table? Yes

d. What does the last entry in the **debug** output say? RIP-DB: Adding new rndb entry 172.18.0.0/16

e. Turn off debugging by typing either **no debug ip rip** or **undebug all**.

Step 19 Use the debug events function to see routing updates

a. Use the **debug** function to see routing updates by typing **debug ip rip events** in privileged EXEC mode on the BHM router.

b. What interfaces are the routing updates sent on? FastEthernet 0/0 and Serial 0/0

c. How many routes are in the routing updates being sent? 2

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.				

