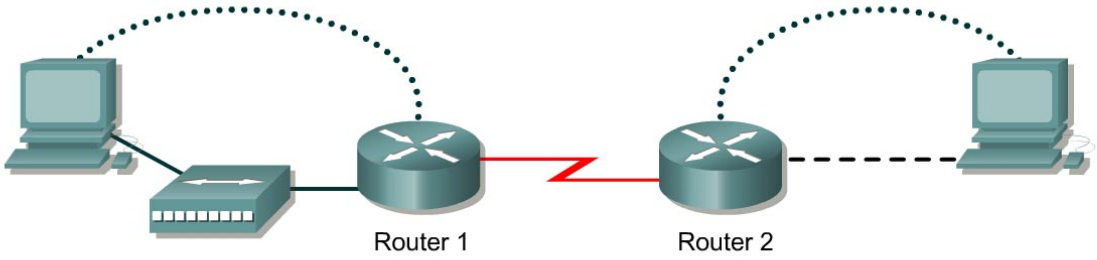
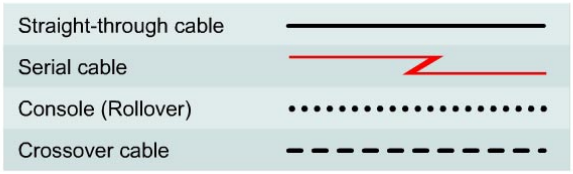
Lab 9.1.2 Gateway of Last Resort – Instructor Version 2500



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

- Configure RIP routing and add default routes (gateways) to the routers.
- Remove RIP and the default routes.
- Configure IGRP routing and add default routes (gateways) to the routers.

Background/Preparation

This lab shows the purpose of the gateway of last resort, also known as the default gateway.

Cable a network similar to the one in the diagram. Any router that meets the interface requirements displayed on the above diagram, such as 800, 1600, 1700, 2500, and 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.

 Copyright © 2003, Cisco Systems, Inc.

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 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 to find the error. Then do the pings again until the answer to both questions is yes.

Step 4 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 display? Showed all RIP updates from all three networks.

d. Type **`undebug all`** to turn off debugging.

Step 5 Show the routing tables for each router

a. Examine the routing table entries, by using **`show ip route`** command on each router.

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

```
C    172.17.0.0/24 is directly connected, Serial0
C    172.16.0.0/24 is directly connected, Ethernet0
R    172.18.0.0/24 [120/1] via 172.17.0.2, 00:00:17, Serial0
```

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

```
C    172.17.0.0/24 is directly connected, Serial0
C    172.18.0.0/24 is directly connected, Ethernet0
R    172.16.0.0/24 [120/1] via 172.17.0.1, 00:00:17, Serial0
```

Step 6 Add the default route to the BHM router

a. Enter the command **`ip route 0.0.0.0 0.0.0.0 172.17.0.1`** at the configuration mode prompt.

b. Type **`show ip route`** at the privileged exec mode.

c. What is the Gateway of last resort listed? `S*   0.0.0.0/0 [1/0] via 172.17.0.1`

d. What does the gateway of last resort mean?

All packets without destinations listed in the routing tables will be forwarded to the gateway of last resort.

 Copyright © 2003, Cisco Systems, Inc.

Step 7 Add the default route to the GAD router

a. Enter the command **ip route 0.0.0.0 0.0.0.0 172.17.0.2** at the configuration prompt.

b. Type **show ip route** at the privileged exec mode.

c. What is the Gateway of last resort listed? S* 0.0.0.0/0 [1/0] via 172.17.0.2

d. Are there any other new entries in the routing table? Yes

Step 8 Remove RIP routing from both routers

a. To remove RIP routing type the **no router rip** command at the configuration mode prompt.

Then ping the ~~Fast~~Ethernet 0 interface on the GAD router from the BHM router.

b. What were the results of the ping? Successful

c. Why was the ping successful? It is using the default route.

Step 9 Remove the default route from just the GAD router

a. Remove the gateway of last resort on the GAD router by typing the **no ip route 0.0.0.0 0.0.0.0 172.17.0.2** at the configuration mode prompt on the GAD router.

b. Type **show ip route** at the privileged exec mode.

c. What is the Gateway of last resort listed? None listed.

d. Why is the gateway gone? The ip route statement was removed.

e. **Ping** the ~~Fast~~Ethernet 0 interface on the GAD router from the BHM router.

f. What were the results of the ping? Successful

g. Why was the ping successful? There is a static route to that location.

h. **Ping** the ~~Fast~~Ethernet 0 interface on the BHM router from the GAD router.

i. What were the results of the pings? Not successful

j. Why was the ping unsuccessful? There is no route to that location.

k. Remove the gateway of last resort from the BHM router.

Step 10 Remove RIP routing from the routers and use IGRP instead

a. Remove the RIP routing by using the **no** form of the RIP routing command. Then set up IGRP routing using 30 as the AS number. Remember to wait for the routes to propagate to the other router.

b. Check the new routing protocol by typing **show ip route** at the privileged exec mode prompt. There should be two connected and IGRP route in the listing.

Step 11 Enter a default network entry on the BHM router

a. Enter the command **ip default-network 172.17.0.0** at the configuration mode prompt

b. Type the **show ip route** command at the privileged exec mode.

c. Is there a default route listed? Yes

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

 Copyright © 2003, Cisco Systems, Inc.

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(config)#reloadRouter#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.

 Copyright © 2003, Cisco Systems, Inc.

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.					

 Copyright © 2003, Cisco Systems, Inc.

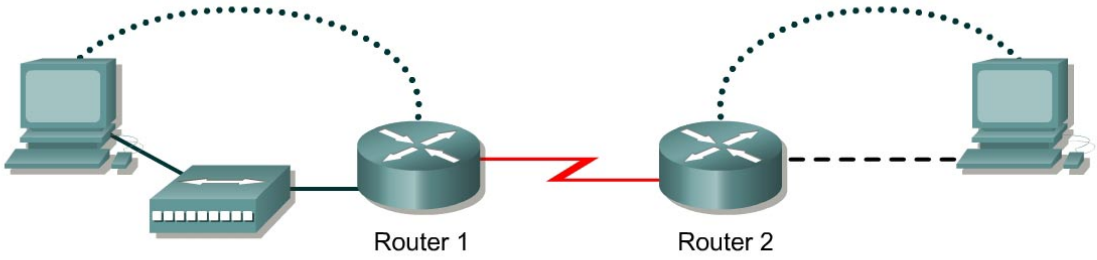
```
GAD#show running-config
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname GAD
!
enable secret 5 $1$6cFg$EBewg1wDwedaTPlMnxaQb/
!
memory-size iomem 10
ip subnet-zero
!
ip audit notify log
ip audit po max-events 100
!
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 64000
!
interface Serial1
 no ip address
 no ip directed-broadcast
 shutdown
!
router igrp 30
 network 172.17.0.0
 network 172.16.0.0
!
ip classless
no ip http server
!
line con 0
 password cisco
 login
 transport input none
line aux 0
line vty 0 4
 password cisco
 login
!
end
```

 Copyright © 2003, Cisco Systems, Inc.

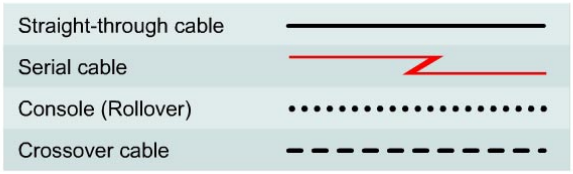
```
BHM#show running-config
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname BHM
!
memory-size iomem 10
ip subnet-zero
!
ip audit notify log
ip audit po max-events 100
!
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
!
interface Serial1
 no ip address
 no ip directed-broadcast
 shutdown
!
router igrp 30
 network 172.17.0.0
 network 172.18.0.0
!
ip classless
ip default-network 172.18.0.0
no ip http server
!
line con 0
 password cisco
 login
 transport input none
line aux 0
line vty 0 4
 password cisco
 login
!
end
```

 Copyright © 2003, Cisco Systems, Inc.

Lab 9.1.2 Gateway of Last Resort – 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



Objective

- Configure RIP routing and add default routes (gateways) to the routers.
- Remove RIP and the default routes.
- Configure IGRP routing and add default routes (gateways) to the routers.

Background/Preparation

This lab shows the purpose of the gateway of last resort, also known as the default gateway.

Cable a network similar to the one in the diagram. Any router that meets the interface requirements displayed on the above diagram, such as 800, 1600, 1700, 2500, and 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.

 Copyright © 2003, Cisco Systems, Inc.

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 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 to find the error. Then do the pings again until the answer to both questions is yes.

Step 4 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 display? Showed all RIP updates from all three networks.

d. Type **`undebug all`** to turn off debugging.

Step 5 Show the routing tables for each router

a. Examine the routing table entries, by using **`show ip route`** command on each router.

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

```
C    172.17.0.0/24 is directly connected, Serial0/0
C    172.16.0.0/24 is directly connected, FastEthernet0/0
R    172.18.0.0/24 [120/1] via 172.17.0.2, 00:00:17, Serial0/0
```

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

```
C    172.17.0.0/24 is directly connected, Serial0/0
C    172.18.0.0/24 is directly connected, FastEthernet0/0
R    172.16.0.0/24 [120/1] via 172.17.0.1, 00:00:17, Serial0/0
```

Step 6 Add the default route to the BHM router

a. Enter the command **`ip route 0.0.0.0 0.0.0.0 172.17.0.1`** at the configuration mode prompt.

b. Type **`show ip route`** at the privileged exec mode.

c. What is the Gateway of last resort listed? S* 0.0.0.0/0 [1/0] via 172.17.0.1

d. What does the gateway of last resort mean?

All packets without destinations listed in the routing tables will be forwarded to the gateway of last resort.

 Copyright © 2003, Cisco Systems, Inc.

Step 7 Add the default route to the GAD router

a. Enter the command **`ip route 0.0.0.0 0.0.0.0 172.17.0.2`** at the configuration prompt.

b. Type **`show ip route`** at the privileged exec mode.

c. What is the Gateway of last resort listed? S* 0.0.0.0/0 [1/0] via 172.17.0.2

d. Are there any other new entries in the routing table? Yes

Step 8 Remove RIP routing from both routers

a. To remove RIP routing type the **`no router rip`** command at the configuration mode prompt.

Then ping the FastEthernet 0 interface on the GAD router from the BHM router.

b. What were the results of the ping? Successful

c. Why was the ping successful? It is using the default route.

Step 9 Remove the default route from just the GAD router

a. Remove the gateway of last resort on the GAD router by typing the **`no ip route 0.0.0.0 0.0.0.0 172.17.0.2`** at the configuration mode prompt on the GAD router.

b. Type **`show ip route`** at the privileged exec mode.

c. What is the Gateway of last resort listed? None listed

d. Why is the gateway gone? The ip route statement was removed.

e. **`Ping`** the FastEthernet 0 interface on the GAD router from the BHM router.

f. What were the results of the ping? Successful

g. Why was the ping successful? There is a static route to that location.

h. **`Ping`** the FastEthernet 0 interface on the BHM router from the GAD router.

i. What were the results of the pings? Not successful

j. Why was the ping unsuccessful? There is no route to that location.

k. Remove the gateway of last resort from the BHM router.

Step 10 Remove RIP routing from the routers and use IGRP instead

a. Remove the RIP routing by using the **`no`** form of the RIP routing command. Then set up IGRP routing using 30 as the AS number. Remember to wait for the routes to propagate to the other router.

b. Check the new routing protocol by typing **`show ip route`** at the privileged exec mode prompt. There should be two connected and IGRP route in the listing.

Step 11 Enter a default network entry on the BHM router

a. Enter the command **`ip default-network 172.17.0.0`** at the configuration mode prompt

b. Type the **`show ip route`** command at the privileged exec mode.

c. Is there a default route listed? Yes

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

 Copyright © 2003, Cisco Systems, Inc.

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(config)#reloadRouter#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.

 Copyright © 2003, Cisco Systems, Inc.

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.					

 Copyright © 2003, Cisco Systems, Inc.

```
GAD#show running-config
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname GAD
!
enable secret 5 $1$6cFg$EBewg1wDwedaTPlMnxaQb/
!
memory-size iomem 10
ip subnet-zero
!
ip audit notify log
ip audit po max-events 100
!
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 64000
!
interface Serial0/1
 no ip address
 no ip directed-broadcast
 shutdown
!
router igrp 30
 network 172.17.0.0
 network 172.16.0.0
!
ip classless
no ip http server
!
line con 0
 password cisco
 login
 transport input none
line aux 0
line vty 0 4
 password cisco
 login
!
end
```

 Copyright © 2003, Cisco Systems, Inc.

```
BHM#show running-config
Building configuration...

Current configuration:
!
version 12.0
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname BHM
!
memory-size iomem 10
ip subnet-zero
!
ip audit notify log
ip audit po max-events 100
!
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
!
interface Serial0/1
 no ip address
 no ip directed-broadcast
 shutdown
!
router igrp 30
 network 172.17.0.0
 network 172.18.0.0
!
ip classless
ip default-network 172.18.0.0
no ip http server
!
line con 0
 password cisco
 login
 transport input none
line aux 0
line vty 0 4
 password cisco
 login
!
end
```

 Copyright © 2003, Cisco Systems, Inc.