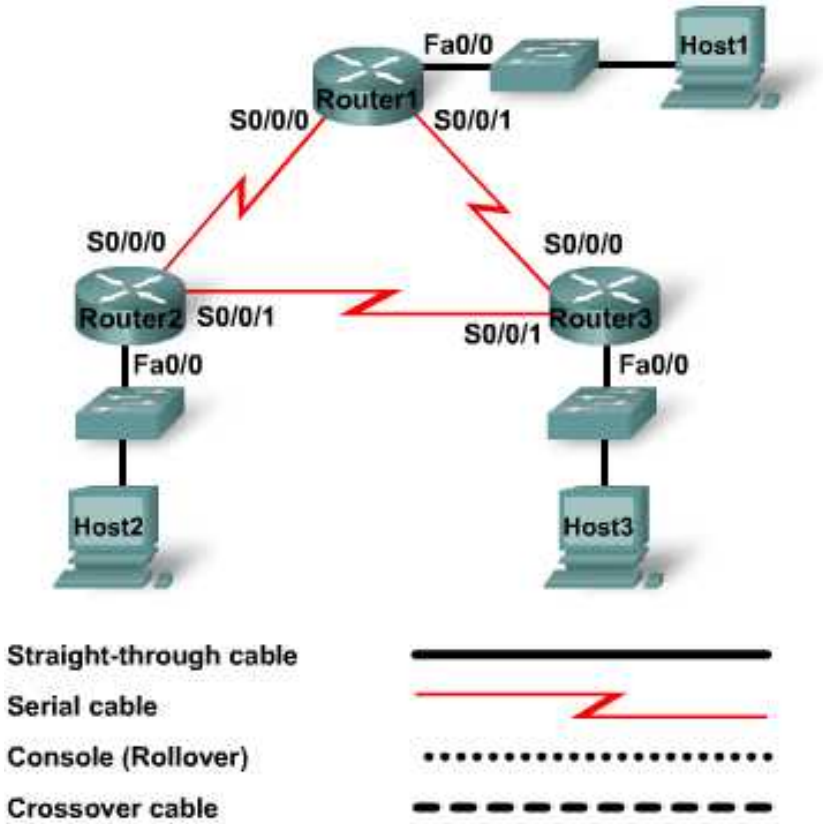
Lab 4.3.4 Configuring a LAN with Discontiguous Subnets



Device	Host Name	FastEthernet 0/0/ Subnet Mask	Serial 0/0/0 / Subnet Mask	Interface Type	Serial0/ 0/1 Subnet Mask	Interface Type	Enable Secret Password	Enable, vty, and Console Password
Router1	Main	172.30.0.1/24	10.0.0.1/30	DCE	10.0.0.5/30	DCE	class	cisco
Router2	Branch1	172.30.1.1/24	10.0.0.2/30	DTE	10.0.0.9/30	DCE	class	cisco
Router3	Branch2	172.30.2.1/24	10.0.0.6/30	DTE	10.0.0.10/30	DTE	class	cisco
			Default Gateway					
Host 1	Host1	172.30.0.2/24	172.30.0.1					
Host 2	Host2	172.30.1.2/24	172.30.1.1					
Host 3	Host3	172.30.2.2/24	172.30.2.1					

Objectives

- Configure routers and hosts to use discontiguous subnets.
- Observe the effects of discontiguous subnets on routing tables.
- Modify the existing configuration to improve results.
- Three null serial DCE-DTE V.35 cable sets.

Background / Preparation

Good VLSM implementation requires assigning subnets contiguously. However, meeting network design requirements can result in subnets that are separated by a different network. In this lab, according to a VLSM scheme, subnets assigned to two LANs are separated from each other by a public network connecting the two routers. The results of this condition are seen in the routing tables. After the problem has been identified, you will take steps to improve the ability of the routers to report all the existing routes.

The following resources are required:

- Three routers with 2 serial connections and 1 Ethernet interface to connect to a switch
- Three Cisco 2960 switches or other comparable switches
- Three Windows-based PCs, one with a terminal emulation program, and both set up as hosts
- At least one RJ-45-to-DB-9 connector console cable to configure the routers and switches
- Six straight-through Ethernet cables to connect from the routers to the switches and from the hosts to the switches

NOTE: Make sure that the routers and the switches have been erased and have no startup configurations. Instructions for erasing both switch and router are provided in the Lab Manual, located on Academy Connection in the Tools section.

NOTE: SDM Enabled Routers – If the startup-config is erased in an SDM enabled router, SDM will no longer come up by default when the router is restarted. It will be necessary to build a basic router configuration using IOS commands. The steps provided in this lab use IOS commands and do not require the use of SDM. If you wish to use SDM, refer to the instructions in the Lab Manual, located on the Academy Connection in the Tools section or contact your instructor if necessary.

Step 1: Connect the equipment

a. Connect Router1 Serial 0/0/0 interface to Router2 Serial 0/0/0 interface using a serial cable.

b. Connect Router2 Serial 0/0/1 interface to Router3 Serial 0/0/1 interface using a serial cable.

c. Connect Router1 to Router3 with a serial cable as shown in the diagram and table.

d. Connect the Fa0/0 interface of each router to the Fa0/1 interface on the corresponding switch.

e. Connect a PC with a console cable to perform configurations on the routers and switches.

f. Connect each host PC to the Fa0/2 interface on its switch using a straight-through cable.

Step 2: Perform basic configurations on Router1

Perform basic configuration on Router1 with a hostname, interfaces, console, Telnet, and privileged passwords according to the table diagram. Use RIP as the routing protocol, and advertise the attached networks. Save the configuration.

Step 3: Configure the other routers

Perform similar basic configurations on Router2 and Router3 with a hostname, interfaces, console, Telnet, and privileged passwords according to the table diagram. Use RIP as the routing protocol, and advertise the attached networks. Save the configurations.

Step 4: Configure the hosts with the proper IP address, subnet mask, and default gateway

Configure each host with the proper IP address, subnet mask, and default gateway.

From the configurations given, what would be the next available subnetwork IP address on the 172.30.0.0 network? _____

If you needed to accommodate an additional LAN with 60 hosts, what mask would you use for that subnetwork? _____

Step 5: Verify that the network is functioning

a. From each host, ping its default gateway.

Was the ping from Host1 successful? _____

Was the ping from Host2 successful? _____

Was the ping from Host3 successful? _____

If the answer is **no** for any question, troubleshoot the router and host configurations to find the error. Ping again until they are successful.

b. For each router, view the status of the interface.

```
Main#show ip interface brief
Branch1#show ip interface brief
Branch2#show ip interface brief
```

Is the status and protocol listed as **up** for all active interfaces? _____

If the answer is **no**, troubleshoot the router configurations to find the error. Recheck until the status and protocol are **up**.

Step 6: Examine the routing tables

a. From the network topology, how many routes should each router report in its routing table to have a complete picture of the network? _____

b. On each router, view the routing table. The command and output for Main is shown below:

```
Main#show ip route
<<output omitted>>
Gateway of last resort is not set
     10.0.0.0/30 is subnetted, 3 subnets
C       10.0.0.0 is directly connected, Serial0/0/0
C       10.0.0.4 is directly connected, Serial0/0/1
R       10.0.0.8 [120/1] via 10.0.0.2, 00:00:21, Serial0/0/0
                 [120/1] via 10.0.0.6, 00:00:15, Serial0/0/1
     172.30.0.0/24 is subnetted, 1 subnets
C       172.30.0.0 is directly connected, FastEthernet0/0
```

What problem do you see in the routing tables? _____

_____

Step 7: Identify and attempt to correct the problem

a. From the router configurations, identify the reason for the problem you found in Step 6.

_____

_____

b. On each router, issue the commands to correct this problem. A sample command and output for Main is shown.

```
Main(config-router)#version 2
Main(config-router)#end
Main#show ip route
<<output omitted>>
Gateway of last resort is not set
     10.0.0.0/30 is subnetted, 3 subnets
C       10.0.0.0 is directly connected, Serial0/0/0
C       10.0.0.4 is directly connected, Serial0/0/1
R       10.0.0.8 [120/1] via 10.0.0.2, 00:00:08, Serial002/0
                 [120/1] via 10.0.0.6, 00:00:02, Serial0/0/1
     172.30.0.0/16 is variably subnetted, 2 subnets, 2 masks
R       172.30.0.0/16 [120/1] via 10.0.0.2, 00:00:08, Serial0/0/0
                      [120/1] via 10.0.0.6, 00:00:02, Serial0/0/1
C       172.30.0.0/24 is directly connected, FastEthernet0/0
```

c. Re-examine the routing tables carefully.

Explain why, even though each router now has RIP routes, there is still a problem with the tables.

_____

What should be done to correct the problem?

_____

d. On all three routers, issue the command to correct this issue. A sample for Main is shown.

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

Step 8: Verify that the problem has been corrected

View the routing table. Routes should be reported as shown for the Main router.

```
Main#show ip route
<<output omitted>>
  Gateway of last resort is not set

     10.0.0.0/30 is subnetted, 3 subnets
C       10.0.0.0 is directly connected, Serial0/0/0
C       10.0.0.4 is directly connected, Serial0/0/1
R       10.0.0.8 [120/1] via 10.0.0.2, 00:00:02, Serial0/0/0
                 [120/1] via 10.0.0.6, 00:00:02, Serial0/0/1
     172.30.0.0/16 is variably subnetted, 4 subnets, 2 masks
R       172.30.0.0/16 [120/1] via 10.0.0.2, 00:00:32, Serial0/0/0
                      [120/1] via 10.0.0.6, 00:00:29, Serial0/0/1
C       172.30.0.0/24 is directly connected, FastEthernet0/0
R       172.30.1.0/24 [120/1] via 10.0.0.2, 00:00:02, Serial0/0/0
R       172.30.2.0/24 [120/1] via 10.0.0.6, 00:00:02, Serial0/0/1
```

Are all expected routes being reported now? _____

Why are there two routes reported to the 10.0.0.8 subnetwork?

_____

Step 9: Reflection

a. When would it be important to view all possible routes in a routing table?

_____

_____

b. RIP version 2 supports VLSM, but changing to version 2 did not fully resolve the problem. Why?

_____

_____