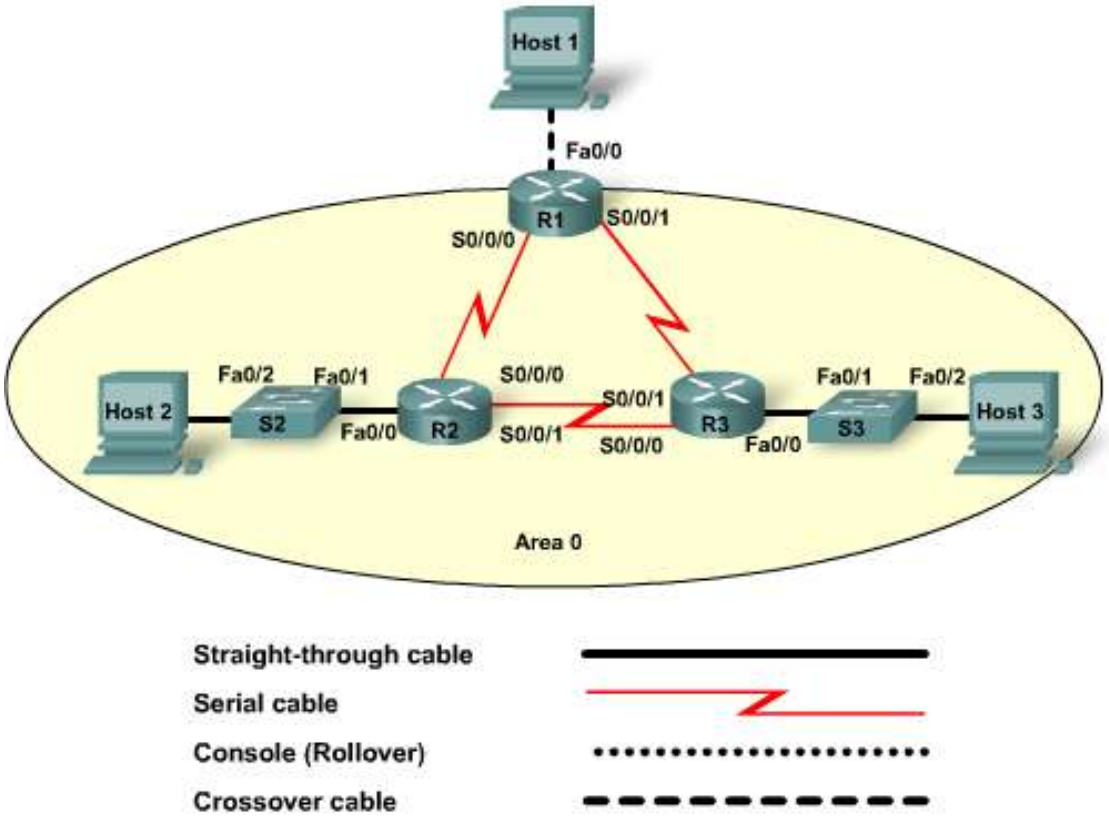
Lab 6.3.2 Configuring OSPF Summarization



Device	Host Name	FastEthernet 0/0 IP Address	Serial 0/0/0 IP Address	Serial 0/0/0 Interface Type	Serial 0/0/1 IP Address	Serial 0/0/1 Interface Type	Enable Secret Password	vty, Console Password
Router 1	Border	209.165.201.2 /24	192.168.10.65 /30	DCE	192.168.10.69 /30	DCE	class	cisco
Router 2	R2	192.168.10.1 /28	192.168.10.66 /30	DTE	192.168.10.73 /30	DCE	class	cisco
Router 3	R3	192.168.10.33/28	192.168.10.74 /30	DTE	192.168.10.70 /30	DTE	class	cisco
Switch 2	SW2						class	cisco
Switch 3	SW3						class	cisco

Objectives

- Configure a three-router topology using VLSM.
- Configure OSPF as the routing protocol.
- Configure a default route and redistribute it into the OSPF routing protocol.
- Examine the effect of summarization on the routing table.

Background / Preparation

In this lab, you will set up a network similar to the one in the topology diagram. This topology represents a three-router corporate network using variably-subnetted private IP addressing. From one router, a public network connection to a host PC simulates the corporate network's connection to the ISP. You will configure OSPF as the routing protocol for the corporate network You will also adjust the OSPF configuration to reduce the size of the routing tables. The following resources are required:

- Three Cisco 1841 or comparable routers
- Two Cisco 2960 or other comparable switches
- Three Windows-based PCs, at least one with a terminal emulation program
- At least one RJ-45-to-DB-9 connector console cable
- Three serial cables
- One crossover Ethernet cable
- Four straight-through Ethernet cables
- Access to the PC command prompt
- Access to PC network TCP/IP configuration

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 Router 1 to Routers 2 and 3 with serial cables. Connect Router 2 to Router 3 with a serial cable.

b. Connect the Router 2 Fa0/0 interface to the Switch 2 Fa0/1 interface using a straight-through cable.

c. Connect the Router 3 Fa0/0 interface to the Switch 3 Fa0/1 interface using a straight-through cable.

d. Connect Host 2 to Switch 2 and Host 3 to Switch 3 to the Fa0/2 interface using straight-through cables.

e. Connect Host 1 to the Router 1 Fa0/0 interface using a crossover cable.

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

Step 2: Perform basic configurations on the routers

a. Establish a console session with Router 1 and configure hostname, passwords, and interfaces as shown in the addressing table. Save the configuration.

b. Establish a console session with Router 2. Configure hostname, passwords, and interfaces according to the addressing table. Save the configuration.

c. Establish a console session with Router 3. Configure hostname, passwords, and interfaces according to the addressing table. Save the configuration.

Step 3: Perform basic configurations on the switches

a. Establish a console session with Switch 2 and configure hostname and passwords according to the addressing table. Save the configuration.

b. Perform a similar configuration on Switch 3, configuring the hostname and passwords as described for SW3. Save the configuration.

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

a. Configure each host with the proper IP address, subnet mask, and default gateway for the network on which it resides. Host 1 should be assigned the address 209.165.201.1/24. Host 2 and Host 3 should be assigned IP addresses in the 192.168.10.0/28 and 192.168.10.32/28 networks respectively. All three PCs use the Fa0/0 interface of their attached router as their default gateway.

b. Each workstation should be able to ping the attached router. If the ping is not successful, troubleshoot as necessary. Check and verify that the workstation has been assigned the correct IP address and default gateway.

Step 5: Configure OSPF routing with default summarization

a. On Border, configure OSPF as the routing protocol with a process ID of 1 and advertise the appropriate networks.

```
Border(config)#router ospf 1
Border(config-router)#network 192.168.10.64 0.0.0.3 area 0
Border(config-router)#network 192.168.10.68 0.0.0.3 area 0
```

From the network commands, which interfaces are participating in OSPF routing?

_____

b. Perform a similar configuration on R2, using the same process ID and advertising the appropriate networks. Remember to advertise the FastEthernet interface.

c. On R3, perform a similar configuration, using the same process ID and advertising the appropriate networks.

Step 6: Configure and redistribute a default route for Internet access

a. From the Border router to Host 1, the host simulating the Internet, create a static route to network 0.0.0.0 0.0.0.0, using the **ip route** command and the next hop interface. This will forward any unknown-destination address traffic to the PC simulating the Internet by setting a gateway of last resort on the Border router.

```
Border(config)#ip route 0.0.0.0 0.0.0.0 209.165.201.1
```

b. Border will advertise this route to the other routers if this command is added to its OSPF configuration.

```
Border(config)#router ospf 1
Border(config-router)#default-information originate
```

Step 7: Verify the routing configuration

a. View the routing table on Border.
<<output omitted>>

```
Gateway of last resort is 209.165.201.1 to network 0.0.0.0
     192.168.10.0/24 is variably subnetted, 5 subnets, 2 masks
O       192.168.10.0/28 [110/65] via 192.168.10.66, 00:08:52, Serial0/0/0
O       192.168.10.32/28 [110/65] via 192.168.10.70, 00:09:25, Serial0/0/1
C       192.168.10.64/30 is directly connected, Serial0/0/0
C       192.168.10.68/30 is directly connected, Serial0/0/1
O       192.168.10.72/30 [110/128] via 192.168.10.70, 00:09:25,Serial0/0/1
                         [110/128] via 192.168.10.66, 00:08:52,Serial0/0/0
C    209.165.201.0/24 is directly connected, FastEthernet0/0
S*   0.0.0.0/0 [1/0] via 209.165.201.1
```

How can you tell from the routing table that the subnetted network shared by the corporate routers has a pathway for traffic destined for the Internet?

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b. View the routing tables on R2 and R3.

How is the pathway for Internet traffic provided in their routing tables?

_____

Step 8: Verify connectivity

a. Simulate sending traffic to the Internet by pinging from the host PCs to 209.165.201.1.

Were the pings successful? _____

b. Verify that hosts within the subnetted network can reach each other by pinging between Host 1 and Host 2.

Were the pings successful? _____

Step 9: Configure OSPF summarization

As the OSPF network grows, it may become necessary to add additional OSPF areas and perform summarization between those areas. Compute a summary route for the corporate subnetworks within Area 0. The networks have been assigned contiguously:

192.168.10.0
192.168.10.32
192.168.10.64
192.168.10.68
192.168.10.72

What is the one summary route that can be used to advertise all of these subnets?

_____

Step 10: Speculating on summarization effects on routing tables

Consider that the Border router has been configured to connect to another OSPF area (Area 1) off of a new serial interface (S0/1/0). Answer the following question assuming that summarization is configured on the border router for all networks within Area 0. .

1. Is the default route to the Internet included within the summary route information sent to other areas within the OSPF network?

_____

_____

2. Will the routers in the new area still have a route for Internet traffic?

_____

_____

3. If the border router experiences changes to connecting subnets that are included within the summary address, does it have to report those changes to other areas within the OSPF network?

_____

_____

4. Considering your answers to the previous questions, what advantage do you see in using summarization in this network?

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_____

Step 11: Reflection

List three effects of using summarization within an OSPF area.

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