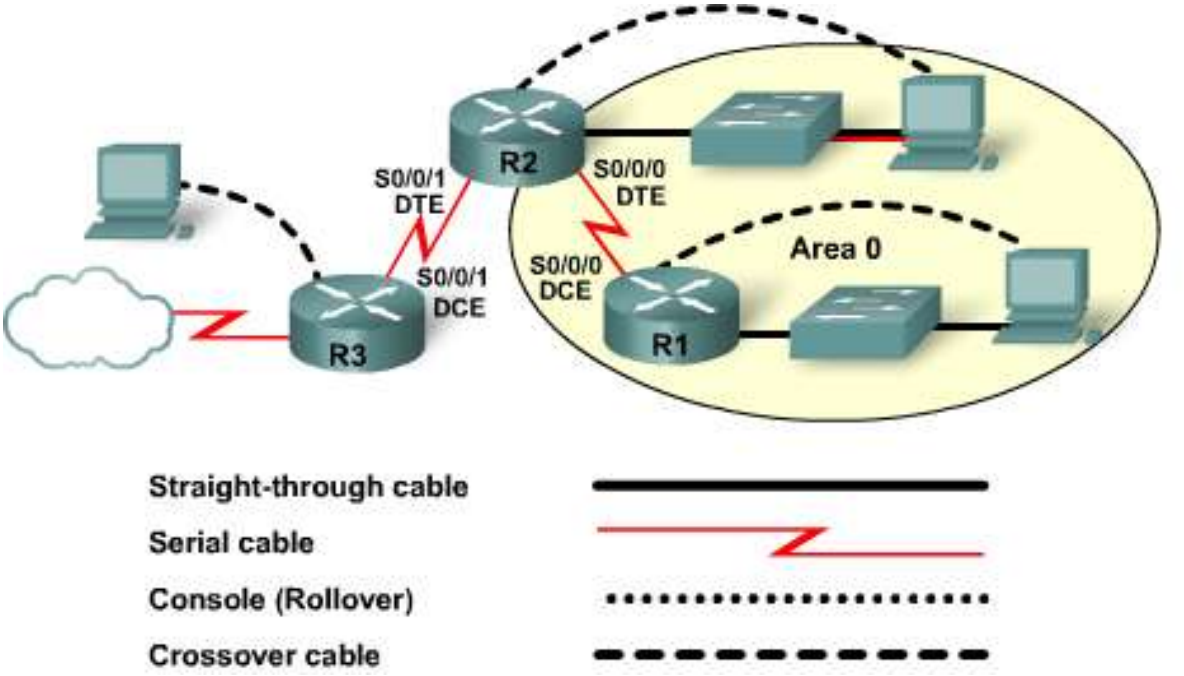
Lab 6.3.1 Configuring and Propagating an OSPF Default Route



Device	Router Name	IP Address/Mask	Lookback Address/Mask	Network Statements	Enable Secret Password	Enable, vty, and Console Passwords
R1	**R1**	**Fa0/0** 192.168.1.129/26 **S0/0/0** = DCE 192.168.1.1/30	192.168.31.11/32	192.168.1.0	class	cisco
R2	**R2**	**Fa0/0** 192.168.0.1/24 **S0/0/0** 192.168.1.2/30 **S0/0/1** 200.20.20.2/30	192.168.31.22/32	192.168.1.0 192.168.0.0	class	cisco
R3	**ISP**	**S0/0/1** = DCE 200.20.20.1/30	138.25.6.33/32		class	cisco

Objectives

- Set up an IP addressing scheme for the OSPF area.
- Configure and verify OSPF routing.
- Configure the OSPF network so that all hosts in the OSPF area can connect to outside networks.

Background / Preparation

This lab focuses on the basic configuration of the Cisco 1800 series or comparable router using Cisco IOS commands. The information in this lab applies to other routers; however, command syntax may vary. Depending on the router model, the interfaces may differ. For example, on some routers Serial 0 may be Serial 0/0, Serial 0/0/0 and Ethernet 0 may be FastEthernet 0/0 or FastEthernet 0/0/0. The Cisco Catalyst 2960 switch comes preconfigured and only needs to be assigned basic security information before being connected to a network.

The following resources are required:

- Two Cisco 2960 switches or other comparable switches
- Three Cisco 1841 or comparable routers with 2 serial interfaces and 1 FastEthernet interface
- Three Windows-based PCs, each with a terminal emulation program and set up as a host
- At least one RJ-45-to-DB-9 connector console cable to configure the routers
- Four straight-through Ethernet cables to connect the routers to the switches and the switches to the hosts
- Three serial cables to connect the routers

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

Connect each of the routers, switches, and hosts as shown in the topology diagram.

Step 2: Perform basic configurations on the routers

a. Connect a PC to the console port of the router to perform configurations using a terminal emulation program.

b. On Routers 1, 2, and 3, configure the hostname, console, Telnet, privileged passwords, and message-of-the-day banner and disable DNS lookups according to the addressing table and topology diagram.

Step 3: Configure the ISP router

a. Configure serial and loopback interfaces on Router 3.

```
R3(config)#interface s0/0/1
R3(config-if)#ip address 200.20.20.1 255.255.255.252
R3(config-if)#clock rate 64000
R3(config-if)#no shutdown
R3(config-if)#interface lo0
R3(config-if)#ip address 138.25.6.33 255.255.255.255
R3(config-if)#exit
```

b. On Router 3, configure a default route to both the 192.168.0.0 and the 192.168.1.0 networks.

```
R3(config)#ip route 192.168.1.0 255.255.255.0 200.20.20.2
R3(config)#ip route 192.168.0.0 255.255.255.0 200.20.20.2
```


Step 4: Configure the Area 0 OSPF routers

a. Configure loopback, FastEthernet, and serial interfaces on Router 1 and Router 2.

```
R1(config)#interface loopback 0
R1(config-if)#ip address 192.168.31.11 255.255.255.255
R1(config-if)#interface serial 0/0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.252
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown
R1(config-if)#interface fa 0/0
R1(config-if)#ip address 192.168.1.129 255.255.255.192
R1(config-if)#no shutdown

R2(config)#interface loopback 0
R2(config-if)#ip address 192.168.31.22 255.255.255.255
R2(config-if)#interface serial 0/0/0
R2(config-if)#ip address 192.168.1.2 255.255.255.252
R2(config-if)#no shutdown
R2(config-if)#interface serial 0/0/1
R2(config-if)#ip address 200.20.20.2 255.255.255.252
R2(config-if)#no shutdown
R2(config-if)#interface fa 0/0
R2(config-if)#ip address 192.168.0.1 255.255.255.0
R2(config-if)#no shutdown
```

b. Save the running configuration to the NVRAM of each router.

Step 5: Configure the hosts with the proper IP address, subnet mask, and default gateway

Each workstation should be able to ping the attached router. Troubleshoot as necessary. Remember to assign a specific IP address and default gateway to the workstation. At this point, the workstations will not be able to communicate with each other.

Step 6: Verify connectivity

Ping from R2 to both the ISP and R1 routers.

Were the pings successful? _____

If the pings were not successful, troubleshoot the router configurations until the ping is successful.

Step 7: Configure OSPF routing on both Area 0 routers

a. Configure OSPF routing on each router. Use OSPF process number 1 and ensure that all networks are in Area 0.

```
R1(config)#router ospf 1
R1(config-router)#network 192.168.1.128 0.0.0.127 area 0
R1(config-router)#network 192.168.1.0 0.0.0.3 area 0

R2(config)#router ospf 1
R2(config-router)#network 192.168.0.0 0.0.0.255 area 0
R2(config-router)#network 192.168.1.0 0.0.0.3 area 0
```

Did the IOS version automatically add any lines under router OSPF 1? _____

b. Show the routing table for R1.

Are there any entries in the routing table? _____

Step 8: Test network connectivity

Ping the R1 host from the R2 host.

Was it successful? _____

If the ping is not successful, troubleshoot as necessary.

Step 9: Observe OSPF traffic

a. At the privileged EXEC mode, enter the command **debug ip ospf events** and observe the output. You may have to wait at least 40 seconds for the hello packet to be sent before observations can be recorded.

   Is there OSPF traffic? _____

   What type of OSPF traffic is observed on the network? _____

b. Turn off debugging by entering **no debug ip ospf events** or **undebug all**.

Step 10: Create a default route to the ISP

On R2 only, enter a static default route.

```
R2(config)#ip route 0.0.0.0 0.0.0.0 200.20.20.1
```

Step 11: Verify the default static route

Verify the default static route by looking at the R2 routing table.

Is the default route in the routing table? _____

Step 12: Verify connectivity from the R2 router

a. Verify connectivity from R2 by pinging the ISP Serial 0/0/1 interface from the R2 router.

   Is the ping successful? _____

b. Next, on the host attached to R2, open a command prompt and ping the Serial 1 interface on the ISP router.

   Is the ping successful? _____

c. This time, ping the loopback interface address of the ISP router, which represents the ISP connection to the Internet.

   Is the ping successful? _____

All of these pings should be successful. If they are not, troubleshoot the configurations on the host and on the R2 and ISP routers.

Step 13: Verify connectivity from the R1 router.

Verify the connection between the ISP and R1 by pinging the Serial 0/0/1 interface of the ISP router on R2.

Is the ping successful? _____

If yes, why? _____

If not, why not? _____

Step 14: Redistribute the static default route

Propagate the gateway of last resort to the other routers in the OSPF domain. At the configure router prompt on R2, enter **default-information originate**.

```
R2(config-router)#default-information originate
```

Is there now a default route on R1? _____

What is the address of the gateway of last resort? _____

There is an O*E2 entry in the routing table. What type of route is this?

_____ _____ _____

Can the ISP server address at 138.25.6.33 be pinged from both workstations? _____

If no, troubleshoot both hosts and all three routers.

Step 15: Reflection

a. How does OSPF reach networks outside of the domain?

_____

_____

b. What does a router use to generate a gateway of last resort?

_____