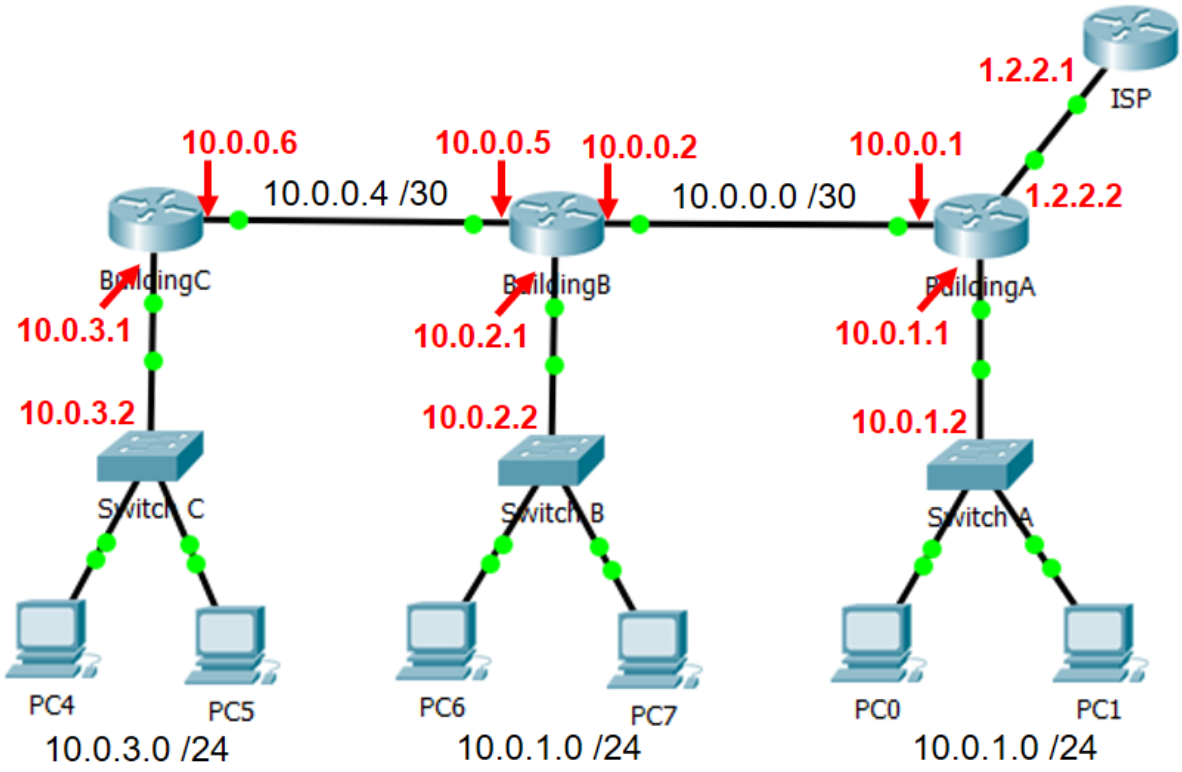
Assignment 6-6 Dynamic Routing (OSPF)

Name: _____

Objective

In this lab, we demonstrate working with single-area OSPF dynamic routing using the topology below from the 6-4 lab. The new loopbacks are virtual interfaces that will be added to be router IDs for the OSPF configuration.

Lab Topology



Task 1 – Getting Started

Rather than taking the time to remove all of the static routes from 6-5-2, this topology assumes that you completed and saved as ***yourname*6-4-2** as a starting point. If for any reason you do not have that you can download **Class6-6-1** from the assignment page. Either way immediately save your open file as ***yourname*6-6-1**.

OSPF Single Area Configuration Basics

There are only two things required to configure OSPF on routers in a single area.

1. OSPF routing is enabled with a single command **router ospf *process-ID*** where the *process-ID* could be any number. At this point, one or more **network** statements define which **Area** the OSPF interfaces are in. It could be a network statement for each interface, or they can be grouped using wildcard masks. For example, **BuildingA** could be configured with either of the following:

```
network 10.0.1.0 0.0.0.255 area 0
network 10.0.0.0 0.0.0.3 area 0
```

Or

```
network 10.0.0.0 0.255.255.255 area 0
```

This last option is saying all 10.0.0.0 networks on my interfaces are included. This is one advantage of using only subnets from one address pool (10 network) in your design.

2. On the gateway router connected to the Internet, the default route isn't part of the routing. To avoid entering a default route on all routers, we use the **default-information originate** command on the gateway router only. The command adds it to the routes being shared.

Task 2 Setting up

Configure one of the PCs in the BuildingA LAN to 10.0.1.10 /24 and then Telnet to the BuildingA router just like we did in exercise 6-5. You could run a console cable to the router but that assumes you have physical access to the device.

First we need to create our default route to the Internet. It is required because our ISP is not included in our dynamic routing.

Just like last time the commands would be:

ip route 0.0.0.0 0.0.0.0 1.2.2.1

```
Packet Tracer PC Command Line 1.0
C:\>telnet 10.0.1.1
Trying 10.0.1.1 ...Open

BuildingA#config t
Enter configuration commands, one per line.  End with CNTL/Z.
BuildingA(config)#ip route 0.0.0.0 0.0.0.0 1.2.2.1
BuildingA(config)#
```

Task 3 – Configuring Router A (the gateway router)

The following are commands required for Router A setting up the loopback based on the topology diagram. The default route to the Internet is already configured, so we only need to add the **default-information originate** statement which won't be added to the other routers.

Make the following entries.

```
BuildingA(config)#router ospf 1
BuildingA(config-router)#network 10.0.0.0 0.255.255.255 area 0
BuildingA(config-router)#default-information originate
BuildingA(config-router)#^Z
BuildingA#
```

Until other routers are configured, the **show ip route** command won't show anything except the new loopback.

The **show ip ospf** command will confirm that OSPF is running.

```
BuildingA#show ip ospf
 Routing Process "ospf 1" with ID 10.0.1.1
 Supports only single TOS(TOS0) routes
 Supports opaque LSA
 SPF schedule delay 5 secs, Hold time between two SPFs 10 secs
 Minimum LSA interval 5 secs. Minimum LSA arrival 1 secs
 Number of external LSA 1. Checksum Sum 0x00b511
 Number of opaque AS LSA 0. Checksum Sum 0x000000
 Number of DCbitless external and opaque AS LSA 0
 Number of DoNotAge external and opaque AS LSA 0
 Number of areas in this router is 1. 1 normal 0 stub 0 nssa
 External flood list length 0
```

```
    Area BACKBONE(0)
        Number of interfaces in this area is 2
        Area has no authentication
        SPF algorithm executed 2 times
        Area ranges are
        Number of LSA 1. Checksum Sum 0x004bc9
        Number of opaque link LSA 0. Checksum Sum 0x000000
        Number of DCbitless LSA 0
        Number of indication LSA 0
        Number of DoNotAge LSA 0
        Flood list length 0

BuildingA#
```

Save your router configuration.

Until we configure Building B and C our route table won't change.

Task 3 – Configure Builing B and C

Telnet to each in turn as we did in 6-5.

Configure OSPF on the routers using just the first two commands – do not include the **default-information originate** command.

Use the **show ip route** to see that BuildingA routes as well as the default route are already present. The **show ip ospf** command is also useful to confirm your results.

Save the router configurations.

Task 4 – Confirming Connectivity

Exit back out of your Telnet sessions.

Confirm that the host can ping and Telnet to the switch in BuildingC. In theory if you can do that, then you can ping anything in between and Telnet to there as well.

Save the Packet Tracer file as **yourname6-6-2**.

Reflection

Not only are dynamic routing protocols like OSPF easier to configure, they scale well, react quickly to link changes, and make missed routes less likely. It should be obvious that adding additional routers and networks would only impact the new routers and would only require a small handful of new lines.

The following are the final route tables for each route.

```
BuildingA#sho ip route
~~Legend Omitted~~

Gateway of last resort is 1.2.2.1 to network 0.0.0.0

     1.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
C       1.2.2.0/30 is directly connected, GigabitEthernet0/0
L       1.2.2.2/32 is directly connected, GigabitEthernet0/0
     10.0.0.0/8 is variably subnetted, 7 subnets, 3 masks
C       10.0.0.0/30 is directly connected, GigabitEthernet0/2
L       10.0.0.1/32 is directly connected, GigabitEthernet0/2
O       10.0.0.4/30 [110/2] via 10.0.0.2, 00:06:40, GigabitEthernet0/2
C       10.0.1.0/24 is directly connected, GigabitEthernet0/1
```

```
L       10.0.1.1/32 is directly connected, GigabitEthernet0/1
O       10.0.2.0/24 [110/2] via 10.0.0.2, 00:14:02, GigabitEthernet0/2
O       10.0.3.0/24 [110/3] via 10.0.0.2, 00:06:40, GigabitEthernet0/2
S*   0.0.0.0/0 [1/0] via 1.2.2.1

BuildingA#
```

```
BuildingB#sho ip route
~~Legend Omitted~~

Gateway of last resort is 10.0.0.1 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 8 subnets, 3 masks
C       10.0.0.0/30 is directly connected, GigabitEthernet0/0
L       10.0.0.2/32 is directly connected, GigabitEthernet0/0
C       10.0.0.4/30 is directly connected, GigabitEthernet0/2
L       10.0.0.5/32 is directly connected, GigabitEthernet0/2
O       10.0.1.0/24 [110/2] via 10.0.0.1, 00:16:58, GigabitEthernet0/0
C       10.0.2.0/24 is directly connected, GigabitEthernet0/1
L       10.0.2.1/32 is directly connected, GigabitEthernet0/1
O       10.0.3.0/24 [110/2] via 10.0.0.6, 00:09:41, GigabitEthernet0/2
O*E2 0.0.0.0/0 [110/1] via 10.0.0.1, 00:16:58, GigabitEthernet0/0

BuildingB#
```

```
BuildingC#sho ip route
~~Legend Omitted~~

Gateway of last resort is 10.0.0.5 to network 0.0.0.0

     10.0.0.0/8 is variably subnetted, 7 subnets, 3 masks
O       10.0.0.0/30 [110/2] via 10.0.0.5, 00:11:17, GigabitEthernet0/0
C       10.0.0.4/30 is directly connected, GigabitEthernet0/0
L       10.0.0.6/32 is directly connected, GigabitEthernet0/0
O       10.0.1.0/24 [110/3] via 10.0.0.5, 00:11:17, GigabitEthernet0/0
O       10.0.2.0/24 [110/2] via 10.0.0.5, 00:11:17, GigabitEthernet0/0
C       10.0.3.0/24 is directly connected, GigabitEthernet0/1
L       10.0.3.1/32 is directly connected, GigabitEthernet0/1
O*E2 0.0.0.0/0 [110/1] via 10.0.0.5, 00:11:17, GigabitEthernet0/0

BuildingC#
```