**OSPF Configuration Lab**



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| --- | --- | --- | --- |
| **Device** | **Interface** | **IP Address** | **Subnet Mask** |
| **Seattle** | **Eth1/0** | 172.20.60.9 | 255.255.255.252 |
| **Eth1/1** | 172.20.60.6 | 255.255.255.252 |
| **Eth1/2** | 172.20.32.1 | 255.255.240.0 |
| **Boston** | **Eth1/0** | 172.20.60.10 | 255.255.255.252 |
| **Eth1/1** | 172.20.60.13 | 255.255.255.252 |
| **Eth1/2** | 172.20.48.1 | 255.255.248.0 |
| **Dallas** | **Eth1/0** | 172.20.60.1 | 255.255.255.252 |
| **Eth1/1** | 172.20.60.14 | 255.255.255.252 |
| **Eth1/2** | 172.20.56.1 | 255.255.252.0 |
| **HQ** | **Eth1/0** | 172.20.60.2 | 255.255.255.252 |
| **Eth1/1** | 172.20.60.5 | 255.255.255.252 |
| **Eth1/2** | 172.20.0.1 | 255.255.224.0 |
| **PC #** | **IP Address** | **Subnet Mask** | **Gateway** |
| **PC1** | 172.20.32.2 | 255.255.240.0 | 172.20.32.1 |
| **PC2** | 172.20.48.2 | 255.255.248.0 | 172.20.48.1 |
| **PC3** | 172.20.56.2 | 255.255.252.0 | 172.20.56.1 |
| **PC4** | 172.20.0.2 | 255.255.224.0 | 172.20.0.1 |

**Subnet the Address Space.**

**Examine the network requirements.**

The addressing for the network has the following requirements:

The 172.20.0.0 network must be subnetted to provide addresses for the LANs and connecting links.

* The HQ LAN will require 8000 addresses (Network D)
* The Seattle LAN will require 4000 addresses (Network A)
* The Boston LAN will require 2000 addresses (Network B)
* The Dallas LAN will require 1000 addresses (Network C)
* The links between the routers will require two addresses for each link (Networks E, F, G, H)

\*Cable a network that like the one in the Topology Diagram.\*

**1.) Configure ethernet interfaces on the routers.** If you do not remember how to do this, see how we did it in the Static Routing lab activity.

* Configure the interfaces on the HQ, Seattle, Dallas, and Boston routers with the IP addresses from the table under the Topology Diagram.
* Verify IP addressing and interfaces.
* Use the show ip interface brief command to verify that the IP addressing is correct and that the interfaces are active.
* When you have finished, be sure to save the running configuration to the NVRAM of the router. (copy run start)

**2.) Configure the IP address, slash notation, and gateway for PC1, PC2, PC3 and PC4.** If you do not remember how to do this, see how we did it in the previous lab activities.

* Configure the interfaces on the PC1, PC2, PC3, and PC4 with the IP addresses from the table under the Topology Diagram.

**Configure OSPF Routing on the BRANCH1 Router.**

1. **Enable OSPF.**

Use **router ospf** command in global configuration mode to enable OSPF on the BRANCH1 router. Enter a process ID of 1 for the ***process-ID***parameter.

**Seattle(config)#router ospf 1**

**Seattle(config-router)#**

1. Once you are in the Router OSPF configuration sub-mode, configure the connected networks to be included in the OSPF updates that are sent out of BRANCH1 Router as explained below:
2. The OSPF **network** command uses a combination of **network-address** and **wildcard-mask** similar to that which can be used by EIGRP.
3. Use an area ID of 0 for the OSPF ***area-id*** parameter. 0 will be used for the OSPF area ID in all of the network statements in this topology.

**Note: Think of a wildcard mask as the inverse of a subnet mask. The inverse of the subnet mask 255.255.255.252 is 0.0.0.3. To calculate the inverse of the subnet mask, subtract the subnet mask from 255.255.255.255:**

**255.255.255.255**

**– 255.255.255.252 Subtract the subnet mask**

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**0. 0. 0. 3 Wildcard mask**

**Seattle(config-router)# network 172.20.X.X 0.0.X.X area 0**

(Network Address and wildcard mask of A)

**Seattle(config-router)# network 172.20.X.X 0.0.X.X area 0**

(Network Address and wildcard mask of F)

**Seattle(config-router)# network 172.20.X.X 0.0.X.X area 0**

(Network Address and wildcard mask of H)

* When you have finished, be sure to save the running configuration to the NVRAM of the router.

**Follow the same procedure explained above to configure OSPF Routing on the HQ, Boston, and Dallas routers.**

Notice that when the network for the link from Seattle to HQ is added to the OSPF configuration, the router sends a notification message to the console stating that a neighbor relationship with another OSPF router has been established.

**(**00:07:27: %OSPF-5-ADJCHG: Process 1, Nbr 192.168.10.5 on Serial0/0/0 from EXCHANGE to FULL, Exchange Done)

* Use **ping** to check the connectivity between Ethernet Interfaces of all the routers.

**Verify OSPF Operation on HQ, BRANCH1, BRANCH2 AND BRANCH3**

**View neighbors**

* Use the **show ip ospf neighbor** command to view the neighbor table and verify that OSPF has established an adjacency with the neighbor routers.

**View routing protocol information**

* Use the **show ip protocols** command to view information about the routing protocol operation of all the three routers.

**View the routing table**

* Use the **show ip route** command to see the routing table of three routers. OSPF routes are denoted in the routing table with a **O**, which stands for Open Shortest Path First.

**View the OSPF Database**

* Use the **show ip ospf database** command to view the information about number of routers in the internetwork (AS) plus the neighboring router’s ID.

**View the OSPF interface related information**

* Use the **show ip ospf interface** command to view all the interface-related OSPF information. It displays Process ID, Router ID, Cost, Network Type, Priority, Adjacent neighbor information.

**Submission Criteria:**

**Fill in the complete chart on Page 1**

**For each router:**

show ip interface brief

show ip route

show ip protocols

show ip ospf neighbor

show ip ospf database

**For PCs:**

From PC1 ping PC2, PC3, PC4

From PC2 ping PC1, PC3, PC4

From PC3 ping PC1, PC2, PC4

From PC4 ping PC1, PC2, PC3