**Spanning Tree Protocol Lab Activity**



**Addressing Table**

|  |  |  |  |
| --- | --- | --- | --- |
| Device (Hostname) | Interface | IP Address | Subnet Mask |
| ESW1 | VLAN 1 | 172.17.10.1 | 255.255.255.0 |
| ESW2 | VLAN 1 | 172.17.10.2 | 255.255.255.0 |
| ESW3 | VLAN 1 | 172.17.10.3 | 255.255.255.0 |
| ESW4 | VLAN 1 | 172.17.10.4 | 255.255.255.0 |
| PC1 | NIC | 172.17.10.21 | 255.255.255.0 |
| PC2 | NIC | 172.17.10.22 | 255.255.255.0 |
| PC3 | NIC | 172.17.10.23 | 255.255.255.0 |
| PC4 | NIC | 172.17.10.24 | 255.255.255.0 |

**Learning Objectives**

Upon completion of this lab, you will be able to:

* Cable a network according to the topology diagram
* Perform basic configuration tasks on a switch
* Observe and explain the default behavior of Spanning Tree Protocol (STP, 802.1D)
* Observe the response to a change in the spanning tree topology.

**Task 1: Perform Basic Switch Configurations**

**Step 1: “Cable” a network that is like the one in the topology diagram above.**

**(Use VPCS and the EtherSwitch router that you made.)**

**Step 2: Verify default configuration.**

Use the **show vlan** in privileged EXEC command to confirm that only default VLANs exist and that all ports are assigned to VLAN 1.

**ESW1#show vlan-switch**

**ESW2#show vlan-switch**

**ESW3#show vlan-switch**

**ESW4#show vlan-switch**

**Task 2: Prepare the Network**

**Step 1: Disable all ports by using the shutdown command.**

Ensure that the initial switch port states are inactive with the **shutdown** command. Use the **interface range** command to simplify this task.

**ESW1# config t**

**ESW1(config)#interface range fa1/0 - 15**

**ESW1(config-if-range)#shutdown**

You will then see all ports change their state to down.

**ESW2# config t**

**ESW2(config)#interface range fa1/0 - 15**

**ESW2(config-if-range)#shutdown**

You will then see all ports change their state to down.

**ESW3# config t**

**ESW3(config)#interface range fa1/0 - 15**

**ESW3(config-if-range)#shutdown**

You will then see all ports change their state to down.

**ESW4# config t**

**ESW4(config)#interface range fa1/0 - 15**

**ESW4(config-if-range)#shutdown**

You will then see all ports change their state to down.

**Step 2: Re-enable the user ports on ESW1, ESW2, ESW3 and ESW4 in access mode.**

Refer to the topology diagram to determine which switch ports are activated for end-user device access. These four ports will be configured for access mode and enabled with the **no shutdown** command.

* Check what mode you are in. You may need to type “exit” to take you back a level before or elevate a level before typing the commands below.

**ESW1(config)#interface fa1/8**

**ESW1(config-if)#switchport mode access**

**ESW1(config-if)#no shutdown**

**ESW2(config)#interface fa1/8**

**ESW2(config-if)#switchport mode access**

**ESW2(config-if)#no shutdown**

**ESW3(config)#interface fa1/8**

**ESW3(config-if)#switchport mode access**

**ESW3(config-if)#no shutdown**

**ESW4(config)#interface fa1/8**

**ESW4(config-if)#switchport mode access**

**ESW4(config-if)#no shutdown**

**Step 3: Enable trunk ports on ESW1, ESW2, ESW3 and ESW4.**

Only a single VLAN is being used in this lab. However, trunking has been enabled on all links between switches to allow for additional VLANs to be added in the future.

**ESW1(config)#interface range fa1/1 - 2**

**ESW1(config-if-range)#switchport mode trunk**

**ESW1(config-if-range)#no shutdown**

**ESW2(config)#interface range fa1/1 - 2**

**ESW2(config-if-range)#switchport mode trunk**

**ESW2(config-if-range)#no shutdown**

**ESW3(config)#interface range fa1/1 - 2**

**ESW3(config-if-range)#switchport mode trunk**

**ESW3(config-if-range)#no shutdown**

**ESW4(config)#interface range fa1/1 - 2**

**ESW4(config-if-range)#switchport mode trunk**

**ESW4(config-if-range)#no shutdown**

**Step 4: Configure the management interface address on all four switches.**

* Check what mode you are in. You may need to type “exit” to take you back a level before or elevate a level before typing the commands below.

**ESW1(config)#interface vlan1**

**ESW1(config-if)#ip address 172.17.10.1 255.255.255.0**

**ESW1(config-if)#no shutdown**

**ESW2(config)#interface vlan1**

**ESW2(config-if)#ip address 172.17.10.2 255.255.255.0**

**ESW2(config-if)#no shutdown**

**ESW3(config)#interface vlan1**

**ESW3(config-if)#ip address 172.17.10.3 255.255.255.0**

**ESW3(config-if)#no shutdown**

**ESW4(config)#interface vlan1**

**ESW4(config-if)#ip address 172.17.10.4 255.255.255.0**

**ESW4(config-if)#no shutdown**

Verify that the switches are correctly configured by pinging between them. From ESW1, ping the management interface on ESW2, ESW3 and ESW4. From ESW2, ping ESW1, ESW3, and ESW4. From ESW3 ping ESW1, ESW2 and ESW4. From ESW4 ping ESW1, ESW2, and ESW3. Were the pings successful? Yes

If not, troubleshoot the switch configurations and try again.

*\*Note that first set of pings might only get 80%, try pinging again to verify 100%*

**Task 3: Configure Host PCs and record MAC address**

Configure the Ethernet interfaces of PC1, PC2, PC3, and PC4 with the IP address, subnet mask, and gateway indicated in the addressing table at the beginning of the lab.

**PC-1> ip 172.17.10.21/24**

**PC-1> show**

Record the MAC address for PC 1: \_\_\_\_\_\_\_00:50:79:66:68:00\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PC-2> ip 172.17.10.22/24**

**PC-2> show**

Record the MAC address for PC 2: \_\_\_\_\_\_\_\_00:50:79:66:68:03\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**PC-3> ip 172.17.10.23/24**

**PC-3> show**

Record the MAC address for PC 3: \_\_\_\_\_\_\_\_\_00:50:79:66:68:01\_\_\_\_\_\_\_\_\_\_\_\_\_

**PC-4> ip 172.17.10.24/24**

**PC-4> show**

Record the MAC address for PC 4: \_\_\_\_\_\_\_00:50:79:66:68:02\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Task 4: Configure Spanning Tree**

**Step 1: Examine the default configuration of 802.1D STP.**

On each switch, display the spanning tree table with the show spanning-tree command. Root selection varies depending on the BID of each switch in your lab resulting in varying outputs.

* Check what mode you are in. You may need to type “exit” to take you back a level before or elevate a level before typing the commands below.

**ESW1#show spanning-tree**

**ESW2#show spanning-tree**

**ESW3#show spanning-tree**

**ESW4#show spanning-tree**

**Step 2: Examine the output.**

The bridge identifier (bridge ID), stored in the spanning tree BPDU consists of the bridge priority, the system ID extension, and the MAC address. The combination or addition of the bridge priority and the system ID extension are known as the **bridge ID priority**. The system ID extension is always the number of the VLAN.

For example, the system ID extension for VLAN 100 is 100. Using the default bridge priority value of 32768, the **bridge ID priority** for VLAN 100 would be 32868 (32768 + 100).

The **show spanning-tree** command displays the value of **bridge ID priority**. Note: The “priority” value within the parentheses represents the bridge priority value, which is followed by the value of the system ID extension.

**Answer the following questions based on the output.**

1. What is the bridge ID priority for switches ESW1, ESW2, ESW3 and ESW4 on VLAN 1?

1. ESW1

32768

1. ESW2

32768

c.ESW3

32768

d. ESW4

32768

2. Which switch is the root for the VLAN 1 spanning tree? ESW1

3. On ESW1 or ESW2 or ESW3 or ESW4 which spanning tree ports are in the blocking state on the root switch?

49 fa1/8

4. On ESW1 or ESW2 or ESW3 or ESW4, which spanning tree port is in the blocking state? 49

5. How does STP elect the root switch? Lowest bridge id number or Switch with lowest mac address

6. Since the bridge priorities are all the same, what else does the switch use to determine the root? \_\_\_\_\_\_tie breaker\_\_\_lowest\_Mac address\_

**Task 5: Observe the response to the topology change in 802.1D STP**

Now let's observe what happens when we intentionally simulate a broken link

**Step 1: Place the switches in spanning tree debug mode using the command debug spanningtree events**

**ESW1#debug spanning-tree events**

**ESW2#debug spanning-tree events**

**ESW3#debug spanning-tree events**

**ESW4#debug spanning-tree events**

**Step 2: Intentionally shutdown port Fa1/1 on ROOT SWITCH**

(config)#**interface fa1/1**

(config-if)#**shutdown**

**Step 3: Record the debug output from other two switches**

When the link from ESW2 or ESW3 or ESW1 or ESW4 that is connected to the root switch goes down, what is its initial conclusion about the spanning tree root?

Blocking or administratively down

Once the switch receives new information on Fa0/2, what new conclusion does it draw?

The Port on Switch was previously in a blocking state before the link between two switches went

down. What states does it go through as a result of the topology change?

New route switch

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**Step 4: Examine what has changed in the spanning tree topology using the show spanning tree command.**

**ESW1#show spanning-tree**

**ESW2#show spanning-tree**

**ESW3#show spanning-tree**

**ESW4#show spanning-tree**

Answer the following questions based on the output.

1. What has changed about the way that ESW2 forwards traffic?

More bpdu sent and recieved

2.What has changed about the way that ESW3 forwards traffic?

**More bpdu sent and recieved \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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**Task 6: Using the show run command, record the configuration of each switch. Paste it below**

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