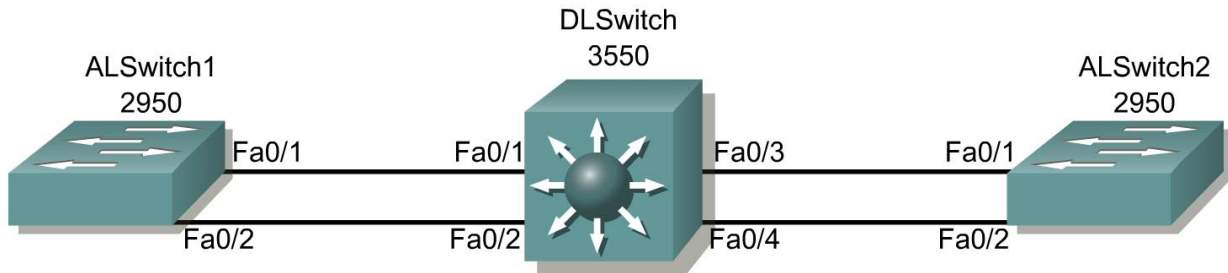


Lab 3.10.1 Spanning-Tree Protocol (STP) Default Behavior



Objective

The purpose of this lab is to observe the default behavior of STP.

Scenario

Three switches have just been installed. The distribution layer switch is a Catalyst 3550 and the access layer switches are both Catalyst 2950. There are redundant uplinks between the access layer and distribution layer. Because of the possibility of bridging loops, spanning tree will logically remove any redundant links. In this lab, students will observe what spanning tree does and why.

Step 1

Delete the vlan.dat database file, power cycle, and erase the startup configuration on each switch before configuring the switches. Issue the `reload` command. Cable and configure the two switches as shown in the diagram with a hostname, enable password, and console security.

Console into DLSwitch and enter the following commands.

```

Switch>enable
Switch#configure terminal
Switch(config)#hostname DLSwitch
DLSwitch(config)#enable secret class
DLSwitch(config)#line console 0
DLSwitch(config-line)#password cisco
DLSwitch(config-line)#login
  
```

Console into ALSwitch1 and enter the following commands.

```

Switch>enable
Switch#configure terminal
Switch(config)#hostname ALSwitch1
ALSwitch1(config)#enable secret class
ALSwitch1(config)#line console 0
ALSwitch1(config-line)#password cisco
ALSwitch1(config-line)#login
  
```

Console into the ALSwitch2 and enter the following commands.

```

Switch>enable
Switch# configure terminal
Switch(config)#hostname ALSwitch2
  
```

```

ALSwitch2(config)#enable secret class
ALSwitch2(config)#line console 0
ALSwitch2(config-line)#password cisco
ALSwitch2(config-line)#login

```

Step 2

Use crossover Cat 5 cables to make the connections since the switches are like devices.

Connect a cable from Fastethernet 0/1 on DLSwitch to Fastethernet 0/1 ALSwitch1.

Connect a cable from Fastethernet 0/2 on DLSwitch to Fastethernet 0/2 ALSwitch1.

Connect a cable from Fastethernet 0/3 on DLSwitch to Fastethernet 0/1 ALSwitch2.

Connect a cable from Fastethernet 0/4 on DLSwitch to Fastethernet 0/2 ALSwitch2.

After the cables are connected and the switch detects the redundant links, spanning tree will be initiated.

By default, spanning tree will run on every port. When a new link becomes active, the port will go through the Listening, Learning, and Forwarding states before it becomes active. During this period, the switch will discover if it is connected to another switch or an end-user device.

If another switch is detected, the two switches will begin creating a spanning tree. One of the switches will be elected as the root of the tree. Then an agreement will be established as to which links to keep active and which links to disable if multiple links exist.

1. What type of frame does the Spanning-Tree Protocol use to communicate with other switches?

Note: The results in this lab will vary. Spanning-tree operation is based on the MAC address of the switches.

Observe the LEDs on the switch to check the status of the link. A bright green light indicates an active link. An amber light indicates an inactive link.

Step 3

Verify STP with the **show spanning-tree** command on the DLSwitch.

```
DLSwitch#show spanning-tree
```

```

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    32769
             Address     0009.430f.a400
             Cost        19
             Port        3 (FastEthernet0/3)
             Hello Time   2 sec   Max Age 20 sec   Forward Delay 15 sec

```

```

Bridge ID    Priority    32769 (priority 32768 sys-id-ext 1)
             Address     000a.b701.f700
             Hello Time   2 sec   Max Age 20 sec   Forward Delay 15 sec
             Aging Time   300

```

Interface Name	Port ID Prio.Nbr	Cost	Sts	Designated Cost	Bridge ID	Port ID Prio.Nbr
Fa0/1	128.1	19	FWD	19 32769	000a.b701.f700	128.1
Fa0/2	128.2	19	FWD	19 32769	000a.b701.f700	128.2
Fa0/3	128.3	19	FWD	0 32769	0009.430f.a400	128.1
Fa0/4	128.4	19	BLK	0 32769	0009.430f.a400	128.2

Console into ALSwitch1. Issue the **show spanning-tree** command.

```
ALSwitch1#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    32769
             Address     0009.430f.a400
             Cost        38
             Port        1 (FastEthernet0/1)
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769 (priority 32768 sys-id-ext 1)
             Address     000a.8afc.dd80
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  300

Interface          Port ID          Designated          Port ID
Name               Prio.Nbr         Cost Sts            Cost Bridge ID        Prio.Nbr
-----
Fa0/1              128.1            19 FWD              19 32769 000a.b701.f700 128.1
Fa0/2              128.2            19 BLK              19 32769 000a.b701.f700 128.2
```

Console into ALSwitch2. Issue the **show spanning-tree** command.

```
ALSwitch2#show spanning-tree
VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    32769
             Address     0009.430f.a400
             This bridge is the root
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    32769 (priority 32768 sys-id-ext 1)
             Address     0009.430f.a400
             Hello Time  2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time  300

Interface          Port ID          Designated          Port ID
Name               Prio.Nbr         Cost Sts            Cost Bridge ID        Prio.Nbr
-----
Fa0/1              128.1            19 FWD              0 32769 0009.430f.a400 128.1
Fa0/2              128.2            19 FWD              0 32769 0009.430f.a400 128.2
```

Notice that between two switches, one of the two ports will be set to blocking. Blocking could occur on the access layer switch or the distribution layer switch. If all ports have their default setting, then the higher MAC address of the two ports is set to blocking.

The switch port is in blocking state because it detected two links between the same switches. This would result in a bridge loop if the switch logically disables one link.

After reviewing the spanning-tree output, answer the following questions:

2. Which switch is the root of the spanning-tree?

3. How can the root switch be identified?

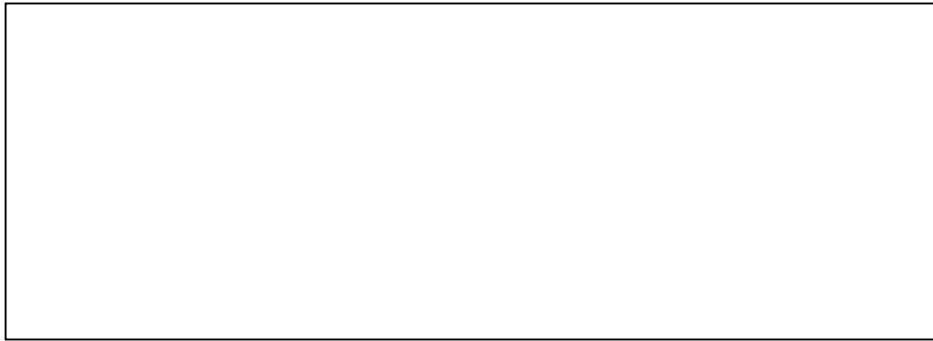
4. Why was that switch selected as the root?

5. What caused the one port to be in blocking state over another?

6. What caused one link to be blocked over another?

Step 4

Create a diagram of the spanning-tree topology for VLAN 01. With Cisco Catalyst switches, there is a different spanning-tree state for each VLAN. Identify the root bridge, root ports, and designated ports.



In this lab the default operation of spanning tree was observed. Since no bridge priorities were specified, the switch with the lowest MAC address was elected as the root. Since no link priorities were changed, the link with the lowest cost was chosen as the active link. If costs were equal, then the tie was broken by the lowest port number.

In a later lab the default STP behavior will be modified so that spanning tree will work according to the specifications.