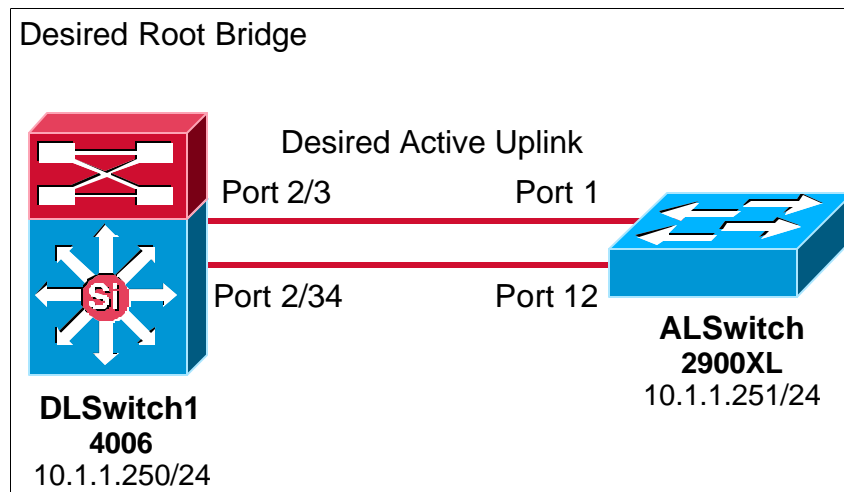


Lab 5.2.5.2: Spanning-Tree - Root and Port Priorities



Objective:

Modify the default behavior of spanning-tree by using root bridge and port priorities.

Scenario:

You are not happy with the way spanning-tree is working. Your access layer switch has become your root spanning-tree switch, and you would like your distribution layer switch to serve this function. You also want to use port priorities to control which links are elected as the active links.

In this lab, you will learn to control the operation of spanning-tree through priorities.

Lab Tasks:

1. Use the same configuration from the previous lab - 5.2.5.1 (Spanning-Tree Default Behavior). Make sure your uplink cables are connected as shown in the graphic above.
2. Look at the spanning-tree output:

```
DLSwitch1> (enable) sh spantree
VLAN 1
Spanning tree enabled
Spanning tree type          ieee

Designated Root             00-02-4b-21-36-c0
Designated Root Priority     49152
Designated Root Cost         3019
Designated Root Port        2/3
Root Max Age      20 sec    Hello Time 2   sec    Forward Delay 15 sec

Bridge ID MAC ADDR          00-02-4b-59-40-00
Bridge ID Priority           49152
Bridge Max Age 20 sec    Hello Time 2   sec    Forward Delay 15 sec

Port              Vlan Port-State      Cost   Priority Portfast   Channel_id
-----
2/3              1    forwarding    3019      32 disabled      0
```

(Other output deleted)

```
2/34          1    blocking          3019          32 disabled    0
```

```
ALSwitch>sh spanning-tree
```

```
Spanning tree 1 is executing the IEEE compatible Spanning Tree protocol
  Bridge Identifier has priority 49152, address 0002.4b21.36c0
  Configured hello time 2, max age 20, forward delay 15
  We are the root of the spanning tree
  Topology change flag not set, detected flag not set, changes 5
  Times: hold 1, topology change 35, notification 2
         hello 2, max age 20, forward delay 15
  Timers: hello 0, topology change 0, notification 0
  Fast uplink switchover is enabled
```

```
Interface Fa0/1 (port 13) in Spanning tree 1 is FORWARDING
  Port path cost 3019, Port priority 128
  Designated root has priority 49152, address 0002.4b21.36c0
  Designated bridge has priority 49152, address 0002.4b21.36c0
  Designated port is 13, path cost 0
  Timers: message age 0, forward delay 0, hold 0
  BPDU: sent 2089, received 45
```

```
Interface Fa0/12 (port 25) in Spanning tree 1 is FORWARDING
  Port path cost 3019, Port priority 128
  Designated root has priority 49152, address 0002.4b21.36c0
  Designated bridge has priority 49152, address 0002.4b21.36c0
  Designated port is 25, path cost 0
  Timers: message age 0, forward delay 0, hold 0
  BPDU: sent 3222, received 42
```

Currently the ALSwitch (2900) is our root bridge and the active link between the two switch is the link running from port 2/3 to port 1.

Modify this behavior so that the DLSwitch1 (4000) becomes the root bridge and the link from port 2/34 to port 12 becomes the active link between the two switches.

3. Setting the root bridge priority:

Remember that the root bridge priority is determined by selecting the switch with the lower BID (Bridge ID). The BID consists of the root bridge priority and the MAC address assigned to that switch. The root bridge priority has a default setting of 49152. The current root bridge is the ALSwitch because it has a BID of 49152-0002.4b21.36c0. This is not a real number. The root bridge priority is expressed in decimal and the MAC address is expressed in HEX. It would be a very large number if we had to convert the MAC address to decimal.

The root bridge priority is at the beginning of the BID. The bridge priority is also a very large number. It will always be the root bridge priority that determines the length of the BID because the MAC address is a fixed length. Therefore, if we set a bridge priority of 1 on the DLSwitch1 and a bridge priority of 100 on the ALSwitch, the DLSwitch1 will always have the smaller BID regardless of the MAC address.

Set the bridge priority to 1 on DLSwitch1:

```
DLSwitch1> (enable) set spantree priority 1
Spanntree 1 bridge priority set to 1.
```

Immediately after issuing the above command, check to see who is the root of the spanning-tree now:

```

DLSwitch1> (enable) sh spantree
VLAN 1
Spanning tree enabled
Spanning tree type          ieee

Designated Root              00-02-4b-59-40-00
Designated Root Priority      1
Designated Root Cost          0
Designated Root Port          1/0
Root Max Age    20 sec    Hello Time 2   sec    Forward Delay 15 sec

Bridge ID MAC ADDR            00-02-4b-59-40-00
Bridge ID Priority              1
Bridge Max Age 20 sec    Hello Time 2   sec    Forward Delay 15 sec

```

You can see that the root priority is now set to 1, and that the designated root's MAC address matches the bridge ID MAC address (listed further down in the output). This means that we are now the root bridge.

Just to make sure, examine things on ALSwitch:

```

ALSwitch#sh spanning-tree

Spanning tree 1 is executing the IEEE compatible Spanning Tree
protocol
  Bridge Identifier has priority 49152, address 0002.4b21.36c0
  Configured hello time 2, max age 20, forward delay 15
  Current root has priority 1, address 0002.4b59.4000
  Root port is 25, cost of root path is 3019
  Topology change flag not set, detected flag not set, changes 3
  Times:  hold 1, topology change 35, notification 2
           hello 2, max age 20, forward delay 15
  Timers: hello 0, topology change 0, notification 0
  Fast uplink switchover is enabled

```

Notice that it no longer tells us that we are the root bridge. It does give the MAC address and priority of the current root bridge.

Set the bridge priority to 100 on ALSwitch:

```

ALSwitch(config)#spanning-tree priority 100

```

Check again with the **show spanning-tree** command to make sure the priority has changed:

```

ALSwitch#sh spanning-tree

Spanning tree 1 is executing the IEEE compatible Spanning Tree
protocol
  Bridge Identifier has priority 100, address 0002.4b21.36c0
  Configured hello time 2, max age 20, forward delay 15
  Current root has priority 1, address 0002.4b59.4000
  Root port is 25, cost of root path is 3019
  Topology change flag not set, detected flag not set, changes 3

```

```
Times: hold 1, topology change 35, notification 2
      hello 2, max age 20, forward delay 15
Timers: hello 0, topology change 0, notification 0
Fast uplink switchover is enabled
```

Notice that the bridge priority is now 100 and we have successfully changed the root bridge to the DLSwitch1.

4. Now we want to force the uplink between ports 2/34 and port 12 to be the active link.

First, check the status of the current link:

On DLSwitch1:

```
DLSwitch1> (enable) sh spantree
VLAN 1
Spanning tree enabled
Spanning tree type          ieee

Designated Root            00-02-4b-59-40-00
Designated Root Priority    1
Designated Root Cost        0
Designated Root Port        1/0
Root Max Age 20 sec  Hello Time 2 sec  Forward Delay 15 sec

Bridge ID MAC ADDR          00-02-4b-59-40-00
Bridge ID Priority          1
Bridge Max Age 20 sec  Hello Time 2 sec  Forward Delay 15 sec

Port      Vlan Port-State      Cost  Priority Portfast  Channel_id
-----
2/3       1    forwarding    3019    32 disabled    0
2/34      1    forwarding    3019    32 disabled    0
```

Notice that both ports are forwarding. This is because DLSwitch1 is now the root of our spanning-tree. The backup link is blocked at the other (non-root) end.

On ALSwitch:

```
ALSwitch#sh spanning-tree int fa0/1
Interface Fa0/1 (port 13) in Spanning tree 1 is FORWARDING
Port path cost 3019, Port priority 128
Designated root has priority 1, address 0002.4b59.4000
Designated bridge has priority 1, address 0002.4b59.4000
Designated port is 67, path cost 0
Timers: message age 2, forward delay 0, hold 0
BPDU: sent 2301, received 447
```

```
ALSwitch#sh spanning-tree int fa0/12
Interface Fa0/12 (port 25) in Spanning tree 1 is BLOCKING
Port path cost 3019, Port priority 128
Designated root has priority 1, address 0002.4b59.4000
Designated bridge has priority 1, address 0002.4b59.4000
Designated port is 98, path cost 0
Timers: message age 2, forward delay 0, hold 0
BPDU: sent 2295, received 466
```

As predicted, the higher number port, fa0/12, is the port that is blocking. Both links have port costs of 3019.

How is this number determined?

We will now configure port priorities to force the uplink from port 2/34 to port 2 to become the active uplink. Just like the bridge priority, the lower the priority the better when it comes to selecting which link will become the active link. We will set the link that is currently blocked to a priority of 1 and the other link to a priority of 100 to make it the blocked link.

On DLSwitch1:

```
DLSwitch1> (enable) set spantree portcost 2/34 1  
Spantree port 2/34 path cost set to 1.  
DLSwitch1> (enable) set spantree portcost 2/3 100  
Spantree port 2/3 path cost set to 100.
```

Check on ALSwitch to see if anything changed yet.

Did anything change?

On ALSwitch:

```
ALSwitch(config-if)#int fa0/1  
ALSwitch(config-if)#spanning-tree cost 100  
ALSwitch(config-if)#int fa0/12  
ALSwitch(config-if)#spanning-tree cost 1
```

You may see a message like this:

```
01:42:27: %SPANTREE_FAST-6-PORT_FWD_UPLINK: Port FastEthernet0/12 in vlan 1 moved to Forwarding.
```

Now check your links again:

```
ALSwitch#sh spanning-tree int fa0/1  
Interface Fa0/1 (port 13) in Spanning tree 1 is BLOCKING  
  Port path cost 100, Port priority 128  
  Designated root has priority 1, address 0002.4b59.4000  
  Designated bridge has priority 1, address 0002.4b59.4000  
  Designated port is 67, path cost 0  
  Timers: message age 1, forward delay 0, hold 0  
  BPDU: sent 2301, received 834  
ALSwitch#sh spanning-tree int fa0/12  
Interface Fa0/12 (port 25) in Spanning tree 1 is FORWARDING  
  Port path cost 1, Port priority 128  
  Designated root has priority 1, address 0002.4b59.4000  
  Designated bridge has priority 1, address 0002.4b59.4000  
  Designated port is 98, path cost 0  
  Timers: message age 2, forward delay 0, hold 0  
  BPDU: sent 2296, received 830
```

We were successful at forcing the link in port 12 to become the active uplink. The port priorities have changed. They are now set at 100 and at 1.