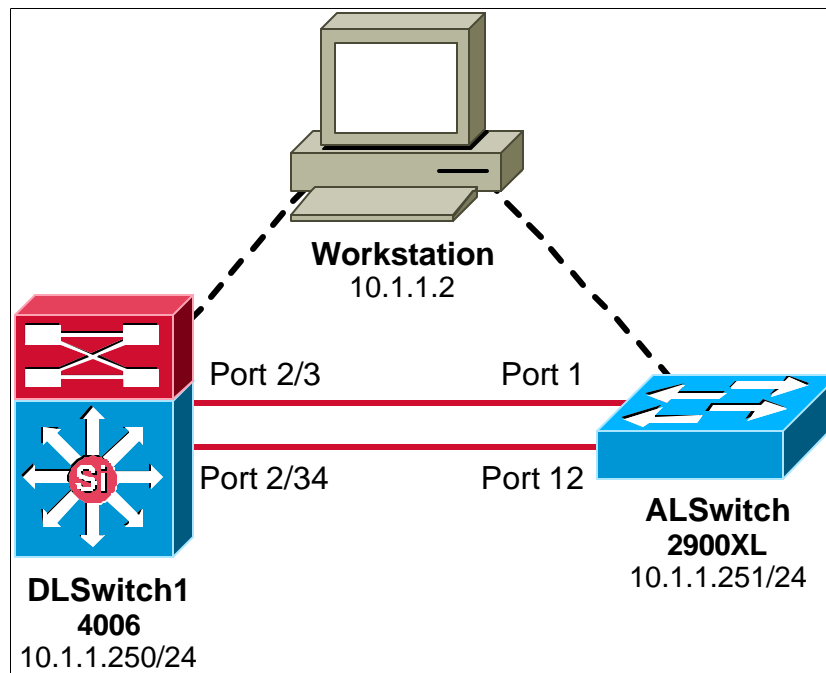


Lab 5.5.7: PortFast/UplinkFast/BackboneFast



Objective:

Use PortFast, UplinkFast, and BackboneFast to improve the time it takes for the spanning-tree algorithm to configure the mode of the port.

Scenario:

You have just implemented a new redundant switched network. You start receiving calls from users reporting they can't log into their NT domain. You discover their PCs are not getting an IP address from the DHCP server. After further investigation, you realize that when a workstation is powered on it takes about 30 seconds for the port to become active. This means they are booting up faster than the switch port can be configured. In other words, while the PC is requesting a DHCP address, the switch port is still going through the listening and learning modes.

You also noticed that when the active uplink between your two switches is broken, it takes the redundant link the same 30 seconds to complete the spanning-tree process before bringing up the backup (blocked) link. This results in a network outage for your users.

We will use the PortFast, UplinkFast, and BackboneFast commands to assist spanning-tree in bringing these convergence times down.

Lab Tasks:

1. First, configure your 4000 switch to the diagram above. You can skip this step if you already have the Lab 3.1.3 (4000 initial setup) configured.

```
Console> enable
Console> (enable) set system name DLSwitch1
```

System name set.
DLSwitch1> (enable)

DLSwitch1> (enable) **set password**
Enter old password: (Because you do not currently have a password, just hit enter)
Enter new password:
Retype new password:
Password changed.

DLSwitch1> (enable) **set enablepass**
Enter old password: (Because you do not currently have a password, just hit enter)
Enter new password:
Retype new password:
Password changed.

DLSwitch1> (enable) **set interface sc0 10.1.1.250 255.255.255.0**
DLSwitch1> (enable) **set interface sc0 1**

2. Next, configure your 2900 switch to the diagram above. You can skip this step if you already have the Lab 3.2.3 (2900 initial setup) configured.

Switch>**enable**
Switch#

Set the switch name.

Switch#**config terminal**
Switch(config)#**host ALSwitch**
ALSwitch(config)#

ALSwitch(config)#**enable password class**
ALSwitch(config)#**line con 0**
ALSwitch(config-line)#**login**
ALSwitch(config-line)#**password cisco**
ALSwitch(config-line)#**line vty 0 15**
ALSwitch(config-line)#**login**
ALSwitch(config-line)#**password cisco**

ALSwitch(config)#**interface vlan 1**
ALSwitch(config-if)#**ip address 10.1.1.251 255.255.255.0**

3. Connect your uplink cables between the two switches. Remember to use crossover cables.

Connect an uplink cable from port 2/3 on DLSwitch1 to port 1 on ALSwitch.

Connect an uplink cable from port 2/34 on DLSwitch1 to port 12 on ALSwitch.

You should notice that no matter which order you install the uplinks, the cable connecting ports 2/3 to port 1 will become the active link.

Depending on which side of the link is blocking (the 2900 or the 4000) you may have a hard time reading the lights. The 2900 will change its light to a very distinct yellow color. The Catalyst 4000 on the other hand has very small port lights. If the 4000 side of the link chooses to block the link, you may have a hard time viewing the lights. You can always use

the **show spantree** command on the 4000 to view the port status:

```
Console> sh spantree
VLAN 1
Spanning tree enabled
Spanning tree type          ieee

Designated Root              00-02-4b-21-36-c0
Designated Root Priority      32768
Designated Root Cost          19
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             32768
Bridge Max Age 20 sec  Hello Time 2 sec  Forward Delay 15 sec

Port              Vlan Port-State      Cost  Priority Portfast  Channel_id
-----
... Output Deleted
2/3                1    forwarding        19      32 disabled    0
... Output Deleted
2/34               1    blocking          19      32 disabled    0
```

Notice that port 2/34 is in a blocking state.

4. Now let's observe the default behavior of spanning-tree. This is similar to what we did in a previous lab.

First, connect a workstation to any of the switch ports on either switch. Power On your workstation. You will notice that once the NIC card is initialized by the operating system, the port will turn yellow. The port is now active, but starting the spanning tree process. Watch the PC boot up and watch the color of the link light. You should observe that the PC makes it through most of the startup before the link turns green and active. This is where DHCP can miss its opportunity to get an IP address while spanning-tree is listening/learning.

You should observe that it takes about 30 seconds for a new device to become active in a port.

Now let's watch what happens when one of our uplinks status changes.

Remove the active uplink cable (should be the port 2/3 to port 1 cable). Monitor the backup uplink ports. Watch the lights (if the 2900 is indicating a yellow blocked port) or the **show spantree** command on the 4000 (if the 4000 has the blocked end of the link).

You should observe that it takes about 30 seconds for the backup uplink ports to become active.

Now lets work to try and reduce the amount of time spanning-tree needs to get these ports active.

5. Configuring PortFast:

PortFast can be used to force a port to skip all of the spanning-tree steps and go right to forwarding. It will continue to listen for a loop and if one exists, place the port into blocking mode. You do run the risk of opening your network up to spanning-tree loops when using PortFast. Therefore, it is recommended that you only use PortFast on ports that you know will be used by end user devices and not other layer 2 networking equipment link hubs,

concentrators, bridges and switches.

PortFast must be configured on each port individually. The Catalyst 4000 makes this easy as we can specify a range of ports when enabling it. On the 2900 you must turn it on each port individually.

6. Configuring PortFast on the Catalyst 4000:

```
DLSwitch1> (enable) set spanntree portfast 2/4-2/33 enable
```

Warning: Spanntree port fast start should only be enabled on ports connected to a single host. Connecting hubs, concentrators, switches, bridges, etc. to a fast start port can cause temporary spanning tree loops. Use with caution.

Spanntree ports 2/4-33 fast start enabled.

We were able to set PortFast on all of our remaining ports with one command. Notice that we skipped ports 2/3 and 2/34 because we are using these ports as uplinks. Also notice the warning that was issued informing us of the problems that PortFast can cause.

7. Verifying PortFast on the Catalyst 4000:

Remove your workstation from the switch and plug it into any 10/100 port on the Catalyst 4000.

You should see it go active right away. On the Catalyst 4000, refer to the **show spanntree** command to verify this.

8. Configuring PortFast on the Catalyst 2900:

```
ALSwitch(config-if)#int fa0/3  
ALSwitch(config-if)#spanning-tree portfast  
ALSwitch(config-if)#int fa0/4  
ALSwitch(config-if)#spanning-tree portfast  
ALSwitch(config-if)#int fa0/5  
ALSwitch(config-if)#spanning-tree portfast  
(Complete for ports fa0/6 through fa0/11)
```

Remember not to configure PortFast on ports fa0/1 and fa0/12 as they are the port being used as uplinks.

9. Verifying PortFast on the Catalyst 2900:

Remove your workstation from the switch and plug it into any port on the Catalyst 2900.

You should see it go active right away. The Catalyst 2900 indicator light goes green immediately without the yellow "learning/listening" period.

Use the **show spanning-tree** command to check what state each link is in:

```
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
```

10. Configuring UplinkFast:

Now we want to speed up the process of switching over from the active uplink to the blocked uplink in the event that the active uplink fails.

The UplinkFast command is a command that affects all VLANs and ports. There is no way to issue UplinkFast on just one port or VLAN.

On the Catalyst 4000:

```
DLSwitch1> (enable) set spantree uplinkfast enable
VLANs 1-1005 bridge priority set to 49152.
The port cost and portvlancost of all ports set to above 3000.
Station update rate set to 15 packets/100ms.
uplinkfast all-protocols field set to off.
uplinkfast enabled for bridge.
```

On the ALSwitch (Catalyst 2900):

```
ALSwitch(config)#spanning-tree uplinkfast
```

11. Verifying UplinkFast:

Now remove the active uplink cable. Watch the lights and/or the **show spantree** command on DLSwitch1 (Catalyst 4000). You should see the blocked uplink come active much quicker than the 30 seconds that it took without the **spanning-tree uplinkfast** command.

How long did it take for the blocked link to become active?

12. Configuring Backbone Fast:

Backbone Fast modifies how the switch evaluates spanning-tree rules when BPDUs are received from a switch that is identified as both the root bridge and designated bridge. Under normal spanning-tree rules the BPDUs are ignored for the maximum aging time.

Backbone Fast modifies these rules and tells the switch to ignore these timers. If a uplink changes and there is another backup link, Backbone Fast will cause the switch to move the backup link through the listening/learning modes and immediately to the forwarding mode. If the switch determines that there is no longer a link to the other switch, it immediately expires the maximum aging timer and removes that link.

This results in much faster convergence when you have multiple links to your switched network.

This command is only supported on the Catalyst 4000 series switch.

```
DLSwitch1> (enable) set spantree backbonefast enable  
Backbonefast enabled for all VLANs.
```

13. Verifying Backbone Fast operation:

```
DLSwitch1> (enable) sh spantree backbonefast  
Backbonefast is enabled.
```