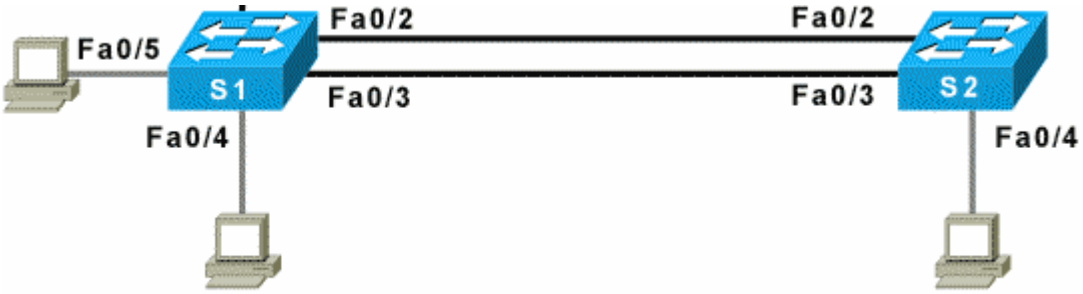
Spanning Tree Lab



Please note: PCs are not implemented in Basic Switch Pod Version 1.

Objective

- Create a basic switch configuration and verify it.
- Determine which switch is selected as the root switch with the factory default settings.
- Force the other switch to be selected as the root switch.

Step 1: Getting familiar with Switch IOS

If this is your first time configuring the switch, you will notice that the Switch IOS is almost identical to Router IOS.

Configure the hostname and console information for each switch.

```
Switch>ena
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname Switch-1
Switch-1(config)#line con 0
Switch-1(config-line)#logging synchronous
Switch-1(config-line)#exec-timeout 0 0
Switch-1(config-line)#end
Switch-1#
```

```
Switch>ena
Switch#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname Switch-2
Switch-2(config)#line con 0
Switch-2(config-line)#logging synchronous
Switch-2(config-line)#exec-timeout 0 0
Switch-2(config-line)#end
Switch-2#
```

Verify the changes using **show running-config**.

```
Switch-1#show running-config
Building configuration...

Current configuration : 1495 bytes
!
version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Switch-1
!
<Output omitted>


Switch-2#show running-config
Building configuration...

Current configuration : 1201 bytes
!
version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Switch-2
!
<Output omitted>
```

Step 2: Configure an IP Address and Subnet Mask for Management Purposes

An IP Address can be configured on a Cisco Layer 2 switch. This IP address, subnet mask and default gateway is only for purposes of managing the switch and has nothing to do with normal operations of switching Ethernet frames. This information is used so that network administrators can telnet into the switch instead of accessing it via the console port.

```
Switch-1#show interface vlan 1
Vlan1 is administratively down, line protocol is down
  Hardware is CPU Interface, address is 0011.5cd1.bc00 (bia 0011.5cd1.bc00)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
<Output omitted>
```

Now, configure the IP address for the switch. This is done using the interface VLAN 1. VLANs will be discussed later.

```
Switch-1(config)#interface vlan 1
Switch-1(config-if)#ip address 192.168.1.1 255.255.255.0
Switch-1(config-if)#no shutdown
Switch-1(config-if)#end
```

Notice that the IP address and subnet mask are now displayed.

```
Switch-1#show interface vlan 1
Vlan1 is up, line protocol is up
  Hardware is CPU Interface, address is 0011.5cd1.bc00 (bia 0011.5cd1.bc00)
  Internet address is 192.168.1.1/24
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     182 packets input, 31162 bytes, 0 no buffer
     Received 0 broadcasts (0 IP multicast)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     4992 packets output, 0 bytes, 0 underruns
     0 output errors, 3 interface resets
     0 output buffer failures, 0 output buffers swapped out
Switch-1#
```

```
Switch-1#show ip interface brief
Interface                  IP-Address      OK? Method Status                Protocol
Vlan1                      192.168.1.1     YES manual up                    up
```

Configure passwords for telnet access.

```
Switch-1(config)#enable secret class
Switch-1(config)#line vty 0 15
Switch-1(config-line)#password cisco
Switch-1(config-line)#login
```

Configure the IP address and telnet access for Switch-2.

```
Switch-2(config)#interface vlan 1
Switch-2(config-if)#ip address 192.168.1.2 255.255.255.0
Switch-2(config-if)#no shutdown
Switch-2(config-if)#exit
Switch-2(config)#enable secret class
Switch-2(config)#line vty 0 15
Switch-2(config-line)#password cisco
Switch-2(config-line)#login
```

```
Switch-2#ping 192.168.1.1
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/3/4 ms
Switch-2#
```

Note: The first ping timed-out waiting for the ARP Reply.

Step 3: Getting more familiar with Switch IOS

Familiarize yourself with the following commands.

```
Switch-1#show flash

Directory of flash:/

    2  -rwx     2980731   Mar 01 1993 00:03:31  c2950-i6q4l2-mz.121-
19.EA1c.bin
    3  -rwx         286   Jan 01 1970 00:00:21  env_vars
    4  -rwx        1495   Mar 01 1993 00:06:12  config.text
    5  -rwx           5   Mar 01 1993 00:06:12  private-config.text
    7  -rwx         110   Mar 01 1993 00:01:58  info
    8  drwx        2432   Mar 01 1993 00:04:58  html
   85  -rwx         110   Mar 01 1993 00:05:01  info.ver

7741440 bytes total (1758720 bytes free)

Switch-1#show version
Cisco Internetwork Operating System Software
IOS (tm) C2950 Software (C2950-I6Q4L2-M), Version 12.1(19)EA1c, RELEASE
SOFTWARE (fc2)
Copyright (c) 1986-2004 by cisco Systems, Inc.
Compiled Mon 02-Feb-04 23:29 by yenanh
Image text-base: 0x80010000, data-base: 0x8058A000

ROM: Bootstrap program is C2950 boot loader

Switch-1 uptime is 20 minutes
System returned to ROM by power-on
System image file is "flash:/c2950-i6q4l2-mz.121-19.EA1c.bin"

cisco WS-C2950-24 (RC32300) processor (revision P0) with 20808K bytes of
memory.
Processor board ID FOC0824X3ME
Last reset from system-reset
Running Standard Image
24 FastEthernet/IEEE 802.3 interface(s)

32K bytes of flash-simulated non-volatile configuration memory.
Base ethernet MAC Address: 00:11:5C:D1:BC:00
Motherboard assembly number: 73-5781-13
Power supply part number: 34-0965-01
Motherboard serial number: FOC08250BXS
Power supply serial number: DAB08178H4C
Model revision number: P0
Motherboard revision number: A0
Model number: WS-C2950-24
System serial number: FOC0824X3ME
Configuration register is 0xF
```

Step 4: Examine MAC-Address-Tables and CDP

```
Switch-1#show mac-address-table
          Mac Address Table
-------------------------------------------

Vlan    Mac Address       Type        Ports
----    -----------       --------    -----
 All    0011.5cd1.bc00    STATIC      CPU
 All    0100.0ccc.cccc    STATIC      CPU
 All    0100.0ccc.cccd    STATIC      CPU
 All    0100.0cdd.dddd    STATIC      CPU
   1    0013.6012.42c2    DYNAMIC     Fa0/2
   1    0013.6012.42c3    DYNAMIC     Fa0/3
Total Mac Addresses for this criterion: 6
Switch-1#
```

The MAC addresses shown in Switch-1's MAC-Address-Table are due to CDP packets sent by Switch-2. This can be somewhat confusing. On Cisco switches, there is a MAC address assigned to each port and used by CDP (Cisco Discovery Protocol). Later, we will see that there is another MAC address which is assigned to each switch and is used by Spanning Tree Protocol (STP) to uniquely identify the switch. Both the MAC address used by STP and the MAC addresses used by CDP have nothing to do with the transparent switching operations (1. Learn by examining Source MAC address, 2. Forward by examining Destination MAC address) done by the switch in its normal Layer 2 operations. By default, CDP is enabled on Cisco switches. So, except for the frames leaned via CDP, the switch's MAC address table is empty until a frame enters the switch on one its interfaces (ports), which originated from a device (host, router, printer, etc.) on the LAN.

```
Switch-1#show cdp
Global CDP information:
        Sending CDP packets every 60 seconds
        Sending a holdtime value of 180 seconds
        Sending CDPv2 advertisements is  enabled
Switch-1#
```

```
Switch-1#show cdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone

Device ID        Local Intrfce     Holdtme    Capability  Platform  Port ID
Switch-2         Fas 0/3            146          S I      WS-C2950T-Fas 0/3
Switch-2         Fas 0/2            146          S I      WS-C2950T-Fas 0/2
Switch-1#
```

The command show cdp entry is useful when determining the IP address of a neighboring device. With the IP address of this device we could telnet to the device.

```
Switch-1#show cdp entry Switch-2
-------------------------
Device ID: Switch-2
Entry address(es):
  IP address: 192.168.1.2
Platform: cisco WS-C2950T-24,  Capabilities: Switch IGMP
Interface: FastEthernet0/3,  Port ID (outgoing port): FastEthernet0/3
Holdtime : 136 sec
```

```
Version :
Cisco Internetwork Operating System Software
IOS (tm) C2950 Software (C2950-I6Q4L2-M), Version 12.1(22)EA2, RELEASE
SOFTWARE (fc1)
Copyright (c) 1986-2004 by cisco Systems, Inc.
Compiled Sun 07-Nov-04 23:14 by antonino

advertisement version: 2
Protocol Hello:  OUI=0x00000C, Protocol ID=0x0112; payload len=27,
value=00000000FFFFFFFF010221FF00000000000000013601242C0FF0000
VTP Management Domain: ''
Native VLAN: 1
Duplex: full
Management address(es):
  IP address: 192.168.1.2

<Output omitted>
```

Step 5: Examining Interfaces

Examine Switch-1's FastEthernet 0/1 interface. Although this interface is connected to a router, this interface is "down" and "notconnect". Since we are not using the router in this lab, the router's interface is administratively shutdown and the switchport of Switch-1 displays the interface as "down".

```
Switch-1#show interface fa 0/1
FastEthernet0/1 is down, line protocol is down (notconnect)
  Hardware is Fast Ethernet, address is 0011.5cd1.bc01 (bia 0011.5cd1.bc01)
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Auto-duplex, Auto-speed
  input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input never, output 00:12:33, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     1 packets input, 64 bytes, 0 no buffer
     Received 0 broadcasts (0 multicast)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 0 multicast, 0 pause input
     0 input packets with dribble condition detected
     66 packets output, 7454 bytes, 0 underruns
     0 output errors, 0 collisions, 2 interface resets
     0 babbles, 0 late collision, 0 deferred
     0 lost carrier, 0 no carrier, 0 PAUSE output
     0 output buffer failures, 0 output buffers swapped out
Switch-1#
```

Examine Switch-1's FastEthernet 0/2 interface. This interface is connected to Switch -2, so the interface shows as "up" and "connected".

```
Switch-1#show interface fa 0/2
FastEthernet0/2 is up, line protocol is up (connected)
  Hardware is Fast Ethernet, address is 0011.5cd1.bc02 (bia 0011.5cd1.bc02)
  MTU 1500 bytes, BW 100000 Kbit, DLY 1000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA, loopback not set
  Keepalive set (10 sec)
  Full-duplex, 100Mb/s
  input flow-control is off, output flow-control is off
  ARP type: ARPA, ARP Timeout 04:00:00
  Last input 00:00:09, output 00:00:00, output hang never
  Last clearing of "show interface" counters never
  Input queue: 0/75/0/0 (size/max/drops/flushes); Total output drops: 0
  Queueing strategy: fifo
  Output queue: 0/40 (size/max)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     137 packets input, 14636 bytes, 0 no buffer
     Received 51 broadcasts (0 multicast)
     0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored
     0 watchdog, 51 multicast, 0 pause input
     0 input packets with dribble condition detected
     989 packets output, 70834 bytes, 0 underruns

Switch-1#
```

Step 5: Examining Spanning Tree Protocol Information

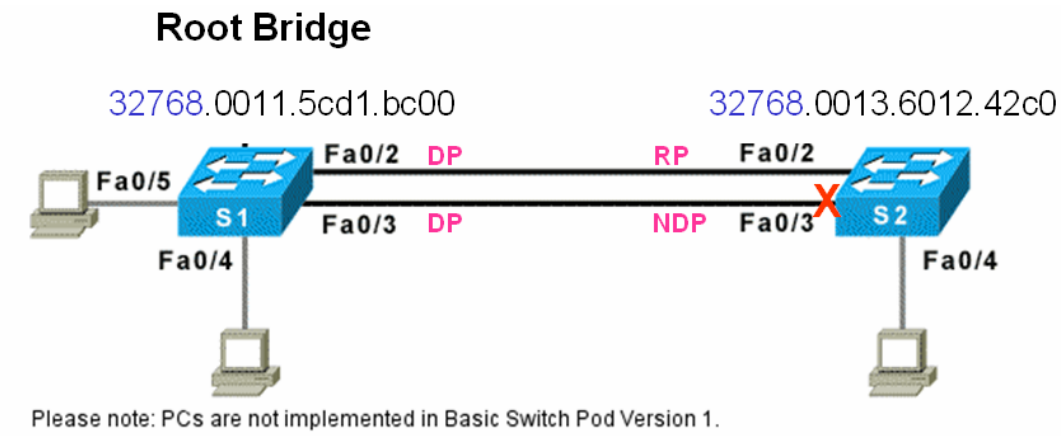
After the cables are connected and the switch detects the redundant links, spanning tree will be initiated. By default, spanning tree will run on every port. When a new link becomes active, the port will go through the Listening, Learning, and Forwarding states before it becomes active. During this period, 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.

Note: The actual priority value is one less than what is shown. The default priority is 32768, but show spanning-tree will display 32769, priority plus the System ID Extension of 1 (for VLAN 1). The System ID Extension is discussed in more detail in CIS 187, CCNP 3.

```
Switch-1#show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    32769
              Address     0011.5cd1.bc00
              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     0011.5cd1.bc00
              Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time 300

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/2            Desg FWD 19        128.2    P2p
Fa0/3            Desg FWD 19        128.3    P2p
Fa0/4            Desg FWD 100       128.4    Shr

Switch-1#


Switch-2#show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID     Priority    32769
              Address     0011.5cd1.bc00
              Cost        19
              Port        2 (FastEthernet0/2)
              Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID   Priority    32769  (priority 32768 sys-id-ext 1)
              Address     0013.6012.42c0
              Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
              Aging Time 300

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/2            Root FWD 19        128.2    P2p
Fa0/3            Altn BLK 19        128.3    P2p
Fa0/5            Desg FWD 100       128.5    Shr

Switch-2#
```

Examine the output and answer the following questions.

1. Which switch has the lower Priority? *Both are equal.*
2. Which switch has the lower MAC address? *Switch-1*
3. Which switch is the root switch? *Switch-1*
4. What is the priority of the root switch? *32768*
5. What is the bridge id of the root switch? 0011.5cd1.bc00
6. Which ports are forwarding on the root switch? *FastEthernet 0/2, 0/3, 0/4*
7. Which ports are blocking on the root switch? *None*
8. What is the priority of the non-root switch? *32768*
9. What is the bridge id of the non-root switch? *0013.6012.42c0*
10. Which ports are forwarding on the non-root switch? *FastEthernet 0/2 and 0/5*
11. Which ports are blocking on the non-root switch? *FastEthernet 0/3*



The switch with the lowest Bridge ID (BID) becomes the root bridge. The BID consists of the root bridge priority and the MAC address assigned to the switch. Since all switches default to a root bridge priority of 32768, the switch with the lowest MAC address becomes the Root Bridge.

The BID is not a real number. The root bridge priority is expressed in decimal form and the MAC address is expressed in HEX. The default bridge priority has a value of 32768. The current Root Bridge in the above sample output is Switch-1 because it has a lower MAC address. The root bridge priority is at the beginning of the BID.

Notice that between two switches, one of the two ports will be 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.

Switch-1 is the Root Switch (Bridge) and both of its ports become Designated Ports (DP). Switch-2 is the non-root bridge and must select which of its two ports will forward traffic to the root and which port will be in blocking state. Since both ports have the same port cost (100 Mbps ports), the port with the lower Port ID, Fa 0/2 will be elected as the Root Port, the port to forward traffic to the root. The other port, Fa 0/3 will be the Non-Designated Port and be put in blocking state. This is discussed further in CIS 187, CCNP 3.

Step 6: Modifying the Root Bridge

It has been decided by the network administrator to modify which switch is the root switch and to make Switch-2 the root. The reasons are not obvious in with this topology, but in a larger switched LAN, the root bridge is usually at the center of the LAN. This helps ensure the most efficient use of links and the best paths between switches. This is also susceptible to design issues and is discussed further in CIS 187, CCNP 3.

Configure Switch-2 as the root switch. The switch with the lowest BID becomes the root. This is done by lowering the priority on that switch, below the default of 32768.

There are two ways to lower the priority on Switch-2 to make it the Root Bridge

```
Switch-2(config)#spanning-tree vlan 1 root primary
 or
Switch-2(config)#spanning-tree vlan 1 priority 4096
```

The **spanning-tree vlan 1 priority 4096** command lowers the priority from 32768 to 4096, thus making it the root switch. The **spanning-tree vlan 1 root primary** command lowers the priority to 24576 (on a 2950 switch), thus making it the root switch.

Use **spanning-tree vlan 1 root primary** command to configure Switch-2 as the root switch.

```
Switch-2(config)#spanning-tree vlan 1 root primary
```

```
Switch-2#show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
             Address     0013.6012.42c0
             This bridge is the root
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec

  Bridge ID  Priority    24577  (priority 24576 sys-id-ext 1)
             Address     0013.6012.42c0
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time 15

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/2            Desg FWD 19        128.2    P2p
Fa0/3            Desg FWD 19        128.3    P2p
Fa0/5            Desg FWD 100       128.5    Shr

Switch-2#
```

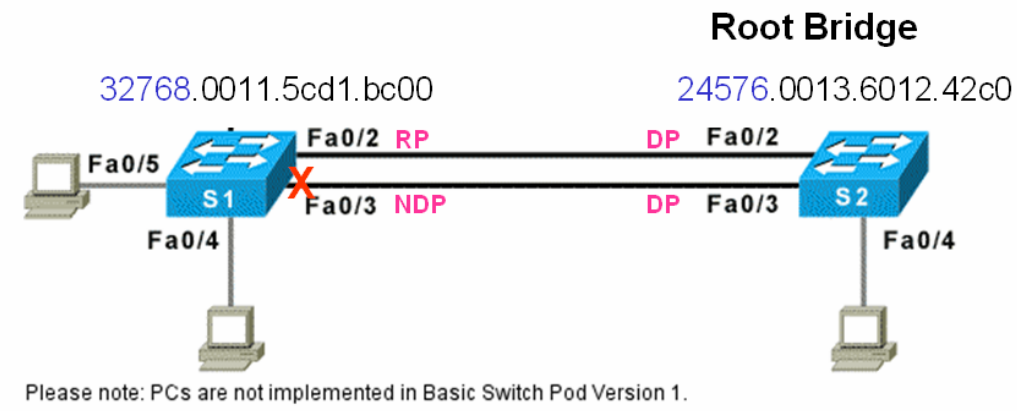
Notice that the non-root switch, Switch-1 has the blocking port.

```
Switch-1#show spanning-tree

VLAN0001
  Spanning tree enabled protocol ieee
  Root ID    Priority    24577
             Address     0013.6012.42c0
             Cost        19
             Port        2 (FastEthernet0/2)
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
```

```
  Bridge ID  Priority    32769  (priority 32768 sys-id-ext 1)
             Address     0011.5cd1.bc00
             Hello Time   2 sec  Max Age 20 sec  Forward Delay 15 sec
             Aging Time 300

Interface        Role Sts Cost      Prio.Nbr Type
---------------- ---- --- --------- -------- --------------------------------
Fa0/2            Root FWD 19        128.2    P2p
Fa0/3            Altn BLK 19        128.3    P2p
Fa0/4            Desg FWD 100       128.4    Shr

Switch-1#
```

Examine the output and answer the following questions.

1. Which switch has the lower Priority? *Switch-2.*
2. Which switch has the lower MAC address? *Switch-1*
3. Which switch is the root switch? *Switch-2*
4. What is the priority of the root switch? *24576*
5. What is the bridge id of the root switch? *0013.6012.42c0*
6. Which ports are forwarding on the root switch? *FastEthernet 0/2, 0/3, 0/5*
7. Which ports are blocking on the root switch? *None*
8. What is the priority of the non-root switch? *32768*
9. What is the bridge id of the non-root switch? *0011.5cd1.bc00*
10. Which ports are forwarding on the non-root switch? *FastEthernet 0/2 and 0/4*
11. Which ports are blocking on the non-root switch? *FastEthernet 0/3*



Even though FA 0/3 on Switch-1 is in blocking state, it still receives STP BPDUs and CDP packets.

```
Switch-1#show cdp neighbors
Capability Codes: R - Router, T - Trans Bridge, B - Source Route Bridge
                  S - Switch, H - Host, I - IGMP, r - Repeater, P - Phone

Device ID        Local Intrfce     Holdtme    Capability  Platform  Port ID
Switch-2         Fas 0/3            152          S I      WS-C2950T-Fas 0/3
Switch-2         Fas 0/2            152          S I      WS-C2950T-Fas 0/2
Switch-1#
```

Final Configs

```
Switch-1#show running-config
Building configuration...

Current configuration : 1587 bytes
!
version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Switch-1
!
enable secret 5
$1$Ih23$h3xsodc13w.3w8SNdALB20
!
ip subnet-zero
!
!
spanning-tree mode pvst
no spanning-tree optimize bpdu
transmission
spanning-tree extend system-id
!
!
interface FastEthernet0/1
 no ip address
!
interface FastEthernet0/2
 no ip address
!
interface FastEthernet0/3
 no ip address
!
interface FastEthernet0/4
 no ip address
!
interface FastEthernet0/5
 no ip address
!
interface FastEthernet0/6
 no ip address
!
interface FastEthernet0/7
 no ip address
!
interface FastEthernet0/8
 no ip address
!
interface FastEthernet0/9
 no ip address
!
interface FastEthernet0/10
 no ip address
!
interface FastEthernet0/11
 no ip address
!
interface FastEthernet0/12
 no ip address
!
interface FastEthernet0/13
 no ip address
```

```
Switch-2#show running-config
Building configuration...

Current configuration : 1331 bytes
!
version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Switch-2
!
enable secret 5
$1$xwUE$kqvkXOzBsXIhPQurnGFjE0
!
ip subnet-zero
!
!
!
spanning-tree mode pvst
no spanning-tree optimize bpdu
transmission
spanning-tree extend system-id
spanning-tree vlan 1 priority 24576
!
!
!
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
interface FastEthernet0/10
!
interface FastEthernet0/11
!
interface FastEthernet0/12
!
interface FastEthernet0/13
!
interface FastEthernet0/14
!
interface FastEthernet0/15
!
interface FastEthernet0/16
!
interface FastEthernet0/17
!
```

```
!
interface FastEthernet0/14
 no ip address
!
interface FastEthernet0/15
 no ip address
!
interface FastEthernet0/16
 no ip address
!
interface FastEthernet0/17
 no ip address
!
interface FastEthernet0/18
 no ip address
!
interface FastEthernet0/19
 no ip address
!
interface FastEthernet0/20
 no ip address
!
interface FastEthernet0/21
 no ip address
!
interface FastEthernet0/22
 no ip address
!
interface FastEthernet0/23
 no ip address
!
interface FastEthernet0/24
 no ip address
!
interface Vlan1
 ip address 192.168.1.1 255.255.255.0
 no ip route-cache
!
ip http server
!
!
line con 0
 exec-timeout 0 0
 logging synchronous
line vty 0 4
 password cisco
 login
line vty 5 15
 password cisco
 login
!
end

Switch-1#
```

```
interface FastEthernet0/18
!
interface FastEthernet0/19
!
interface FastEthernet0/20
!
interface FastEthernet0/21
!
interface FastEthernet0/22
!
interface FastEthernet0/23
!
interface FastEthernet0/24
!
interface GigabitEthernet0/1
!
interface GigabitEthernet0/2
!
interface Vlan1
 ip address 192.168.1.2 255.255.255.0
 no ip route-cache
!
ip http server
!
line con 0
 exec-timeout 0 0
 logging synchronous
line vty 0 4
 password cisco
 login
line vty 5 15
 password cisco
 login
!
!
end

Switch-2#
```