

# Configuring Spanning Tree

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This chapter describes how to configure the Spanning-Tree Protocol (STP) and the Uplink Fast Switchover and Backbone Fast Convergence features.

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**Note** For information on configuring the spanning-tree PortFast, UplinkFast, and BackboneFast enhancements, see Chapter 8, “Configuring Spanning-Tree PortFast, UplinkFast, and BackboneFast.”

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**Note** For complete syntax and usage information for the commands used in this chapter, refer to the *Command Reference* for your switch.

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This chapter consists of these sections:

- Understanding How Spanning-Tree Protocol Works on page 7-1
- Default Spanning-Tree Configuration on page 7-12
- Configuring Spanning-Tree on page 7-13

## Understanding How Spanning-Tree Protocol Works

STP is a link management protocol that provides path redundancy while preventing undesirable loops in the network. For an Ethernet network to function properly, only one active path must exist between two stations.

STP (IEEE 802.1D bridge protocol) is used on all Ethernet, Fast Ethernet, Gigabit Ethernet, and Token Ring port-based virtual LANs (VLANs). A single instance of STP runs on each configured VLAN (provided you do not manually disable STP). You can enable and disable STP on a per-VLAN basis.

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**Note** On a Catalyst 5000 series switch with a Supervisor Engine III and NetFlow Feature Card (NFFC) or NFFC II, you cannot enable or disable STP on a per-VLAN basis. STP must be enabled or disabled for all VLANs configured on the switch using the **set spantree {enable | disable} all** command.

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IEEE 802.1Q trunks impose some limitations on the trunking strategy for a network. In a network of Cisco switches connected through 802.1Q trunks, the switches maintain one instance of spanning tree for each VLAN allowed on the trunks. Non-Cisco 802.1Q switches maintain only one instance of spanning tree for all VLANs allowed on the trunks.

When you connect a Cisco switch to a non-Cisco device through an 802.1Q trunk, the Cisco switch combines the spanning tree instance of the native VLAN of the trunk with the spanning tree instance of the non-Cisco 802.1Q switch. However, all per-VLAN spanning tree information is maintained by Cisco switches separated by a cloud of non-Cisco 802.1Q switches. The non-Cisco 802.1Q cloud separating the Cisco switches is treated as a single trunk link between the switches.

When you create fault-tolerant internetworks, you must have a loop-free path between all nodes in a network. In STP, an algorithm calculates the best loop-free path throughout a switched network. Switches send and receive spanning-tree packets at regular intervals. The switches do not forward the packets, but use the packets to identify a loop-free path. The default configuration has STP enabled for all VLANs.

Multiple active paths between stations cause loops in the network. If a loop exists in the network, you might receive duplicate messages. When loops occur, some switches see stations on both sides of the switch. This condition confuses the forwarding algorithm and allows duplicate frames to be forwarded.

To provide path redundancy, STP defines a tree that spans all switches in an extended network. STP forces certain redundant data paths into a standby (blocked) state. If one network segment in the STP becomes unreachable, or if STP costs change, the spanning-tree algorithm reconfigures the spanning-tree topology and reestablishes the link by activating the standby path.

STP operation is transparent to end stations, which do not detect whether they are connected to a single LAN segment or a switched LAN of multiple segments.

## Election of the Root Switch

All switches in an extended LAN participating in STP gather information on other switches in the network through an exchange of data messages called Bridge Protocol Data Units (BPDUs). This exchange of messages results in the following actions:

- The election of a unique root switch for the stable spanning-tree network topology
- The election of a designated switch for every switched LAN segment
- The removal of loops in the switched network by placing redundant switch ports in a backup state

The STP root switch is the logical center of the spanning-tree topology in a switched network. All paths that are not needed to reach the root switch from anywhere in the switched network are placed in STP blocked mode. Table 7-1 describes the root switch variables that affect the entire spanning-tree performance.

**Table 7-1 STP Root Switch Parameters**

Variable	Description
Hello Time	Determines how often the switch broadcasts its hello message to other switches.
Maximum Age Timer	Measures the age of the received protocol information recorded for a port and ensures that this information is discarded when its age limit exceeds the value of the maximum age parameter recorded by the switch. The timeout value is the maximum age parameter of the switches.
Forward Delay Timer	Monitors the time spent by a port in the learning and listening states. The timeout value is the forward delay parameter of the switches.

BPDUs contain information about the transmitting switch and its ports, including switch and port Media Access Control (MAC) addresses, switch priority, port priority, and port cost. The STP uses this information to elect the root switch and root port for the switched network, as well as the root port and designated port for each switched segment.

### Bridge Protocol Data Units

The stable active topology of a switched network is determined by the following:

- The unique switch identifier (MAC address) associated with each switch
- The path cost to the root associated with each switch port
- The port identifier (MAC address) associated with each switch port

Each configuration BPDU contains the following minimal information:

- The unique identifier of the switch that the transmitting switch believes to be the root switch
- The cost of the path to the root from the transmitting port
- The identifier of the transmitting port

The switch sends configuration BPDUs to communicate and compute the spanning-tree topology. A MAC frame conveying a BPDU sends the switch group address to the destination address field. All switches connected to the LAN on which the frame is transmitted receive the BPDU. BPDUs are not directly forwarded by the switch, but the receiving switch uses the information in the frame to calculate a BPDU, and, if topology changes, initiate a BPDU transmission.

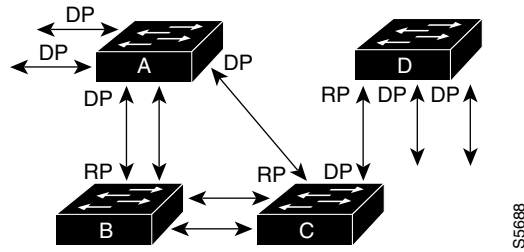
A BPDU exchange results in the following:

- One switch is elected as the root switch.
- The shortest distance to the root switch is calculated for each switch.
- A designated switch is selected. This is the switch closest to the root switch through which frames will be forwarded to the root.
- A port for each switch is selected. This is the port providing the best path from the switch to the root switch.
- Ports included in the STP are selected.

### Creating a Stable STP Topology

If all switches are enabled with default settings, the switch with the lowest MAC address in the network becomes the root switch. In Figure 7-1, Switch A is the root switch because it has the lowest MAC address. However, due to traffic patterns, number of forwarding ports, or line types, Switch A might not be the ideal root switch. By increasing the priority (lowering the numerical priority number) of the ideal switch so that it becomes the root switch, you force an STP recalculation to form a new, stable topology.

Figure 7-1 Configuring a Stable Topology



RP = Root Port  
DP = Designated Port

When the stable STP topology is based on default parameters, the path between source and destination stations in a switched network might not be the most ideal. For instance, connecting higher-speed links to a port that has a higher number than the current root port can cause a root-port change. The goal is to make the fastest link the root port.

For example, assume that port 2 on Switch B is a fiber-optic link, and that port 1 on Switch B (an unshielded twisted-pair [UTP] link) is the root port. Network traffic might be more efficient over the high-speed fiber-optic link. By changing the Port Priority parameter for port 2 to a higher priority (lower numerical value) than port 1, port 2 becomes the root port. The same change can occur by changing the Port Cost parameter for port 2 to a lower value than that of port 1.

## STP Port States

Propagation delays can occur when protocol information passes through a switched LAN. As a result, topology changes can take place at different times and at different places in a switched network. When a switch port transitions directly from nonparticipation in the stable topology to the forwarding state, it can create temporary data loops. Ports must wait for new topology information to propagate through the switched LAN before starting to forward frames. They must allow the frame lifetime to expire for frames that have been forwarded using the old topology.

Each port on a switch using STP exists in one of the following five states:

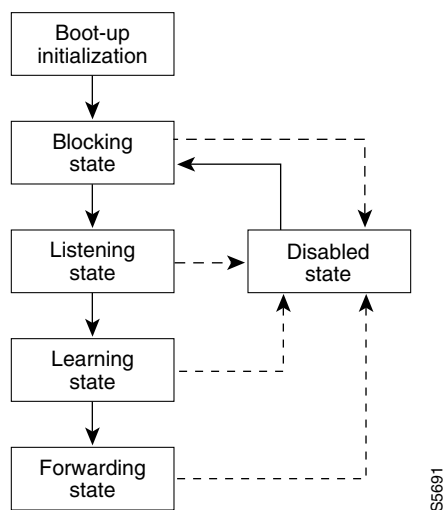
- Blocking
- Listening
- Learning
- Forwarding
- Disabled

A port moves through these five states as follows:

- From initialization to blocking
- From blocking to listening or to disabled
- From listening to learning or to disabled
- From learning to forwarding or to disabled
- From forwarding to disabled

Figure 7-2 illustrates how a port moves through the five states.

**Figure 7-2 STP Port States**



You can modify each port state by using management software. When you enable STP, every switch in the network goes through the blocking state and the transitory states of listening and learning at power up. If properly configured, each port stabilizes to the forwarding or blocking state.

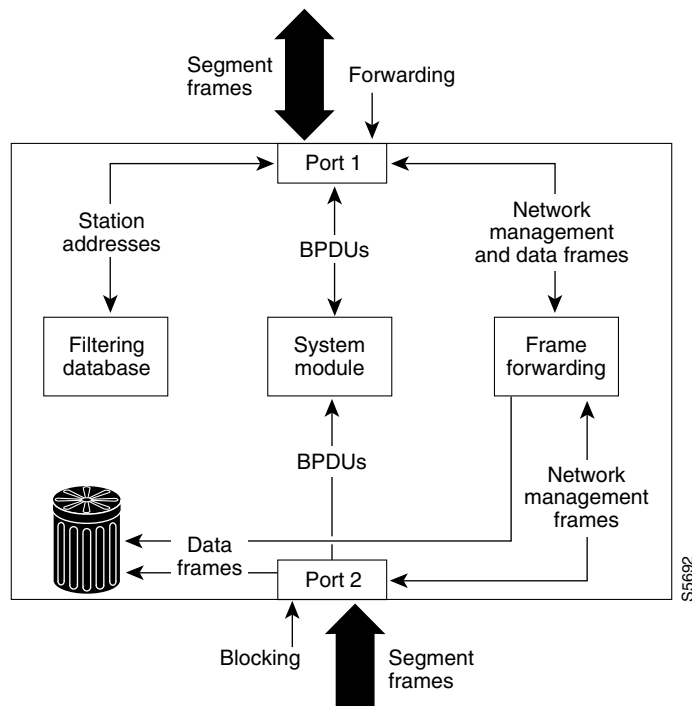
When the spanning-tree algorithm places a port in the forwarding state, the following occurs:

- The port is put into the listening state while it waits for protocol information that suggests it should go to the blocking state.
- The port waits for the expiration of a protocol timer that moves the port to the learning state.
- In the learning state, the port continues to block frame forwarding as it learns station location information for the forwarding database.
- The expiration of a protocol timer moves the port to the forwarding state, where both learning and forwarding are enabled.

## Blocking State

A port in the blocking state does not participate in frame forwarding, as shown in Figure 7-3. After initialization, a BPDU is sent to each port in the switch. A switch initially assumes it is the root until it exchanges BPDUs with other switches. This exchange establishes which switch in the network is really the root. If only one switch resides in the network, no exchange occurs, the forward delay timer expires, and the ports move to the listening state. A switch always enters the blocking state following switch initialization.

**Figure 7-3 Port 2 in Blocking State**



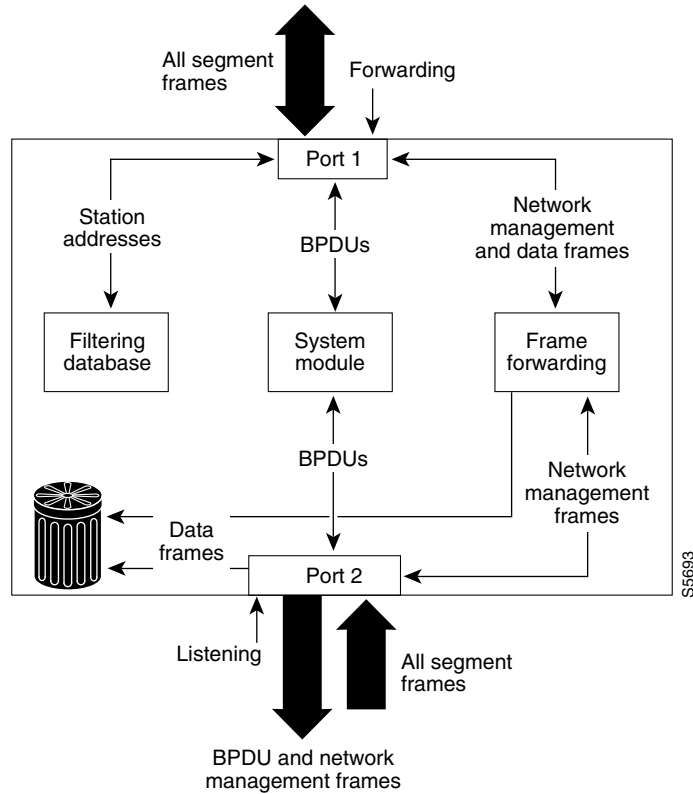
A port in the blocking state performs as follows:

- Discards frames received from the attached segment.
- Discards frames switched from another port for forwarding.
- Does not incorporate station location into its address database. (There is no learning on a blocking port, so there is no address database update.)
- Receives BPDUs and directs them to the system module.
- Does not transmit BPDUs received from the system module.
- Receives and responds to network management messages.

## Listening State

The listening state is the first transitional state a port enters after the blocking state. The port enters this state when STP determines that the port should participate in frame forwarding. Learning is disabled in the listening state. Figure 7-4 shows a port in the listening state.

**Figure 7-4 Port 2 in Listening State**



A port in the listening state performs as follows:

- Discards frames received from the attached segment.
- Discards frames switched from another port for forwarding.
- Does not incorporate station location into its address database. (There is no learning at this point, so there is no address database update.)
- Receives BPDUs and directs them to the system module.
- Processes BPDUs received from the system module.
- Receives and responds to network management messages.

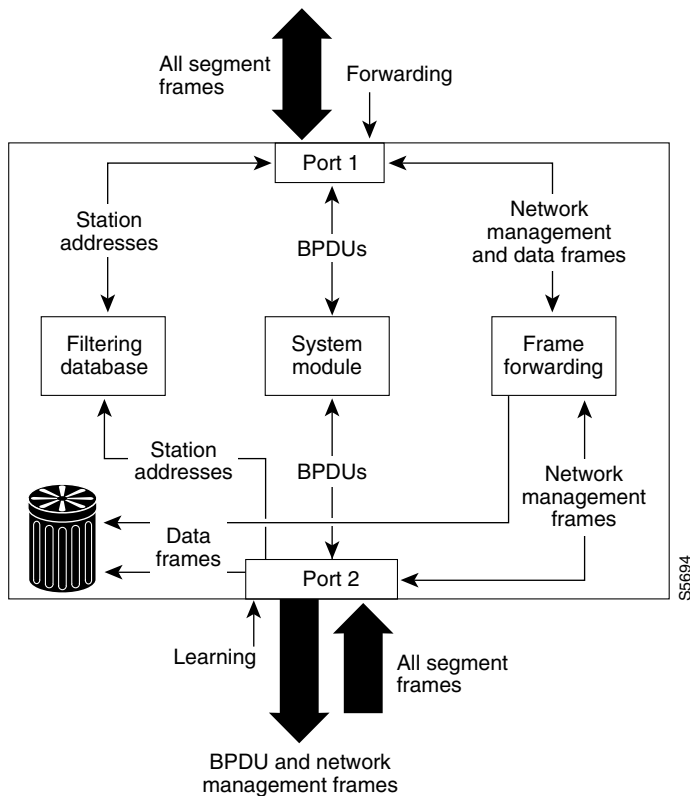
## Learning State

A port in the learning state prepares to participate in frame forwarding. The port enters the learning state from the listening state. Figure 7-5 shows a port in the learning state.

A port in the learning state performs as follows:

- Discards frames received from the attached segment.
- Discards frames switched from another port for forwarding.
- Incorporates station location into its address database.
- Receives BPDUs and directs them to the system module.
- Receives, processes, and transmits BPDUs received from the system module.
- Receives and responds to network management messages.

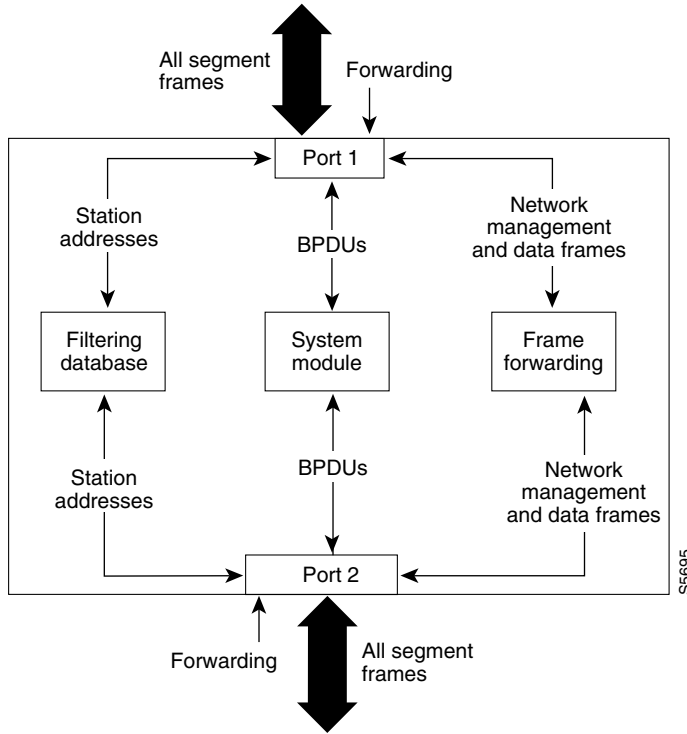
**Figure 7-5 Port 2 in Learning State**



Forwarding State

A port in the forwarding state forwards frames, as shown in Figure 7-6. The port enters the forwarding state from the learning state.

Figure 7-6 Port 2 in Forwarding State



A port in the forwarding state performs as follows:

- Forwards frames received from the attached segment.
- Forwards frames switched from another port for forwarding.
- Incorporates station location information into its address database.
- Receives BPDUs and directs them to the system module.
- Processes BPDUs received from the system module.
- Receives and responds to network management messages.

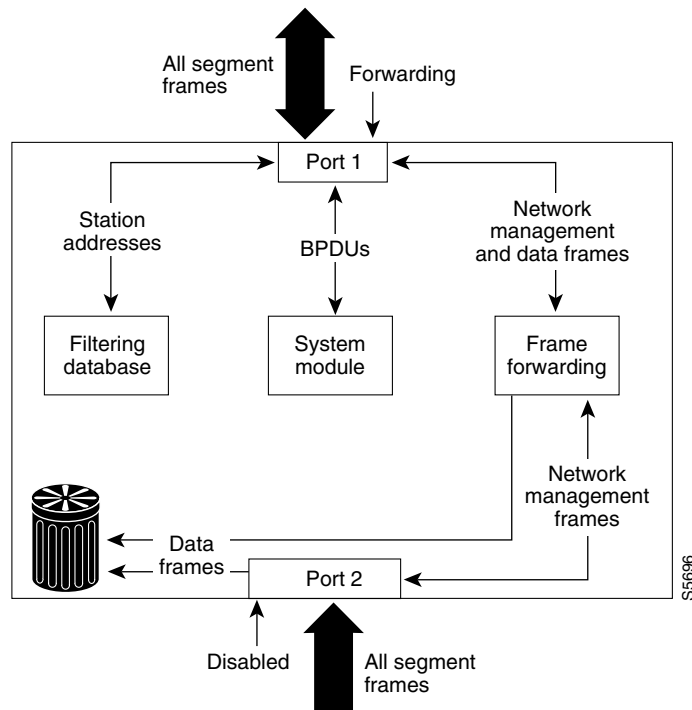


**Caution** Use spanning-tree PortFast mode only on ports directly connected to individual workstations to allow these ports to come up and go directly to the forwarding state, instead of having to go through the entire spanning-tree initialization process. To prevent illegal topologies, enable STP on ports connected to switches or other devices that forward messages. For more information about PortFast, see Chapter 8, “Configuring Spanning-Tree PortFast, UplinkFast, and BackboneFast.”

## Disabled State

A port in the disabled state does not participate in frame forwarding or STP, as shown in Figure 7-7. A port in the disabled state is virtually nonoperational.

**Figure 7-7 Port 2 in Disabled State**



A disabled port performs as follows:

- Discards frames received from the attached segment.
- Discards frames switched from another port for forwarding.
- Does not incorporate station location into its address database. (There is no learning, so there is no address database update.)
- Receives BPDUs, but does not direct them to the system module.
- Does not receive BPDUs for transmission from the system module.
- Receives and responds to network management messages.

### Understanding How Spanning-Tree for Token Ring Works

Typically, each VLAN runs one instance of STP to prevent loops in the bridge topology. However, Token Ring runs STP both at the Token Ring Concentrator Relay Function (TrCRF) level and the Token Ring Bridge Relay Function (TrBRF) level. The TrCRF STP removes loops in the logical ring. The TrBRF STP is similar to the Ethernet STP, interacting with external bridges to remove loops from the bridge topology.

The Catalyst 5000 series Token Ring module supports these STPs:

- IEEE 802.1D STP
- IBM STP
- Cisco STP

The Catalyst 5000 series switch uses the IEEE 802.1D and IBM STPs on TrBRFs. The STP that runs on the TrCRF is either the Cisco or IEEE STP, depending on the bridging mode you configured for the TrCRF with the **set vlan** command.



**Caution** Certain TrBRF STP and TrCRF bridge mode configurations are incompatible and can place the TrCRFs in a blocked state. For more information about these configurations, see the “Setting the Spanning-Tree Port State” section on page 7-18.

### Default Spanning-Tree Configuration

Table 7-2 shows the default STP configuration.

**Table 7-2** STP Default Configuration

Feature	Default Value
Enable state	STP enabled for all VLANs.
Port priority	128
Port cost	62
Bridge Priority	32,768

## Configuring Spanning-Tree

These sections describe how to configure STP on any Ethernet, Fast Ethernet, Gigabit Ethernet, and Token Ring port-based VLANs:

- Enabling STP on page 7-13
- Configuring the Port Priority on page 7-14
- Configuring the Port VLAN Priority on page 7-14
- Configuring Port Cost on page 7-15
- Configuring Port-VLAN Cost on page 7-15
- Configuring a Primary Root Switch on page 7-16
- Configuring a Secondary Root Switch on page 7-17
- Configuring STP for a TrBRF on page 7-17
- Setting the Spanning-Tree Port State on page 7-18
- Specifying the STP Functional Address for a TrBRF on page 7-18
- Configuring Additional STP Parameters on page 7-19
- Disabling STP on page 7-19

## Enabling STP

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**Note** STP is enabled by default on VLAN 1 and on all newly created VLANs.

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**Note** On a chassis with a Supervisor Engine III, III FSX, or III FLX with a NFFC or NFFC II, you cannot enable spanning tree on a per-VLAN basis. You must enable spanning-tree on every VLAN using the **set spantree enable all** command.

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To enable STP, perform this task in privileged mode:

Task	Command
<b>Step 1</b> Enable spanning tree on the desired VLAN.	<b>set spantree enable</b> <i>[vlan]</i>
<b>Step 2</b> Verify that spanning tree is enabled.	<b>show spantree</b> <i>[vlan]</i>

This example shows how to enable spanning tree and verify that it is enabled:

```

Console> (enable) set spantree enable 100
Spantree 100 enabled.
Console> (enable) show spantree 100
VLAN 100
Spanning tree enabled
Spanning tree type          ieee
Designated Root            00-10-0d-40-34-63
Designated Root Priority    32768
Designated Root Cost       19
Designated Root Port       1/2

```

```

Root Max Age 20 sec   Hello Time 2 sec   Forward Delay 15 sec
Bridge ID MAC ADDR      00-10-0d-aa-cc-63
Bridge ID Priority      32768
Bridge Max Age 20 sec   Hello Time 2 sec   Forward Delay 15 sec
Port      Vlan  Port-State      Cost  Priority  Fast-Start  Group-method
-----
  1/2     100  forwarding      19    32     disabled
Console> (enable)

```

## Configuring the Port Priority

You can change the port priority of switch ports. The port with the lowest priority value forwards frames for all VLANs. The possible port-priority range is 0 through 63. The default is 32. If all ports have the same priority value, the port with the lowest port number forwards frames.

To change the port priority for a port, perform this task in privileged mode:

Task	Command
<b>Step 1</b> Change the port priority for a switch port.	<b>set spantree portpri</b> <i>mod_num/port_num</i> <i>priority</i> [ <i>vlangs</i> ]
<b>Step 2</b> Verify the port priority setting.	<b>show spantree</b> [ <i>mod_num/port_num</i> ]

This example shows how to change the port priority for a port and verify the configuration:

```

Console> (enable) set spantree portpri 1/2 20
Bridge port 1/2 port priority set to 20.
Console> (enable) show spantree 1/2
Port      Vlan  Port-State      Cost  Priority  Fast-Start  Group-method
-----
  1/2     1     blocking        19    20     disabled
  1/2    100   forwarding       19    20     disabled
  1/2    521   blocking         19    20     disabled
  1/2    522   blocking         19    20     disabled
  1/2    523   blocking         19    20     disabled
  1/2    524   blocking         19    20     disabled
  1/2   1003  not-connected    19    20     disabled
  1/2   1005  not-connected    19     4     disabled
Console> (enable)

```

## Configuring the Port VLAN Priority

You can set the port priority for a port on a per-VLAN basis. The port with the lowest priority value for a specific VLAN forwards frames for that VLAN. The possible port-VLAN priority range is 0 through 63. The default is 32. If all ports have the same priority value for a particular VLAN, the port with the lowest port number forwards frames for that VLAN.

To change the port-VLAN priority for a port, perform this task in privileged mode:

Task	Command
<b>Step 1</b> Change the port-VLAN priority for a VLAN on a switch port.	<b>set spantree portvlanpri</b> <i>mod_num/port_num</i> <i>priority</i> [ <i>vlangs</i> ]
<b>Step 2</b> Verify the port-VLAN priority setting.	<b>show spantree</b> [ <i>mod_num/port_num</i> ]

This example shows how to change the port-VLAN priority on a port and verify the configuration:

```

Console> (enable) set spantree portvlanpri 1/2 1 100
Port 1/2 vlans 1-99,101-1004 using portpri 32.
Port 1/2 vlans 100 using portpri 1.
Port 1/2 vlans 1005 using portpri 4.
Console> (enable) show spantree 1/2
Port      Vlan  Port-State      Cost   Priority  Fast-Start  Group-method
-----
1/2      1     blocking        19     32       disabled
1/2     100   forwarding       19     1        disabled
1/2     521   blocking         19     32       disabled
1/2     522   blocking         19     32       disabled
1/2     523   blocking         19     32       disabled
1/2     524   blocking         19     32       disabled
1/2     1003  not-connected   19     32       disabled
1/2     1005  not-connected   19     4        disabled
Console> (enable)

```

## Configuring Port Cost

You can change the port cost of switch ports. Ports with lower port costs are more likely to be chosen to forward frames. Assign lower numbers to ports attached to faster media (such as full duplex) and higher numbers to ports attached to slower media. The possible range is 1 to 65535. The default differs for different media. Path cost is typically  $1000 \div \text{LAN speed in megabits per second}$ .

To change the port cost for a port, perform this task in privileged mode:

Task	Command
<b>Step 1</b> Change the port cost for a switch port.	<b>set spantree portcost</b> <i>mod_num/port_num cost</i>
<b>Step 2</b> Verify the port cost setting.	<b>show spantree</b> [ <i>mod_num/port_num</i> ]

This example shows how to change the port-VLAN priority on a port and verify the configuration:

```

Console> (enable) set spantree portcost 1/2 10
Spantree port 1/2 path cost set to 10.
Console> (enable) show spantree 1/2
Port      Vlan  Port-State      Cost   Priority  Fast-Start  Group-method
-----
1/2      1     forwarding       10     20       disabled
1/2     100   forwarding       10     20       disabled
1/2     521   forwarding       10     20       disabled
1/2     522   forwarding       10     20       disabled
1/2     523   forwarding       10     20       disabled
1/2     524   forwarding       10     20       disabled
1/2     1003  not-connected   10     20       disabled
1/2     1005  not-connected   10     4        disabled
Console> (enable)

```

## Configuring Port-VLAN Cost

You can change the port cost for a port on a per-VLAN basis. Ports with lower port-VLAN costs are more likely to be chosen to forward frames. You should assign lower numbers to ports attached to faster media (such as full duplex) and higher numbers to ports attached to slower media. The possible range is 1 to 65535. The default differs for different media.

To change the port-VLAN cost for a port, perform this task in privileged mode:

Task	Command
<b>Step 1</b> Change the port-VLAN cost for a VLAN on a switch port.	<b>set spantree portvlancost</b> <i>mod_num/port_num cost cost [vlans]</i>
<b>Step 2</b> Verify the port-VLAN cost setting.	<b>show spantree</b> [ <i>mod_num/port_num</i> ]

This example shows how to change the port-VLAN priority on a port and verify the configuration:

```

Console> (enable) set spantree portvlancost 1/2 cost 10 100
Port 1/2 VLANs 1-99,101-1005 have path cost 19.
Port 1/2 VLANs 100 have path cost 10.
Console> (enable) show spantree 1/2
Port      Vlan  Port-State      Cost   Priority  Fast-Start  Group-method
-----
1/2      1     blocking        19     20       disabled
1/2     100   forwarding       10     20       disabled
1/2     521   blocking        19     20       disabled
1/2     522   blocking        19     20       disabled
1/2     523   blocking        19     20       disabled
1/2     524   blocking        19     20       disabled
1/2    1003   not-connected   19     20       disabled
1/2    1005   not-connected   19     4        disabled
Console> (enable)
    
```

## Configuring a Primary Root Switch

To configure a switch as the primary root switch, perform this task in privileged mode:

Task	Command
Configure a switch as the primary root switch.	<b>set spantree root vlans</b> [ <i>dia network_diameter</i> ] <b>[hello hello_time]</b>

This example shows how to specify the primary root switch for VLANs 1–10:

```

Console> (enable) set spantree root 1-10 dia 4
VLANs 1-10 bridge priority set to 8192
VLANs 1-10 bridge max aging time set to 14 seconds.
VLANs 1-10 bridge hello time set to 2 seconds.
VLANs 1-10 bridge forward delay set to 9 seconds.
Switch is now the root switch for active VLANs 1-6.
Console> (enable)
    
```

---

**Note** Run the **set spantree root** command on backbone switches or distribution switches only, not on access switches.

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The **set spantree root** command reduces the bridge priority (the value associated with the switch) from the default (32,768) to a significantly lower value, which allows the switch to become the root switch.

When you specify a switch as the primary root, the default bridge priority is modified so that it becomes the root for the specified VLANs. Set the bridge priority to 8192. If this setting does not result in the switch becoming a root, modify the bridge priority to be 100 less than the bridge priority of the current root switch. Since different VLANs could potentially have different root switches, the

bridge VLAN-priority chosen makes this switch the root for all the VLANs specified. If reducing the bridge priority as low as 1 still does not make the switch the root switch, the system displays a message.

## Configuring a Secondary Root Switch

To configure a switch as the secondary root switch, perform this task in privileged mode:

Task	Command
Configure a switch as the secondary root switch.	<b>set spantree root [secondary] vlans [dia network_diameter] [hello hello_time]</b>

This example shows how to specify the secondary root switch for VLANs 22 and 24:

```
Console> (enable) set spantree root secondary 22,24 dia 5 hello 1
VLANs 22,24 bridge priority set to 16384.
VLANs 22,24 bridge max aging time set to 10 seconds.
VLANs 22,24 bridge hello time set to 1 second.
VLANs 22,24 bridge forward delay set to 7 seconds.
Console> (enable)
```

The **set spantree root secondary** command reduces the bridge priority to 16,384, making it the probable candidate to become the root switch if the primary root switch fails. You can run this command on more than one switch to create multiple backup switches in case the primary root switch fails.

## Configuring STP for a TrBRF

You can configure the type of STP to be used by a TrBRF. Note that the following STP and bridge mode configurations are incompatible and can place logical ports in a blocked state:

- TrBRF is running the IBM STP and the TrCRF is in SRT mode.
- TrBRF is running the IEEE STP and the TrCRF is in SRB mode.

For more information, see the “Setting the Spanning-Tree Port State” section on page 7-18.

To specify a STP for a TrBRF, perform this task in privileged mode:

Task	Command
Specify a STP for a TrBRF.	<b>set vlan vlan_num [stp {ieee   ibm}]</b>

This example shows how to specify the STP for a TrBRF:

```
Console> (enable) set vlan 950 stp ieee
Vlan 950 configuration successful
Console> (enable)
```

## Setting the Spanning-Tree Port State

When you enable STP, every switch in the network goes through the transitory listening and learning states at power up. If properly configured, the logical ports then stabilize to the forwarding or blocking state. However, with TrBRFs and TrCRFs, the following exceptions require you to manually set the state of a logical port of a TrBRF:

- TrBRF is running the IBM STP and the TrCRF is in SRT mode.
- TrBRF is running the IEEE STP and the TrCRF is in SRB mode.

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**Note** If one of these configurations occurs, the logical ports are put in a blocked state and no STP is run.

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You can use the **set spantree portstate** command to manually set the state of a logical port to blocked or forwarding mode.

To set the state of a logical port manually, perform this task in privileged mode:

Task	Command
Manually set the state of a logical port.	<b>set spantree portstate <i>trcrf</i> {auto   block   forward} [<i>trbrf</i>]</b>

---

**Note** If you disable the STP state for a TrBRF using the **set spantree** command, the logical ports of the TrBRF are put in forwarding state regardless of the state you configured using the **set spantree portstate** command.

---

This example shows how to set the STP state of a logical port:

```
Console> (enable) set spantree portstate 950 forward
Portstate successfully set for tokenring crf 950
Console> (enable)
```

## Specifying the STP Functional Address for a TrBRF

To configure a TrBRF running IEEE STP to use the bridge functional address instead of the IEEE STP address, perform this task in privileged mode:

Task	Command
Specify that a TrBRF running IEEE STP uses the bridge functional address instead of the IEEE STP address.	<b>set spantree multicast-address <i>vlan_num</i> ibm</b>

## Configuring Additional STP Parameters

To configure additional STP parameters, perform one of these tasks in privileged mode:

Task	Command
• Set the bridge forward delay for a VLAN.	<b>set spantree fwddelay</b> <i>delay</i> [vlan]
• Set the bridge hello time for a VLAN	<b>set spantree hello</b> <i>interval</i>
• Set the bridge maximum aging time for a VLAN.	<b>set spantree maxage agingtime</b> [vlan]
• Set the bridge priority for a VLAN.	<b>set spantree priority</b> <i>bridge_priority</i> [vlan]

## Disabling STP

**Note** On a chassis with a Supervisor Engine III, III FSX, or III FLX with a NFFC or NFFC II, you cannot disable spanning tree on a per-VLAN basis. You must disable spanning-tree on every VLAN using the **set spantree disable all** command.

To disable STP, enter this command in privileged mode:

Task	Command
Disable STP.	<b>set spantree disable</b> [vlan]

**Note** In a Token Ring environment, if you disable STP for a TrBRF, then all TrCRFs with this TrBRF as a parent are set to the forwarding state.

