
Chapter 5

Configuring Spanning Tree Protocol (STP)

The Spanning Tree Protocol (STP) eliminates Layer 2 loops in networks, by selectively blocking some ports and allowing other ports to forward traffic, based on global (bridge) and local (port) parameters you can configure.

This chapter describes how to configure Spanning Tree Protocol (STP) parameters on HP ProCurve switches and routing switches.

This chapter also describes advanced Layer 2 features that enable you to overcome limitations in the standard 802.1d Spanning Tree Protocol (STP). These are the advanced features:

- Fast Port Span
- Fast Uplink Span
- Single-instance STP
- Per VLAN Spanning Tree+ (PVST+) Compatibility

Configuration procedures are provided for the standard STP bridge and port parameters as well as advanced STP parameters.

- To configure standard STP parameters, see “Configuring Standard STP Parameters”.
- To configure advanced STP parameters, see “Configuring Advanced Features” on page 5-13.

Configuring Standard STP Parameters

HP ProCurve devices support standard STP as described in the IEEE 802.1D specification. STP is enabled by default on the HP 6208M-SX but is disabled by default on the routing switches.

By default, each port-based VLAN on an HP device runs a separate spanning tree (a separate instance of STP). An HP device has one port-based VLAN (VLAN 1) by default that contains all the device’s ports. Thus, by default each HP device has one spanning tree. However, if you configure additional port-based VLANs on an HP device, then each of those VLANs and VLAN 1 all run separate spanning trees.

When you configure a port-based VLAN, that VLAN inherits the STP state of the default port-based VLAN. Thus, if STP is enabled on the default VLAN, STP is also enabled on the new port-based VLAN. You can change the STP state of the VLAN afterwards. Changes to the STP state of the default VLAN do not affect existing VLANs. A change to the STP state affects only the VLANs you create after the change.

STP Parameters and Defaults

Table 5.1 lists the default STP bridge parameters. The bridge parameters affect the entire VLAN (or the entire device, if the only port-based VLAN is the default one, VLAN 1).

Table 5.1: Default STP Bridge Parameters

Parameter	Description	Default and Valid Values
Forward Delay	The period of time a bridge will wait (the listen and learn period) before beginning to forward data packets.	15 seconds Possible values: 4 – 30 seconds
Maximum Age	The interval a bridge will wait for a hello packet from the root bridge before initiating a topology change.	20 seconds Possible values: 6 – 40 seconds
Hello Time	The interval of time between each configuration BPDU sent by the root bridge.	2 seconds Possible values: 1 – 10 seconds
Priority	A parameter used to identify the root bridge in a spanning tree (instance of STP). The bridge with the lowest value has the highest priority and is the root. A higher numerical value means a lower priority; thus, the highest priority is 0.	32768 Possible values: 0 – 65535

Table 5.2 lists the default STP port parameters. The port parameters affect individual ports and are separately configurable on each port.

Table 5.2: Default STP Port Parameters

Parameter	Description	Default and Valid Values
Priority	The preference that STP gives this port relative to other ports for forwarding traffic out of the spanning tree. A higher numerical value means a lower priority; thus, the highest priority is 0.	128 Possible values: 0 – 255
Path Cost	The cost of using the port to reach the root bridge. When selecting among multiple links to the root bridge, STP chooses the link with the lowest path cost and blocks the other paths. Each port type has its own default STP path cost.	10 Mbps – 100 100 Mbps – 19 Gigabit – 4 Possible values are 0 – 65535

Enabling or Disabling the Spanning Tree Protocol (STP)

You can enable or disable STP on the following levels:

- Globally – Affects all ports on the device.
- Port-based VLAN – Affects all ports within the specified port-based VLAN. When you enable or disable STP within a port-based VLAN, the setting overrides the global setting. Thus, you can enable STP for the ports within a port-based VLAN even when STP is globally disabled, or disable the ports within a port-based VLAN when STP is globally enabled.

Enabling or Disabling STP Globally

Use the following methods to enable or disable STP on a device on which you have not configured port-based VLANs.

NOTE: When you configure a VLAN, the VLAN inherits the global STP settings. However, once you begin to define a VLAN, you can no longer configure standard STP parameters globally using the CLI. From that point on, you can configure STP only within individual VLANs.

USING THE CLI

To enable STP for all ports on a device, enter the following command:

```
HP9300(config)# spanning-tree
```

Syntax: [no] spanning-tree

USING THE WEB MANAGEMENT INTERFACE

1. Log on to the device using a valid user name and password for read-write access. The System configuration panel is displayed.
2. Select Enable next to Spanning Tree.

NOTE: For information about the Single and Fast checkboxes, see “Single Spanning Tree” on page 5-17 and “Fast Uplink Span” on page 5-15.

3. Click Apply to save the changes to the device’s running-config file.
4. Select the Save link at the bottom of the dialog. Select Yes when prompted to save the configuration change to the startup-config file on the device’s flash memory.

Enabling or Disabling STP in a Port-Based VLAN

Use the following procedure to disable or enable STP on a device on which you have configured a port-based VLAN.

USING THE CLI

To enable STP for all ports in a port-based VLAN, enter commands such as the following:

```
HP9300(config)# vlan 10
HP9300(config-vlan-10)# spanning-tree
```

Syntax: [no] spanning-tree

USING THE WEB MANAGEMENT INTERFACE

You cannot enable or disable STP on individual VLANs using the Web management interface. Use the procedure in “Enabling or Disabling STP Globally” on page 5-3 to enable or disable STP on all the VLANs. If you need STP to be enabled on some VLANs but disabled in other VLANs, use the CLI method above.

Changing STP Bridge and Port Parameters

Table 5.1 on page 5-2 and Table 5.2 on page 5-2 list the default STP parameters. If you need to change the default value for an STP parameter, use the following procedures.

Changing STP Bridge Parameters

To change STP bridge parameters, use either of the following methods.

USING THE CLI

To change a device's STP bridge priority to the highest value to make the device the root bridge, enter the following command:

```
HP9300(config)# spanning-tree priority 0
```

The command in this example changes the priority on a device on which you have not configured port-based VLANs. To configure the same parameters on a port-based VLAN, enter commands such as the following:

```
HP9300(config)# vlan 10
HP9300(config-vlan-10)# spanning-tree priority 0
```

Syntax: [no] spanning-tree [forward-delay <value>] | [hello-time <value>] | [maximum-age <value>] | [priority <value>]

The **forward-delay** <value> parameter specifies the forward delay and can be a value from 4 – 30 seconds. The default is 15 seconds.

NOTE: You can configure a device for faster convergence (including a shorter forward delay) using Fast Span or Fast Uplink Span. See “Configuring Advanced Features” on page 5-13.

The **hello-time** <value> parameter specifies the hello time and can be a value from 1 – 10 seconds. The default is 2 seconds.

NOTE: This parameter applies only when this device or VLAN is the root bridge for its spanning tree.

The **maximum-age** <value> parameter specifies the amount of time the device waits for receipt of a hello packet before initiating a topology change. You can specify from 6 – 40 seconds. The default is 20 seconds.

The **priority** <value> parameter specifies the priority and can be a value from 0 – 65535. A higher numerical value means a lower priority. Thus, the highest priority is 0. The default is 32768.

You can specify some or all of these parameters on the same command line. If you specify more than one parameter, you must specify them in the order shown above, from left to right.

USING THE WEB MANAGEMENT INTERFACE

To modify the STP parameters:

1. Log on to the device using a valid user name and password for read-write access. The System configuration panel is displayed.
2. Click on the plus sign next to Configure in the tree view to display the configuration options.
3. Select the STP link to display the STP bridge and port parameters.
4. Click the Modify button in the STP bridge parameters table to display the STP configuration panel, as shown in the following example. If the device has multiple port-based VLANs, select the Modify button next to the VLAN on which you want to change the parameters. A dialog such as the following is displayed.

STP	
VLAN ID:	<input type="text" value="1"/>
Bridge	
Forward Delay (Seconds):	<input type="text" value="15"/>
Maximum Age (Seconds):	<input type="text" value="20"/>
Hello Time (Seconds):	<input type="text" value="2"/>
Priority:	<input type="text" value="32768"/>
<input type="button" value="Apply"/>	
Port	
Priority:	<input type="text" value="128"/>
Path Cost:	<input type="text" value="0"/>
Slot:	<input type="text" value="1"/> <input type="text" value="Port: 1"/>
<input type="button" value="Apply Port STP"/> <input type="button" value="Apply To All Ports"/>	

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5. Modify the bridge STP parameters to the values desired.
6. Click Apply to save the changes to the device's running-config file.
7. Select the [Save](#) link at the bottom of the dialog. Select Yes when prompted to save the configuration change to the startup-config file on the device's flash memory.

Changing STP Port Parameters

To change STP port parameters, use either of the following methods.

USING THE CLI

To change the path and priority costs for a port, enter commands such as the following:

```
HP9300(config)# vlan 10
HP9300(config-vlan-10)# spanning-tree ethernet 1/5 path-cost 15 priority 64
```

Syntax: spanning-tree ethernet <portnum> path-cost <value> | priority <value>

The **ethernet** <portnum> parameter specifies the interface.

The **path-cost** <value> parameter specifies the port's cost as a path to the spanning tree's root bridge. STP prefers the path with the lowest cost. You can specify a value from 0 – 65535. A higher numerical value means a lower priority; thus, the highest priority is 0.

The default depends on the port type:

- 10 Mbps – 100
- 100 Mbps – 19
- Gigabit – 4

The **priority** <value> parameter specifies the preference that STP gives this port relative to other ports for forwarding traffic out of the spanning tree. You can specify a value from 0 – 255. The default is 128.

USING THE WEB MANAGEMENT INTERFACE

To modify the STP port parameters:

1. Log on to the device using a valid user name and password for read-write access. The System configuration panel is displayed.

2. Click on the plus sign next to Configure in the tree view to display the configuration options.
3. Select the STP link to display the STP bridge and port parameters.
4. Click the Modify button in the STP port parameters table to display the STP configuration panel, as shown in the following example. If the device has multiple port-based VLANs, select the Modify button next to the VLAN on which you want to change the parameters. A dialog such as the following is displayed.

STP

VLAN ID:	<input type="text" value="1"/>
Bridge	
Forward Delay (Seconds):	<input type="text" value="15"/>
Maximum Age (Seconds):	<input type="text" value="20"/>
Hello Time (Seconds):	<input type="text" value="2"/>
Priority:	<input type="text" value="32768"/>
<input type="button" value="Apply"/>	
Port	
Priority:	<input type="text" value="128"/>
Path Cost:	<input type="text" value="0"/>
Slot:	<input type="text" value="1"/>
Port:	<input type="text" value="1"/>
<input type="button" value="Apply Port STP"/> <input type="button" value="Apply To All Ports"/>	

[\[Show\]](#)[\[Statistic\]](#)

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5. Select the port (and slot if applicable) from the Port and Slot pulldown lists.
6. Enter the desired changes to the priority and path cost fields.
7. Click Apply STP Port to apply the changes to only the selected port or select Apply To All Ports to apply the changes to all the ports.

NOTE: If you want to save the priority and path costs of one port to all other ports on the device or within the selected VLAN, you can click the Apply To All Ports button.

8. Select the Save link at the bottom of the dialog. Select Yes when prompted to save the configuration change to the startup-config file on the device's flash memory.

Displaying STP Information

You can display STP information for an entire device and for individual ports.

Displaying STP Information for an Entire Device

To display STP information for an entire device, use either of the following methods.

USING THE CLI

To display STP information, enter the following command at any level of the CLI:

```
HP9300(config)# show span
```

Global STP Parameters:

VLAN ID	Root ID	Root Cost	Root Port	Prio rity	Max Age	He- llo	Ho- ld	Fwd dly	Last Chang	Chg cnt	Bridge Address
				Hex	sec	sec	sec	sec	sec		
1	800000e052a9bb40	0	Root	8000	20	2	2	15	0	6	00e052a9bb40

Port STP Parameters:

VLAN ID	Port Num	Prio rity	Path Cost	State	Fwd Trans	Design Cost	Design Root	Design Bridge
		Hex						
1	3/1	80	19	ENABLED	2	0	800000e052a9bb40	800000e052a9bb40
1	3/2	80	0	DISABLED	0	0	0000000000000000	0000000000000000
1	3/3	80	0	DISABLED	0	0	0000000000000000	0000000000000000
1	3/4	80	0	DISABLED	0	0	0000000000000000	0000000000000000
1	3/5	80	0	DISABLED	0	0	0000000000000000	0000000000000000
1	3/6	80	0	DISABLED	0	0	0000000000000000	0000000000000000
1	3/7	80	0	DISABLED	0	0	0000000000000000	0000000000000000
1	3/8	80	0	DISABLED	0	0	0000000000000000	0000000000000000
1	3/9	80	0	DISABLED	0	0	0000000000000000	0000000000000000
1	3/10	80	0	DISABLED	0	0	0000000000000000	0000000000000000

Syntax: show span [vlan <vlan-id>] | [pvst-mode] | [<num>]

The **vlan** <vlan-id> parameter displays STP information for the specified port-based VLAN.

The **pvst-mode** parameter displays STP information for the device's Per VLAN Spanning Tree (PVST+) compatibility configuration. See "PVST/PVST+ Compatibility" on page 5-20.

The <num> parameter displays only the entries after the number you specify. For example, on a device with three port-based VLANs, if you enter 1, then information for the second and third VLANs is displayed, but information for the first VLAN is not displayed. Information is displayed according to VLAN number, in ascending order. The entry number is not the same as the VLAN number. For example, if you have port-based VLANs 1, 10, and 2024, then the command output has three STP entries. To display information for VLANs 10 and 2024 only, enter **show span 1**.

The **show span** command shows the following information.

Table 5.3: CLI Display of STP Information

This Field...	Displays...
Global STP Parameters	
VLAN ID	The port-based VLAN that contains this spanning tree (instance of STP). VLAN 1 is the default VLAN. If you have not configured port-based VLANs on this device, all STP information is for VLAN 1.
Root ID	The ID assigned by STP to the root bridge for this spanning tree.
Root Cost	The cumulative cost from this bridge to the root bridge. If this device is the root bridge, then the root cost is 0.
Root Port	The port on this device that connects to the root bridge. If this device is the root bridge, then the value is "Root" instead of a port number.
Priority Hex	This device or VLAN's STP priority. The value is shown in hexadecimal format. Note: If you configure this value, specify it in decimal format. See "Changing STP Bridge Parameters" on page 5-4.
Max age sec	The number of seconds this device or VLAN waits for a hello message from the root bridge before deciding the root has become unavailable and performing a reconvergence.
Hello sec	The interval between each configuration BPDU sent by the root bridge.
Hold sec	The minimum number of seconds that must elapse between transmissions of consecutive Configuration BPDUs on a port.
Fwd dly sec	The number of seconds this device or VLAN waits following a topology change and consequent reconvergence.
Last Chang sec	The number of seconds since the last time a topology change occurred.
Chg cnt	The number of times the topology has changed since this device was reloaded.
Bridge Address	The STP address of this device or VLAN. Note: If this address is the same as the Root ID, then this device or VLAN is the root bridge for its spanning tree.
Port STP Parameters	
VLAN ID	The VLAN that the port is in.
Port Num	The port number.
Priority Hex	The port's STP priority, in hexadecimal format. Note: If you configure this value, specify it in decimal format. See "Changing STP Port Parameters" on page 5-5.
Path Cost	The port's STP path cost.

Table 5.3: CLI Display of STP Information (Continued)

This Field...	Displays...
State	<p>The port's STP state. The state can be one of the following:</p> <ul style="list-style-type: none"> • BLOCKING – STP has blocked Layer 2 traffic on this port to prevent a loop. The device or VLAN can reach the root bridge using another port, whose state is FORWARDING. When a port is in this state, the port does not transmit or receive user frames, but the port does continue to receive STP BPDUs. • DISABLED – The port is not participating in STP. This can occur when the port is disconnected or STP is disabled on the port. • FORWARDING – STP is allowing the port to send and receive frames. • LISTENING – STP is responding to a topology change and this port is listening for a BPDU from neighboring bridge(s) in order to determine the new topology. No user frames are transmitted or received during this state. • LEARNING – The port has passed through the LISTENING state and will change to the BLOCKING or FORWARDING state, depending on the results of STP's reconvergence. The port does not transmit or receive user frames during this state. However, the device can learn the MAC addresses of frames that the port receives during this state and make corresponding entries in the MAC table.
Fwd Trans	The number of times STP has changed the state of this port between BLOCKING and FORWARDING.
Design Cost	The cost to the root bridge as advertised by the designated bridge that is connected to this port. If the designated bridge is the root bridge itself, then the cost is 0. The identity of the designated bridge is shown in the Design Bridge field.
Design Root	The root bridge as recognized on this port. The value is the same as the root bridge ID listed in the Root ID field.
Design Bridge	The designated bridge to which this port is connected. The designated bridge is the device that connects the network segment on the port to the root bridge.

USING THE WEB MANAGEMENT INTERFACE

To display STP information:

1. Log on to the device using a valid user name and password for read-only or read-write access. The System configuration panel is displayed.
2. Click on the plus sign next to Monitor in the tree view to display the monitoring options.
3. Select the STP link to display the STP bridge and port parameters.

Table 5.4: Web Management Display of STP Information

This Field...	Displays...
STP Bridge Parameters (global parameters)	
VLAN ID	The port-based VLAN that contains this spanning tree (instance of STP). VLAN 1 is the default VLAN. If you have not configured port-based VLANs on this device, all STP information is for VLAN 1.
Root ID	The ID assigned by STP to the root bridge for this spanning tree.
Root Cost	The cumulative cost from this bridge to the root bridge. If this device is the root bridge, then the root cost is 0.
Root Port	The port on this device that connects to the root bridge. If this device is the root bridge, then the value is "Root" instead of a port number.
Priority	This device or VLAN's STP priority. The value is shown in hexadecimal format. Note: If you configure this value, specify it in decimal format. See "Changing STP Bridge Parameters" on page 5-4.
Max Age	The number of seconds this device or VLAN waits for a hello message from the root bridge before deciding the root has become unavailable and performing a reconvergence.
Hello Time	The interval between each configuration BPDU sent by the root bridge.
Hold Time	The minimum number of seconds that must elapse between transmissions of consecutive Configuration BPDUs on a port.
Forward Delay	The number of seconds this device or VLAN waits following a topology change and consequent reconvergence.
Topology Last Change	The number of seconds since the last time a topology change occurred.
Topology Change Counter	The number of times the topology has changed since this device was reloaded.
Bridge Address	The STP address of this device or VLAN. Note: If this address is the same as the Root ID, then this device or VLAN is the root bridge for its spanning tree.
STP Port Parameters	
VLAN	The VLAN that the port is in.
Port	The port number.
Priority	The port's STP priority, in hexadecimal format. Note: If you configure this value, specify it in decimal format. See "Changing STP Port Parameters" on page 5-5.
Path Cost	The port's STP path cost.

Table 5.4: Web Management Display of STP Information (Continued)

This Field...	Displays...
State	<p>The port's STP state. The state can be one of the following:</p> <ul style="list-style-type: none"> • BLOCKING – STP has blocked Layer 2 traffic on this port to prevent a loop. The device or VLAN can reach the root bridge using another port, whose state is FORWARDING. When a port is in this state, the port does not transmit or receive user frames, but the port does continue to receive STP BPDUs. • DISABLED – The port is not participating in STP. This can occur when the port is disconnected or STP is disabled on the port. • FORWARDING – STP is allowing the port to send and receive frames. • LISTENING – STP is responding to a topology change and this port is listening for a BPDU from neighboring bridge(s) in order to determine the new topology. No user frames are transmitted or received during this state. • LEARNING – The port has passed through the LISTENING state and will change to the BLOCKING or FORWARDING state, depending on the results of STP's reconvergence. The port does not transmit or receive user frames during this state. However, the device can learn the MAC addresses of frames that the port receives during this state and make corresponding entries in the MAC table.
Transition	The number of times STP has changed the state of this port between BLOCKING and FORWARDING.
Cost	The cost to the root bridge as advertised by the designated bridge that is connected to this port. If the designated bridge is the root bridge itself, then the cost is 0. The identity of the designated bridge is shown in the Design Bridge field.
Root	The root bridge as recognized on this port. The value is the same as the root bridge ID listed in the Root ID field.
Bridge	The designated bridge to which this port is connected. The designated bridge is the device that connects the network segment on the port to the root bridge.

Displaying STP Information for an Individual Interface

To display STP information for an individual port, you can use the methods in “Displaying STP Information for an Entire Device” on page 5-7. You also can display some STP information for a specific port using either of the following methods.

USING THE CLI

To display information for a specific port, enter a command such as the following at any level of the CLI:

```
HP9300(config)# show interface ethernet 3/11
```

```
FastEthernet3/11 is up, line protocol is up
  Hardware is FastEthernet, address is 00e0.52a9.bb49 (bia 00e0.52a9.bb49)
  Configured speed auto, actual 100Mbit, configured duplex fdx, actual fdx
  Member of L2 VLAN ID 1, port is untagged, port state is FORWARDING
```

```

STP configured to ON, priority is level0, flow control enabled
mirror disabled, monitor disabled
Not member of any active trunks
Not member of any configured trunks
No port name
MTU 1500 bytes, encapsulation ethernet
5 minute input rate: 352 bits/sec, 0 packets/sec, 0.00% utilization
5 minute output rate: 0 bits/sec, 0 packets/sec, 0.00% utilization
1238 packets input, 79232 bytes, 0 no buffer
Received 686 broadcasts, 0 runts, 0 giants
0 input errors, 0 CRC, 0 frame, 0 ignored
529 multicast
918 packets output, 63766 bytes, 0 underruns
0 output errors, 0 collisions

```

The STP information is shown in bold type in this example.

Syntax: show interfaces [ethernet <portnum>] | [loopback <num>] | [slot <slot-num>] | [ve <num>] | [brief]

You also can display the STP states of all ports by entering a command such as the following, which uses the **brief** parameter:

```
HP9300(config)# show interface brief
```

Port	Link	State	Dupl	Speed	Trunk	Tag	Priori	MAC	Name
1/1	Down	None	None	None	None	No	level0	00e0.52a9.bb00	
1/2	Down	None	None	None	None	No	level0	00e0.52a9.bb01	
1/3	Down	None	None	None	None	No	level0	00e0.52a9.bb02	
1/4	Down	None	None	None	None	No	level0	00e0.52a9.bb03	
1/5	Down	None	None	None	None	No	level0	00e0.52a9.bb04	
1/6	Down	None	None	None	None	No	level0	00e0.52a9.bb05	
1/7	Down	None	None	None	None	No	level0	00e0.52a9.bb06	
1/8	Down	None	None	None	None	No	level0	00e0.52a9.bb07	

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some rows omitted for brevity
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3/10	Down	None	None	None	None	No	level0	00e0.52a9.bb4a	
3/11	Up	Forward	Full	100M	None	No	level0	00e0.52a9.bb49	

In this example, only one port, 3/11, is forwarding traffic toward the root bridge.

USING THE WEB MANAGEMENT INTERFACE

To display STP information for a specific port, use the same method as the one described in “Displaying STP Information for an Entire Device” on page 5-7:

1. Log on to the device using a valid user name and password for read-only or read-write access. The System configuration panel is displayed.
2. Click on the plus sign next to Monitor in the tree view to display the monitoring options.
3. Select the STP link to display the STP bridge and port parameters.

Displaying the STP State of a Port-Based VLAN

When you display information for a port-based VLAN, that information includes the STP state of the VLAN. Use either of the following methods to display port-based VLAN information.

USING THE CLI

To display information for a port-based VLAN, enter a command such as the following at any level of the CLI:

```
HP9300(config)# show vlan
```

```
Total PORT-VLAN entries: 2
```

Maximum PORT-VLAN entries: 16

legend: [S=Slot]

```
PORT-VLAN 1, Name DEFAULT-VLAN, Priority level0, Spanning tree On
  Untagged Ports: (S3) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
  Untagged Ports: (S3) 17 18 19 20 21 22 23 24
  Untagged Ports: (S4) 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
  Untagged Ports: (S4) 18 19 20 21 22 23 24
  Tagged Ports: None
  Uplink Ports: None
```

```
PORT-VLAN 2, Name greenwell, Priority level0, Spanning tree Off
  Untagged Ports: (S1) 1 2 3 4 5 6 7 8
  Untagged Ports: (S4) 1
  Tagged Ports: None
  Uplink Ports: None
```

The STP state is shown in bold type in this example.

USING THE WEB MANAGEMENT INTERFACE

To display STP information for a specific VLAN:

1. Log on to the device using a valid user name and password for read-write access. The System configuration panel is displayed.
2. Click on the plus sign next to Configure in the tree view.
3. Select the VLAN link to display the VLAN configuration options.
4. Select the Port link to display configuration information for the device's port-based VLANs. The STP state is shown in the STP column.

Configuring Advanced Features

This section describes how to configure the following features:

- Fast Port Span
- Fast Uplink Span
- Single-instance STP
- Per VLAN Spanning Tree+ (PVST+) Compatibility

Fast Port Span

When STP is running on a device, message forwarding is delayed during the spanning tree recalculation period following a topology change. The STP forward delay parameter specifies the period of time a bridge waits before forwarding data packets. The forward delay controls the listening and learning periods of STP reconvergence. You can configure the forward delay to a value from 4 – 30 seconds. The default is 15 seconds. Thus, using the standard forward delay, convergence requires 30 seconds (15 seconds for listening and an additional 15 seconds for learning) when the default value is used.

This slow convergence is undesirable and unnecessary in some circumstances. The Fast Port Span feature allows certain ports to enter the forwarding state in four seconds. Specifically, Fast Port Span allows faster convergence on ports that are attached to end stations and thus do not present the potential to cause Layer 2 forwarding loops. Because the end stations cannot cause forwarding loops, they can safely go through the STP state changes (blocking to listening to learning to forwarding) more quickly than is allowed by the standard STP convergence time. Fast Port Span performs the convergence on these ports in four seconds (two seconds for listening and two seconds for learning).

In addition, Fast Port Span enhances overall network performance in the following ways:

- Fast Port Span reduces the number of STP topology change notifications on the network. When an end station attached to a Fast Span port comes up or down, the HP device does not generate a topology change notification for the port. In this situation, the notification is unnecessary since a change in the state of the host does not affect the network's topology.
- Fast Port Span eliminates unnecessary MAC cache aging that can be caused by topology change notifications. Bridging devices age out the learned MAC addresses in their MAC caches if the addresses are unrefreshed for a given period of time, sometimes called the MAC aging interval. When STP sends a topology change notification, devices that receive the notification use the value of the STP forward delay to quickly age out their MAC caches. For example, if a device's normal MAC aging interval is 5 minutes, the aging interval changes temporarily to the value of the forward delay (for example, 15 seconds) in response to an STP topology change.

In normal STP, the accelerated cache aging occurs even when a single host goes up or down. Because Fast Port Span does not send a topology change notification when a host on a Fast Port Span port goes up or down, the unnecessary cache aging that can occur in these circumstances under normal STP is eliminated.

Fast Port Span is a system-wide parameter and is enabled by default. Thus, when you boot a device with software release 06.6.05 or later, all the ports that are attached only to end stations run Fast Port Span. For ports that are not eligible for Fast Port Span, such as ports connected to other networking devices, the device automatically uses the normal STP settings. If a port matches any of the following criteria, the port is ineligible for Fast Port Span and uses normal STP instead:

- The port is 802.1q tagged
- The port is a member of a trunk group
- The port has learned more than one active MAC address
- An STP Configuration BPDU has been received on the port, thus indicating the presence of another bridge on the port.

You also can explicitly exclude individual ports from Fast Port Span if needed. For example, if the only uplink ports for a wiring closet switch are Gigabit ports, you can exclude the ports from Fast Port Span.

Disabling and Re-enabling Fast Port Span

Fast Port Span is a system-wide parameter and is enabled by default. Thus all ports that are eligible for Fast Port Span use it.

To disable or re-enable Fast Port Span, use one of the following methods.

USING THE CLI

To disable Fast Port Span, enter the following commands:

```
HP9300(config)# no fast port-span
HP9300(config)# write memory
```

Syntax: [no] fast port-span

NOTE: The **fast port-span** command has additional parameters that let you exclude specific ports. These parameters are shown in the following section.

To re-enable Fast Port Span, enter the following commands:

```
HP9300(config)# fast port-span
HP9300(config)# write memory
```

USING THE WEB MANAGEMENT INTERFACE

1. Log on to the device using a valid user name and password for read-write access.
2. Click the Fast checkbox next to Spanning Tree to remove the checkmark from the box.
3. Click Apply to apply the change to the device's running-config.

4. Select the [Save](#) link at the bottom of the panel. Select Yes when prompted to save the configuration change to the startup-config file on the device's flash memory.

Excluding Specific Ports from Fast Port Span

You can exclude individual ports from Fast Port Span while leaving Fast Port Span enabled globally. To do so, use one of the following methods.

USING THE CLI

To exclude a port from Fast Port Span, enter commands such as the following:

```
HP9300(config)# fast port-span exclude ethernet 1/1
HP9300(config)# write memory
```

To exclude a set of ports from Fast Port Span, enter commands such as the following:

```
HP9300(config)# fast port-span exclude ethernet 1/1 ethernet 2/1 ethernet 3/2
HP9300(config)# write memory
```

To exclude a contiguous (unbroken) range of ports from Fast Span, enter commands such as the following:

```
HP9300(config)# fast port-span exclude ethernet 1/1 to 1/24
HP9300(config)# write memory
```

Syntax: [no] fast port-span [exclude ethernet <portnum> [ethernet <portnum>... | to <portnum>]]

To re-enable Fast Port Span on a port, enter a command such as the following:

```
HP9300(config)# no fast port-span exclude ethernet 1/1
HP9300(config)# write memory
```

This command re-enables Fast Port Span on port 1/1 only and does not re-enable Fast Port Span on other excluded ports. You also can re-enable Fast Port Span on a list or range of ports using the syntax shown above this example.

To re-enable Fast Port Span on all excluded ports, disable and then re-enable Fast Port Span by entering the following commands:

```
HP9300(config)# no fast port-span
HP9300(config)# fast port-span
HP9300(config)# write memory
```

Disabling and then re-enabling Fast Port Span clears the exclude settings and thus enables Fast Port Span on all eligible ports. To make sure Fast Port Span remains enabled on the ports following a system reset, save the configuration changes to the startup-config file after you re-enable Fast Port Span. Otherwise, when the system resets, those ports will again be excluded from Fast Port Span.

USING THE WEB MANAGEMENT INTERFACE

You cannot exclude individual ports from Fast Span using the Web management interface.

Fast Uplink Span

The Fast Port Span feature described in the previous section enhances STP performance for end stations. The Fast Uplink feature enhances STP performance for wiring closet switches with redundant uplinks. Using the default value for the standard STP forward delay, convergence following a transition from an active link to a redundant link can take 30 seconds (15 seconds for listening and an additional 15 seconds for learning).

You can use the Fast Uplink feature on an HP device deployed as a wiring closet switch to decrease the convergence time for the uplink ports to another device to just four seconds (two seconds for listening and two seconds for learning). The wiring closet switch must be an HP device but the device at the other end of the link can be an HP device or another vendor's switch. Configuration of the Fast Uplink Span feature takes place entirely on the HP device.

To configure the Fast Uplink Span feature, specify a group of ports that have redundant uplinks on the wiring closet switch (HP device) as members of a Fast Uplink Group. If the active link becomes unavailable, the Fast Uplink Span feature transitions the forwarding to one of the other ports in four seconds. You can configure one

Fast Uplink Span group on the device. All Fast Uplink Span ports are members of the same Fast Uplink Span group.

NOTE: To avoid the potential for temporary bridging loops, Hewlett-Packard recommends that you use the Fast Uplink feature only for wiring closet switches (switches at the edge of the network cloud). In addition, enable the feature only on a group of ports intended for redundancy, so that at any given time only one of the ports is expected to be in the forwarding state.

NOTE: When the wiring closet switch (HP device) first comes up or when STP is first enabled, the uplink ports still must go through the standard STP state transition without any acceleration. This behavior guards against temporary routing loops as the switch tries to determine the states for all the ports. Fast Uplink Span acceleration applies only when a working uplink becomes unavailable.

Fast Uplink Span Rules for Trunk Groups

If you add a port to a Fast Uplink Span group that is a member of a trunk group, the following rules apply:

- If you add the primary port of a trunk group to the Fast Uplink Span group, all other ports in the trunk group are automatically included in the group. Similarly, if you remove the primary port in a trunk group from the Fast Uplink Span group, the other ports in the trunk group are automatically removed from the Fast Uplink Span group.
- You cannot add a subset of the ports in a trunk group to the Fast Uplink Span group. All ports in a trunk group have the same Fast Uplink Span property, as they do for other port properties.
- If the working trunk group is partially down but not completely down, no switch-over to the backup occurs. This behavior is the same as in the standard STP feature.
- If the working trunk group is completely down, a backup trunk group can go through an accelerated transition only if the following are true:
 - The trunk group is included in the fast uplink group.
 - All other ports except those in this trunk group are either disabled or blocked. The accelerated transition applies to all ports in this trunk group.
- When the original working trunk group comes back (partially or fully), the transition back to the original topology is accelerated if the conditions listed above are met.

Configuring a Fast Uplink Port Group

To enable Fast Uplink, use one of the following methods.

USING THE CLI

To configure a group of ports for Fast Uplink Span, enter the following commands:

```
HP9300(config)# fast uplink-span ethernet 4/1 to 4/4
HP9300(config)# write memory
```

Syntax: [no] fast uplink-span [ethernet <portnum> [ethernet <portnum>... | to <portnum>]]

This example configures four ports, 4/1 – 4/4, as a Fast Uplink Span group. In this example, all four ports are connected to a wiring closet switch. Only one of the links is expected to be active at any time. The other links are redundant. For example, if the link on port 4/1 is the active link on the wiring closet switch but becomes unavailable, one of the other links takes over. Because the ports are configured in a Fast Uplink Span group, the STP convergence takes about four seconds instead of taking 30 seconds or longer using the standard STP forward delay.

If you add a port that is the primary port of a trunk group, all ports in the trunk group become members of the Fast Uplink Span group.

You can add ports to a Fast Uplink Span group by entering the **fast uplink-span** command additional times with additional ports. The device can have only one Fast Uplink Span group, so all the ports you identify as Fast Uplink Span ports are members of the same group.

To remove a Fast Uplink Span group or to remove individual ports from a group, use “no” in front of the appropriate **fast uplink-span** command. For example, to remove ports 4/3 and 4/4 from the Fast Uplink Span group configured above, enter the following commands:

```
HP9300(config)# no fast uplink-span ethernet 4/3 to 4/4
HP9300(config)# write memory
```

If you delete a port that is the primary port of a trunk group, all ports in the trunk group are removed from the Fast Uplink Span group.

USING THE WEB MANAGEMENT INTERFACE

You cannot configure the Fast Uplink Span feature using the Web management interface.

Single Spanning Tree

In software releases earlier than 05.2.16, each port-based VLAN runs a separate spanning tree, which you can enable or disable on an individual VLAN basis. This is still the default behavior in software release 06.6.X and later. However, this software release enhances HP’s STP support by enabling you to configure a single instance of the Spanning Tree Protocol (STP) to run on all the port-based VLANs on a device.

The single STP feature is especially useful for connecting an HP device to other devices that run a single spanning tree in accordance with the 802.1q specification.

Single-instance STP uses the same parameters, with the same value ranges and defaults, as the default STP on HP devices (multiple-instance STP).

STP Defaults

STP is enabled by default on switches and disabled by default on routing switches. On switches and routing switches, each port-based VLAN runs a separate instance of STP by default. Thus, on devices that have multiple port-based VLANs, each VLAN has its own spanning tree domain. In addition, the STP state of each port-based VLAN is independent of the STP states of other VLANs. You can have STP enabled on port-based VLAN 10, but disabled on port-based VLANs 20 and 30, and so on.

When you configure a port-based VLAN, that VLAN inherits the STP state of the default port-based VLAN. Thus, if STP is enabled on the default VLAN, STP is also enabled on the new port-based VLAN. You can change the STP state of the VLAN afterwards. Changes to the STP state of the default VLAN do not affect existing VLANs. A change to the STP state affects only the VLANs you create after the change.

Single STP and Existing Port-Based VLANs

When you enable single STP, all the ports on the device become members of a single spanning tree domain. Thus, the ports share a single BPDU broadcast domain. The HP device places all the ports in a non-configurable VLAN, 4094, to implement the single STP domain. However, this VLAN does not affect port membership in the port-based VLANs you have configured. Other broadcast traffic is still contained within the individual port-based VLANs. Therefore, you can use single STP while still using your existing VLAN configurations without changing your network. In addition, single STP does not affect 802.1q tagging. Tagged and untagged ports alike can be members of the single spanning tree domain.

NOTE: When single STP is enabled, the BPDUs on tagged ports go out untagged.

NOTE: If STP is disabled on a VLAN, you must enable STP on the VLAN before enabling single STP.

Spanning Tree Parameters

The STP parameters behave the same and have the same defaults and possible values whether you use single STP or you use the default configuration of a separate spanning tree for each port-based VLAN (multiple-instance STP).

You can configure the following parameters on the global level. The parameters apply to all ports.

- Forward Delay – The period of time a bridge will wait (the listen and learn period) before forwarding data packets. Possible values: 4 – 30 seconds. Default is 15.

- **Maximum Age** – The interval a bridge will wait for receipt of a hello packet before initiating a topology change. Possible values: 6 – 40 seconds. Default is 20.
- **Hello Time** – The interval of time between each configuration BPDU sent by the root bridge. Possible values: 1 – 10 seconds. Default is 2.
- **Priority** – A parameter used to identify the root bridge in a network. The bridge with the lowest value has the highest priority and is the root. Possible values: 0 – 65,535. Default is 32,768.

You can apply the following parameters on an individual port level.

- **Port Priority** – This parameter can be used to assign a higher (or lower) priority to a port. In the event that traffic is re-routed, this parameter gives the port forwarding preference over lower priority ports within a VLAN or on the switch or routing switch (when no VLANs are configured for the system). Ports are re-routed based on their priority. The highest value is routed first. Possible values: 0 – 255. Default is 128. This value overrides the system-wide STP priority.
- **Path Cost** – This parameter can be used to assign a higher or lower path cost to a port. This value can be used to bias traffic toward or away from a certain path during periods of rerouting. For example, if you wish to bias traffic away from a certain port, assign it a higher value than other ports within the VLAN or all other ports (when VLANs are not active on the switch or routing switch). Possible values are 0 – 65,535 and the default values are 1000/port speed for half-duplex ports and (1000/port speed)/2 for full-duplex ports.

Enabling Single STP

To enable single STP, use one of the following methods.

NOTE: If the device has only one port-based VLAN (the default VLAN), then the device is already running a single instance of STP. In this case, you do not need to enable single STP. You need to enable single STP only if the device contains more than one port-based VLAN and you want all the ports to be in the same STP broadcast domain.

NOTE: If STP is disabled on a VLAN, you must enable STP on the VLAN before enabling single STP.

USING THE CLI

To configure the HP device to run a single spanning tree, enter the following command at the global CONFIG level.

```
HP9300(config) spanning-tree single
```

Here is the syntax for the global STP parameters.

Syntax: [no] spanning-tree single [forward-delay <value>]
[hello-time <value>] | [maximum-age <time>] | [priority <value>]

Here is the syntax for the STP port parameters.

Syntax: [no] spanning-tree single [ethernet <portnum> path-cost <value> | priority <value>]

NOTE: Both commands listed above are entered at the global CONFIG level.

NOTE: If the device has only one port-based VLAN, the CLI command for enabling single-instance STP is not listed in the CLI. The command is listed only if you have configured a port-based VLAN.

To change a global STP parameter, enter a command such as the following at the global CONFIG level:

```
HP9300(config) spanning-tree single priority 2
```

This command changes the STP priority for all ports to 2.

To change an STP parameter for a specific port, enter commands such as the following:

```
HP9300(config) spanning-tree single ethernet 1/1 priority 10
```

The commands shown above override the global setting for the STP priority and set the priority to 10 for port 1/1.

To verify that single STP is in effect, enter the following command at any level of the CLI:

```
HP9300(config) show span
```

Syntax: show span [vlan <vlan-id>]

Here is an example of the information displayed by this command. Notice that no VLAN IDs are listed in the VLAN ID column. For STP, all ports are members of VLAN 4094, the single STP VLAN. When you enable single STP, all the ports in the single spanning tree, regardless of other VLAN membership, are configured as members of port-based VLAN 4094. This VLAN is used to implement the single spanning tree. VLAN 4094 is used only by single spanning tree. A port can be a member of VLAN 4094 and another port-based VLAN at the same time without being tagged. All ports in VLAN 4094 share a common STP domain, but for all other traffic, the ports remain within the separate Layer 2 broadcast domains established by the port-based VLANs.

```
HP9300(config)# show span
Global STP Parameters:
```

VLAN ID	Root ID	Root Cost	Root Port	Priority	Max Age	Hello Sec	Hold Time Sec	Forward Delay Sec	Last Change	Chg cnt	Bridge Address
	800000e052f04f00	0	Root	8000	20	2	2	15	0	0	00e052f04f00

Port STP Parameters:

VLAN ID	Port Num	Priority	Path Cost	State	Fwd Trans	Design Cost	Design Root	Design Bridge
	1/1	80	0	DISABLED	0	0	0000000000000000	0000000000000000
	1/2	80	0	DISABLED	0	0	0000000000000000	0000000000000000
	1/3	80	0	DISABLED	0	0	0000000000000000	0000000000000000
	1/4	80	0	DISABLED	0	0	0000000000000000	0000000000000000

.
some lines omitted for brevity
 .

To display VLAN information, including the STP state of each VLAN, enter the following command at any CLI level:

```
HP9300(config)# show vlan
```

Syntax: show vlan [<vlan-id> | ethernet <portnum>]

```
HP9300(config)# show vlan
```

Total PORT-VLAN entries: 3

Maximum PORT-VLAN entries: 8

legend: [S=Slot]

PORT-VLAN 1, Name DEFAULT-VLAN, Priority level0, in single spanning tree domain

```
Untagged Ports: (S1) 1 2 3 4 5 6 7 8
Untagged Ports: (S2) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Untagged Ports: (S2) 17 18 19 20 21 22 23 24
Untagged Ports: (S4) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Untagged Ports: (S4) 17 18 19 20 21 22 23 24
Untagged Ports: (S6) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Untagged Ports: (S6) 17 18 19 20 21 22 23 24
Tagged Ports: None
```

SINGLE-SPANNING-TREE-VLAN, Name Single-spanning-tree-vlan, Priority level0, in single spanning tree domain

```
Untagged Ports: (S1) 1 2 3 4 5 6 7 8
Untagged Ports: (S2) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Untagged Ports: (S2) 17 18 19 20 21 22 23 24
Untagged Ports: (S4) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
```

```
Untagged Ports: (S4) 17 18 19 20 21 22 23 24
Untagged Ports: (S6) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
Untagged Ports: (S6) 17 18 19 20 21 22 23 24
Tagged Ports: None
```

This example shows information for port-based VLAN 1, which is the default VLAN. Notice that a message indicates that the VLAN is in the single STP domain. Also notice that the SINGLE-SPANNING-TREE-VLAN contains all the ports in the device.

USING THE WEB MANAGEMENT INTERFACE

1. Log on to the device using a valid user name and password for read-write access. The System configuration dialog is displayed.
2. Click on the Single checkbox next to Spanning Tree to place a checkmark in the box.
3. Click Apply to apply the change to the device's running-config file.
4. Select the [Save](#) link at the bottom of the panel. Select Yes when prompted to save the configuration change to the startup-config file on the device's flash memory.

PVST/PVST+ Compatibility

HP devices that are configured to support a separate spanning tree in each port-based VLAN can interoperate with Cisco devices that are running Per VLAN Spanning Tree (PVST) or PVST+, Cisco proprietary STP implementations that support separate spanning trees in each port-based VLAN.

An HP device configured to run a separate spanning tree in each port-based VLAN automatically enables PVST/PVST+ support on a port if that port receives an STP BPDU with PVST/PVST+ format. You also can enable PVST/PVST+ support statically as well as display PVST/PVST+ information for each port.

The information in this section is for reference. If you are running PVST/PVST+ on the Cisco devices and the default support for separate spanning trees in each VLAN on the HP devices, then no configuration is necessary for the devices to share spanning tree information.

NOTE: If you plan to use the PVST/PVST+ support, do not use VLAN 1. PVST+ uses VLAN 1 as a single STP broadcast domain and thus uses a different BPDU format than for other VLANs.

PVST

Each spanning tree (that is, each instance of STP) has one device called the root bridge. The root bridge is the control point for the spanning tree, and sends STP status and topology change information to the other devices in the spanning tree by sending BPDUs to the other devices. The other devices forward the BPDUs as needed.

The format of an STP BPDU differs depending on whether it is a Cisco PVST BPDU or an HP BPDU. HP and Cisco devices also can support single STP BPDUs, which use another format.

- An HP device configured with a separate spanning tree in each VLAN sends BPDUs in standard IEEE 802.1D format, but includes a proprietary four-byte tag. The tag identifies the VLAN the BPDU is for.
- A Cisco device configured for PVST sends the BPDUs to multicast MAC address 01-00-0C-CC-CC-CD. If the device is configured for PVST+, then the device sends BPDUs for all VLANs except VLAN 1 to 01-00-0C-CC-CC-CD. The device sends BPDUs in VLAN 1 to 01-80-C2-00-00-00, the single STP address (see below and "PVST+").
- An HP device configured for single STP (IEEE 802.1Q) sends untagged BPDUs to the well-known STP MAC address 01-80-C2-00-00-00.

NOTE: Cisco devices can be configured to interoperate with devices that support IEEE 802.1Q single STP, but the devices cannot be configured to run single STP.

HP's PVST support enables HP and Cisco devices that have separate spanning trees in each VLAN to interoperate. The HP PVST support is automatically enabled when a port receives a PVST BPDU and does not require configuration on the HP or Cisco device.

When PVST is enabled on an HP port, that port sends BPDUs in PVST format instead of HP's spanning tree format.

PVST+

HP devices and Cisco devices support separate spanning trees on an individual port-based VLAN basis. However, until the IEEE standard for multiple spanning trees is finalized, vendors are using different methods to support multiple spanning trees within their own products. PVST+ is an extension to PVST that enables a Cisco device to interoperate with other devices that are running a single spanning tree (IEEE 802.1Q) while still running a separate spanning tree in each VLAN.

PVST+ uses 802.1Q single STP BPDUs on VLAN 1 and PVST BPDUs (which have a proprietary format) for other VLANs. In this case, the Cisco device uses devices running 802.1Q as tunnels for PVST (non-802.1Q) traffic. The 802.1Q single STP BPDUs are addressed to the well-known STP MAC address 01-80-C2-00-00-00. The PVST BPDUs for the other VLANs are addressed to multicast address 01-00-0C-CC-CC-CD.

The PVST+ method can require manual configuration of STP parameters on the 802.1Q devices to ensure that traffic for the PVST VLANs is not blocked. In addition, the opportunities to adjust STP parameters to load balance traffic on a VLAN basis are limited when using PVST+.

Using HP Single STP with Cisco PVST+

Since HP's single STP feature complies with IEEE 802.1Q (the single STP specification), you also can use an HP device running single STP to interoperate with a Cisco device running PVST+. When you enable single STP on an HP device, the PVST compatibility feature is not enabled, even if a port receives a PVST BPDU.

Enabling PVST/PVST+ Statically

PVST/PVST+ support is automatically enabled on a port if the port receives a BPDU in PVST/PVST+ format. However, you can statically enable PVST/PVST+ support on a port if desired. In this case, the support is enabled immediately and support for HP tagged BPDUs is disabled at the same time. To enable the PVST/PVST+ support, use the following CLI method.

NOTE: When PVST/PVST+ support is enabled on a port, support for HP BPDUs is disabled.

USING THE CLI

To enable PVST/PVST+ support on a port, enter commands such as the following:

```
HP9300(config)# interface ethernet 1/1
HP9300(config-if-1/1)# pvst-mode
```

Syntax: [no] pvst-mode

NOTE: If you disable PVST/PVST+ support, the software still automatically enables PVST/PVST+ support if the port receives an STP BPDU with PVST/PVST+ format.

USING THE WEB MANAGEMENT INTERFACE

You cannot enable PVST support using the Web management interface.

Displaying PVST Information

To display PVST information, use the following CLI method.

USING THE CLI

To display PVST information for ports on an HP device, enter the following command at any level of the CLI:

```
HP 9304M or HP 9308M(config)# show span pvst-mode
```

```
VLAN   Port   PVST   PVST
ID     Num.   Cfg.   On(by cfg. or detect)
200    10     0       1
200    11     1       1
```

This example shows that for VLAN 200, PVST support is statically enabled on port 11. PVST is not statically enabled on Port 10, but because port 10 received an incoming PVST BPDU on its interface, the port converted to using PVST mode.

Syntax: show span pvst-mode

The **show span pvst-mode** command displays the following information.

Table 5.5: CLI Display of PVST Information

This Field...	Displays...
VLAN ID	The VLAN to which the PVST/PVST+ information applies.
Port Num.	The HP port number.
PVST cfg.	Whether PVST support is statically enabled on the port. The value can be one of the following: <ul style="list-style-type: none"> 0 – The support has not been statically enabled. 1 – The support has been statically enabled.
PVST on(by cfg. or detect)	Whether PVST/PVST+ support is active on the port. The value can be one of the following: <ul style="list-style-type: none"> 0 – PVST/PVST+ support is not enabled. 1 – PVST/PVST+ support is enabled, either because you statically enabled the support or because the port received an STP BPDU with PVST/PVST+ format.

USING THE WEB MANAGEMENT INTERFACE

You cannot display PVST information using the Web management interface.