- General Overview
The STP topology is converged after a root bridge has been selected, and each bridge has selected its root port, designated bridge, and the participating ports.

Path calculation through the network is based on the root bridge which serves as reference point for the topology.

One root is eleccted for each VLAN.

The root maintains the topology and propagtes timers.

- **Selecting the Root Bridge**

The bridge is selected using the bridge ID (BID), which consists of a 2-byte Priority field plus a 6-byte MAC address.

Lower BID values are preferred.

The Priority field value helps determine which bridge is going to be the root and can be manually altered.

By default, the Priority field is set at 32768.

When the default Priority field is the same for all bridges, selecting the root bridge is based on the lowest MAC address.

When a switch first boots and begins sending BPDUs, it has no knowledge of a root ID, so it populates the Root ID field of outbound BPDUs with its own BID.

Spanning tree operation requires that each switch have a unique BID.

Because PVST requires that a separate instance of spanning tree run for each VLAN, the BID field is required to carry VLAN ID (VID) information, which is accomplished by reusing a portion of the Priority field as the extended system ID.

- Configuring PVST

If no priority has been configured, every switch will have the same default priority of 32768. Assuming all other switches are at default priority, the
spanning-tree vlan *vlan-id* **root primary**
command sets a value of 24576. Also, assuming all other switches are at default priority, the
spanning-tree vlan *vlan-id* **root secondary**
command sets a value of 28672.
CAUTION:

Spanning tree commands take effect immediately, so network traffic is disrupted while the reconfiguration occurs.
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Port roles

Each Layer 2 port on a switch running STP exists in one of these five port states :

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- * Blocking: The Layer 2 port is a nondesignated port and does not participate in frame forwarding. The port receives BPDUs to determine the location and root ID of the root switch and which port roles (root, designated, or nondesignated) each switch port should assume in the final active STP topology. By default, the port spends 20 seconds in this state (max age).
- * Listening: Spanning tree has determined that the port can participate in frame forwarding according to the BPDUs that the switch has received. At this point, the switch port is receiving BPDUs and also transmitting its own BPDUs and informing adjacent switches that the switch port is preparing to participate in the active topology. By default, the port spends 15 seconds in this state (forward delay).
- * Learning: The Layer 2 port prepares to participate in frame forwarding and begins to populate the CAM table. The port is still sending and receiving BPDUs. By default, the port spends 15 seconds in this state (forward delay).
- * Forwarding: The Layer 2 port is considered part of the active topology. It forwards frames and also sends and receives BPDUs.
- * Disabled: This is not really an STP state; rather it is the state resulting from administratively shutting down a switch port. In this state, the Layer 2 port does not participate in spanning tree and does not forward frames.
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