



STP/RSTP & EtherChannel

Use this when: you add redundant links between switches and need to know which port blocks, how fast it recovers, or how to bundle links.

CCNA 200-301 · topics 2.4, 2.5
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🔧 How STP picks a loop-free tree

Per VLAN with PVST+ / Rapid PVST+

1 Elect the root

Lowest **bridge ID** wins. Tie on priority? Lowest MAC.

2 Root ports

Each other switch: the port with the lowest **cost to root**.

3 Designated ports

Each link: the side closest to root forwards.

4 Block the rest

Leftover ports become **alternate** (or backup) and block.

Bridge ID =	Priority	Extended system ID	MAC address
	4 bits · default 32768, steps of 4096	12 bits = VLAN number	48 bits · tie-breaker

🔄 Port cost

Lower = better

SPEED	SHORT (802.1D)	LONG (802.1T)
10 Mbps	100	2,000,000
100 Mbps	19	200,000
1 Gbps	4	20,000
10 Gbps	2	2,000

`show spanning-tree summary` shows the method in use.

🕒 STP vs RSTP

Standard	802.1D · 802.1w (Cisco: Rapid PVST+)
Port states	Blocking, listening, learning, forwarding · discarding , learning, forwarding
Timers	Hello 2 s, forward delay 15 s, max age 20 s
Convergence	30 to 50 s · a few seconds

📄 Configure STP

```
spanning-tree mode rapid-pvst
spanning-tree vlan 10 root primary
spanning-tree vlan 20 priority 4096
interface g0/5          ! PC or server
 spanning-tree portfast
 spanning-tree bpduguard enable
```

`root primary` sets priority 24576, or lower if needed.
`show spanning-tree vlan 10` shows root, roles and costs.

🔧 EtherChannel: bundle links

PROTOCOL	STARTS	WAITS	FORMS?
LACP (IEEE)	active	passive	passive + passive: no
PAGP (Cisco)	desirable	auto	auto + auto: no
Static	on (no protocol)		only with on

```
interface range g0/1 - 2
 channel-group 1 mode active
interface port-channel 1
 switchport mode trunk
```

📋 Bundle rules

Members	Up to 8 active (LACP: 8 more on standby)
Must match	Speed, duplex, access VLAN or trunk VLANs, native VLAN
Never mix	LACP and PAGP in one bundle
Check	<code>show etherchannel summary</code> (want SU / P)

🛡️ Avoid loops

⚠️ **DANGER** PortFast only on end-host ports. On a switch link it can loop the network.

⚠️ **CAUTION** Mode `on` skips negotiation; a mismatch can loop.

⚠️ **CAUTION** Pick the root on purpose, not by lowest MAC.



• **Lowest** bridge ID is root

• BPDU Guard err-disables the port

• One bundle = one logical STP link