Achievable

CCNA DUMP SHEET

STP and EtherChannel

What STP elects

	Elected	Lowest wins, in order
1	Root bridge, one per VLAN	Bridge priority, then base MAC address. All its active ports are designated
2	Root port, one per non-root switch	Root Path Cost, then neighbor's bridge ID, port priority (default 128), port number
3	Designated port, one per link	Root Path Cost of the switch on that link, then bridge ID

Rapid PVST+ roles and states

Role	State	Job
Root	Forwarding	Best path to the root
Designated	Forwarding	Forwards onto its link
Alternate	Discarding	Next path to the root
Backup	Discarding	Spare for a designated port

- **Discarding:** was Disabled, Blocking, Listening. **Learning:** learns MACs. Neither sends data
- **Rapid PVST+:** RSTP per VLAN, each VLAN with its own root

Timers

Timer	Default	What it does
Hello	2 s	Time between BPDUs
Forward delay	15 s	Each of Listening, Learning: 30 s in all
Max Age	20 s	Wait without BPDUs, then reconfigure

- **RSTP** spots a loss in 6 s (3 hellos). **802.1D** heals in 30-50 s
- **Proposal/Agreement:** moves RSTP ports to forwarding fast

Cost and priority

10 Mbps	100 Mbps	1 Gbps	10 Gbps
Cost 100	Cost 19	Cost 4	Cost 2

- **Root Path Cost:** the root sends 0; add the receiving port's cost
- **Priority:** default 32768, 0 to 61440 in multiples of 4096
- **System ID Extension:** adds VLAN ID: VLAN 10 shows 32778

Root bridge commands

Command	What it does
`spanning-tree mode rapid-pvst`	Run Rapid PVST+
`spanning-tree vlan 2 priority 4096`	Set priority
`spanning-tree vlan 2 root primary`	24576, or 4096 below a lower root
`spanning-tree vlan 2 root secondary`	28672

- **Read:** `show spanning-tree vlan 2`: `Altn`, `BLK` (Discarding)
- **Protocol:** `rstp` is Rapid PVST+, `ieee` is legacy

STP features, set per port

Feature	Acts on	Result	Interface command
PortFast	Edge port, not a switch	Skips Forward Delay, forwards at once	`spanning-tree portfast`
BPDU Guard	Any BPDU on an edge port	Err-disabled until `shutdown`, `no shutdown`	`spanning-tree bpduguard enable`
BPDU Filter	All BPDUs on the port	Sends none, ignores received. Loop risk	`spanning-tree bpdufilter enable`
Root Guard	Superior BPDU: a better root	Root Inconsistent; recovers when they stop	`spanning-tree guard root`
Loop Guard	BPDUs stop: root, alternate	Loop Inconsistent; recovers when they resume	`spanning-tree guard loop`

EtherChannel

- **Bundle:** one logical link: STP blocks none, bandwidth adds up
- **Losing a member:** less bandwidth, no STP reconvergence
- **Members must match:** duplex, speed, port mode, native VLAN, allowed VLANs

SW1	SW2	Forms?
`active`	`active` or `passive`	Yes, LACP (802.3ad)
`passive`	`passive`	No: neither side starts
`on`	`on` only	Yes, static, no negotiation

Configure and verify

```
SW1(config)# interface range g0/1 - 2
SW1(config-if-range)# channel-group 1 mode active
SW1(config-if-range)# interface port-channel 1
SW1(config-if)# switchport mode trunk
```

- **Layer 3:** `no switchport` on members and Port-Channel; IP on the Port-Channel
- **Verify:** `show etherchannel summary`: `SU` Layer 2 up, `RU` Layer 3 up, `SD` down, `P` bundled. Also `show lacp neighbor`