

# Spanning Tree

## Cisco STP Toolkit

- Access Ports
  - Transition to Forwarding
  - PortFast
- Indirect Failures
  - No MAX\_AGE 20Sec
  - Backbone Fast
- 802.1D only
- 3-5 Sec Convergence
  - Access to Distribution
  - UplinkFast
- Error-Disable
  - Per Port
  - Global
  - BPDUGuard
- Filters (Suppress) BPDU
  - Per Port
  - Global
  - BPDUFilter
- Not Recommended
  - Disables STP on Edge
  - RootGuard
- Prevents Alt or Root to become Designated
  - Monitoring BPDUs
  - Per VLAN
  - LoopGuard
- loop-inconsistent state
- Unidirectional Links
- Software bugs
- Unidirectional Links
  - Physical Level
  - Per Interface
  - UDLD
- Fiber-Optic Ports Default
- Aggressive Mode Recommended
- Uplinks Redundancy
  - Active \ Passive
  - Flex Links
- Access to Distribution

## Fundamentals

- Prevents L2 Loops
  - Choose Root Bridge
    - 1 Priority
    - 2 MAC
    - Lowest Bridge ID
  - Choose Root Ports
    - 10G = 2
    - 1G = 4
    - 100Mb = 19
    - 10Mb = 100
    - 1 Lowest Cost
    - 2 Lowest BID of Uplink Switch
  - Choose Designated Port
    - 1 Lowest Cost Root
    - 2 Lowest BID Uplink Switch
    - 3 Lowest Port Priority to Root
  - Alternate Ports
    - Block other ports
  - Backup Ports
- 128.7 Priority.Number
- 3 Lowest Port Priority

## MSTP

- 802.1S
- 802.1W
- Other MST Region
- Cisco MSTP
  - Load - Medium - High
  - VLAN LIST - Instance
  - VLAN LIST
  - Load-Balancing
  - FAST Convergence
  - Cisco Pre-standard
  - Before IOS 12.2SEC
- MST
  - Name
  - Revision Number
  - VLAN Association
  - Region
  - IST
  - 802.1D
  - NON MST Ports
  - Enchantments
    - PortFast
    - BPDUGuard
    - BPDUFilter
    - LoopGuard
    - RootGuard

## STP

- 802.1D
  - Load - Low
  - CST
    - One Instance
    - No Load-balancing
  - Convergence SLOW
  - Blocking
    - Max\_Age 20Sec
    - Receive BPDUs
    - Not Forwarding
    - Not Learning
    - Not Sending BPDUs
  - Listening
    - Forwarding Delay 15Sec
    - Send/Receive BPDUs
    - Preparing for Active Topology
  - Learning
    - Forwarding Delay 15 Sec
    - MAC Learning
    - Prevents UNKNOWN Unicast Flood
  - Forwarding
    - Port in Active Topology
    - Forwarding Packets
    - Send/Receive BPDU
  - Disabled
    - Port is Down
- Port Roles
  - Root
  - Designated
  - Non Designated

## Cisco 802.1D

- Load - High
- PerVLAN
  - Vlan - Instance
  - Load-Balancing
- Convergence SLOW

## Enchantments

- PortFast
- UplinkFast
- BackboneFast
- BPDUGuard
- BPDUFilter
- LoopGuard
- RootGuard

## Port Roles

- Root
- Designated
- Non Designated

## Enchased System ID

- BID
- 2 Byte Priority
  - 4 Bit Priority
  - 0-61440
  - Step 4096
- 12 Bit VLAN ID
- 0-4095
- 4 byte MAC

## PVST+

- 802.1W
  - Load - Medium
  - CST
    - One Instance
    - No Load-Balancing
  - Convergence FAST
  - Port States
    - Discarding
      - ex Blocked
      - ex Listening
      - ex Disabled
    - Learning
      - Active Negotiation
      - MAC Learning
      - Prevents UNKNOWN Unicast Flood
    - Forwarding
      - Port in Active Topology
      - Forwarding Packets
      - Send/Receive BPDU
  - Port Roles
    - Root
      - Port to Root Bridge
    - Designated
      - Active Forwarding for Segment
    - Alternate
      - Blocked
      - ALT Designated to Segment
    - Backup
      - Blocked
      - Same as Alternate on same Bridge
  - Link-Types
    - Point-to-Point
      - FullDuplex
    - Shared
      - HalfDuplex
    - Mostly Designated Ports
      - For Rapid Convergence
  - Edge Port
    - Switchport PortFast

## RSTP

- 802.1W
  - Load - Medium
  - CST
    - One Instance
    - No Load-Balancing
  - Convergence FAST
  - Port States
    - Discarding
      - ex Blocked
      - ex Listening
      - ex Disabled
    - Learning
      - Active Negotiation
      - MAC Learning
      - Prevents UNKNOWN Unicast Flood
    - Forwarding
      - Port in Active Topology
      - Forwarding Packets
      - Send/Receive BPDU
  - Port Roles
    - Root
      - Port to Root Bridge
    - Designated
      - Active Forwarding for Segment
    - Alternate
      - Blocked
      - ALT Designated to Segment
    - Backup
      - Blocked
      - Same as Alternate on same Bridge
  - Link-Types
    - Point-to-Point
      - FullDuplex
    - Shared
      - HalfDuplex
    - Mostly Designated Ports
      - For Rapid Convergence
  - Edge Port
    - Switchport PortFast

## PVRST+

- Cisco 802.1W
  - Load - Very High
  - PerVLAN
    - Vlan - Instance
    - Load-Balancing
  - Convergence FAST
- Enchantments
  - PortFast
  - BPDUGuard
  - BPDUFilter
  - LoopGuard
  - RootGuard
- Enchased System ID
  - BID
  - 2 Byte Priority
    - 4 Bit Priority
    - 0-61440
    - Step x4096
  - 12 Bit VLAN ID
  - 4 byte MAC