

STP - link management protocol that provides path redundancy while preventing undesirable loops in the network

- Enabling STP
  - Switch (config): spanning-tree vlan 10
    - Enables STP on specific VLAN
  - Setting priority and root
    - Switch (config): spanning-tree vlan 10 root primary
      - Sets switch as root - automatically calculates priority to do so
    - Switch(config)# spanning-tree vlan 20 root secondary
      - Sets switch as secondary root switch with a priority of 28672
    - Switch(config)# exit
    - Switch#: sh spanning-tree
      - View configurations
    - Switch(config)#spanning-tree vlan 20 priority 4096
      - Manually assign a priority - default is 32768, so any lower will set to root
- Additional Configurations
  - Switch (config): spanning-tree mode pvst
    - To configure the STP protocol to run on the switch, enter the following:
      - pvst
      - rapid-pvst
      - stp — Classic STP provides a single path between any two endpoints, eliminating and preventing networking loops.
      - rstp — RSTP detects network topologies to provide faster convergence of the spanning tree. This option is enabled by default.
      - mst — MSTP is based on RSTP. It detects Layer 2 loops, and attempts to mitigate them by preventing the involved port from transmitting traffic.
  - Switch (config): spanning-tree vlan 10 hello-time 4
    - Sets the hello-time - default is 2 seconds
  - Switch (config): spanning-tree vlan 10 max-age 25
    - Sets max-age - default is 20 seconds
  - Switch (config): spanning-tree vlan 10 forward-time 20
    - Sets forward time - default is 15 seconds
- Check configurations
  - Switch#: sh spanning-tree

## OSPF

The OSPF protocol is a link-state routing protocol, which means that the routers exchange topology information with their nearest neighbors. The main advantage of a link state routing protocol like OSPF is that the complete knowledge of topology allows routers to calculate routes that satisfy particular criteria.

### Router 1 Configuration Commands

```
R1>en
R1#config t
R1(config)#router ospf 10
    - Assign process ID (config)
    - Often times 1
R1(config-router)#router-id 1.1.1.1
    - Assign router ID
R1(config-router)#network 172.16.1.0 0.0.0.255 area 0
    - Assign network address / network statements for EACH interface (config-router)
    - network <NETWORK-address> <WILDCARD-BITS> area <#>
        - Area # usually 0 if not specified
        - https://www.cloudaccess.net/cloud-control-panel-ccp/157-dns-management/322-subnet-masks-reference-table.html
        - http://jodies.de/ipcalc?host=172.31.0.0&mask1=23&mask2=
    - If wildcard mask:
        - network <NETWORK-address> <WILDCARD-mask> area <#>
R1(config-router)#network 192.168.10.4 0.0.0.3 area 0
R1(config-router)#network 172.16.3.0 0.0.0.3 area 0
R1(config-router)#passive-int g0/0
    - LAN interface set to passive
    - Interface: on topology, see interface connecting router to switch
```

### Router 2 Configuration Commands

```
R2>en R2
R2#conf t
R2(config)#router ospf 10
R2(config-router)#router-id 2.2.2.2
R2(config-router)#network 172.16.2.0 0.0.0.255 area 0
R2(config-router)#network 172.16.3.0 0.0.0.3 area 0
00:13:00: %OSPF-5-ADJCHG: Process 10, Nbr 1.1.1.1 on Serial0/0/0 from LOADING
to FULL, Loading Done
R2(config-router)#network 192.168.10.8 0.0.0.3 area 0
R2(config-router)#passive-int g0/0
```

### Router 3 Configuration Commands

```
R3>en
R3#conf t
R3(config)#router ospf 10
R3(config-router)#router-id 3.3.3.3
R3(config-router)#network 192.168.10.4 0.0.0.3 area 0
R3(config-router)#network 192.168.1.0 0.0.0.3 area 0
R3(config-router)#network 192.168.10.8 0.0.0.3 area 0
R3(config-router)#passive-int g0/0
R3(config)#int g0/0
R3(config-if)#ip ospf hello-interval 5
    - Set Hello and dead Interval for interface
```

- Default hello: 10

R3(config-if)#ip ospf dead-interval 20

- Set Hello and dead Interval for interface
- Default dead: 40

R2(config-if)#ip ospf cost 30

- Set cost

## LACP

Switch(config-if)#int port-channel 1

- **Specifies the port-channel interface to configure**, and enters the interface configuration mode. The range is from 1 to 4096. The Cisco NX-OS software **automatically creates the channel group if it does not already exist.**

Switch(config-if)#int range fa0/1-2

Switch(config-if-range)#switchport trunk encapsulation dot1

- the switch that the interface should use IEEE 802.1Q encapsulation on the frames when the interface is configured as a trunk

Switch(config-if-range)#channel-group 1 mode active

- **Configures the port in a channel group and sets the mode**
- Associates port channel with channel group
- **You must set all LACP-enabled port-channel interfaces to active or passive. The default mode is on.**

Switch(config-if-range)#int port-channel 2

Switch(config-if)#int range fa0/3-4

Switch(config-if-range)#switchport mode access

Switch(config-if-range)#channel-group 2 mode on

- **DOES NOT set as LACP - Careful w this**

Switch(config-if)#int port-channel 3

Switch(config-if)#int range fa0/5-6

Switch(config-if-range)#no switchport

- **Sets as layer 3 switch**

Switch(config-if-range)#channel-group 3 mode active

Switch# exit

Switch# show etherchannel summary

- Verifies everything is good
- **Notice the '-' where we put 'on' instead of active**