Router infotech
Beyond Certification

STUDENT LAB GUIDE

CCNA (640-802)

CCNA
CISCO

Developed By,

Router Infotech Career Academy

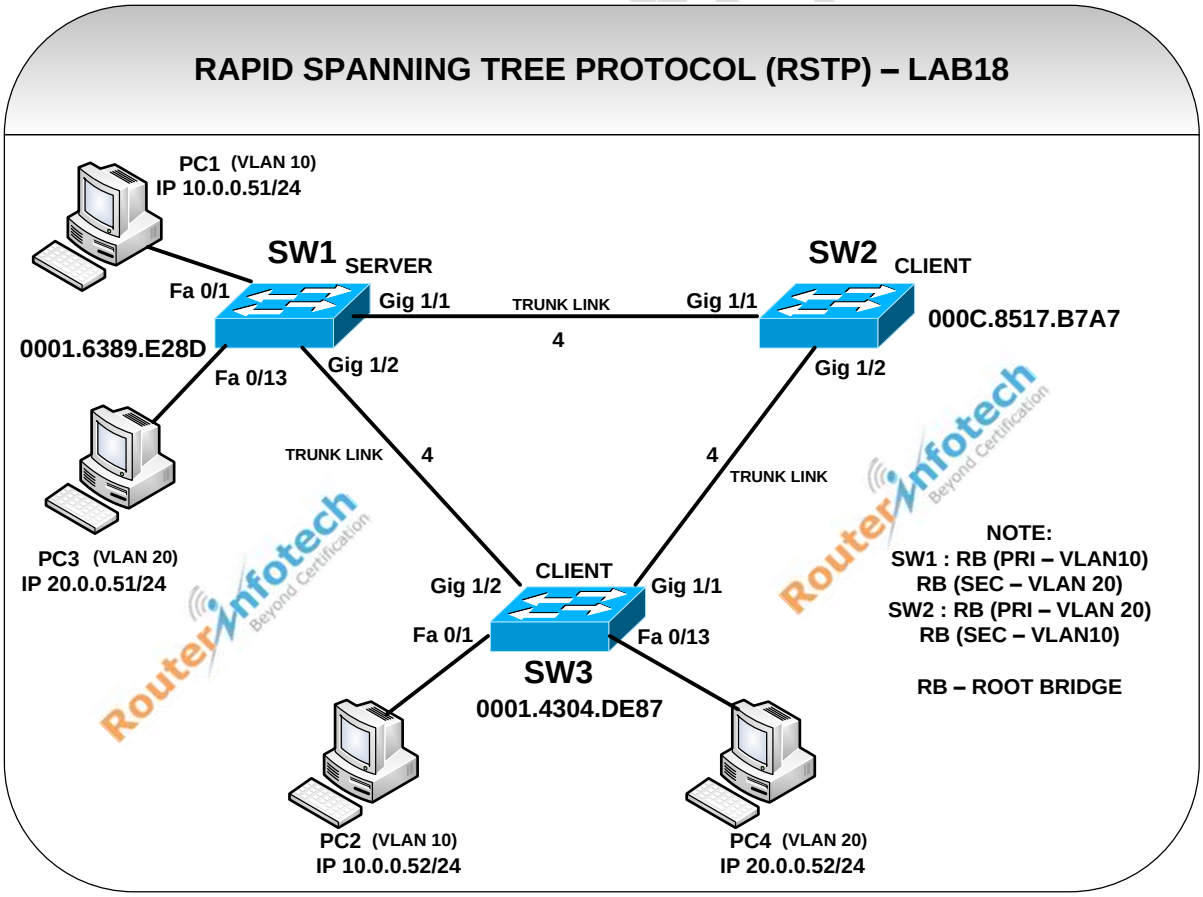
LAB: 18
RAPID SPANNING TREE PROTOCOL (RSTP)

Objective:

To configure & Verify Rapid Spanning Tree Protocol (RSTP) successfully in a switched network and test its all functionalities practically.

NOTE: RSTP is not by default enabled on switch, we have to enable it

TOPOLOGY : Setup your lab topology as below.



Procedure:

1. Configure the hostnames for switches as **SW1,SW2 & SW3** as shown in above topology
2. Configure all **Trunking lines** in between **SW1, SW2 & SW3**
3. Change **VTP Mode** of **SW2 & SW3** as **CLIENT**
4. Add **VTP Domain** having Name **YAHOO** on **SW1**, add **VAN 10** having name **RED** & **VLAN 20** having name **BLUE** on SW1
5. Verify on all switches **SW1, SW2 & SW3** that whether domain name, vtp mode, configuration rivision & VAN's are coming or not by using **show vlan** & **show vtp status** command
6. Now go on Switch **SW1,** apply vlan 10 on interfaces fastEthernet 0/1 – 12 & apply vlan 20 on interfaces fastEthernet 0/13 – 24 (Also use switchport mode access & spanning-tree portfast command on each interface)
   Do the same configuration on **SW2** & **SW3** also.
7. Initially **disable pvstp** & then **enable rstp** on all switches **SW1, SW2 & SW3**
8. Configure **SW1 as Root Bridge** (Primary for VLAN 10 & Secondary for VLAN 20) & also **SW2 as Root Bridge** (Primary for VLAN 20 & Secondary for VLAN 10) **---- Load Balancing**
9. Check the connectivity between PC1 & PC3 **(VLAN 10) &** also between PC2 & PC4 **(VLAN 20)** using **ping utility**
   Note: Here **SW1 acts as Root Bridge** (Primary for VLAN 10 & Secondary for VLAN 20) & also **SW2 acts as Root Bridge** (Primary for VLAN 20 & Secondary for VLAN 10)
10. **Scenario:** Now Suppose link between SW2 & SW3 goes down (**e.g** Make this by using **shutdown** command on interface Giga 1/1 of SW3)
    Now in this case SW1 becomes the Root Bridge for VLAN 20 to forward the traffic

Configuration:

Step 1:

Configure the hostnames for switches as SW1, SW2 & SW3 as shown in above topology

1.1: For SW1

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW1
SW1(config)#
```

1.2: For SW2

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW2
SW2(config)#
```

1.3: For SW3

```
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#hostname SW3
SW3(config)#
```

Step 2:

Configure all **Trunking lines** in between **SW1, SW2 & SW3**

2.1: For SW1

```
SW1(config)#interface range gigabitEthernet 1/1 - 1/2
SW1(config-if)#switchport mode trunk
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/1,
changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/2,
changed state to up
```

2.2: For SW2

```
SW2(config)#interface range gigabitEthernet 1/1 - 1/2
SW2(config-if)#switchport mode trunk
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/1,
changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/2,
changed state to up
```

2.3: For SW3

```
SW3(config)#interface range gigabitEthernet 1/1 - 1/2
SW3(config-if)#switchport mode trunk
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/1,
changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/2,
changed state to up
```

Step 3:

Change **VTP Mode** of **SW2 & SW3** as **CLIENT**

3.1: For SW2

```
SW2(config)#vtp mode client
Setting device to VTP CLIENT mode.
```

3.2: For SW3

```
SW3(config)#vtp mode client
Setting device to VTP CLIENT mode.
```

Step 4:

Add **VTP Domain** having Name **YAHOO** on **SW1**, add **VAN 10** having name **RED** & **VLAN 20** having name **BLUE** on SW1

4.1: For SW1

```
SW1(config)#vtp domain YAHOO
Changing VTP domain name from NULL to YAHOO
SW1(config)#vlan 10
SW1(config-vlan)#name RED
SW1(config-vlan)#exit
SW1(config)#vlan 20
SW1(config-vlan)#name BLUE
SW1(config-vlan)#exit
SW1(config)#
```

Step 5:

Verify on all switches **SW1, SW2 & SW3** that whether domain name, vtp mode, configuration rivision & VAN's are coming or not by using **show vlan** & **show vtp status** command

5.1: For e.g On SW2

```
SW2#show vlan

VLAN Name                              Status    Ports
---- --------------------------------- --------- -------------------------

  1   default                          active    Fa0/1, Fa0/2, Fa0/3, Fa0/4
                                                 Fa0/5, Fa0/6, Fa0/7, Fa0/8
                                                 Fa0/9, Fa0/10, Fa0/11, Fa0/12
                                                 Fa0/13, Fa0/14, Fa0/15,
                                                 Fa0/16, Fa0/17, Fa0/18,
                                                 Fa0/19, Fa0/20, Fa0/21,
```

Fa0/22, Fa0/23, Fa0/24

```
10  RED                                active
20  BLUE                               active
1002 fddi-default                      act/unsup
1003 token-ring-default                act/unsup
1004 fddinet-default                   act/unsup
1005 trnet-default                     act/unsup
  . . . output omitted . . .
```

```
SW2#show vtp status
VTP Version                     : 2
Configuration Revision          : 4
Maximum VLANs supported locally : 255
Number of existing VLANs        : 7
VTP Operating Mode              : Client
VTP Domain Name                 : YAHOO
VTP Pruning Mode                : Disabled
VTP V2 Mode                     : Disabled
VTP Traps Generation            : Disabled
MD5 digest                      : 0x1E 0x3A 0xAA 0x00 0xF1 0x91 0xCE
0xA5
Configuration last modified by 0.0.0.0 at 3-1-93 00:20:26
```

Note: Similarly Check on SW1 & SW3

Step 6:

Now go on Switch **SW1,** apply vlan 10 on interfaces fastEthernet 0/1 – 12 & apply vlan 20 on interfaces fastEthernet 0/13 – 24 (Also use switchport mode access & spanning-tree portfast command on each interface)
Do the same configuration on **SW2** & **SW3** also.

6.1: For SW1

```
SW1(config)#interface range fastEthernet 0/1 - 12
SW1(config-if-range)#switchport mode access
SW1(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a
single
host. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION
```

```
%Portfast will be configured in 12 interfaces due to the range command
but will only have effect when the interfaces are in a non-trunking
mode.
SW1(config-if-range)#switchport access vlan 10
SW1(config-if-range)#^Z
SW1#

SW1(config)#interface range fastEthernet 0/13 - 24
SW1(config-if-range)#switchport mode access
SW1(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a
single
host. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION

%Portfast will be configured in 12 interfaces due to the range command
but will only have effect when the interfaces are in a non-trunking
mode.
SW1(config-if-range)#switchport access vlan 20
SW1(config-if-range)#^Z
SW1#
```

6.2: For SW2

```
SW2(config)#interface range fastEthernet 0/1 - 12
SW2(config-if-range)#switchport mode access
SW2(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a
single
host. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION

%Portfast will be configured in 12 interfaces due to the range command
 but will only have effect when the interfaces are in a non-trunking
mode.
SW2(config-if-range)#switchport access vlan 10
SW2(config-if-range)#^Z
SW2#
```

```
SW2(config)#interface range fastEthernet 0/13 - 24
SW2(config-if-range)#switchport mode access
SW2(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a
single
host. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION

%Portfast will be configured in 12 interfaces due to the range command
but will only have effect when the interfaces are in a non-trunking
mode.
SW2(config-if-range)#switchport access vlan 20
SW2(config-if-range)#^Z
SW2#
```

6.3: For SW3

```
SW3(config)#interface range fastEthernet 0/1 - 12
SW3(config-if-range)#switchport mode access
SW3(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a
single
host. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION

%Portfast will be configured in 12 interfaces due to the range command
 but will only have effect when the interfaces are in a non-trunking
mode.
SW3(config-if-range)#switchport access vlan 10
SW3(config-if-range)#^Z
SW3#

SW3(config)#interface range fastEthernet 0/13 - 24
SW3(config-if-range)#switchport mode access
SW3(config-if-range)#spanning-tree portfast
%Warning: portfast should only be enabled on ports connected to a
single
host. Connecting hubs, concentrators, switches, bridges, etc... to this
interface when portfast is enabled, can cause temporary bridging loops.
Use with CAUTION
```

```
%Portfast will be configured in 12 interfaces due to the range command
but will only have effect when the interfaces are in a non-trunking
mode.
SW3(config-if-range)#switchport access vlan 20
SW3(config-if-range)#^Z
SW3#
```

Step 7:

Initially **disable pvstp** & then **enable rstp** on all switches **SW1, SW2 & SW3**

7.1: For SW1

```
SW1(config)#no spanning-tree mode
SW1(config)#spanning-tree mode rapid-pvst
```

7.2: For SW2

```
SW2(config)#no spanning-tree mode
SW2(config)#spanning-tree mode rapid-pvst
```

7.3: For SW3

```
SW3(config)#no spanning-tree mode
SW3(config)#spanning-tree mode rapid-pvst
```

Step 8:

Configure **SW1 as Root Bridge** (Primary for VLAN 10 & Secondary for VLAN 20) & also **SW2 as Root Bridge** (Primary for VLAN 20 & Secondary for VLAN 10)

8.1: For SW1

```
SW1(config)#spanning-tree vlan 10 root primary
SW1(config)#spanning-tree vlan 20 root secondary
```

8.2: For SW2

```
SW2(config)#spanning-tree vlan 20 root primary
SW2(config)#spanning-tree vlan 10 root secondary
```

Step 9:

Check the connectivity between PC1 & PC3 **(VLAN 10) &** also between PC2 & PC4 **(VLAN 20)** using **ping utility**
Note: Here **SW1 acts as Root Bridge** (Primary for VLAN 10 & Secondary for VLAN 20) & also **SW2 acts as Root Bridge** (Primary for VLAN 20 & Secondary for VLAN 10)

9.1: For e.g Check connectivity between PC3 & PC4 (VLAN 20)

```
PC4>ping -t 20.0.0.51

Pinging 20.0.0.51 with 32 bytes of data:

Reply from 20.0.0.51: bytes=32 time=80ms TTL=128
Reply from 20.0.0.51: bytes=32 time=125ms TTL=128
Reply from 20.0.0.51: bytes=32 time=125ms TTL=128
Reply from 20.0.0.51: bytes=32 time=125ms TTL=128
Reply from 20.0.0.51: bytes=32 time=125ms TTL=128
Reply from 20.0.0.51: bytes=32 time=125ms TTL=128
Reply from 20.0.0.51: bytes=32 time=125ms TTL=128
Reply from 20.0.0.51: bytes=32 time=109ms TTL=128
Reply from 20.0.0.51: bytes=32 time=93ms TTL=128
        . . . output omitted . . .
```

Note: Here PC3 & PC4 both are in VLAN 20, so SW2 acts as Primary Root Bridge for VLAN 20

Step 10:

Scenario: Now Suppose link between SW2 & SW3 goes down (**e.g** Make this by using **shutdown** command on interface Giga 1/1 of SW3)
Now in ths case SW1 becomes the Root Bridge for VLAN 20 to forward the traffic

10.1: For SW3

```
SW3(config)#interface gigabitEthernet 1/1
SW3(config-if)#shutdown                          --- to make it disable

%LINK-5-CHANGED: Interface GigabitEthernet1/1, changed state to
administratively down
```

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/1, changed state to down

10.2:

NOTE: Now check again the connectivity between PC3 & PC4

```
PC4>ping -t 20.0.0.51

Pinging 20.0.0.51 with 32 bytes of data:
Reply from 20.0.0.51: bytes=32 time=125ms TTL=128
Request timed out.                -----      Almost 0 Sec. of Network outage
Reply from 20.0.0.51: bytes=32 time=93ms TTL=128
Reply from 20.0.0.51: bytes=32 time=94ms TTL=128      Switch SW1 becomes
Reply from 20.0.0.51: bytes=32 time=94ms TTL=128        Root Bridge for
Reply from 20.0.0.51: bytes=32 time=94ms TTL=128          VLAN 20
Reply from 20.0.0.51: bytes=32 time=94ms TTL=128
        . . . output omitted . . .
```

COOL COOL