

## Assignment 2: Spanning Tree Protocol (STP)

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### Topology Diagram

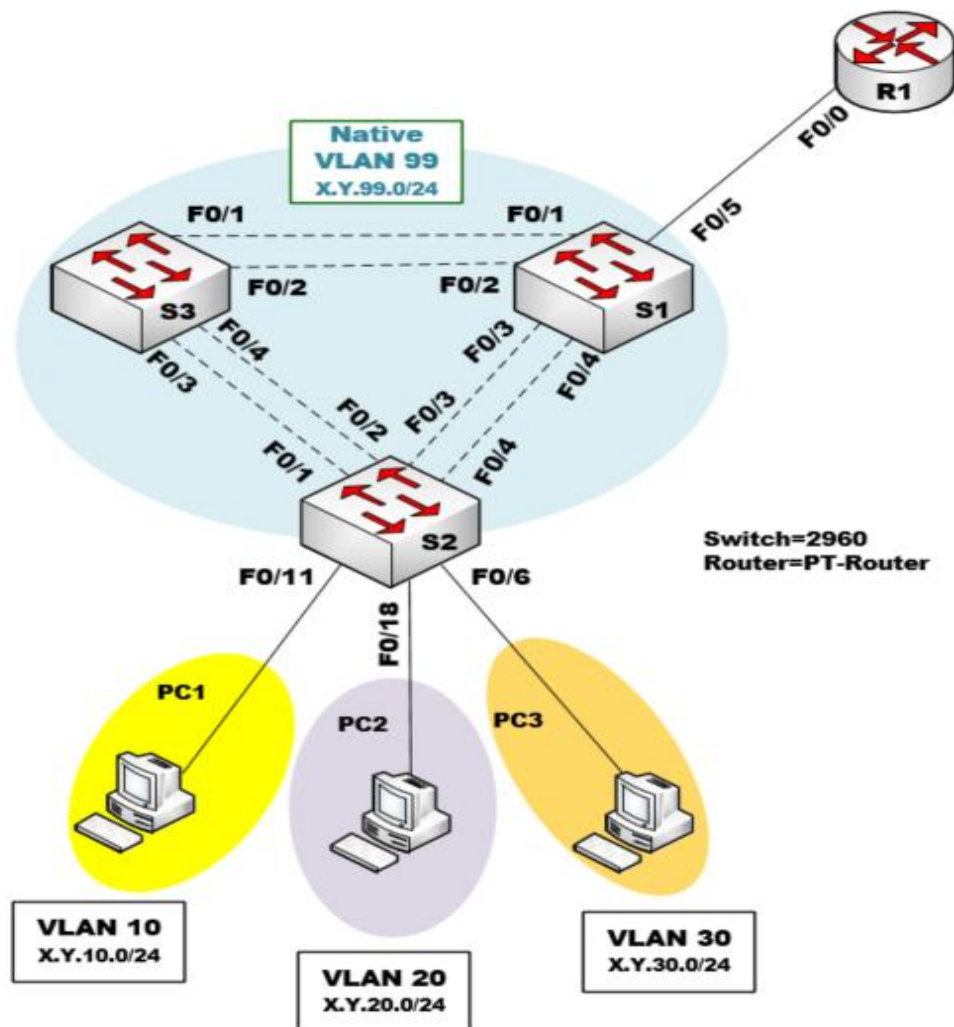


Fig 1

## Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
S1	VLAN 99	10.10.99.11	255.255.255.0	-
S2	VLAN 99	10.10.99.12	255.255.255.0	-
S3	VLAN 99	10.10.99.13	255.255.255.0	-
PC1	NIC	10.10.10.254	255.255.255.0	10.10.10.1
PC2	NIC	10.10.20.154	255.255.255.0	10.10.20.1
PC3	NIC	10.10.30.254	255.255.255.0	10.10.30.1

## Port Assignments

Ports	Assignment	Network
Fa0/1 - 0/5	802.1q Trunks	
Fa0/6 - 0/10	VLAN 30 – Guest(Default)	10.10.30.0 /24
Fa0/11 - 0/17	VLAN 10 – Faculty/Staff	10.10.10.0 /24
Fa0/18 - 0/24	VLAN 20 - Students	10.10.20.0 /24

## Task #1 Configurations

Implement the topology of Fig-1 using the information in the given tables. Take X and Y to be 10. Use 2960 switches and a 1941 router.

- Configure S1, S2, and S3 switches according to the following guidelines:
  - Set the switch hostname as indicated on the topology.
  - Disable DNS lookup
  - Configure an encrypted privileged EXEC mode password of **class**.
  - Configure a password of **cisco** for console connections.
  - Configure a password of **cisco** for vty connections.

- Insert a screenshot of S1 running config here: [0.25 Marks]

Insert image01 here

```
sl#
sl#sh run
Building configuration...

Current configuration : 1419 bytes
!
! Last configuration change at 00:05:04 UTC Mon Mar 1 1993
!
version 15.0
no service pad
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname sl
!
boot-start-marker
boot-end-marker
!
enable secret 5 $1$Glyj$Oc5/eOR0QYmNqrdkSEQKT.
!
no aaa new-model
system mtu routing 1500
!
!
no ip domain-lookup
!
!
!
!
!
!
!
spanning-tree mode pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
!
!
!
!
interface FastEthernet0/1
!
interface FastEthernet0/2
!
interface FastEthernet0/3
!
interface FastEthernet0/4
!
interface FastEthernet0/5
!
interface FastEthernet0/6
!
interface FastEthernet0/7
!
interface FastEthernet0/8
!
interface FastEthernet0/9
!
```

```
!  
!  
!  
!  
!  
interface FastEthernet0/1  
!  
interface FastEthernet0/2  
!  
interface FastEthernet0/3  
!  
interface FastEthernet0/4  
!  
interface FastEthernet0/5  
!  
interface FastEthernet0/6  
!  
interface FastEthernet0/7  
!  
interface FastEthernet0/8  
!  
interface FastEthernet0/9  
!  
interface FastEthernet0/10  
!  
interface FastEthernet0/11  
!  
interface FastEthernet0/12  
!  
interface FastEthernet0/13  
!  
interface FastEthernet0/14  
!  
interface FastEthernet0/15  
!  
interface FastEthernet0/16  
!  
interface FastEthernet0/17  
!  
interface FastEthernet0/18  
!  
interface FastEthernet0/19  
!  
interface FastEthernet0/20  
!  
interface FastEthernet0/21  
!  
interface FastEthernet0/22  
!  
interface FastEthernet0/23  
!  
interface FastEthernet0/24  
!  
interface GigabitEthernet0/1  
!  
interface GigabitEthernet0/2  
!  
interface Vlan1  
  no ip address  
!  
ip http server  
sl#GROUP 1
```

3. Configure the Ethernet interfaces of PC1, PC2, and PC3 with the IP addresses, subnet masks, and gateway indicated in the addressing table.
4. Configure VLANs 10, 20, 30 and 99 on all the switches. Assign the shown ports to correct VLANs and set proper modes for each interface. Display a summary of the VLANs on S2 and **insert a screenshot here: [0.5 Marks]**

Insert image02 here

```
S2#show vlan brief
```

VLAN	Name	Status	Ports
1	default	active	Fa0/5, Gi0/1, Gi0/2
10	faculty/staff	active	Fa0/11, Fa0/12, Fa0/13, Fa0/14 Fa0/15, Fa0/16, Fa0/17
20	students	active	Fa0/18, Fa0/19, Fa0/20, Fa0/21 Fa0/22, Fa0/23, Fa0/24
30	guests	active	Fa0/6, Fa0/7, Fa0/8, Fa0/9 Fa0/10
99	management	active	
1002	fddi-default	act/unsup	
1003	token-ring-default	act/unsup	
1004	fddinet-default	act/unsup	
1005	trnet-default	act/unsup	

```
S2#GROUP 1
```

S2#sh vlan brief

5. Configure trunk ports on the switches according to the tables above. Don't forget to set 99 as the native VLAN for all trunks. Display the trunks on S1 and **insert a screenshot of the output here: [0.5 Marks]**

Insert image03 here


```
S1#sh int tru

Port          Mode          Encapsulation  Status      Native vlan
Fa0/1         on            802.1q         trunking    99
Fa0/2         on            802.1q         trunking    99
Fa0/3         on            802.1q         trunking    99
Fa0/4         on            802.1q         trunking    99
Fa0/5         on            802.1q         trunking    99

Port          Vlans allowed on trunk
Fa0/1         10,20,30,99
Fa0/2         10,20,30,99
Fa0/3         10,20,30,99
Fa0/4         10,20,30,99
Fa0/5         10,20,30,99

Port          Vlans allowed and active in management domain
Fa0/1         10,20,30,99
Fa0/2         10,20,30,99
Fa0/3         10,20,30,99
Fa0/4         10,20,30,99
Fa0/5         10,20,30,99

Port          Vlans in spanning tree forwarding state and not pruned
Fa0/1         10,20,30,99
Fa0/2         10,20,30,99
Fa0/3         10,20,30,99
Fa0/4         10,20,30,99
Fa0/5         10,20,30,99
S1#
S1#
S1#
S1#
S1#Group 1
```



S1#sh int tru

6. Configure management VLAN interfaces on all switches. Display a summary of the S1 interfaces and **insert a screenshot here: [0.5 Marks]**

Insert image04 here

```

S1#sh ip int br
Interface                IP-Address      OK? Method Status      Protocol
Vlan1                    10.10.99.11     YES manual  up          up
Vlan99                   unassigned      YES manual  up          up
FastEthernet0/1          unassigned      YES unset   up          up
FastEthernet0/2          unassigned      YES unset   up          up
FastEthernet0/3          unassigned      YES unset   up          up
FastEthernet0/4          unassigned      YES unset   up          up
FastEthernet0/5          unassigned      YES unset   up          up
FastEthernet0/6          unassigned      YES unset   down        down
FastEthernet0/7          unassigned      YES unset   down        down
FastEthernet0/8          unassigned      YES unset   down        down
FastEthernet0/9          unassigned      YES unset   down        down
FastEthernet0/10         unassigned      YES unset   down        down
FastEthernet0/11         unassigned      YES unset   down        down
FastEthernet0/12         unassigned      YES unset   down        down
FastEthernet0/13         unassigned      YES unset   down        down
FastEthernet0/14         unassigned      YES unset   down        down
FastEthernet0/15         unassigned      YES unset   down        down
FastEthernet0/16         unassigned      YES unset   down        down
FastEthernet0/17         unassigned      YES unset   down        down
FastEthernet0/18         unassigned      YES unset   down        down
FastEthernet0/19         unassigned      YES unset   down        down
FastEthernet0/20         unassigned      YES unset   down        down
FastEthernet0/21         unassigned      YES unset   down        down
FastEthernet0/22         unassigned      YES unset   down        down
FastEthernet0/23         unassigned      YES unset   down        down
FastEthernet0/24         unassigned      YES unset   down        down
GigabitEthernet0/1       unassigned      YES unset   down        down
GigabitEthernet0/2       unassigned      YES unset   down        down
S1#
S1#
S1#Group 1

```


S1#sh ip int brief

- Configure R1 as ROAS. Create sub-interfaces for all the 4 VLANs. Remember that VLAN 99 is the native VLAN.

Display a summary of R1 interfaces, and **insert a screenshot below:** *[0.5 marks]*

Insert image05 here

```
Router#sh ip int br
Interface                IP-Address      OK? Method Status      Protocol
FastEthernet0/0          unassigned      YES unset    up          up
FastEthernet0/0.10       10.10.10.1      YES manual   up          up
FastEthernet0/0.20       10.10.20.1      YES manual   up          up
FastEthernet0/0.30       10.10.30.1      YES manual   up          up
FastEthernet0/0.99       10.10.99.1      YES manual   up          up
FastEthernet0/1          unassigned      YES unset    administratively down down
Serial0/0/0              unassigned      YES unset    administratively down down
Serial0/0/1              unassigned      YES unset    administratively down down
Router#Group 1
```



R1#sh ip int brief

8. Insert a label on the diagram for each switch, including its IP address in VLAN99, its MAC address and its STP priority.
9. Assign proper IP addresses where needed and label your diagram
10. Insert the completed diagram here: [0.25 marks]

Insert image06 here

Diagram with Labels

## Task #2 Connectivity Test

1. All PCs and switches should be able to ping each other now. If not, troubleshoot and try again.

Take two screenshots of PC1 pinging the other 2 PCs and S1. Insert screenshots below: [0.5 marks]

Insert image07 here



```
C:\> Select Administrator: Command Prompt

Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\Users\echowdhury7>ping 10.10.30.1

Pinging 10.10.30.1 with 32 bytes of data:
Reply from 10.10.30.1: bytes=32 time=1ms TTL=255
Reply from 10.10.30.1: bytes=32 time=1ms TTL=255
Reply from 10.10.30.1: bytes=32 time=1ms TTL=255
Reply from 10.10.30.1: bytes=32 time=1ms TTL=255

Ping statistics for 10.10.30.1:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\Users\echowdhury7>ping 10.10.99.11

Pinging 10.10.99.11 with 32 bytes of data:
Request timed out.
Reply from 10.10.99.11: bytes=32 time=1ms TTL=254
Reply from 10.10.99.11: bytes=32 time=1ms TTL=254
Reply from 10.10.99.11: bytes=32 time=1ms TTL=254

Ping statistics for 10.10.99.11:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms

C:\Users\echowdhury7>GROUP 1
```

ROAS working

### Task #3 Spanning Tree Verification

1. Download the “**STP table Assignment2.xlsx**” file and complete the two sheets using the command “**show span**” on each switch: **[0.5 mark for completing both sheets in the Excel file]**

#### Equal Priority sheet

Answer the following questions based on your completed Excel sheet:

2. What is the bridge priority for S1, S2, and S3 on VLAN 99? **[0.3 marks]**
  - a. S1 \_\_\_\_\_ 32867 \_\_\_\_\_

- b. S2 \_\_\_\_\_ 32867 \_\_\_\_\_
- c. S3 \_\_\_\_\_ 32867 \_\_\_\_\_
- 3. What is the bridge priority for S2 on VLANs 10, 20, 30, and 99? *[0.3 marks]*
  - d. VLAN 10 \_\_\_\_\_ 32778 \_\_\_\_\_
  - e. VLAN 20 \_\_\_\_\_ 32788 \_\_\_\_\_
  - f. VLAN 30 \_\_\_\_\_ 32798 \_\_\_\_\_
- 4. Which switch is the root for: *[0.4 marks]*
  - a. VLAN 10 spanning tree? \_\_\_\_\_ switch 2 \_\_\_\_\_
  - b. VLAN 20 spanning tree? \_\_\_\_\_ switch 2 \_\_\_\_\_
  - c. VLAN 30 spanning tree? \_\_\_\_\_ switch 2 \_\_\_\_\_
  - d. VLAN 99 spanning tree? \_\_\_\_\_ switch 2 \_\_\_\_\_
- 5. On VLAN 99, which spanning tree ports are in the blocking state on the root switch? \_\_\_\_\_ none \_\_\_\_\_ *[0.1 mark]*

## Task #4 Optimizing STP

Make proper changes to your diagram in Fig1 so that you change the root bridge of VLAN99 to another switch (For example, if the root bridge was S1, then change it to S2 or S3)

**Hint:** use the following commands

```
S#(config)#spanning-tree vlan 99 priority ?
<0-61440> bridge priority in increments of 4096

S#(config)#spanning-tree vlan 99 priority 4096
S#(config)#exit
```

(A lower number indicates a higher priority for root election)

### **Different Priority sheet**

For the second sheet of the Excel file "STP table Assignment2.xlsx":

- 6. Fill in the status of each interface for each switch for each VLAN and save the file under the name **"STP table Assignment2\_Group Number.xlsx"**.
- 7. Which switch is the root for VLAN99 now? \_\_\_\_\_ 4195 \_\_\_\_\_
- 8. Which switch is the root for VLAN10 now? \_\_\_\_\_ 4106 \_\_\_\_\_
- 9. Which switch is the root for VLAN20 now? \_\_\_\_\_ 4116 \_\_\_\_\_
- 10. Which switch is the root for VLAN30 now? \_\_\_\_\_ 4126 \_\_\_\_\_