


**NST21022 - Practical for  
Network Switching and  
Routing**

**Department of Information  
and Communication  
Technology  
Faculty of Technology**



**Lab sheet :13  
Reg. Number: SEU/IS/20/ICT/084  
Academic Year :2020/2021  
Practical No :13**

# Title: Configure VLANs

## Aim:

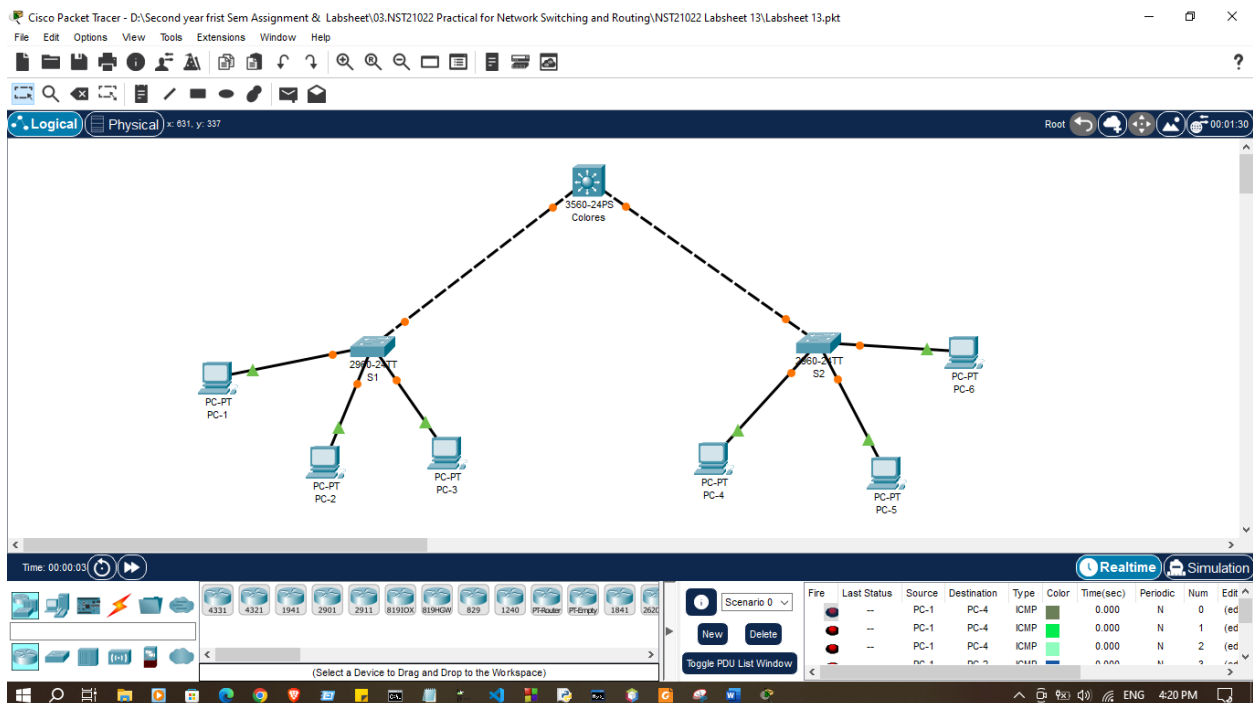
- Getting familiar with Layer-3 Switching and Inter-VLAN Routing

## Task:

- Design a network topology
- Adding VLANs to a Switch
- Configure IP addresses
- Configure Layer 3 switch
- Configure Inter-VLAN Routing

## Activities

### Exercise 01: Design a Network Topology Use “NST21022 Lab sheet 14.pka” file VLAN and

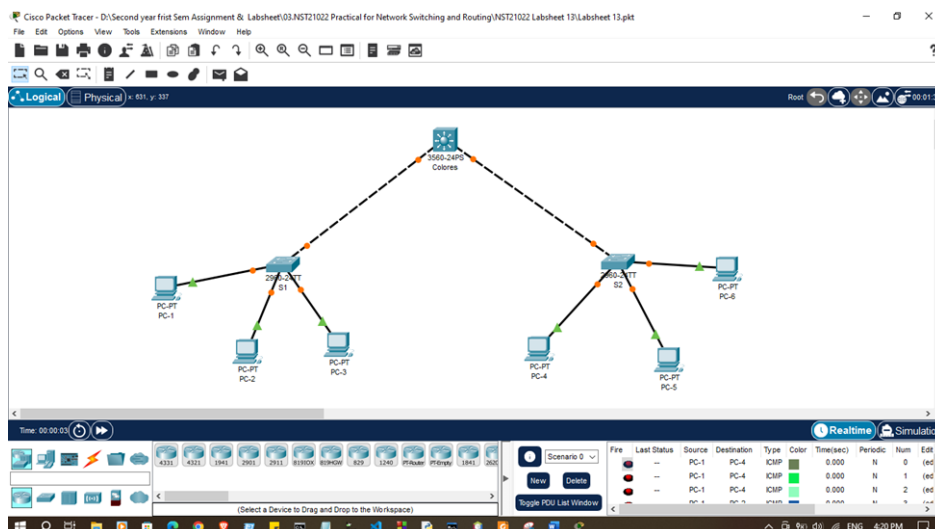


## Addressing Table

Device	VLAN	Name	Network	Device
S1	VLAN 10	Red	192.168.1.0/24	VLAN 10
	VLAN 20	Green	192.168.2.0/24	VLAN 20
	VLAN 30	Blue	192.168.3.0/24	VLAN 30
S2	VLAN 40	Yellow	192.168.4.0/24	VLAN 40
	VLAN 50	White	192.168.5.0/24	VLAN 50
	VLAN 60	Black	192.168.6.0/24	VLAN 60

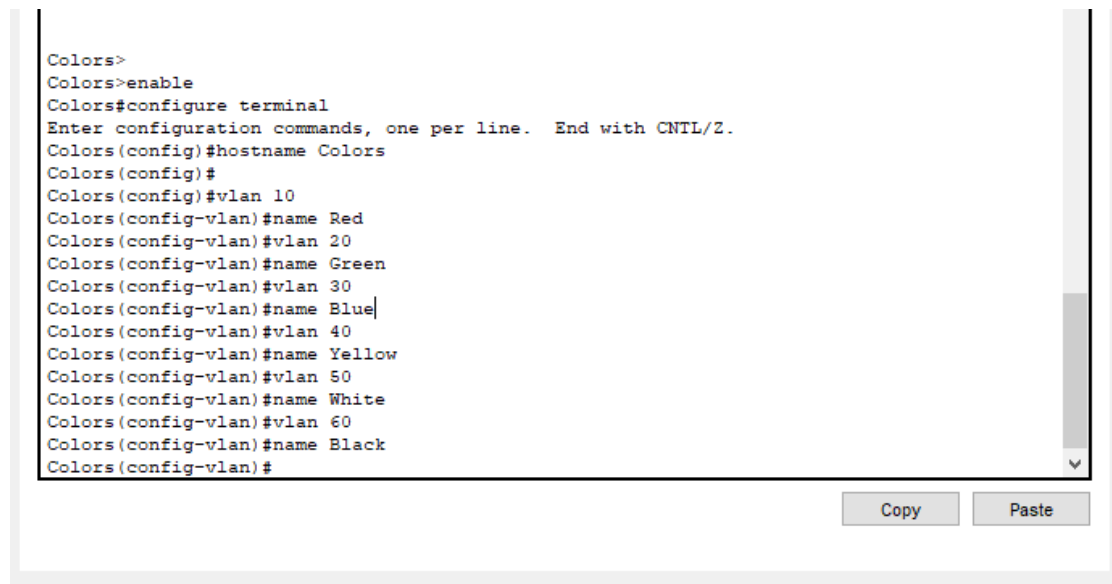
Device	Interface	IP Address	VLAN	Device
Colors	VLAN 10	192.168.1.1/24	VLAN 10	
	VLAN 20	192.168.2.1/24	VLAN 20	
	VLAN 30	192.168.3.1/24	VLAN 30	
	VLAN 40	192.168.4.1/24	VLAN 40	
	VLAN 50	192.168.5.1/24	VLAN 50	
	VLAN 60	192.168.6.1/24	VLAN 60	
PC-1	NIC	192.168.1.10/24	VLAN 10	PC-1
PC-2	NIC	192.168.2.10/24	VLAN 20	PC-2
PC-3	NIC	192.168.3.10/24	VLAN 30	PC-3
PC-4	NIC	192.168.4.10/24	VLAN 40	PC-4
PC-5	NIC	192.168.5.10/24	VLAN 50	PC-5
PC-6	NIC	192.168.6.10/24	VLAN 60	PC-6

1. Create a network topology with layer 3 switch including another 2, layer 2 switch.



2. Create additional VLANs on Colors, S1 and S2 according to the table above.

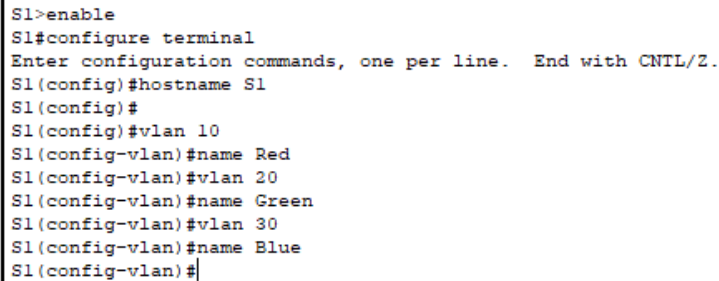
```
Colors>enable
Colors#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Colors(config)#hostname Colors
Colors(config)#
Colors(config)#vlan 10
Colors(config-vlan)#name Red
Colors(config-vlan)#vlan 20
Colors(config-vlan)#name Green
Colors(config-vlan)#vlan 30
Colors(config-vlan)#name Blue
Colors(config-vlan)#vlan 40
Colors(config-vlan)#name Yellow
Colors(config-vlan)#vlan 50
Colors(config-vlan)#name White
Colors(config-vlan)#vlan 60
Colors(config-vlan)#
```



```
Colors>
Colors>enable
Colors#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Colors(config)#hostname Colors
Colors(config)#
Colors(config)#vlan 10
Colors(config-vlan)#name Red
Colors(config-vlan)#vlan 20
Colors(config-vlan)#name Green
Colors(config-vlan)#vlan 30
Colors(config-vlan)#name Blue
Colors(config-vlan)#vlan 40
Colors(config-vlan)#name Yellow
Colors(config-vlan)#vlan 50
Colors(config-vlan)#name White
Colors(config-vlan)#vlan 60
Colors(config-vlan)#name Black
Colors(config-vlan)#
```

```
S1>enable
S1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#hostname S1
S1(config)#
S1(config)#vlan 10
S1(config-vlan)#name Red
S1(config-vlan)#vlan 20
```

```
S1(config-vlan)#name Green
S1(config-vlan)#vlan 30
S1(config-vlan)#name Blue
S1(config-vlan)#
```



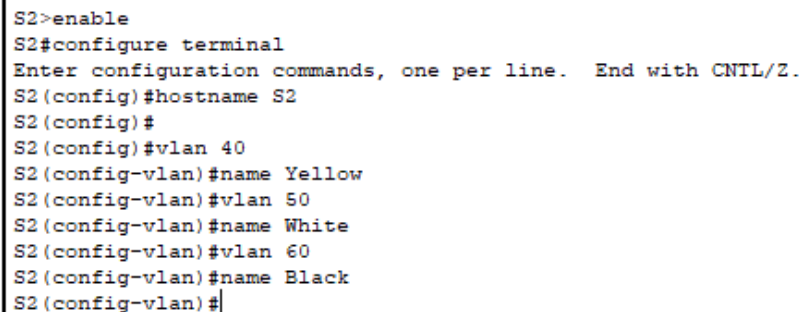
A screenshot of a network configuration terminal window for device S1. The window has a title bar and a scroll bar on the right. The text inside shows the following commands and prompts: S1>enable, S1#configure terminal, Enter configuration commands, one per line. End with CNTL/Z., S1(config)#hostname S1, S1(config)#, S1(config)#vlan 10, S1(config-vlan)#name Red, S1(config-vlan)#vlan 20, S1(config-vlan)#name Green, S1(config-vlan)#vlan 30, S1(config-vlan)#name Blue, and S1(config-vlan)#. Below the terminal window, there are two buttons: 'Copy' and 'Paste'.

```
S1>enable
S1#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S1(config)#hostname S1
S1(config)#
S1(config)#vlan 10
S1(config-vlan)#name Red
S1(config-vlan)#vlan 20
S1(config-vlan)#name Green
S1(config-vlan)#vlan 30
S1(config-vlan)#name Blue
S1(config-vlan)#
```

Copy

Paste

```
2>enable
S2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S2(config)#hostname S2
S2(config)#
S2(config)#vlan 40
S2(config-vlan)#name Yellow
S2(config-vlan)#vlan 50
S2(config-vlan)#name White
S2(config-vlan)#vlan 60
S2(config-vlan)#name Black
S2(config-vlan)#
```



A screenshot of a network configuration terminal window for device S2. The window has a title bar and a scroll bar on the right. The text inside shows the following commands and prompts: S2>enable, S2#configure terminal, Enter configuration commands, one per line. End with CNTL/Z., S2(config)#hostname S2, S2(config)#, S2(config)#vlan 40, S2(config-vlan)#name Yellow, S2(config-vlan)#vlan 50, S2(config-vlan)#name White, S2(config-vlan)#vlan 60, S2(config-vlan)#name Black, and S2(config-vlan)#. Below the terminal window, there are two buttons: 'Copy' and 'Paste'.

```
S2>enable
S2#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
S2(config)#hostname S2
S2(config)#
S2(config)#vlan 40
S2(config-vlan)#name Yellow
S2(config-vlan)#vlan 50
S2(config-vlan)#name White
S2(config-vlan)#vlan 60
S2(config-vlan)#name Black
S2(config-vlan)#
```

Copy

Paste

### 3. Assign Ports to VLANs

```
S1(config-vlan)#
S1(config-vlan)#exit
S1(config)#interface range f0/1-10
S1(config-if-range)#switchport mode access
S1(config-if-range)#switchport access vlan 10
S1(config-if-range)#
S1(config-if-range)#interface range f0/11-19
S1(config-if-range)#switchport mode access
S1(config-if-range)#switchport access vlan 20
S1(config-if-range)#
S1(config-if-range)#interface range f0/20-24
S1(config-if-range)#switchport mode access
S1(config-if-range)#switchport access vlan 30
S1(config-if-range)#
```

```
S1(config-vlan)#
S1(config-vlan)#exit
S1(config)#interface range f0/1-10
S1(config-if-range)#switchport mode access
S1(config-if-range)#switchport access vlan 10
S1(config-if-range)#
S1(config-if-range)#interface range f0/11-19
S1(config-if-range)#switchport mode access
S1(config-if-range)#switchport access vlan 20
S1(config-if-range)#
S1(config-if-range)#interface range f0/20-24
S1(config-if-range)#switchport mode access
S1(config-if-range)#switchport access vlan 30
S1(config-if-range)#
```

Copy

Paste

```
S2(config)#interface range f0/1-10
S2(config-if-range)#switchport mode access
S2(config-if-range)#switchport access vlan 40
S2(config-if-range)#
S2(config-if-range)#interface range f0/11-20
S2(config-if-range)#switchport mode access
S2(config-if-range)#switchport access vlan 50
S2(config-if-range)#
S2(config-if-range)#interface range f0/21-24
S2(config-if-range)#switchport mode access
S2(config-if-range)#switchport access vlan 60
S2(config-if-range)#
S2(config-if-range)#interface g0/1
S2(config-if-range)#switchport mode access
S2(config-if-range)#switchport mode trunk
```

S2(config-if)#

```
S2(config)#
S2(config)#interface range f0/1-10
S2(config-if-range)#switchport mode access
S2(config-if-range)#switchport access vlan 40
S2(config-if-range)#
S2(config-if-range)#interface range f0/11-20
S2(config-if-range)#switchport mode access
S2(config-if-range)#switchport access vlan 50
S2(config-if-range)#
S2(config-if-range)#interface range f0/21-24
S2(config-if-range)#switchport mode access
S2(config-if-range)#switchport access vlan 60
S2(config-if-range)#
S2(config-if-range)#interface g0/1
S2(config-if)#switchport mode access
S2(config-if)#switchport mode trunk
S2(config-if)#
```

Copy

Paste

[Top](#)

#### 4. Configure Switch Virtual Interface (SVI) on Colors

*Colors(config)# interface vlan 10*  
*Colors(config-if)# ip address 192.168.1.1 255.255.255.0*

```
Colors(config)#interface vlan 10
Colors(config-if)#ip address 192.168.1.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
Colors(config-if)#interface vlan 20
Colors(config-if)#ip address 192.168.2.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
Colors(config-if)#interface vlan 30
Colors(config-if)#ip address 192.168.3.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
Colors(config-if)#interface vlan 40
Colors(config-if)#ip address 192.168.4.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
Colors(config-if)#interface vlan 50
Colors(config-if)#ip address 192.168.5.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
Colors(config-if)#interface vlan 60
```

```
Colors(config-if)#ip address 192.168.6.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
```

```
Colors(config)#
Colors(config)#interface vlan 10
Colors(config-if)#ip address 192.168.1.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
Colors(config-if)#interface vlan 20
Colors(config-if)#ip address 192.168.2.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
Colors(config-if)#interface vlan 30
Colors(config-if)#ip address 192.168.3.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
Colors(config-if)#interface vlan 40
Colors(config-if)#ip address 192.168.4.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
Colors(config-if)#interface vlan 50
Colors(config-if)#ip address 192.168.5.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
Colors(config-if)#interface vlan 60
Colors(config-if)#ip address 192.168.6.1 255.255.255.0
Colors(config-if)#no shutdown
Colors(config-if)#
```

Copy

Paste

## 5. Configure trunking on Colors

### a. Configure interface g0/1 and g0/2

```
Colors(config)#
Colors(config)#interface range g0/1-2
Colors(config-if-range)#
```

```
Colors(config)#
Colors(config)#
Colors(config)#interface range g0/1-2
Colors(config-if-range)#
```

Copy

Paste

### b. Make the interface a static trunk mode

```
Colors(config-if-range)# switchport mode trunk
```

```
Colors(config-if-range)#switchport mode trunk
Colors(config-if-range)#
```



```

Colors(config)#interface range g0/1-2
Colors(config-if-range)#switchport mode trunk
Colors(config-if-range)#
Colors#
%SYS-5-CONFIG_I: Configured from console by console
|

```

- c. Encapsulate the link with the dot1q protocol

*Colors(config-if-range)# switchport trunk encapsulation dot1q*

```

Colors(config)#interface range g0/1-2
Colors(config-if-range)#switchport mode trunk
Colors(config-if-range)#switchport trunk encapsulation dot1q
Colors(config-if-range)#

```

```

Colors#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Colors(config)#interface range g0/1-2
Colors(config-if-range)#switchport mode trunk
Colors(config-if-range)#switchport trunk encapsulation dot1q
Colors(config-if-range)#

```

Copy

Paste

7 Top

6. Configure trunking in S1 and S2

```

S1(config)#
S1(config)#interface g0/1
S1(config-if)#switchport mode access
S1(config-if)#switchport mode trunk

```

S1(config-if)#

```

S1(config)#
S1(config)#interface g0/1
S1(config-if)#switchport mode access
S1(config-if)#switchport mode trunk
S1(config-if)#

```

```

S2(config)#interface g0/1
S2(config-if)#switchport mode access
S2(config-if)#switchport mode trunk
S2(config-if)#

```

```

S2(config)#interface g0/1
S2(config-if)#switchport mode access
S2(config-if)#switchport mode trunk
S2(config-if)#
S2(config-if)#

```

7. Enable routing in global configuration mode.

*Colors(config)#ip routing*

Colors(config)#ip routing

Colors(config)#

```
-----
Colors(config)#ip routing
Colors(config)#
```

Copy

Paste

8. Check routing table

Colors#show ip route

Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP

i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area

\* - candidate default, U - per-user static route, o - ODR

P - periodic downloaded static route

Gateway of last resort is not set

C 192.168.1.0/24 is directly connected, Vlan10

C 192.168.2.0/24 is directly connected, Vlan20

C 192.168.3.0/24 is directly connected, Vlan30

C 192.168.4.0/24 is directly connected, Vlan40

C 192.168.5.0/24 is directly connected, Vlan50

C 192.168.6.0/24 is directly connected, Vlan60

Colors#

```
[OK]
Colors#show ip route
Codes: C - connected, S - static, I - IGRP, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2, E - EGP
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-IS inter area
       * - candidate default, U - per-user static route, o - ODR
       P - periodic downloaded static route

Gateway of last resort is not set

C    192.168.1.0/24 is directly connected, Vlan10
C    192.168.2.0/24 is directly connected, Vlan20
C    192.168.3.0/24 is directly connected, Vlan30
C    192.168.4.0/24 is directly connected, Vlan40
C    192.168.5.0/24 is directly connected, Vlan50
C    192.168.6.0/24 is directly connected, Vlan60

Colors#
Colors#
```

Copy

Paste

## 9. Verify connectivity

### Discussion

- In this lab session, we focused on understanding Layer-3 switching and configuring inter-VLAN routing. We began by designing a network topology that included multiple VLANs to segment the network and improve security. After setting up the network, we added VLANs to the switch and assigned specific VLAN IDs to relevant switch ports. Next, we configured IP addresses for the devices within each VLAN to enable proper communication. By enabling Layer 3 switching, we were able to route traffic between VLANs directly on the switch without the need for a router. This was done by configuring the switch as a Layer 3 device and setting up inter-VLAN routing, ensuring seamless communication across different VLANs within the network.