

# Assignment

## Network Systems Assignment

### OBJECTIVE:

Design and configure a network in Cisco Packet Tracer using VLANs. Create seven separate VLANs, where each VLAN contains a single PC connected to a switch. Connect the switch to a router using a single Ethernet cable. Implement Inter-VLAN Routing using sub interfaces on the router. Assign IP addresses to each device manually as per the network details provided below. Verify the connectivity by pinging devices across the VLANs.

Following are the network details:

#### VLAN 10 (Class C):

Starting IP Address: 192.168.1.100

Router0 (Sub-interface fa0/0.1): 192.168.1.1

#### VLAN 20 (Class C):

Starting IP Address: 192.168.2.100

Router0 (Sub-interface fa0/0.2): 192.168.2.1

#### VLAN 30 (Class C):

Starting IP Address: 192.168.3.100

Router0 (Sub-interface fa0/0.3): 192.168.3.1

#### VLAN 40 (Class C):

Starting IP Address: 192.168.4.100

Router0 (Sub-interface fa0/0.4): 192.168.4.1

#### VLAN 50 (Class C):

Starting IP Address: 192.168.5.100

Router0 (Sub-interface fa0/0.5): 192.168.5.1

#### VLAN 60 (Class C):

Starting IP Address: 192.168.6.100

Router0 (Sub-interface fa0/0.6): 192.168.6.1

#### VLAN 70 (Class C):

Starting IP Address: 192.168.7.100

Router0 (Sub-interface fa0/0.7): 192.168.7.1  
Router to Switch Connection:

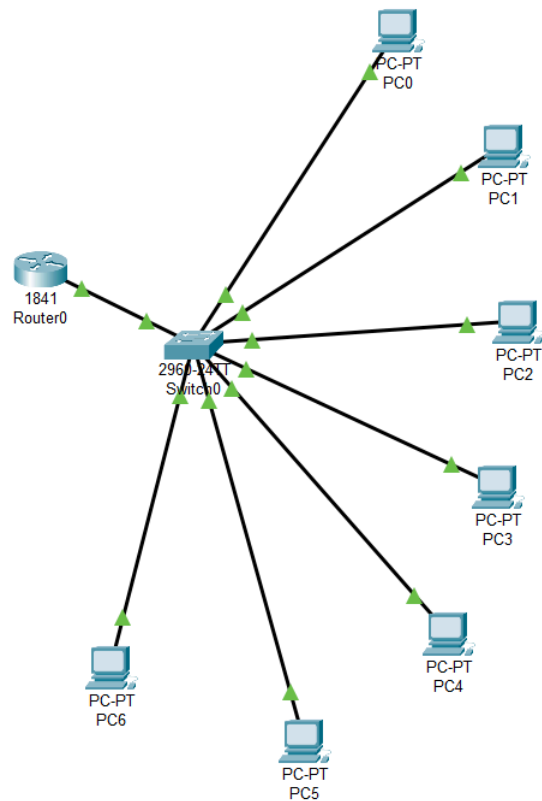
Router0 connected to Switch0 through FastEthernet0/0 (configured as trunk)  
Switch0 interfaces configured as access ports for corresponding VLANs

Establish a successful connection and verify the Inter-VLAN Routing implementation. Attach all screenshots (including IP configuration of PCs, VLAN and interface configurations, router sub-interface configurations, successful ping outputs, and network structure) along with a description in a PDF file and submit.

### What is **VLAN**?

A **VLAN (Virtual Local Area Network)** is a logical subdivision of a network at the data link layer (Layer 2 of the OSI model) that creates separate broadcast domains within the same physical network infrastructure.

### Network Structure



## Switch VLAN configuration

```
Switch#show vlan brief
```

VLAN Name	Status	Ports
1 default	active	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 Gig0/1, Gig0/2
10 vian10	active	Fa0/1
20 vian20	active	Fa0/2
30 vian30	active	Fa0/3
40 vian40	active	Fa0/4
50 vian50	active	Fa0/5
60 vian60	active	Fa0/6
70 vian70	active	Fa0/7
1002 fddi-default	active	
1003 token-ring-default	active	
1004 fddinet-default	active	
1005 trnet-default	active	

## Commands used to configure VLAN -

```
vlan 10
```

```
name VLAN10
```

```
Exit
```

## Else setup manually in VLAN Database -

Switch0

Physical Config CLI Attributes

**GLOBAL**

Settings

Algorithm Settings

**SWITCHING**

VLAN Database

**INTERFACE**

FastEthernet0/1

FastEthernet0/2

FastEthernet0/3

FastEthernet0/4

FastEthernet0/5

FastEthernet0/6

FastEthernet0/7

FastEthernet0/8

FastEthernet0/9

FastEthernet0/10

FastEthernet0/11

FastEthernet0/12

FastEthernet0/13

FastEthernet0/14

FastEthernet0/15

FastEthernet0/16

FastEthernet0/17

VLAN Configuration

VLAN Number

VLAN Name

Add Remove

VLAN No	VLAN Name
1	default
10	vian10
20	vian20
30	vian30
40	vian40
50	vian50
60	vian60
70	vian70
1002	fddi-default
1003	token-ring-default
1004	fddinet-default
1005	trnet-default

Equivalent IOS Commands

```
Port      Vlans allowed and active in management domain
Fa0/8     1,10,20,30,40,50,60,70

Port      Vlans in spanning tree forwarding state and not pruned
Fa0/8     1,10,20,30,40,50,60,70

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

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Configuring access ports -

```
interface FastEthernet0/2
switchport mode access
switchport access vlan 10
exit
```

Or Setup Manually

FastEthernet0/2	
Port Status	<input checked="" type="checkbox"/> On
Bandwidth	<input checked="" type="radio"/> 100 Mbps <input type="radio"/> 10 Mbps <input checked="" type="checkbox"/> Auto
Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto
<div>Access ▼</div>	VLAN <div>20 ▼</div>
Tx Ring Limit	<div>10</div>

Configure trunk port to router

```
interface FastEthernet0/1
switchport mode trunk
exit
```

```
Switch#show interfaces trunk
Port      Mode      Encapsulation  Status        Native vlan
Fa0/8     on        802.1q         trunking      1

Port      Vlans allowed on trunk
Fa0/8     1-1005

Port      Vlans allowed and active in management domain
Fa0/8     1,10,20,30,40,50,60,70

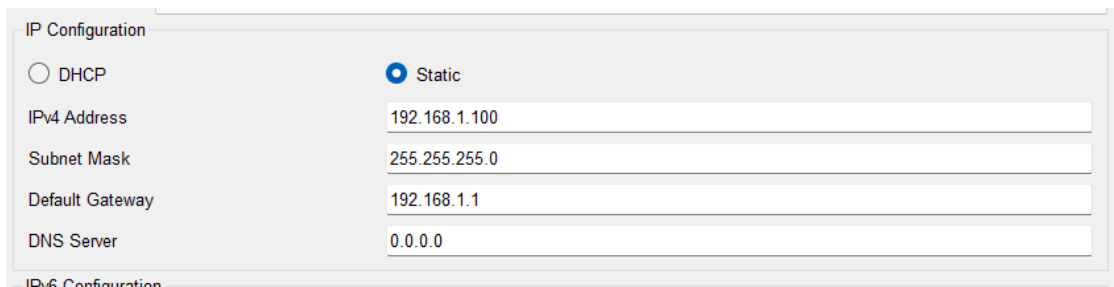
Port      Vlans in spanning tree forwarding state and not pruned
Fa0/8     1,10,20,30,40,50,60,70
```

## Router Configuration

Command-

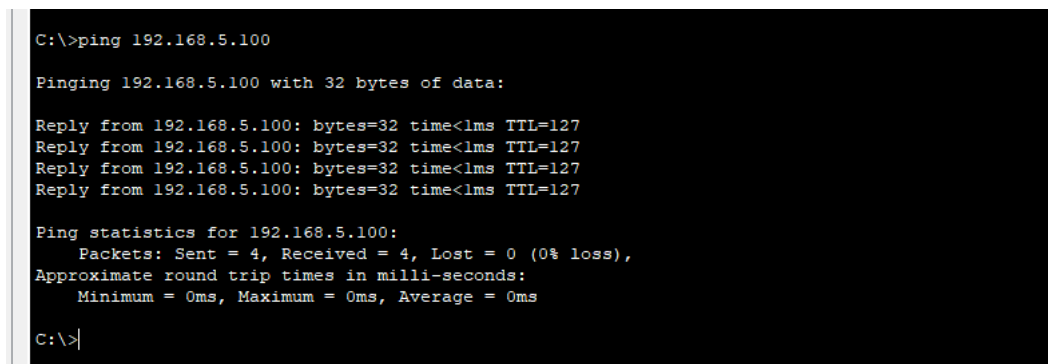
```
interface FastEthernet0/0.1
encapsulation dot1Q 10
ip address 192.168.1.1 255.255.255.0
exit
```

## IP Configuration from one PC



IP Configuration	
<input type="radio"/> DHCP	<input checked="" type="radio"/> Static
IPv4 Address	192.168.1.100
Subnet Mask	255.255.255.0
Default Gateway	192.168.1.1
DNS Server	0.0.0.0

## Pinging Between PCs



```
C:\>ping 192.168.5.100

Pinging 192.168.5.100 with 32 bytes of data:

Reply from 192.168.5.100: bytes=32 time<1ms TTL=127
Reply from 192.168.5.100: bytes=32 time<1ms TTL=127
Reply from 192.168.5.100: bytes=32 time<1ms TTL=127
Reply from 192.168.5.100: bytes=32 time<1ms TTL=127

Ping statistics for 192.168.5.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>|
```

Ping successful from PC1 → PC5

## Router interface status

At the end - `show ip interface brief`

```
Router#show ip interface brief
Interface          IP-Address      OK? Method Status      Protocol
FastEthernet0/0    unassigned      YES unset    up          up
FastEthernet0/0.1  192.168.1.1     YES manual    up          up
FastEthernet0/0.2  192.168.2.1     YES manual    up          up
FastEthernet0/0.3  192.168.3.1     YES manual    up          up
FastEthernet0/0.4  192.168.4.1     YES manual    up          up
FastEthernet0/0.5  192.168.5.1     YES manual    up          up
FastEthernet0/0.6  192.168.6.1     YES manual    up          up
FastEthernet0/0.7  192.168.7.1     YES manual    up          up
FastEthernet0/1    unassigned      YES unset    administratively down down
Vlan1              unassigned      YES unset    administratively down down
Router#
```

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