NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

COMPUTER NETWORKS LAB

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Lab	10
Course	Computer Networks
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IN LAB TASKS

Warm up Task [30 Minutes]

Answer each question in your own words (3 to 4 lines)

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1. What is VAN?

- **VAN** usually refers to a **Value-Added Network**.
- It's a private network provider that offers specialized services (like secure data transmission, electronic data interchange (EDI), or managed communication) on top of basic network connectivity.
- Think of it as a middleman network that adds extra functionality beyond simple data transfer.

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2. How are VLAN identified?

- VLANs are identified by a **VLAN ID**.
- This is a numeric value ranging from **1 to 4094** (in IEEE 802.1Q standard).
- Each VLAN ID uniquely distinguishes one virtual LAN from another within a switch or across a network.

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3. What is VLAN tagging?

- VLAN tagging is the process of **inserting a VLAN ID into Ethernet frames** so that traffic can be properly associated with its VLAN.
- The most common method is **IEEE 802.1Q tagging**, which adds a 4-byte tag to the Ethernet frame header.
- This allows switches and routers to know which VLAN the packet belongs to, especially when traffic passes through trunk links.

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4. How does a VLAN differ from a physical LAN?

Aspect	Physical LAN	VLAN
Definition	A network formed by physical devices connected via cables/switches.	A logical segmentation of a LAN created in software on switches.

Flexibility	Limited to physical layout.	Can group devices regardless of physical location.
Isolation	Requires separate hardware for isolation.	Provides logical isolation using VLAN IDs.
Cost	More hardware needed for segmentation.	Cost-effective, uses existing hardware with configuration.

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5. What is the primary purpose of DHCP?

- The **Dynamic Host Configuration Protocol (DHCP)** automatically assigns **IP addresses and other network configuration parameters** to devices on a network.
- This eliminates the need for manual configuration and ensures efficient IP address management.

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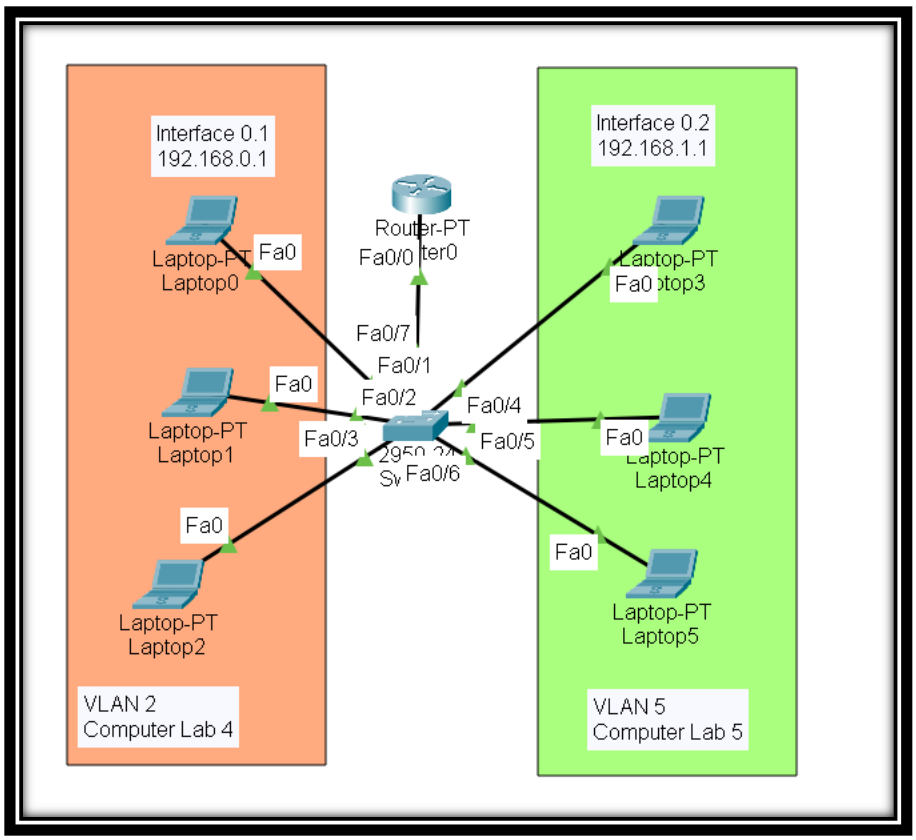
6. Name three key configuration parameters provided by DHCP

- **IP Address** – Unique identifier for the device on the network.
- **Subnet Mask** – Defines the network and host portions of the IP address.
- **Default Gateway** – The router address used to reach other networks.

(Other common parameters include DNS server addresses, lease time, and domain name.)

Task 1

By using Drag and drop draw topology diagram as Shown below and attach screenshot of each step.



Step1: Configure switch for Vlan

```
Switch#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name clab4
Switch(config-vlan)#exit
Switch(config)#vlan 5
Switch(config-vlan)#name clab5
Switch(config-vlan)#exit
Switch(config)#exit
Switch#
```

Step2: After creating Vlan connect a router to switch through fast Ethernet interface
Switch configuration for Vlan

1. en
2. Config t
3. Int fa0/7(switch interface connected with router)
4. Switchport mode trunk
5. Exit
6. Exit

```
Switch>enable
Switch#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int fa0/7
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#exit
Switch#
%SYS-5-CONFIG_I: Configured from console by console
```

```
Switch#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#int fa0/1
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#int fa0/2
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#int fa0/3
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#int fa0/4
Switch(config-if)#switchport access vlan 5
Switch(config-if)#exit
Switch(config)#int fa0/5
Switch(config-if)#switchport access vlan 5
Switch(config-if)#exit
Switch(config)#int fa0/6
Switch(config-if)#switchport access vlan 5
Switch(config-if)#exit
Switch(config)#
```

Step3: Router configuration for Vlan

1. en
2. Show ip interface brief
3. Config t
4. Int fa0/0(router interface connected with switch)
5. No shutdown
6. Exit
7. Exit

```
Router#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#no shut

Router(config-if)#
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed state to up

%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up
```

Creation of sub Interface and route

1. en
2. Show ip interface brief
3. Config t

4. Int fa0/0.1 (router interface connected with switch)
5. Encapsulation dot1Q 2
6. Ip address 192.168.10.100 255.255.255.0
7. Exit
8. Int fa0/0.2 (router interface connected with switch)
9. Encapsulation dot1Q 5
10. Ip address 192.168.11.100 255.255.255.0
11. Exit
12. Exit

```
FastEthernet3/0        unassigned      YES unset  administratively down
Router#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/0.1
Router(config-subif)#encapsulation dot1Q 2
Router(config-subif)#ip address 192.168.10.100 255.255.255.0
Router(config-subif)#exit
Router(config)#int fa0/0.2
Router(config-subif)#encapsulation dot1Q 5
Router(config-subif)#ip address 192.168.11.100 255.255.255.0
Router(config-subif)#exit
Router(config)#exit
Router#
```

Step4: DHCP configuration in router

1. en
2. Config t
3. Ip dhcp pool 1
4. Network 192.168.10.0 255.255.255.0
5. Default-router 192.168.10.100
6. Exit
7. Ip dhcp excluded-address 192.168.10.100 192.168.10.105
8. Exit

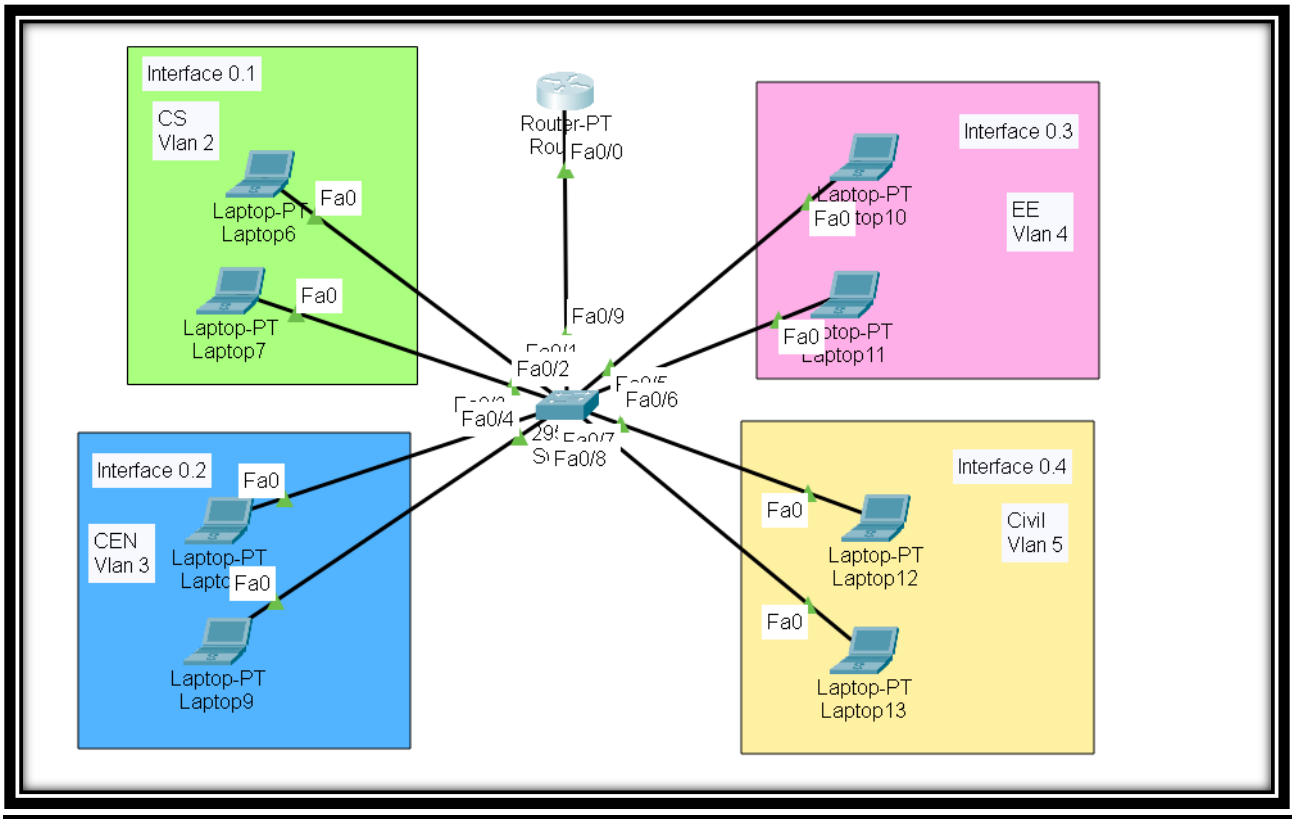
```
Router#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip dhcp pool 1
Router(dhcp-config)#network 192.168.10.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.10.100
Router(dhcp-config)#exit
Router(config)#ip dhcp excluded-address 192.168.10.100 192.168.10.105
Router(config)#exit
Router#
```

Packets Real Time:

Realtime | Simulatic

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	Laptop0	Laptop2	ICMP		0.000	N	0	(edit)	(delete)
	Successful	Laptop3	Laptop4	ICMP		0.000	N	1	(edit)	(delete)
	Successful	Laptop5	Laptop0	ICMP		0.000	N	2	(edit)	(delete)
	Successful	Laptop2	Laptop5	ICMP		0.000	N	3	(edit)	(delete)

TASK 02:



Switch Configuration:

```
Switch>enable
Switch#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#vlan 2
Switch(config-vlan)#name cs
Switch(config-vlan)#exit
Switch(config)#vlan 3
Switch(config-vlan)#name CEN
Switch(config-vlan)#exit
Switch(config)#vlan 4
Switch(config-vlan)#name EE
Switch(config-vlan)#exit
Switch(config)#vlan 5
Switch(config-vlan)#name CIVIL
Switch(config-vlan)#exit
Switch(config)#int fa0/1
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#int fa0/2
Switch(config-if)#switchport access vlan 2
Switch(config-if)#exit
Switch(config)#int fa0/3
Switch(config-if)#switchport access vlan 3
Switch(config-if)#exit
Switch(config)#int fa0/4
Switch(config-if)#switchport access vlan 3
Switch(config-if)#exit
Switch(config)#int fa0/5
Switch(config-if)#switchport access vlan 4
Switch(config-if)#exit
Switch(config)#int fa0/6
Switch(config-if)#switchport access vlan 4
Switch(config-if)#exit
Switch(config)#int fa0/7
Switch(config-if)#switchport access vlan 5
Switch(config-if)#exit
Switch(config)#int fa0/8
Switch(config-if)#switchport access vlan 5
Switch(config-if)#exit
Switch(config)#int fa0/9
Switch(config-if)#switchport mode trunk
Switch(config-if)#exit
Switch(config)#exit
```

Router Configuration:

```
Router#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#no shut
```

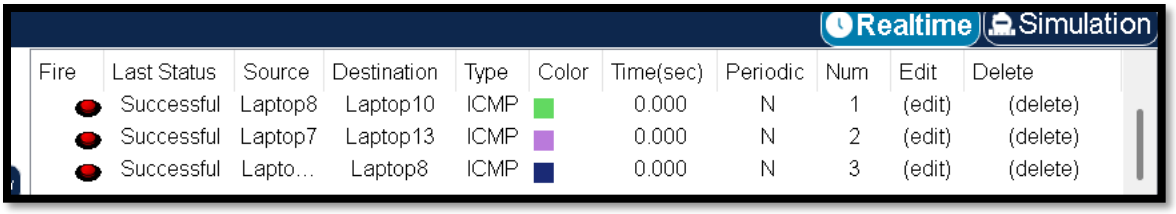
```
Router#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/0.1
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.1, changed state to up

Router(config-subif)#encapsulation dot1Q 2
Router(config-subif)#ip address 192.168.10.100 255.255.255.0
Router(config-subif)#exit
Router(config)#int fa0/0.2
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.2, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.2, changed state to up

Router(config-subif)#encapsulation dot1Q 3
Router(config-subif)#ip address 192.168.20.100 255.255.255.0
Router(config-subif)#exit
Router(config)#int fa0/0.3
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.3, changed state to up

Router(config-subif)#encapsulation dot1Q 4
Router(config-subif)#ip address 192.168.30.100 255.255.255.0
Router(config-subif)#exit
Router(config)#int fa0/0.4
Router(config-subif)#
%LINK-5-CHANGED: Interface FastEthernet0/0.4, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0.4, changed state to up

Router(config-subif)#encapsulation dot1Q 5
Router(config-subif)#ip address 192.168.40.100 255.255.255.0
Router(config-subif)#exit
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#config ter
```

```
Router#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#ip dhcp pool CS
Router(dhcp-config)#network 192.168.10.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.10.100
Router(dhcp-config)#exit
Router(config)#ip dhcp excluded-address 192.168.10.100 192.168.10.105
Router(config)#ip dhcp pool CEN
Router(dhcp-config)#network 192.168.20.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.20.100
Router(dhcp-config)#exit
Router(config)#ip dhcp excluded-address 192.168.20.100 192.168.20.105
Router(config)#ip dhcp pool EE
Router(dhcp-config)#network 192.168.30.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.30.100
Router(dhcp-config)#exit
Router(config)#ip dhcp excluded-address 192.168.30.100 192.168.30.105
Router(config)#ip dhcp pool CIVIL
Router(dhcp-config)#network 192.168.40.0 255.255.255.0
Router(dhcp-config)#default-router 192.168.40.100
Router(dhcp-config)#exit
Router(config)#ip dhcp excluded-address 192.168.40.100 192.168.40.105
Router(config)#exit
Router#
%SYS-5-CONFIG_I: Configured from console by console

Router#copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
Router#
```

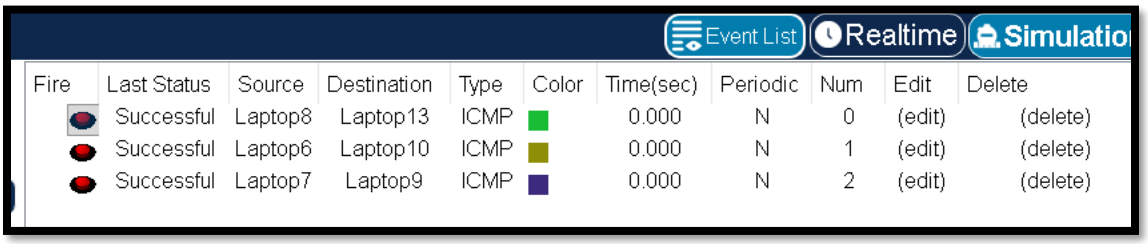
Ping Laptop:

```
C:\>ping 192.168.10.100

Pinging 192.168.10.100 with 32 bytes of data:

Reply from 192.168.10.100: bytes=32 time=4ms TTL=255
Reply from 192.168.10.100: bytes=32 time=4ms TTL=255
Reply from 192.168.10.100: bytes=32 time=4ms TTL=255
Reply from 192.168.10.100: bytes=32 time=4ms TTL=255

Ping statistics for 192.168.10.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 4ms, Maximum = 4ms, Average = 4ms
```

Packet Transfer:


Realtime
Simulation
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
Successful
Laptop8
Laptop10
ICMP
0.000
N
1
(edit)
(delete)
Successful
Laptop7
Laptop13
ICMP
0.000
N
2
(edit)
(delete)
Successful
Lapto...
Laptop8
ICMP
0.000
N
3
(edit)
(delete)

Simulation:


Event List
Realtime
Simulatio
Fire
Last Status
Source
Destination
Type
Color
Time(sec)
Periodic
Num
Edit
Delete
Successful
Laptop8
Laptop13
ICMP
0.000
N
0
(edit)
(delete)
Successful
Laptop6
Laptop10
ICMP
0.000
N
1
(edit)
(delete)
Successful
Laptop7
Laptop9
ICMP
0.000
N
2
(edit)
(delete)