



**NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**DEPARTMENT OF COMPUTER SCIENCE**

**COMPUTER NETWORKS LAB**

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<b>Lab</b>	08
<b>Course</b>	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)

### 1. What is DHCP?

- **DHCP (Dynamic Host Configuration Protocol)** is a network management protocol used to automatically assign IP addresses and other configuration parameters (like subnet mask, default gateway, and DNS servers) to devices on a network.
  - It eliminates the need for manual IP configuration.
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### 2. Why is DHCP important?

- **Automation:** Saves administrators from manually configuring IP addresses for every device.
  - **Consistency:** Prevents IP conflicts by ensuring unique assignments.
  - **Scalability:** Makes it easier to manage large networks with hundreds or thousands of devices.
  - **Flexibility:** Supports mobile devices that frequently join/leave networks.
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### 3. How does DHCP work?

The DHCP process follows a **DORA sequence** (Discover, Offer, Request, Acknowledge):

- **Discover:** A client broadcasts a request asking for an IP address.
  - **Offer:** The DHCP server responds with an available IP address and configuration details.
  - **Request:** The client requests to use the offered IP address.
  - **Acknowledge:** The server confirms and finalizes the lease, allowing the client to use the IP.
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### 4. What is a DHCP lease?

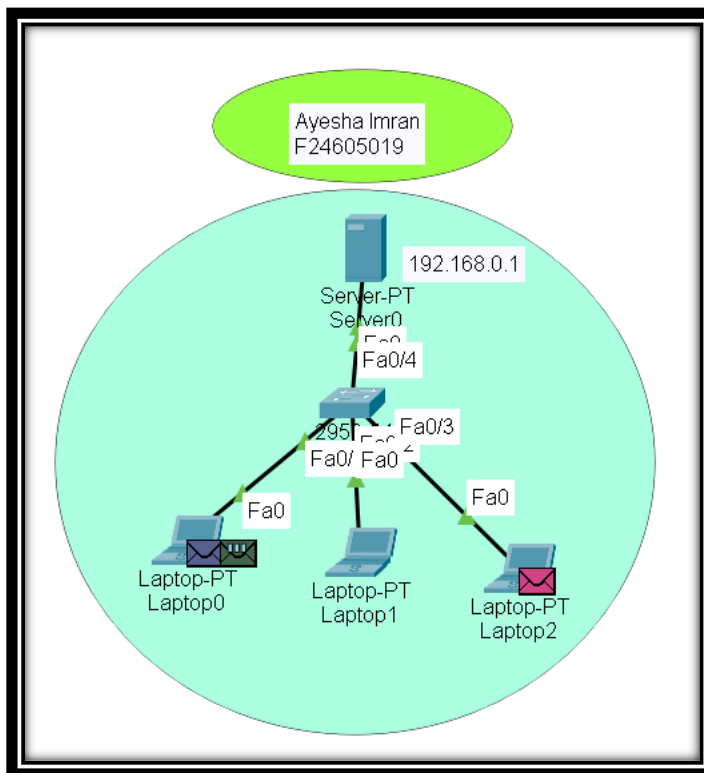
- A **DHCP lease** is the temporary assignment of an IP address to a client by the DHCP server.
  - The lease includes a **duration** (time period) during which the client can use the IP.
  - Once the lease expires, the client must renew it or request a new IP.
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### 5. Explain the DHCP lease renewal process.

- **T1 (Renewal Time):** When 50% of the lease time has passed, the client sends a **unicast DHCPREQUEST** to the server that granted the lease, asking to renew.
- **T2 (Rebinding Time):** If the server doesn't respond by 87.5% of the lease time, the client broadcasts a DHCPREQUEST to any available DHCP server.
- **Expiration:** If no server responds before the lease expires, the client must stop using the IP and restart the DORA process to obtain a new one.

### Task 1

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



### Server Configuration:

Physical **Config** Services Desktop Programming Attributes

**GLOBAL**  
Settings  
Algorithm Settings  
**INTERFACE**  
FastEthernet0

FastEthernet0

Port Status ☒ On  
 Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto  
 Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto  
 MAC Address 0001.9608.325C

IP Configuration  
☐ DHCP  
☒ Static  
 IPv4 Address 192.168.0.1  
 Subnet Mask 255.255.255.0

IPv6 Configuration  
☐ Automatic  
☒ Static  
 IPv6 Address   
 Link Local Address: FE80::201:96FF:FE08:325C

HTTP  
**DHCP**  
 DHCPv6  
 TFTP  
 DNS  
 SYSLOG  
 AAA  
 NTP  
 EMAIL  
 FTP  
 IoT  
 VM Management  
 Radius EAP

Interface FastEthernet0 Service ☐ On ☒ Off

Pool Name serverPool  
 Default Gateway 192.168.0.1  
 DNS Server 0.0.0.0  
 Start IP Address: 192 168 0 0  
 Subnet Mask: 255 255 255 0  
 Maximum Number of Users: 256  
 TFTP Server: 0.0.0.0  
 WLC Address: 0.0.0.0

Add Save Remove

Pool Name	Default Gateway	DNS Server	Start IP Address	Subnet Mask	Max User	TFTP Server	WLC Address
serverPool	192.168.0.1	0.0.0.0	192.168.0.0	255.255.255.0	256	0.0.0.0	0.0.0.0

## PC's Configuration:

**GLOBAL**  
**Settings**  
 Algorithm Settings  
**INTERFACE**  
 FastEthernet0  
 Bluetooth

Global Settings

Display Name Laptop2  
 Interfaces FastEthernet0

Gateway/DNS IPv4  
☒ DHCP  
☐ Static  
 Default Gateway  
 DNS Server

Gateway/DNS IPv6

## Real Time:


Realtime Simulation											
Scenario 0	Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
New Delete		Successful	Laptop0	Laptop1	ICMP	Blue	0.000	N	0	(edit)	(delete)
Toggle PDU List Window		Successful	Laptop1	Laptop2	ICMP	Green	0.000	N	1	(edit)	(delete)
		Successful	Laptop0	Laptop2	ICMP	Yellow	0.000	N	2	(edit)	(delete)

## Simulation:

Event List

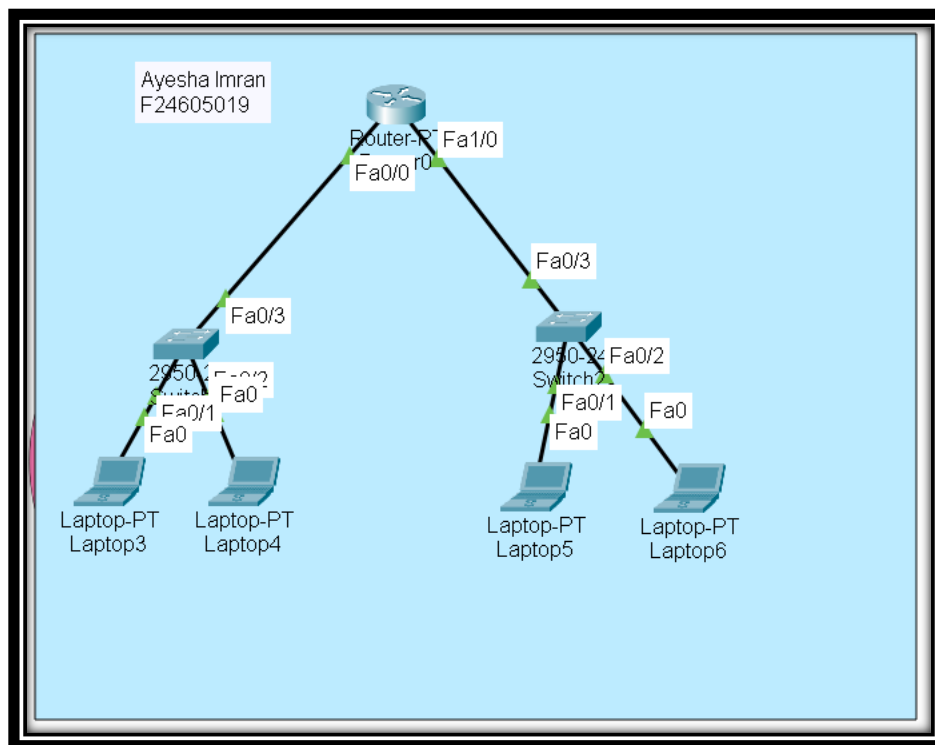
Realtime

Simulation

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	In Progress	Laptop0	Laptop1	ICMP		0.000	N	0	(edit)	(delete)
	In Progress	Laptop2	Laptop1	ICMP		0.000	N	1	(edit)	(delete)
	In Progress	Laptop0	Laptop1	ICMP		0.000	N	2	(edit)	(delete)

## Task 2:

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



## Pc's Configuration:

INTERFACE	Configuration
FastEthernet0	Duplex: <input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> Auto MAC Address: 0060.5C2E.E19C
Bluetooth	IP Configuration: <input checked="" type="radio"/> DHCP <input type="radio"/> Static IPv4 Address: 192.168.0.3 Subnet Mask: 255.255.255.0
	IPv6 Configuration: <input type="radio"/> Automatic <input checked="" type="radio"/> Static IPv6 Address: <input type="text"/> Link Local Address: FE80::260:5CFF:FE2E:E19C

IP Configuration X

Interface: FastEthernet0

IP Configuration

☒ DHCP ☐ Static DHCP request successful.  
 IPv4 Address: 192.168.0.2  
 Subnet Mask: 255.255.255.0  
 Default Gateway: 192.168.0.1  
 DNS Server: 0.0.0.0

IPv6 Configuration

☒ Automatic ☐ Static Ipv6 request failed.  
 IPv6 Address:   
 Link Local Address: FE80::290:21FF:FE42:98B3  
 Default Gateway:   
 DNS Server:

## Router Configuration For Network1 And Network2:

```

Router#config ter
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#int fa0/0
Router(config-if)#ip address 192.168.0.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#do write memory
Building configuration...
[OK]
Router(config-if)#ip dhcp pool net1
Router(dhcp-config)#default-router 192.168.0.1
Router(dhcp-config)#network 192.168.0.0 255.255.255.0
Router(dhcp-config)#exit
Router(config)#int fal/0
Router(config-if)#ip address 192.168.1.1 255.255.255.0
Router(config-if)#no shut
Router(config-if)#do write memory
Building configuration...
[OK]
Router(config-if)#ip dhcp pool net2
Router(dhcp-config)#default-router 192.168.1.1
Router(dhcp-config)#network 192.168.1.0 255.255.255.0
Router(dhcp-config)#exit]exit
^
% Invalid input detected at '^' marker.

Router(dhcp-config)#

```

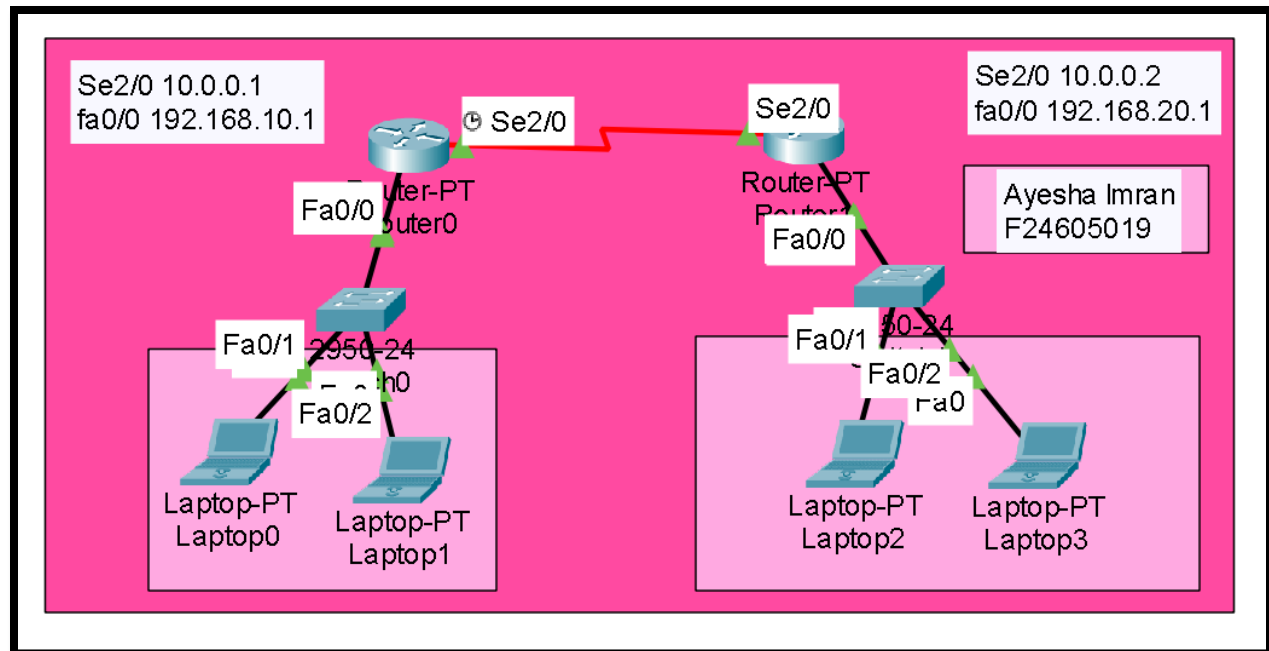
## Real Time Packets:

Realtime Simulation											
Scenario 0		Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit Delete
New Delete			Successful	Laptop0	Laptop1	ICMP		0.000	N	0	(edit) (delete)
Toggle PDU List Window			Successful	Laptop2	Laptop1	ICMP		0.000	N	1	(edit) (delete)
			Successful	Laptop0	Laptop1	ICMP		0.000	N	2	(edit) (delete)

## Task 3

You are tasked with setting up a network infrastructure using Cisco Packet Tracer. The goal is to implement DHCP services through Two routers and name each network with your own name example network 1 (dhcp pool abc1) and network 2(dhcp pool abc2)

- Highlight different sections
- Send packets (Real time).
- Send packets(Simulation).
- Take screen shots of every step



## Router 1 Configuration:



```
Physical  Config  CLI  Attributes
IOS Command Line Interface

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>en
Router#config t
Enter configuration commands, one per line.  End with CNTL/Z.
Router(config)#hostname hunainal
hunainal(config)#int fa0/0
hunainal(config-if)#ip address 192.168.1.1 255.255.255.0
hunainal(config-if)#no shut

hunainal(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

hunainal(config-if)#int se 2/0
hunainal(config-if)#ip address 10.0.0.1 255.0.0.0
hunainal(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial2/0, changed state to down
hunainal(config-if)#exit
hunainal(config)#ip dhcp pool hunainal
hunainal(dhcp-config)#network 192.168.1.0 255.255.255.0
hunainal(dhcp-config)#default-router 192.168.1.1
hunainal(dhcp-config)#do write memory
Building configuration...
[OK]
hunainal(dhcp-config)#exit
hunainal(config)#router rip
hunainal(config-router)#network 192.168.2.0
hunainal(config-router)#exit
hunainal(config)#do write memory
Building configuration...
[OK]
hunainal(config)#
```

## Router 2 configuration:

```

Router2
Physical Config CLI Attributes
IOS Command Line Interface

Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

Router>en
Router#config t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname hunaina2
hunaina2(config)#int fa0/0
hunaina2(config-if)#ip address 192.168.2.1 255.255.255.0
hunaina2(config-if)#no shutdown

hunaina2(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

hunaina2(config-if)#int se 2/0
hunaina2(config-if)#ip address 10.0.0.2 255.0.0.0
hunaina2(config-if)#no shut

hunaina2(config-if)#
%LINK-5-CHANGED: Interface Serial2/0, changed state to up

hunaina2(config-if)#ip djc
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial2/0, changed state to up
^
% Invalid input detected at '^' marker.

hunaina2(config-if)#exit
hunaina2(config)#ip dhcp pool hunaina2
hunaina2(dhcp-config)#network 192.168.2.1 255.255.255.0
hunaina2(dhcp-config)#exit
hunaina2(config)#router rip
hunaina2(config-router)#network 192.168.1.0
hunaina2(config-router)#exit
hunaina2(config)#do write memory
Building configuration...
[OK]
hunaina2(config)#

```

## Real Time:

<div> <div>Realtime</div> <div>Simulation</div> </div>										
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC3	PC4	ICMP		0.000	N	0	(edit)	(delete)
	Successful	PC3	PC5	ICMP		0.000	N	1	(edit)	(delete)
	Successful	PC3	PC6	ICMP		0.000	N	2	(edit)	(delete)

## Simulation:

Simulation Panel

Event List

Vis.	Time(sec)	Last Device
	0.362	Switch3
	0.363	Switch3
	1.336	--
	1.337	--
	1.337	--
	1.337	Switch1
	1.337	Switch1
	1.337	Switch1
	1.337	--

Reset Simulation

☒ Constant Delay

Captured to: 1.337 s

Play Controls

Event List Filters - Visible Events

ACL Filter, ARP, BGP, Bluetooth, CAPWAP, CDP, DHCP, DHCPv6, DNS, DTP, EAPOL, EIGRP, EIGRPv6, FTP, H.323, HSRP, HSRPv6, HTTP, HTTPS, ICMP, ICMPv6, IPSec, ISAKMP, IoT, IoT TCP, LACP, LLDP, Meraki, NDP, NETFLOW, NTP, OSPF, OSPFv6, PAgP, POP3, PPP, PPPoE, PTP, RADIUS, REP, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters

Show All/None

Event List

Realtime

Simulation

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	PC3	PC4	ICMP		0.351	N	0	(edit)	(delete)
	Successful	PC3	PC5	ICMP		0.351	N	1	(edit)	(delete)
	Successful	PC3	PC6	ICMP		0.351	N	2	(edit)	(delete)

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