



NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE

COMPUTER NETWORKS LAB

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Lab	08
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)

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.
-

4. What is a DHCP lease?

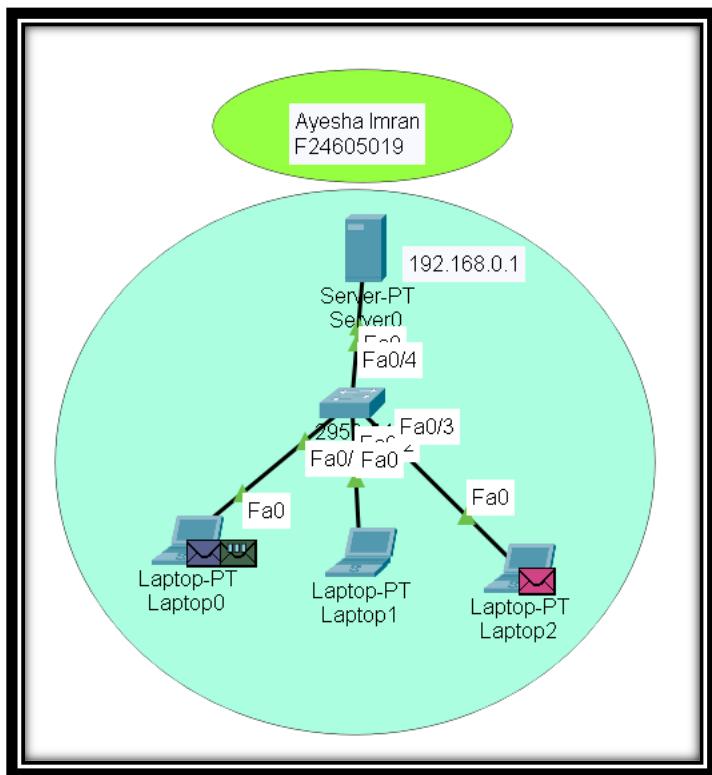
- A **DHCP lease** is the temporary assignment of an IP address to a client by the DHCP server.
 - The lease includes a **duration** (time period) during which the client can use the IP.
 - Once the lease expires, the client must renew it or request a new IP.
-

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
Bandwidth
Duplex
MAC Address: 0001.9608.325C

On: 100 Mbps 10 Mbps Auto
 Half Duplex Full Duplex Auto

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: 192.168.0.1
 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:

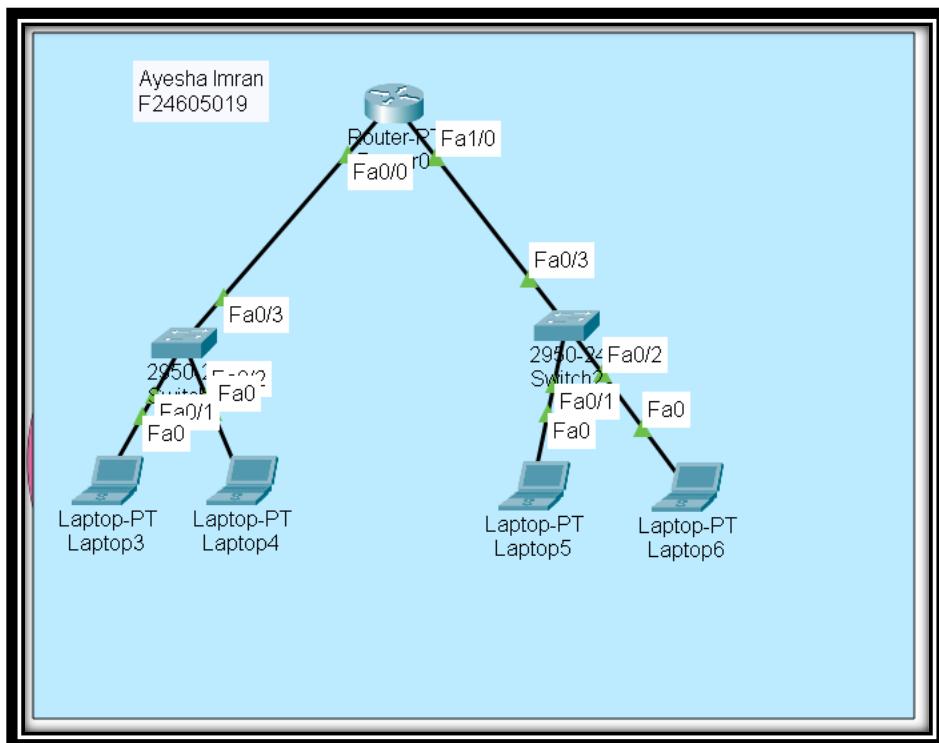
Realtime Simulation										
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	Laptop0	Laptop1	ICMP	Blue	0.000	N	0	(edit)	(delete)
	Successful	Laptop1	Laptop2	ICMP	Green	0.000	N	1	(edit)	(delete)
	Successful	Laptop0	Laptop2	ICMP	Brown	0.000	N	2	(edit)	(delete)

Simulation:

Event List Realtime Simulation										
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	In Progress	Laptop0	Laptop1	ICMP	Dark Blue	0.000	N	0	(edit)	(delete)
	In Progress	Laptop2	Laptop1	ICMP	Magenta	0.000	N	1	(edit)	(delete)
	In Progress	Laptop0	Laptop1	ICMP	Dark Green	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	Duplex	<input type="radio"/> Half Duplex <input checked="" type="radio"/> Full Duplex <input checked="" type="checkbox"/> A
FastEthernet0	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	/
	Link Local Address: FE80::260:5CFF:FE2E:E19C	

IP Configuration

Interface	FastEthernet0
IP Configuration	
<input checked="" type="radio"/> DHCP	<input type="radio"/> Static
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	
<input checked="" type="radio"/> Automatic	<input type="radio"/> Static
IPv6 Address	/
Link Local Address	FE80::290:21FF:FE42:98B3
Default Gateway	
DNS Server	

Router Configuration For Network1 And Network2:

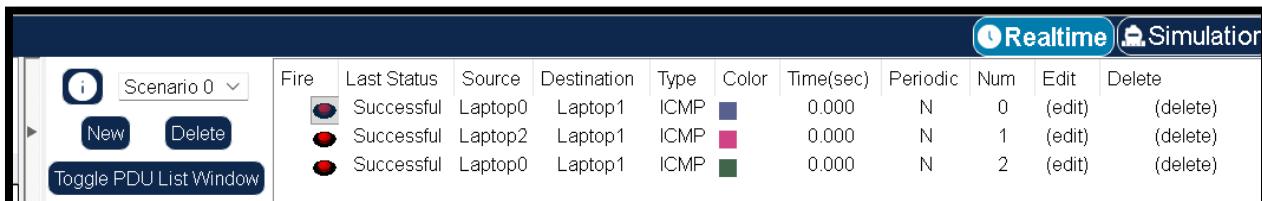
```

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 fa1/0
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:



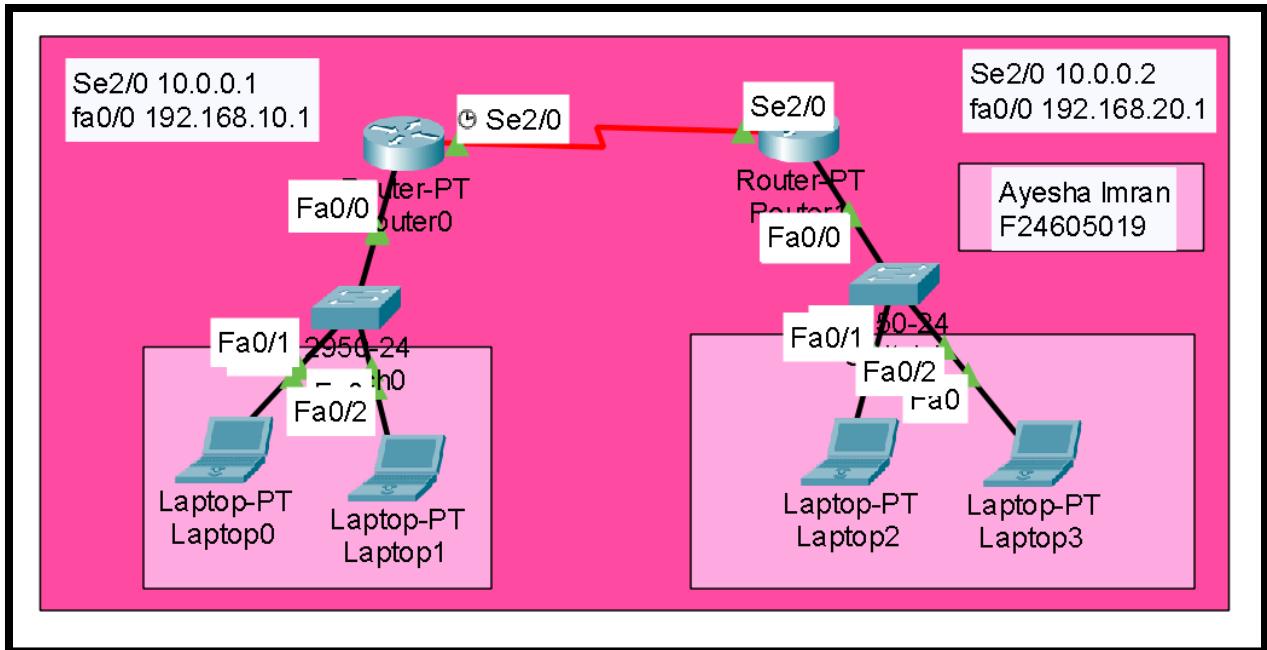
The screenshot shows the Cisco Packet Tracer interface with the "Realtime" tab selected. On the left, there's a toolbar with buttons for "Scenario 0" (dropdown), "New", "Delete", and "Toggle PDU List Window". The main area displays a table of real-time packets:

Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
	Successful	Laptop0	Laptop1	ICMP	■	0.000	N	0	(edit)	(delete)
	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)#

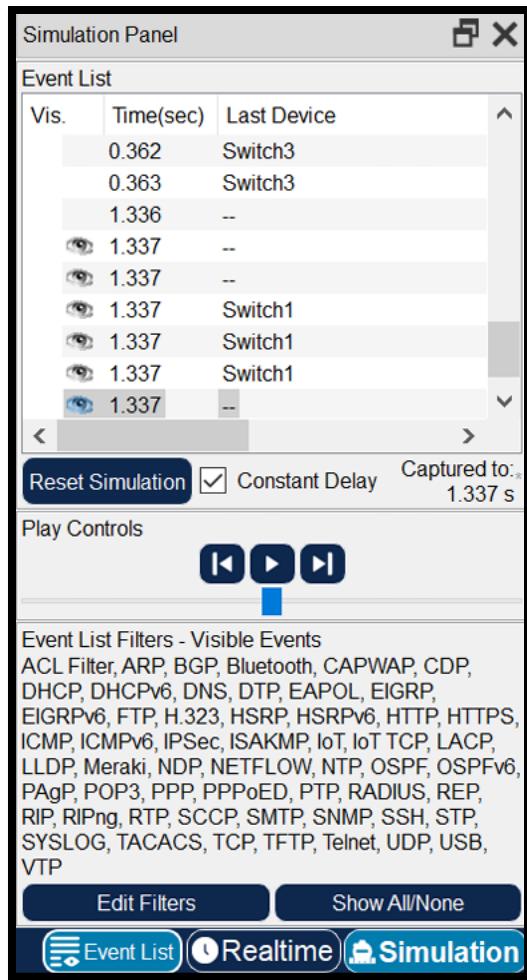
```

Copy **Paste**

Real Time:

Realtime Simulation										
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit	Delete
●	Successful	PC3	PC4	ICMP	■ Red	0.000	N	0	(edit)	(delete)
●	Successful	PC3	PC5	ICMP	■ Purple	0.000	N	1	(edit)	(delete)
●	Successful	PC3	PC6	ICMP	■ Green	0.000	N	2	(edit)	(delete)

Simulation:



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