



## **Computer Networking with Lab** **(SWE 411)**

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# Project Report

## Experiment Title:

Establishment an internetwork for SWE building

## Objective:

1. We build and configure an internetwork using a dynamic routing protocol (RIP)
2. We configure DHCP & create a wireless LAN (Wi-Fi) to extend a wired LAN
3. We configure and apply Standard ACLs
4. We use here Access Control Lists (ACLs) defined in Routers to control access in a network

## Theory:

### The reasons we perform the experiment:

We create here an internetwork for our SWE building

### We do it for some reasons:

To gain practical knowledge to configure DHCP server, using a dynamic routing protocol and create ACL to control access in the network. Here, we also create a wireless LAN (Wi-Fi) to extend a wired LAN.

### We try to find out:

Here, we try to find out that how router gives control to access in a network. We also find out that how a router gives IP in a host through DHCP server. And we also find out that how a wireless LAN sends packet in wired LAN through wireless router.

### Brief Summary:

First of all, we need to use a Router to connect Switches. If we want to transmit a packet from one network to another network, then we must have different Switches. For connecting those Switches, we need a Router that can connect Switches. But we must have to configure the Router. Otherwise, the Router won't work. And for configuring the Router we need a PC and have to connect the PC with Router through Console cable.

In cisco packet tracer, the ports remain off by default. For that reason, we need to on the port manually for working with the ports. We can off the port if we want even after making them on.

Secondly, as we create multiple networks so here, we use more than one router. To Connect one router to another we need Serial DCE cable.

Straight-through and Crossover cables are common Ethernet network cables. There are 2 types of categories to use these cables. One category includes a Hub, Switch. And the second category includes PC, laptop, server, printer, router, etc. If we use the same category (e.g. laptop & server) then we use a crossover cable and if we use different types of the category (e.g. PC & Hub) then we use a straight-through cable. For serving different purposes we have to use different types of cables.

There are four-mode in Cisco Router named User EXEC mode, Privileged EXEC mode, Global configuration mode, other configuration modes. There are some specific functions for every mode. The configuration is performed in the Third and Fourth mode. But for working in the third and fourth mode, at first, we have to go through the first and second mode.

The DHCP Server feature is a full DHCP server implementation that assigns and manages IP addresses from specified address pools within the router to DHCP clients.

The Access Control List (ACL) is a collection of security rules or policies that allows or denies packets after looking at the packet headers and other attributes. Each permit or deny statement in the ACL is referred to as an access control entry (ACE).

When an ACL has been properly configured, we can apply it to an interface to filter traffic. The security appliance can filter packets in both the inbound and outbound direction on an interface. When an inbound ACL is applied to an interface, the security appliance analyzes packets against the ACEs after receiving them. If a packet is permitted by the ACL, the firewall continues to process the packet and eventually passes the packet to the defined interface.

Standard access control lists (ACLs) are router configuration scripts that control whether a router permits or denies packets based on the source address only. Tasks are: defining filtering criteria, configuring standard ACLs, applying ACLs to router interfaces, and verifying and testing the ACL implementation.

An IP address is consisting of 32 bits and every device has a unique IP address. Subnetting is a subnet mask of every IP. Subnet mask contains 1 for network bits and 0 for host bits for any IP address. For configuring the Router, IP address and subnet mask are must be needed.

Moreover, Wildcard bits contain 0 for network bits and 1 for host bits for any IP address. In inbound traffic, the router checks the rules first then process the router. On the other hand, in outbound traffic, the router process firstly then checks the rules.

## Data & Observations:

### Step 1: Physical Connections

- First of all, we create 7 LANs. In every LAN, there is one Switch and some PCs
- Then, we set up a connection among every LAN individually with Straight-through Cable because PC & Switch are in a different category
- After that, we tried to send a packet within the same LAN and it was successful. But when tried to send a packet from one LAN to another LAN, it failed. So, we took 7 routers
- Next, we set up 7 Routers
- Then, we connect the Routers with the Switches with Straight-through Cable as Router & Switch are in a different category
- After that, we connect the Routers between them through Serial DCE Cables
- Thus, we connect existing PCs to configure the routers through Console Cables. Because, without configuring the Router, the packet won't be sent

### Step 2: IP Addressing Table

- Our Root Network is 10.168.92.0/22. Now, we configure all the PCs & Routers. Here, we create 14 subnets. So, we need to borrow 4 bits from the host bit. Thus, Subnet Mask for each subnet is 255.255.255.192. Now, we assign an IP Address and a default Gateway for every PCs

### Step 3: Host Name

Here, we change the hostname. We take the hostname by default. We can change the hostname by this command:

```
For Router R1: (Router(config)# hostname R1)
For Router R2: (Router(config)# hostname R2)
For Router R3: (Router(config)# hostname R3)
For Router R4: (Router(config)# hostname R4)
For Router R5: (Router(config)# hostname R5)
```

For Router R6: (Router(config)# hostname R6)

For Router R7: (Router(config)# hostname R7)

#### **Step 4: Adding IP Addresses**

- Now, we add IP addresses to both an Ethernet and serial interface. For serial interface with the DCE cable, we'll need to also add the clocking with the clock rate command
- For serial interface with the DCE cable, we'll need to also add the clocking with the clock rate command

#### **Step 5: Configure Ethernet & Serial interfaces**

- Then, we set up an IP address, Subnet Mask, and make interface active (no shutdown) for Ethernet. Thus, we set up the default gateway for every LAN. Because without gateway it's impossible to send a packet from one LAN to other LAN
- After that, we set up an IP address, Subnet Mask, and make interface active (no shutdown) for Serial interfaces. To Configure DCE serial interface: Set IP address, Subnet mask, Clock Rate and make interface active (no shutdown)





PC8

Logic

Physical Config Desktop Programming Attributes

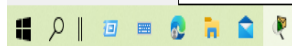
```
R7>enable
R7#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
R7(config)#interface fa0/0
R7(config-if)#ip add
R7(config-if)#ip address 10.168.93.193 255.255.255.192
R7(config-if)#no sh
R7(config-if)#no shutdown
R7(config-if)#ex
R7(config-if)#exit
R7(config)#int
R7(config)#interface se2/0
R7(config-if)#ip add
R7(config-if)#ip address 10.168.95.130 255.255.255.192
R7(config-if)#no sh
R7(config-if)#no shutdown
R7(config-if)#exit
R7(config)#int
R7(config)#interface se2/0
R7(config-if)#clock rate 64000
R7(config-if)#exit
R7(config)#interface se3/0
R7(config-if)#ip add 10.168.94.1 255.255.255.192
R7(config-if)#no sh
R7(config-if)#no shutdown
R7(config-if)#
```

&lt; Top

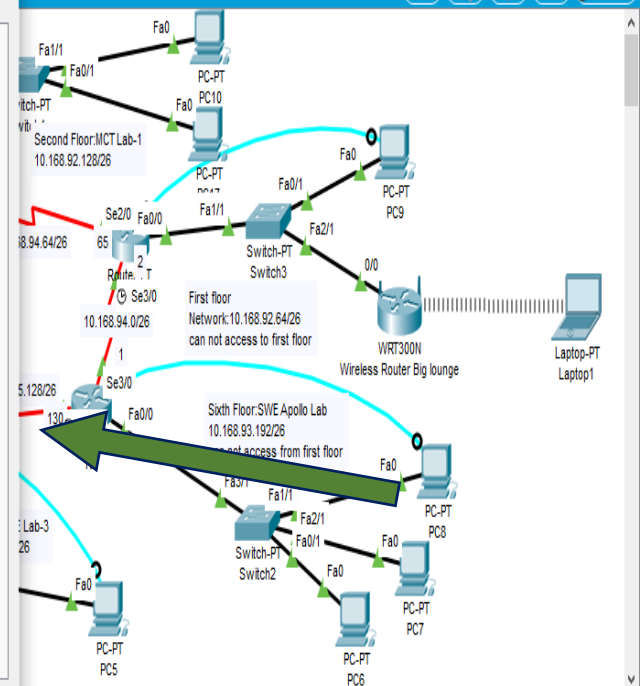
Time: 00:10:30



819HG-4G-10X



[Root] 05:26:00



Realtime Simulation

10:02 PM 8/26/2020

## Step 6: Configure Dynamic Routes

- Here, we set up a **Dynamic Routing** using a dynamic routing protocol like RIP, for that reason, we'll need to enable a routing protocol and advertise the directly connected networks that we want to be advertised. To enable a dynamic routing protocol, enter global configuration mode and use the router command
- If we enter the router then we have to enable the global configuration prompt to see a list of available routing protocols on the selected router
- To enable RIP, enter the command `router rip` in global configuration mode
- Once we are in routing configuration mode, enter the network address for each directly connected network, using the `network` command
- Now, we configure the Router R7 with PC8





PC8

Logic

Physical Config Desktop Programming Attributes

Root net:  
Required  
Borrow f  
Network  
Host bit-  
SM/255.2

```
R7#  
%SYS-5-CONFIG_I: Configured from console by console  
conf t  
Enter configuration commands, one per line. End with CNTL/Z.  
R7(config)#router rip  
R7(config-router)#network 10.168.93.192  
R7(config-router)#network 10.168.94.0  
R7(config-router)#network 10.168.96.128  
R7(config-router)#exit  
R7#  
%SYS-5-CONFIG_I: Configured from console by console  
  
R7#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  
  
10.0.0.0/26 is subnetted, 14 subnets  
R 10.168.92.64 [120/1] via 10.168.94.2, 00:00:13, Serial3/0  
R 10.168.92.128 [120/2] via 10.168.94.2, 00:00:13, Serial3/0
```

Network diagram showing various devices and connections:

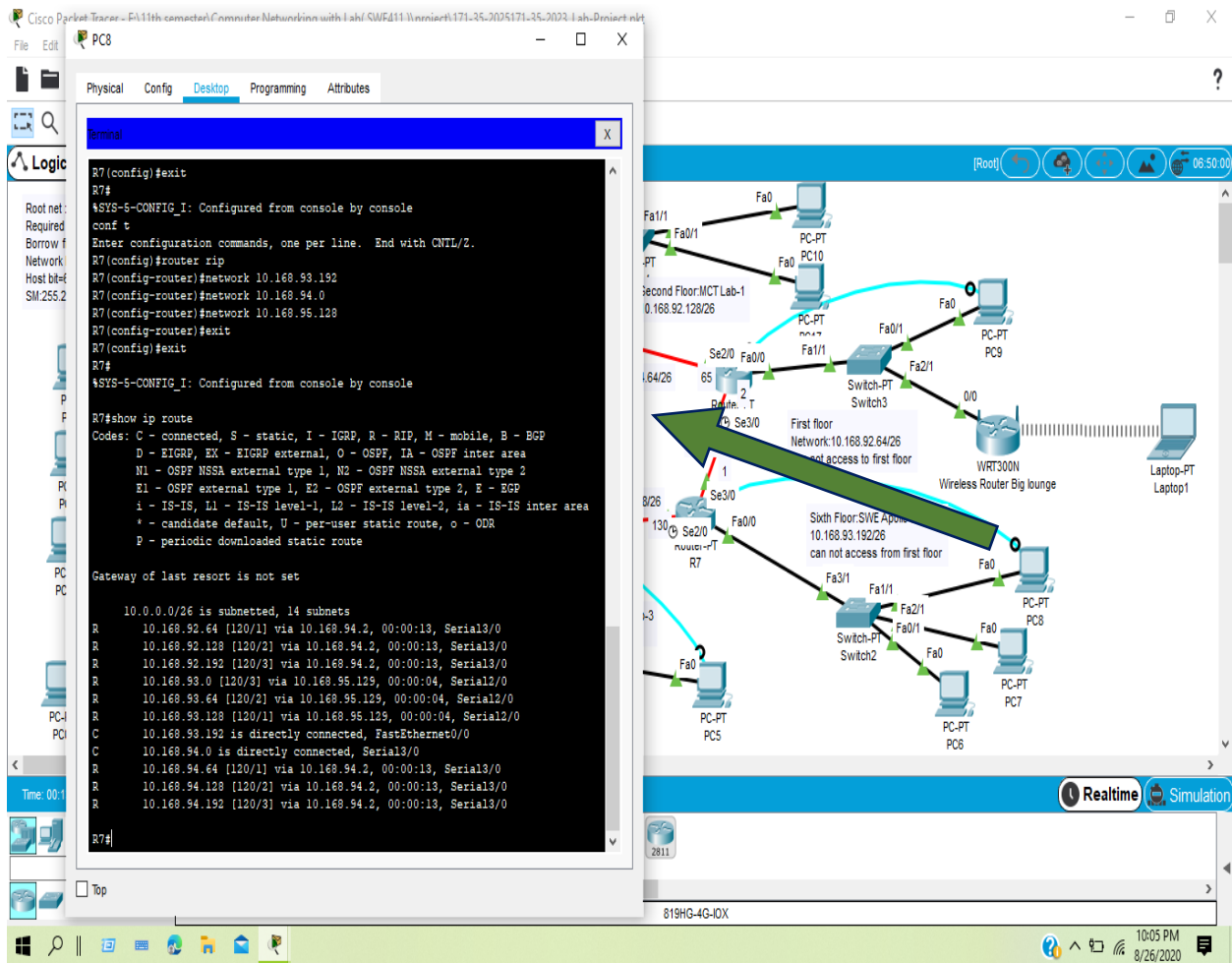
- PC-PT, PC10, PC-PT, PC-PT, PC9, PC-PT, PC8, PC7, PC6, PC5, Laptop-PT, Laptop1
- Switch-PT, Switch3, Switch-PT, Switch2
- Wireless Router Big lounge
- First floor Network: 10.168.92.64/26 can not access to first floor
- Sixth Floor: SWE App 10.168.93.192/26 can not access from first floor
- Lab-3 26

Time: 00:12:55

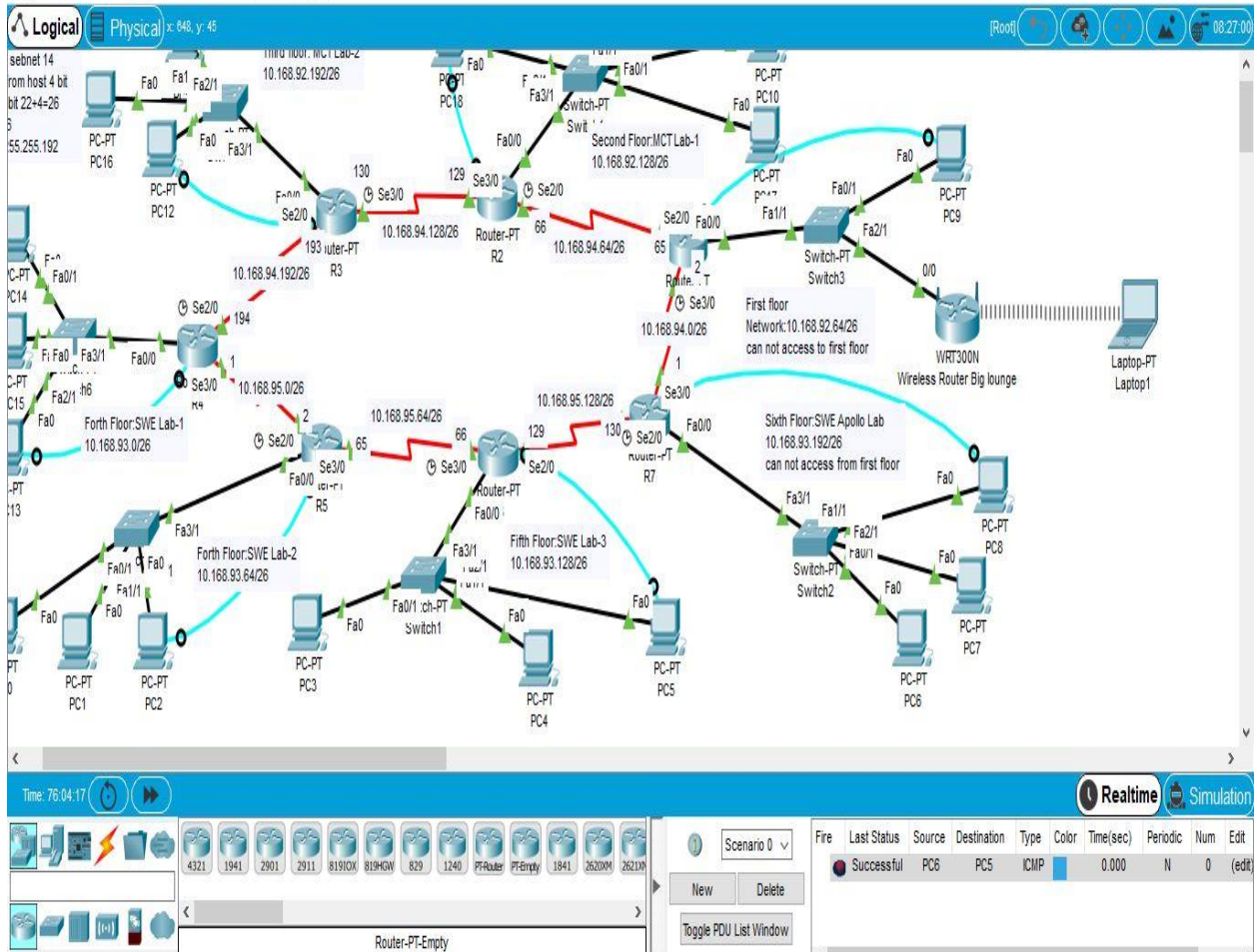
Realtime Simulation

819HG-4G-IOX

10:05 PM 8/26/2020



- Similarly, we configure Dynamic Routes for all router
- After setting up the gateway & configure Dynamic Routes for every LAN, we send a packet from one network to another. And it works successfully [N.B: At first, it may be failed in the 1<sup>st</sup> time but if we try again then it will be successful]
- Then, we send a packet from PC6 to PC5. In Realtime mode, the packet status is successful



- Finally, we send a packet from PC6 to PC5. We observe the activity for the network  
In the Simulation mode

Cisco Packet Tracer - C:\Users\Sakib\Desktop\171-35-2025\_171-35-2023\_Lab Project.pkt

File Edit Options View Tools Extensions Help

Logical Physical x 764, y: 149

Simulation Panel

Event List

Vis	Time(sec)	Last Device	At Device	Type
	0.002	Switch2	R7	ICMP
	0.003	R7	R6	ICMP
	0.004	R6	Switch1	ICMP
	0.005	Switch1	PC5	ICMP
	0.006	PC5	Switch1	ICMP
	0.007	Switch1	R6	ICMP
	0.008	R6	R7	ICMP
	0.009	R7	Switch2	ICMP
Visible	0.010	Switch2	PC6	ICMP

Reset Simulation ☒ Constant Delay Captured to: 0.010 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, 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 AllNone

Time: 76:05:49.840 PLAY CONTROLS

Scenario 0

New Delete

Toggle PDU List Window

Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit

Successful	PC6	PC5	ICMP	0.000	N	0	(edit)
------------	-----	-----	------	-------	---	---	--------

## Step 7: Verify Routing table and Test the network

Configure PC8 to receive an IP address through DHCP

- ✓ Click on the PC8
- ✓ Click on Desktop
- ✓ IP Configuration
- ✓ Select DHCP option to set PC8 to get dynamic IP from the DHCP Server
- ✓ Do the same for all PC's

## Step 8: Configure a DHCP Server

Configure the R7 router as a DHCP server for the 10.168.93.192/26 subnet.

Now, Configure all the Router's like R7.

## Step 9:

### *Step-01: Exclude statically assigned addresses*

The DHCP server assumes that all IP addresses in a DHCP address pool subnet are available for assigning to DHCP clients. We must specify the IP addresses that the DHCP server should not assign to clients. These IP addresses are usually static addresses reserved for the router interface, switch management IP address, servers, and a local network printer. The IP DHCP excluded-address command prevents the router from assigning IP addresses within the configured range. The following commands exclude the first 10 IP addresses from each pool for the LANs attached to Switch1. These addresses will not be assigned to any DHCP clients.

```
R7(config)#ip DHCP excluded-address 10.168.93.193 10.168.93.202
```

### *Step-02: Configure the pool*

Create the DHCP pool using the IP DHCP pool command and name it R7Fa0\_0.

```
R7(config)#ip dhcp pool R7Fa0_0
```

```
R7(dhcp-config) #network 10.168.93.192 255.255.255.192
```

Configure the default router and domain name server for the network. Clients receive these settings via DHCP, along with an IP address.

```
R7(dhcp-config) #default-router 10.168.93.193
```

```
R7(dhcp-config) #dns-server 10.10.10.10
```

**Note:** There is not a DNS server at 10.10.10.10. We are configuring the command for practice only.



PC8

Physical Config Desktop Programming Attributes

Terminal

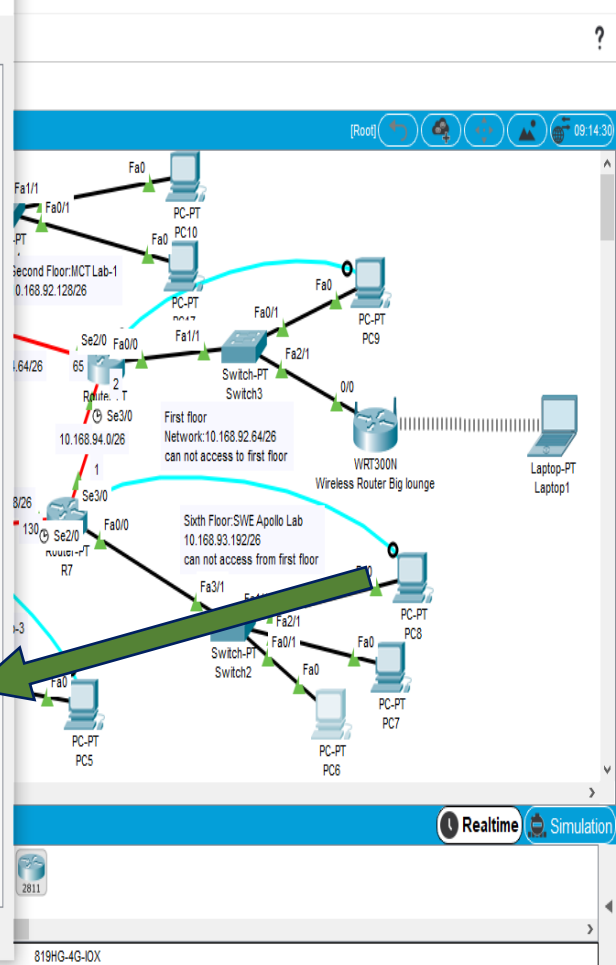
```
R7#
%SYS-5-CONFIG_I: Configured from console by console

R7#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 - BGP
       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

10.0.0.0/26 is subnetted, 14 subnets
R 10.168.92.64 [120/1] via 10.168.94.2, 00:00:13, Serial3/0
R 10.168.92.128 [120/2] via 10.168.94.2, 00:00:13, Serial3/0
R 10.168.92.192 [120/3] via 10.168.94.2, 00:00:13, Serial3/0
R 10.168.93.0 [120/3] via 10.168.95.129, 00:00:04, Serial2/0
R 10.168.93.64 [120/2] via 10.168.95.129, 00:00:04, Serial2/0
R 10.168.93.128 [120/1] via 10.168.95.129, 00:00:04, Serial2/0
C 10.168.93.192 is directly connected, FastEthernet0/0
C 10.168.94.0 is directly connected, Serial3/0
R 10.168.94.64 [120/1] via 10.168.94.2, 00:00:13, Serial3/0
R 10.168.94.128 [120/2] via 10.168.94.2, 00:00:13, Serial3/0
R 10.168.94.192 [120/3] via 10.168.94.2, 00:00:13, Serial3/0

R7#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R7(config)#ip dhcp exc
R7(config)#ip dhcp excluded-address 10.168.93.193 10.168.93.202
R7(config)#ip dhcp
R7(config)#ip dhcp pool R7fa0_0
R7(dhcp-config)#network 10.168.93.192 255.255.255.192
R7(dhcp-config)#de
R7(dhcp-config)#default-router 10.168.93.193
R7(dhcp-config)#dns
R7(dhcp-config)#dns-server 10.10.10.10
R7(dhcp-config)#
```



Specify the subnet to use when assigning IP addresses. DHCP pools automatically associate with an interface based on the network statement. The router R1 now acts as a DHCP server, handing out addresses in the **10.168.93.193/26** subnet starting with **10.168.93.204** for PC8.

Cisco Packet Tracer - C:\Users\Sakib\Desktop\171-35-2025\_171-35-2023\_Lab Project.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 830, y: 322

Host bit=6 SM:255.255.255.192

PC-PT PC16 PC-PT PC12 PC-PT PC14 PC-PT PC15 PC-PT PC13 PC-PT PC0 PC-PT PC1 PC-PT PC2

Forth Floor:SWE Lab-1 10.168.93.0/26

Forth 10.16

PC8

Physical Config Desktop Programming Attributes

☒ DHCP ☐ Static

IP Address 10.168.93.204

Subnet Mask 255.255.255.192

Default Gateway 10.168.93.193

DNS Server 10.10.10.10

IPv6 Configuration

☐ DHCP ☐ Auto Config ☒ Static

IPv6 Address

Link Local Address FE80::200:CFF:FE50:132D

IPv6 Gateway

IPv6 DNS Server

802.1X

☐ Use 802.1X Security

Authentication MDS

Username

Password

☐ Top

Time: 76:06:00.721 PLAY CONTROLS

Event List

Scenario 0

New Delete

Toggle PDU List Window

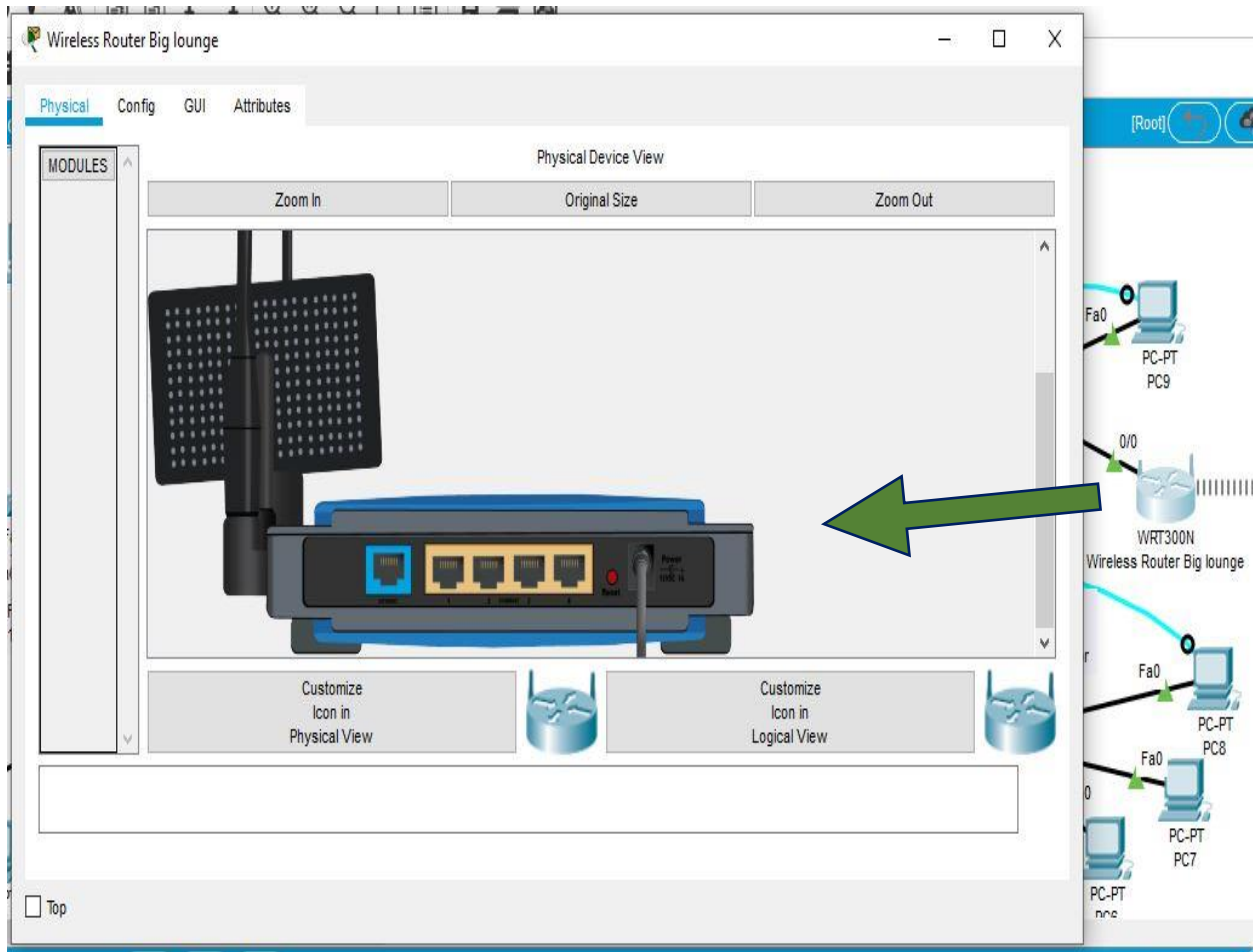
Fire Last Status Source Destination Type Color

2620XM

## Step 10: Configure a Wireless Router to create a Wireless LAN (Wi-Fi)

### Part 1: Connect to the Wireless router

- ✓ Now, we take a Wireless Router WRT300N
- ✓ Then, we connect the Automatically Choose Connection Type cable from Wireless Router Big Lounge to the Switch3
- ✓ After that, we click the Wireless Router Big Lounge and click the GUI
- ✓ As we configure multiple DHCP for Router R1, so for this LAN, we have to choose a static IP in the Internet Connection Type





✓ Then enter the following static IP information:

- Internet IP Address – 10.168.92.66
- Subnet Mask –255.255.255.192
- Default Gateway –192.168.11.1
- DNS 1 –10.10.10.40

The image displays the Cisco Packet Tracer interface. On the left, a network diagram shows a multi-floor building with various devices including PCs, switches, and a wireless router. The router is labeled 'Wireless Router Big lounge'. On the right, the configuration window for the 'Wireless Router Big lounge' is open, showing the 'Config' tab. The 'Internet Setup' section is active, where the 'Internet Connection type' is set to 'Static IP'. The following fields are configured:

- Internet IP Address: 10.168.92.66
- Subnet Mask: 255.255.255.192
- Default Gateway: 10.168.92.65
- DNS 1: 10.10.10.40
- DNS 2 (Optional): 0.0.0.0
- DNS 3 (Optional): 0.0.0.0
- Host Name: (empty)
- Domain Name: (empty)
- MTU: 1500

The 'Network Setup' section is also visible, showing the 'Router IP' configuration:

- IP Address: 192.168.11.1
- Subnet Mask: 255.255.255.0

- ✓ After that, we configure the inside network parameters. Scroll down to the Network Setup section and configure the following information:

- IP Address –192.168.11.1
- Subnet Mask –255.255.255.192
- Then we have to select DHCP Server Enable so that, the router can give Automatic IP to the host from the DHCP pool
- Starting IP Address – Enter 100 for the last octet
- Maximum number of Users – 50

**Note:** The IP address range of the DHCP pool will only reflect the changes once you click 'Save Settings'

The screenshot displays the Cisco Packet Tracer interface. On the left, a network topology is visible with various devices including PCs, switches, and a wireless router. A text box in the topology indicates a network issue: "First floor Network: 10.168.92.64/26 can not access to first floor" and "Sixth Floor: SWE Apollo Lab 10.168.93.192/26 can not access from first floor". On the right, the configuration window for the "Wireless Router Big lounge" is open, showing the "Config" tab. The "DHCP Server Settings" section is configured as follows:

- DHCP Server: ☒ Enabled
- Start IP Address: 192.168.11.100
- Maximum number of Users: 50
- IP Address Range: 192.168.11.100 - 149
- Client Lease Time: 0 minutes (0 means one day)
- Static DNS 1: 0.0.0.0
- Static DNS 2: 0.0.0.0
- Static DNS 3: 0.0.0.0
- WINS: 0.0.0.0

- ✓ Next, we Save the settings and reconnect to the router
  - Scroll to the bottom of the page and click Save Settings. If we move from one tab to another without saving, our configurations will be lost.

✓ Now, configure wireless connectivity for wireless devices

- Click the Wireless tab and investigate the options in the dropdown list for Network Mode
- Set the network mode for Mixed
- Change the SSID to SWE\_lounge
- When a wireless client surveys the area searching for wireless networks, it detects any SSID broadcasts. SSID broadcasts are enabled by default
- As we select network mode Mixed, so we set the radio band to Auto
- Click Save Settings and then click Continue

Cisco Packet Tracer - C:\Users\Sakib\Desktop\171-35-2025,171-35-2023\_Lab Project.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 1333, y: 190

First floor Network: 10.168.92.64/26 can not access to first floor

Sixth Floor: SWE Apollo Lab 10.168.93.192/26 can not access from first floor

Wireless Router Big lounge

Wireless Router Big lounge

Wireless-N Broadband Router

Physical Config GUI Attributes

Wireless Setup Wireless Security Access Restrictions Applications & Gaming Administration

Basic Wireless Settings

Network Mode: Mixed

Network Name (SSID): SWE\_lounge

Radio Band: Auto

Wide Channel: Auto

Standard Channel: 1 - 2.412GHz

SSID Broadcast: ☒ Enabled ☐ Disabled

Time: 75:18:21

Router-PT

- 
- The screenshot displays the Cisco Packet Tracer interface. On the left, a network topology is shown with two floors. The 'First floor' network (10.168.92.64/26) includes PC-PT PC10, PC-PT PC9, and a Wireless Router Big lounge (WRT300N). The 'Sixth Floor: SWE Apollo Lab' network (10.168.93.192/26) includes PC-PT PC8, PC-PT PC7, and a Switch-PT Switch2. A text box indicates that the Sixth Floor network 'can not access first floor'. The topology also shows a Switch-PT Switch3 and a Laptop-PT Laptop1.
- On the right, the 'Wireless Router Big lounge' configuration window is open, showing the 'Wireless Security' tab. The configuration includes:
- Security Mode: WPA2 Personal
  - Encryption: AES
  - Passphrase: 12345678
  - Key Renewal: 3600 seconds
- The bottom status bar shows the time as 75:19:21 and a list of devices including 4321, 1941, 2901, 2911, 81910X, 819HGW, 829, 1240, PT-Router, PT-Empty, 1841, 2620M1, 2620M4, 2811, and Router-PT-Empty.

## Part 2: Configure and Verify Wireless Client Access

- ✓ Configure Laptop1 to access the wireless network
- ✓ If a wireless interface is not found, add a wireless interface (Laptop1 > Physical > free slot WPC300N add)

Cisco Packet Tracer - C:\Users\Sakib\Desktop\171-35-2025,171-35-2023\_Lab Project.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 1710, y: 421

Physical Device View

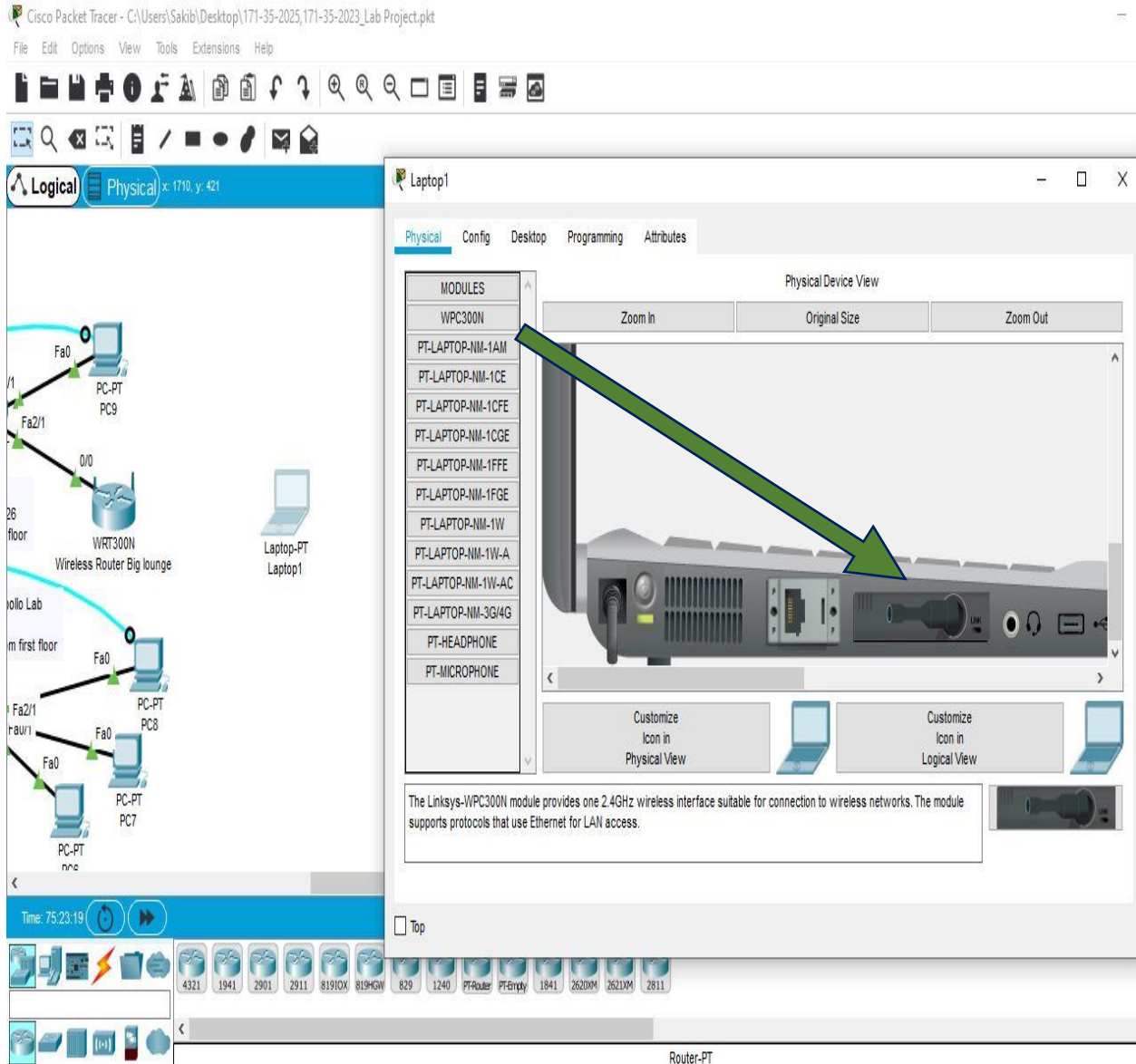
Zoom In Original Size Zoom Out

MODULES

- WPC300N
- PT-LAPTOP-NM-1AM
- PT-LAPTOP-NM-1CE
- PT-LAPTOP-NM-1CFE
- PT-LAPTOP-NM-1CGE
- PT-LAPTOP-NM-1FFE
- PT-LAPTOP-NM-1FGE
- PT-LAPTOP-NM-1W
- PT-LAPTOP-NM-1W-A
- PT-LAPTOP-NM-1W-AC
- PT-LAPTOP-NM-3G/4G
- PT-HEADPHONE
- PT-MICROPHONE

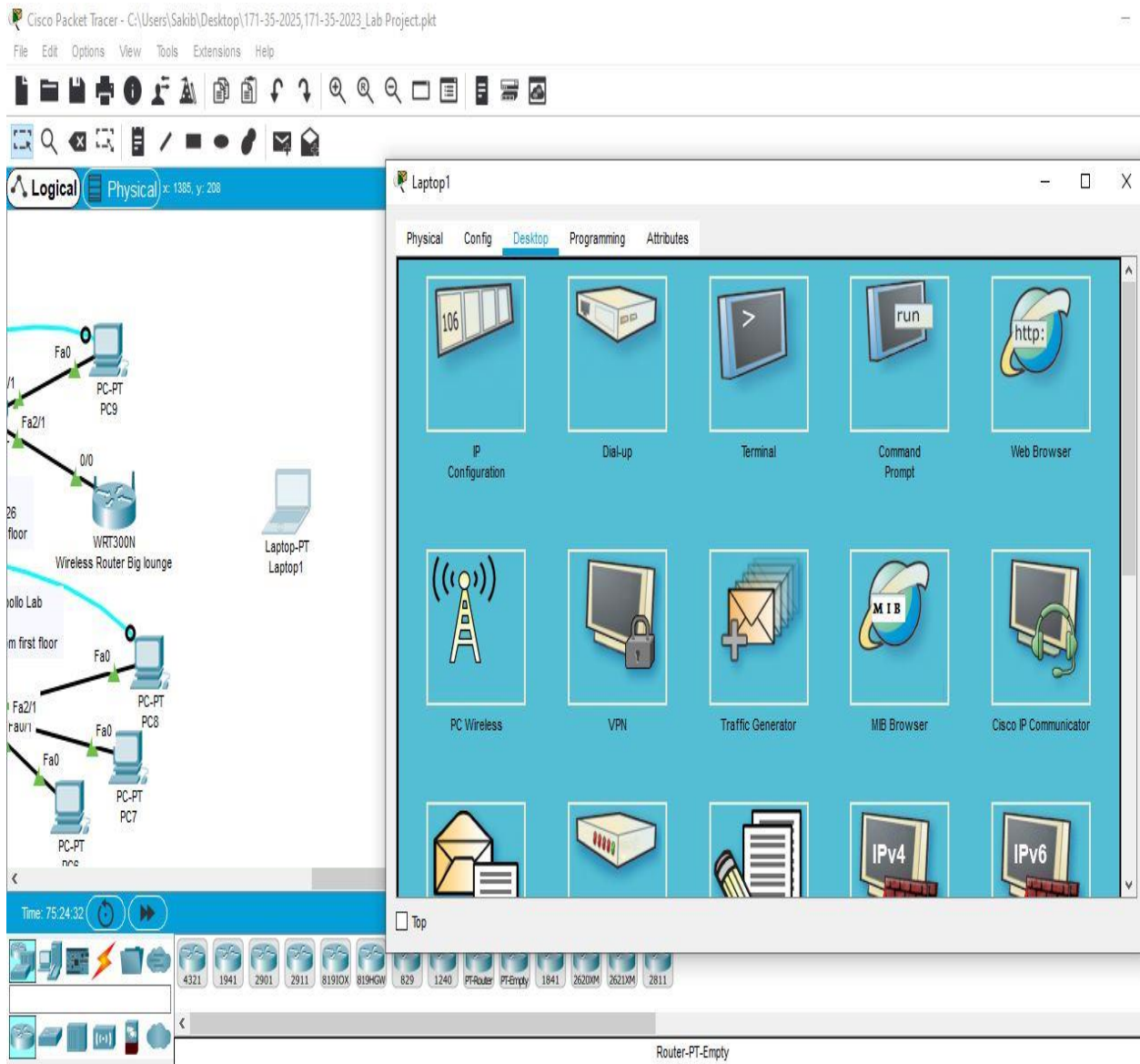
The Linksys-WPC300N module provides one 2.4GHz wireless interface suitable for connection to wireless networks. The module supports protocols that use Ethernet for LAN access.

Router-PT





✓ Click Laptop1 and click Desktop > PC Wireless



- ✓ Click the Connect tab and click Refresh, if necessary. We should see SWE\_lounge listed under Wireless Network Name

Cisco Packet Tracer - C:\Users\Sakib\Desktop\171-35-2025,171-35-2023\_Lab Project.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 1295, y: 445

Switch-PT Swit Second Floor:MCT Lab-1 10.168.92.128/26

PC-PT PC10

PC-PT PC9

Switch-PT Switch3

First floor Network:10.168.92.64/26 can not access to first floor

WRT300N Wireless Router Big lounge

PC-PT Laptop1

Se2/0 Fa0/0 10.168.94.0/26

Se3/0 Fa0/0 10.168.93.192/26

Sixth Floor:SWE Apollo Lab 10.168.93.192/26 can not access from first floor

Switch-PT Switch2

PC-PT PC5

PC-PT PC8

PC-PT PC7

PC-PT PC6

Time: 75:27:03

Realtime

Laptop1

Physical Config Desktop Programming Attributes

Link Information Connect Profiles

Below is a list of available wireless networks. To search for more wireless networks, click the Refresh button. To view more information about a network, select the wireless network name. To connect to that network, click the Connect button below.

Wireless Network Name	CH	Signal
SWE_lounge	1	100%

Site Information

Wireless Mode Infrastructure

Network Type Mixed B/G/N

Radio Band Auto

Security WPA2-PSK

MAC Address 0090.2B94.9208

Refresh Connect

Adapter is

Wireless-N Notebook Adapter Wireless Network Monitor v1.0 Model No. WPC

Top

4321 1941 2901 2911 81910X 819HGN 829 1240 PFRouter PFREmpty 1841 26200M 26210M 2811

2901

- ✓ Click SWE-lounge and click Connect
- ✓ The Pre-shared Key is the password we configured in Part 2. Now, enter the password and click Connect

The screenshot shows a software window titled "Laptop1" with a tabbed interface. The "Desktop" tab is selected, displaying a connection configuration screen. At the top, a green bar contains the tabs: "Physical", "Config", "Desktop", "Programming", and "Attributes". Below this, a grey header reads "WPA2-Personal Needed for Connection". The main area contains instructions: "This wireless network has WPA2-Personal enabled. To connect to this network, enter the required passphrase in the appropriate field below. Then click the **Connect** button." There are two input fields: "Security" with a dropdown menu set to "WPA2-Personal" and a note "Please select the wireless security method used by your existing wireless network.", and "Pre-shared Key" with the text "12345678" entered and a note "Please enter a Pre-shared Key that is 8 to 63 characters in length." At the bottom right, there are "Cancel" and "Connect" buttons. A status bar at the very bottom shows "Wireless-N Notebook Adapter", "Wireless Network Monitor v1.0", and "Model No. WPC" with a dropdown arrow. A "Top" button is located at the bottom left of the window.

Laptop1

Physical Config **Desktop** Programming Attributes

### WPA2-Personal Needed for Connection

This wireless network has WPA2-Personal enabled. To connect to this network, enter the required passphrase in the appropriate field below. Then click the **Connect** button.

**Security** WPA2-Personal ▼ Please select the wireless security method used by your existing wireless network.

**Pre-shared Key** 12345678 Please enter a Pre-shared Key that is 8 to 63 characters in length.

Cancel Connect

Wireless-N Notebook Adapter Wireless Network Monitor v1.0 Model No. WPC ▼

☐ Top



✓ After click connect, the connection is established

Cisco Packet Tracer - C:\Users\Sakib\Desktop\171-35-2025,171-35-2023\_Lab Project.pkt

File Edit Options View Tools Extensions Help

Logical Physical x: 1422, y: 446

Second Floor:MCT Lab-1  
10.168.92.128/26

First floor  
Network:10.168.92.64/26  
can not access to first floor

Sixth Floor:SWE Apollo Lab  
10.168.93.192/26  
can not access from first floor

Wireless Router Big lounge

Laptop-PT  
Laptop1

Time: 75:31:24

4321 1941 2901 2911 8191OX 819HGW 829 1240 PFRouter PFREmpty 1841 2620XM 2621XM 2811

Laptop1

Physical Config Desktop Programming Attributes

Link Information Connect Profiles

Below is a list of available wireless networks. To search for more wireless networks, click the Refresh button. To view more information about a network, select the wireless network name. To connect to that network, click the Connect button below.

Wireless Network Name	CH	Signal
SWE_lounge	1	100%

Site Information

Wireless Mode Infrastructure  
Network Type Mixed B/G/N  
Radio Band Auto  
Security WPA2-PSK  
MAC Address 0090.2B94.9206

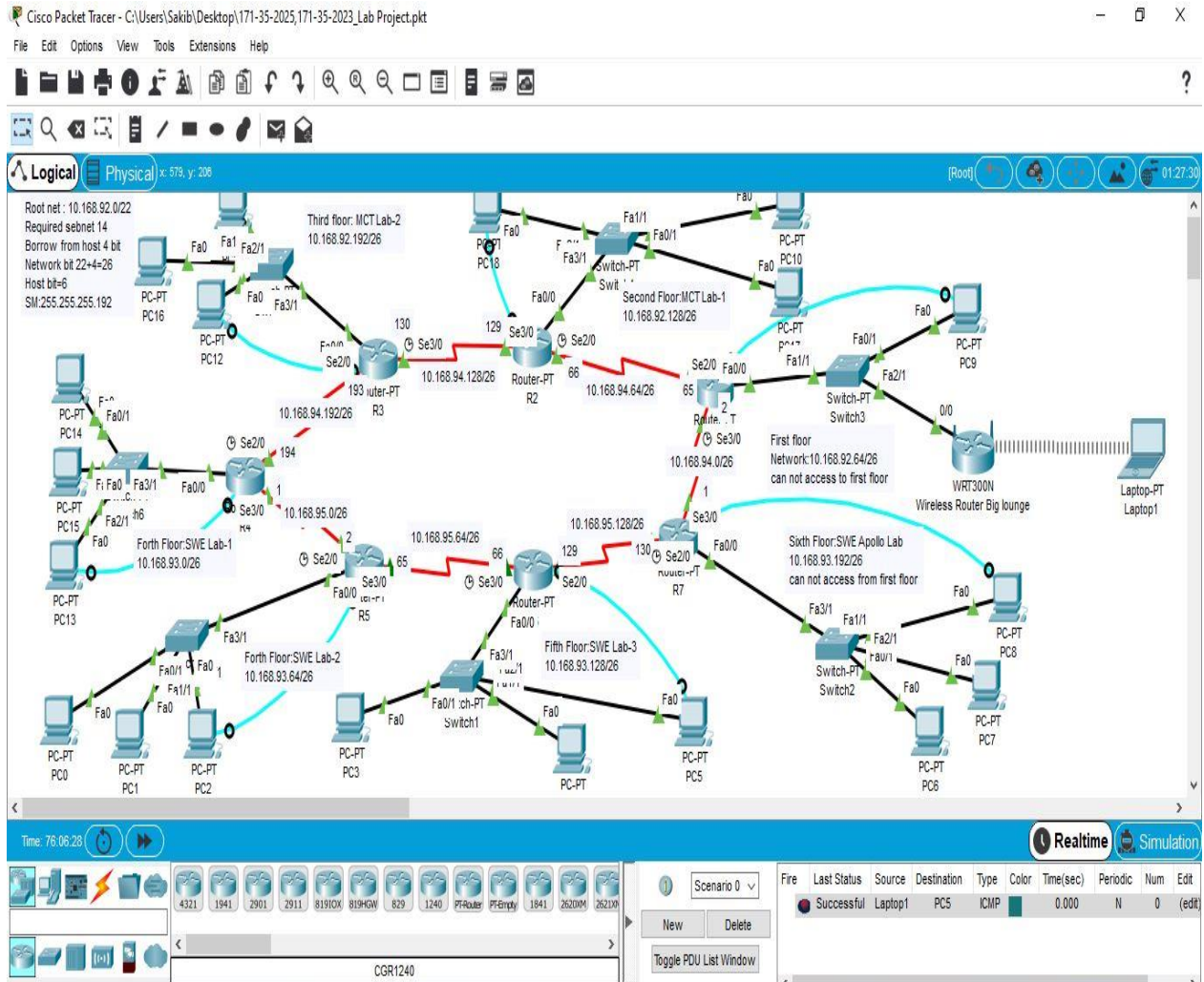
Refresh Connect

Adapter

Wireless-N Notebook Adapter Wireless Network Monitor v1.0 Model No. WPC

Top

- ✓ Now, we send a packet from Laptop1 to PC5. In Realtime Mode, the packet status is successful [N.B: At first, it may be failed in the 1<sup>st</sup> time but if we try again then it will be successful]



### Step 11: Create Standard ACLs

- Creating an ACL using the number 1 on Router with a statement that denies access to the First Floor (10.168.92.64/26) network from the Apollo Lab (10.168.93.192/26) network

```
R7(config)#access-list 1 deny 10.168.92.64 0.0.0.63
```

- By default, an access list denies all traffic that does not match a rule. To permit all other traffic

```
R7(config)#access-list 1 permit any
```

- For the ACL to actually filter traffic, it must be applied to some router operation. Apply the ACL by placing it for outbound traffic

```
R7(config)#interface fastEthernet 0/0
```

```
R7(config-if) #ip access-group 1 out
```



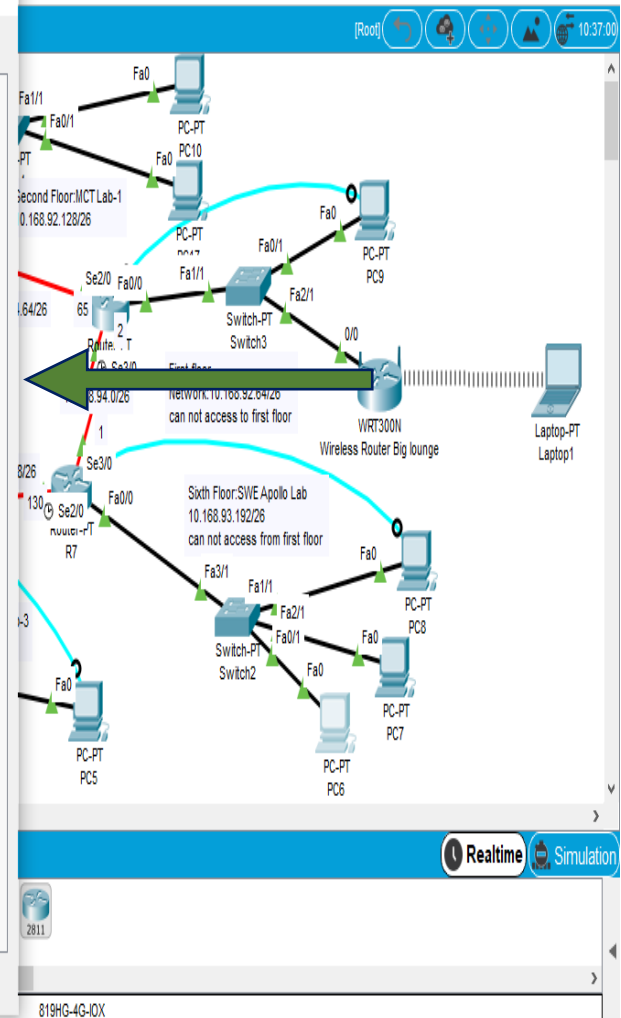
PC8

Physical Config **Desktop** Programming Attributes

Terminal

```
10.0.0.0/26 is subnetted, 14 subnets
R 10.168.92.64 [120/1] via 10.168.94.2, 00:00:13, Serial3/0
R 10.168.92.128 [120/2] via 10.168.94.2, 00:00:13, Serial3/0
R 10.168.92.192 [120/3] via 10.168.94.2, 00:00:13, Serial3/0
R 10.168.93.0 [120/3] via 10.168.95.129, 00:00:04, Serial2/0
R 10.168.93.64 [120/2] via 10.168.95.129, 00:00:04, Serial2/0
R 10.168.93.128 [120/1] via 10.168.95.129, 00:00:04, Serial2/0
C 10.168.93.192 is directly connected, FastEthernet0/0
C 10.168.94.0 is directly connected, Serial3/0
R 10.168.94.64 [120/1] via 10.168.94.2, 00:00:13, Serial3/0
R 10.168.94.128 [120/2] via 10.168.94.2, 00:00:13, Serial3/0
R 10.168.94.192 [120/3] via 10.168.94.2, 00:00:13, Serial3/0

R7#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R7(config)#ip dhcp exc
R7(config)#ip dhcp excluded-address 10.168.93.193 10.168.93.202
R7(config)#ip dhcp
R7(config)#ip dhcp pool R7fa0_0
R7(dhcp-config)#network 10.168.93.192 255.255.255.192
R7(dhcp-config)#de
R7(dhcp-config)#default-router 10.168.93.193
R7(dhcp-config)#dns
R7(dhcp-config)#dns-server 10.10.10.10
R7(dhcp-config)#
R7(dhcp-config)#exit
R7(config)#acce
R7(config)#access-list 1 deny 10.168.92.64 0.0.0.63
R7(config)#acc
R7(config)#access-list 1 permit any
R7(config)#int fa0/0
R7(config-if)#ip acc
R7(config-if)#ip access-group 1 out
R7(config-if)#
```



- 
- The diagram illustrates a complex network topology within a building, organized by floor:
- Root Network:** 10.168.92.0/22. Subnets include 10.168.92.128/26 (Second Floor), 10.168.92.192/26 (Third Floor), and 10.168.93.0/26 (Forth Floor).
  - Third Floor (MCT Lab-2):** Contains PC-PT 12, 14, 15, 16, and Switch-PT. Connected to the 10.168.92.192/26 subnet.
  - Second Floor (MCT Lab-1):** Contains PC-PT 9, 10, and Switch-PT. Connected to the 10.168.92.128/26 subnet.
  - Forth Floor (SWE Lab-1):** Contains PC-PT 13, 15, and Switch-PT. Connected to the 10.168.93.0/26 subnet.
  - Forth Floor (SWE Lab-2):** Contains PC-PT 0, 1, 2, and Switch-PT. Connected to the 10.168.93.0/26 subnet.
  - Fifth Floor (SWE Lab-3):** Contains PC-PT 3, 5, and Switch-PT. Connected to the 10.168.93.128/26 subnet.
  - Sixth Floor (SWE Apollo Lab):** Contains PC-PT 6, 7, 8, and Switch-PT. Connected to the 10.168.93.192/26 subnet.
  - Other Components:** Includes a Wireless Router Big lounge (WRT300N) and a Laptop-PT.
- The interface shows the 'Logical' view of the network, with a toolbar at the top and a status bar at the bottom indicating 'Time: 76:06:57' and 'Realtime Simulation' mode.



- Next, we send a packet from PC9 to PC8. We observe the activity for the network In the **Simulation mode**. Here, we see **ACL actually filters the traffic & follow the deny rules from the First Floor to the Apollo Lab**

Cisco Packet Tracer - C:\Users\Sakib\Desktop\171-35-2025,171-35-2023\_Lab Project.pkt

File Edit Options View Tools Extensions Help

Logical Physical x 894, y: 184 [Root] 07:19:00

Simulation Panel

Event List

Vis	Time(sec)	Last Device	At Device	Type
	0.000	--	PC9	ICMP
	0.001	PC9	Switch3	ICMP
	0.002	Switch3	R1	ICMP
	0.003	R1	R7	ICMP
	0.003	--	R7	ICMP
	0.004	R7	R1	ICMP
	0.005	R1	Switch3	ICMP
Visible	0.006	Switch3	PC9	ICMP

Reset Simulation ☒ Constant Delay Captured to: 0.006 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, NDP, NETFLOW, NTP, OSPF, OSPFv6, PaGP, POP3, PPP, PPPoE, PTP, RADIUS, RER, RIP, RIPng, RTP, SCCP, SMTP, SNMP, SSH, STP, SYSLOG, TACACS, TCP, TFTP, Telnet, UDP, USB, VTP

Edit Filters Show AllNone

Time: 76:09:24.309 PLAY CONTROLS

Scenario 0

New Delete

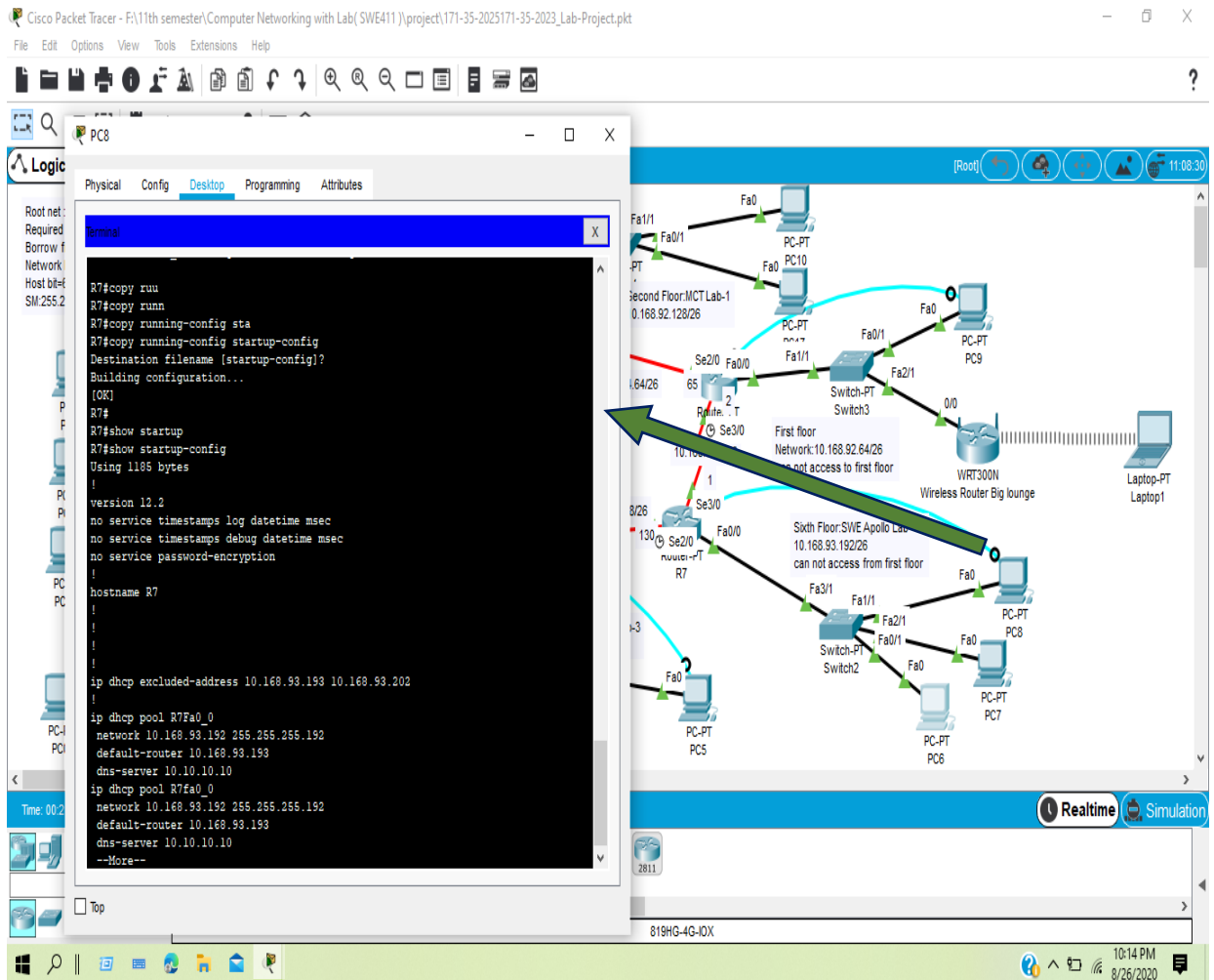
Toggle PDU List Window

Fire Last Status Source Destination Type Color Time(sec) Periodic Num Edit

Failed	PC9	PC8	ICMP	0.000	N	0	(edit)
--------	-----	-----	------	-------	---	---	--------

## Step 12: Verify Routing table and Test the network

- We use the show IP route command to verify that each router has all of the networks in the topology entered in the routing table. When we are finished with the routing configuration, return to privileged EXEC Mode and save the current configuration to NVRAM
- Now, we save the current configuration to NVRAM for R7 router with PC8



- Similarly, we save the current configuration to NVRAM for all routers

## Discussion and Conclusion:

In this project, we use the Dynamic Host Configuration Protocol (DHCP). The DHCP Server feature is a full DHCP server implementation that assigns and manages IP addresses from specified address pools within the router to DHCP clients.

Here, the router works as a DHCP server to assign and manages IP addresses. The router can also exclude IP addresses for reservations. As a result, we can fix some static IP there which is used for different DHCP Lan & also for some different purposes like server, IP camera etc. We can create multiple DHCP in a router. Router can control all of these things.

We can also extend the network with Wireless Lan or Wi-Fi. So, the cost is reduced. As DHCP server assigns dynamic IP automatically so that cost is also reduced. Because Static IP is expensive.

Moreover, we use here RIP protocols in Dynamic Routes. In this protocol, all the router advertises its own links or networks to the other routers or networks. So, if any link fails then the router easily finds the other path to go to the destination. For this reason, it can transfer data successfully.

Next, we use Standard ACL, we denied a specific network address which means it does not accept any packets from that specific network. Here, the **Apollo Lab** does not give access to the **First Floor**. So, the **First Floor** doesn't send any packet to the **Apollo Lab**.

On the other hand, the **Apollo Lab** gives permission to send all of the networks except the **First Floor**. So, the **Other Floor** has access to the **Apollo Lab**. As a result, the **Other Floor** can send packets to the **Apollo Lab** successfully.

Furthermore, we have to mind that we can't write one mode's command in any other mode. If we write one mode's command to any other mode, then it will never work. We can ignore this problem by noticing the symbol of every mode.

We always have to take any IP from the specific LAN's to configure and Subnet Mask of that PC. If we don't do it and want to take another IP address then we have to configure the PC with that IP address otherwise it won't work.

In cisco packet tracer, the ports remain off by default. For that reason, we need to on the port manually for working with the ports. We can off the port if we want even after making them on.

We can't connect or send any packet among different LAN without router and gateway. For that reason, we have to configure the router firstly. For configuring the router, IP address, Subnet Mask and Clock Rate are mandatory.



We always have to take the correct cable for providing a connection. If we do mistake by any chance then the packets won't be transmitted.

We have to save the current configuration to the startup configuration (NVRAM) at the end of the work. If any router shuts down manually or automatically then we may lose our current configuration. Then again, we have to configure.

So, we use here DHCP server as it has some benefits:

- ✓ **Reduced Internet access costs:** Using automatic IP address assignment at each remote site substantially reduces Internet access costs. Static IP addresses are considerably more expensive to purchase than are automatically allocated IP addresses.
- ✓ **Reduced client configuration tasks and costs:** Because DHCP is easy to configure, it minimizes operational overhead and costs associated with device configuration tasks and eases deployment by non-technical users.
- ✓ **Centralized management:** Because the DHCP server maintains configurations for several subnets, an administrator only needs to update a single, central server when configuration parameters change.

Besides that, we use Dynamic Routing protocol instead of Static Routing. In Dynamic Routing, all the router advertises its own links or networks to the other routers or networks. So, if any link fails or broken somehow, then the router easily finds the other path to go to the destination easily.

Moreover, we use Standard ACL. So, it is very easy to define in Routers to control access in a network. As a result, we can deny any networks & also we can permit any networks very easily.