

**COMPUTER & DATA NETWORKS**  
**SELF LEARNING ASSIGNMENT**  
**EC4060**

**VITHUSHIKAN V.**  
**2021/E/169**  
**GROUP EG18**  
**SEMESTER 04**  
**15 DECEMBER 2023**

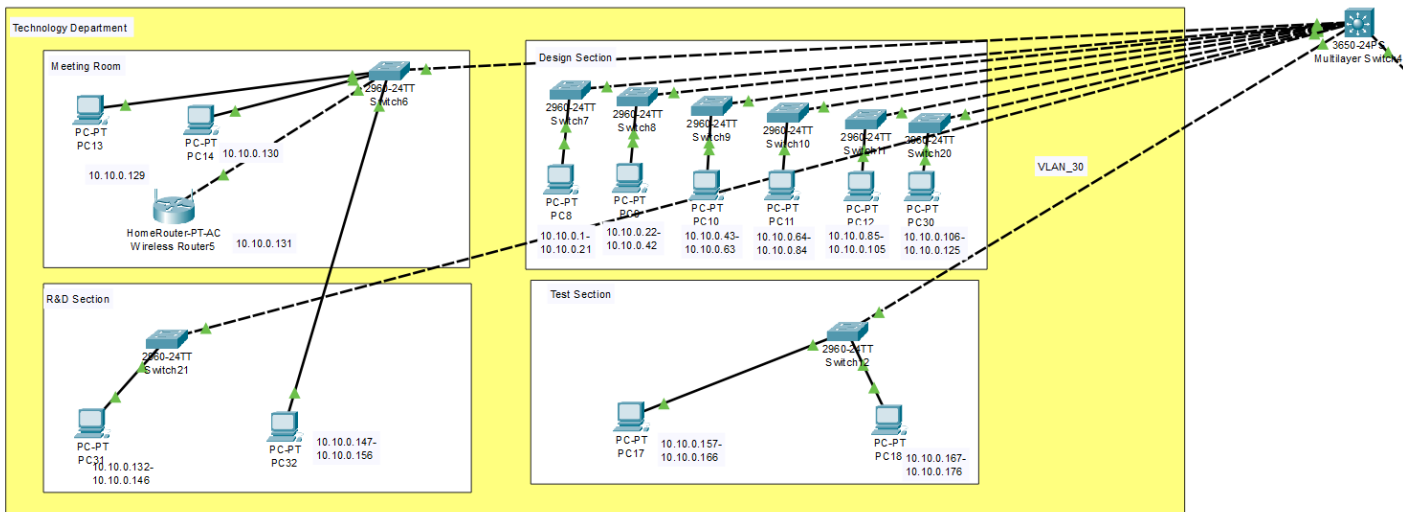
**OBJECTIVE:**

- Multinational Corporation IT company want to establish a new overseas branch in Sri Lanka  
This company newly constructed a three-story building: Length: 60 meters, Width: 30 meters, Height: each floor 4 meters.
- You are requested to design a computer network to this company building with optimum use of network IP addresses. Available IP address range is 10.10.0.0/16.
- You should submit a report with the following details:
  - Network diagram (subnets and VLANs – provide IP addresses for each of them)
  - Write the steps on how to configure Routers and switches.
  - Wi-Fi Access points configuration details

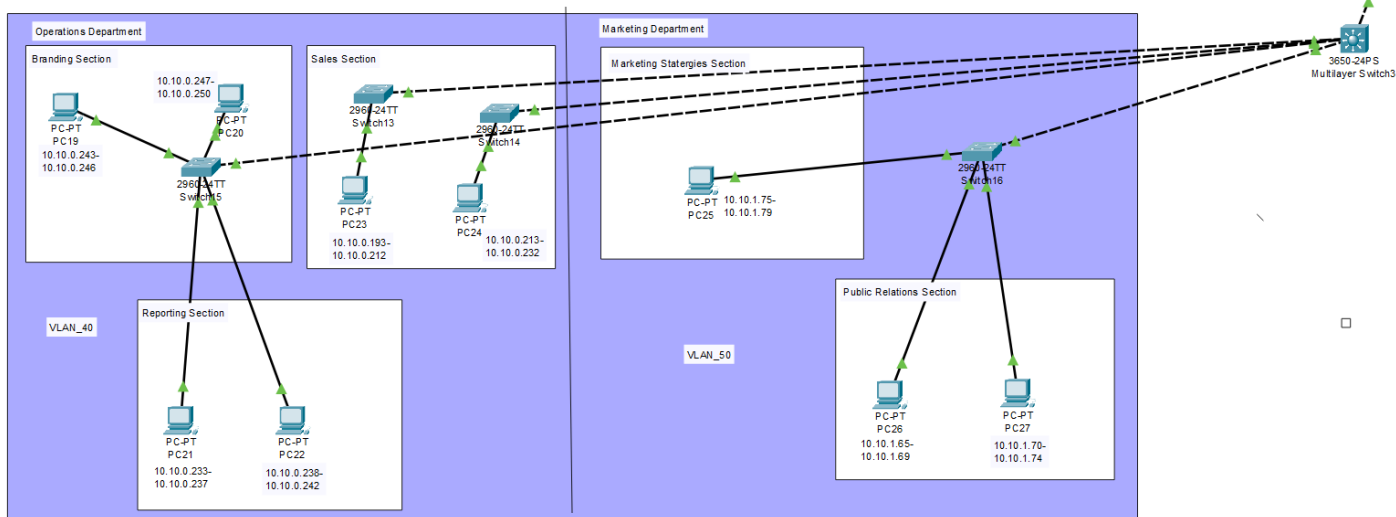
**DIAGRAM PLAN:**

FLOOR	OFFICE/DEPARTMENT	SECTIONS	DATA POINTS	WIFI
1	Management Office	CEO office	1	1
		Staff office	1	1
		Board Room	2	1
		Lobby Area		1
		Printing Room	2	
	Admin	Finance Section	15	
		Human Resource	25	
		Assistant Section	10	
		Printing Room	2	
2	Technology	Meeting Room	2	1
		R&D Section	25	
		Design Section	125	
		Test Section	20	
3	Operations	Branding Room	8	
		Reporting Room	10	
		Sales Section	40	
	Marketing	Marketing Strategies	5	
		Public Relations section	10	

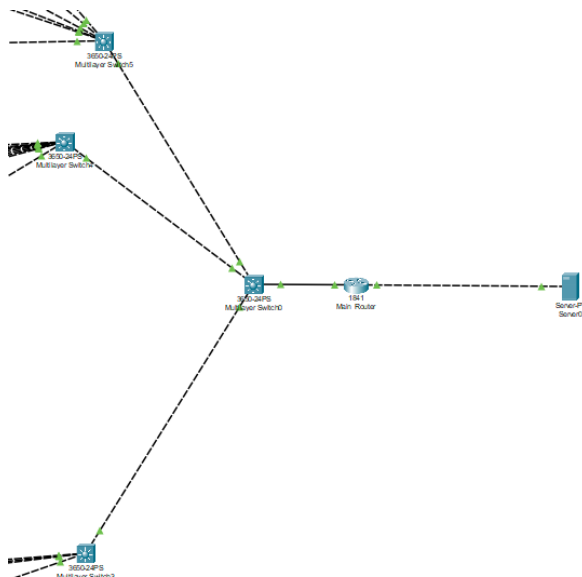




## FLOOR 2: TECHNOLOGY DEPARTMENT



## FLOOR 3: OPERATION DEPARTMENT, MARKETING DEPARTMENT



**MAIN CONNECTION: MULTILAYER SWITCHES TO MAIN MULTILAYER SWITCH.**

**MAIN MULTILAYER SWITCH TO ROUTER**

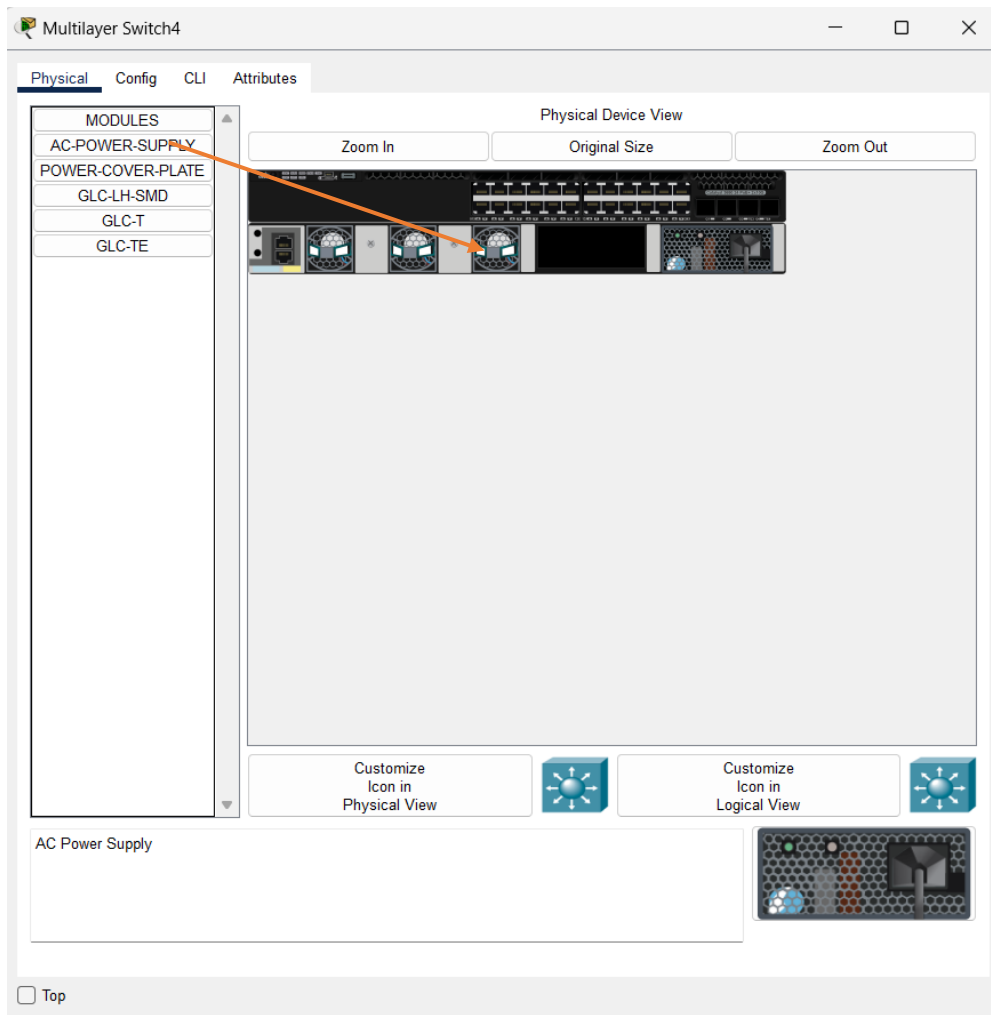
**ROUTER TO SERVER**

**SUBNETTING AND VLAN DETAILS**

NAME	SIZE	ALLOCATED SIZE	CID R	SUBNET MASK	NETWOR K ADDRESS	RANGE	BROADCASTY
TECHNOLOGY	125	126	/25	255.255.255.128	10.10.0.0	10.10.0.1- 10.10.0.125	10.10.0.127
	48	62	/26	255.255.255.192	10.10.0.128	10.10.0.129- 10.10.0.176	10.10.0.191
OPERATIONS DEPARTMENT	58	62	/26	255.255.255.192	10.10.0.192	10.10.0.193- 10.10.0.250	10.10.0.255
ADMIN DEPARTMENT	52	62	/26	255.255.255.192	10.10.1.0	10.10.1.1- 10.10.1.52	10.10.1.63
MARKETING DEPARTMENT	15	30	/27	255.255.255.224	10.10.1.64	10.10.1.65- 10.10.1.79	10.10.1.95
MANGEMENT OFFICE	8	14	/28	255.255.255.240	10.10.1.96	10.10.1.97- 10.10.1.105	10.10.1.111
LOBBY	1	2	/30	255.255.255.252	10.10.1.112	10.10.1.113	10.10.1.115

<b>VLAN NO</b>	<b>OFFICE/DEPARTMENT</b>	<b>VLAN NAME</b>	<b>SIZE</b>	<b>RANGE</b>
10	Management Office	CEO office	2	10.10.1.100-10.10.1.101
		Staff office	2	10.10.1.102-10.10.1.103
		Board Room	3	10.10.1.97-10.10.1.99
		Printing Room	2	10.10.1.104-10.10.1.105
20	Admin	Finance Section	15	10.10.1.26-10.10.1.40
		Human Resource	25	10.10.1.1-10.10.1.25
		Assistant Section	10	10.10.1.41-10.10.1.50
		Printing Room	2	10.10.1.51-10.10.1.52
30	Technology	Meeting Room	3	10.10.0.129-10.10.0.131
		R&D Section	25	10.10.0.132-10.10.0.156
		Design Section	125	10.10.0.1-10.10.0.125
		Test Section	20	10.10.0.157-10.10.0.176
40	Operations	Branding Room	8	10.10.0.243-10.10.0.250
		Reporting Room	10	10.10.0.233-10.10.0.242
		Sales Section	40	10.10.0.193-10.10.0.232
50	Marketing	Marketing Strategies	5	10.10.1.75-10.10.1.79
		Public Relations Section	10	10.10.1.65-10.10.1.74
60	Management Office	Lobby	1	10.10.1.113

## Turn on Multilayer Switch



## MULTILAYER SWITCH AND VLAN SWITCH CONNECTING POINT CONFIGURATION

```
Switch>enable
Switch#
Switch#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Switch(config)#router rip
IP routing not enabled
Switch(config)#
%LINK-3-UPDOWN: Interface GigabitEthernet1/0/3, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/3, changed state to down

%LINK-5-CHANGED: Interface GigabitEthernet1/0/3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/3, changed state to up

%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet1/0/2 (1), with Switch FastEthernet0/10 (10).

%LINK-3-UPDOWN: Interface GigabitEthernet1/0/3, changed state to down

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/3, changed state to down

%LINK-5-CHANGED: Interface GigabitEthernet1/0/3, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet1/0/3, changed state to up

Switch(config)#interface GigabitEthernet1/0/1
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface GigabitEthernet1/0/2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface GigabitEthernet1/0/3
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface GigabitEthernet1/0/4
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface GigabitEthernet1/0/3
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface GigabitEthernet1/0/2
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface GigabitEthernet1/0/4
Switch(config-if)#
%CDP-4-NATIVE_VLAN_MISMATCH: Native VLAN mismatch discovered on GigabitEthernet1/0/2 (1), with Switch FastEthernet0/10 (10).
```

## ROUTER CONFIGURATION

```
Router>enable
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#hostname Main_Router
Main_Router(config)#line console 0
Main_Router(config-line)#password Connect_123
Main_Router(config-line)#login
Main_Router(config-line)#exit
Main_Router(config)#vty 0 4
      ^
% Invalid input detected at '^' marker.

Main_Router(config)#line vty 0 4
Main_Router(config-line)#password Connect_123
Main_Router(config-line)#login
Main_Router(config-line)#exit
Main_Router(config)#enable secret Main_Router
Main_Router(config)#banner motd "Main Router, No unauthorized login!"
Main_Router(config)#exit
Main_Router#
%SYS-5-CONFIG_I: Configured from console by console
```



## VLAN CONFIGURATION

Switch2

Physical **Config** CLI Attributes

**GLOBAL**

Settings

Algorithm Settings

**SWITCHING**

VLAN Database

**INTERFACE**

VLAN Configuration

VLAN Number 10

VLAN Name VLAN10

Add Remove

VLAN No VLAN Name

Switch2

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

FastEthernet0/3

Port Status ☒ On

Bandwidth ☐ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

Access

VLAN 10

Tx Ring Limit

10

1:default

10:VLAN10

1002:fdi-default

```

%LINK-5-CHANGED: Interface FastEthernet0/10, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/10, changed state to up

Switch>enable
Switch#
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface FastEthernet0/3
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#interface FastEthernet0/3
Switch(config-if)#
Switch(config-if)#exit
Switch(config)#
Switch(config)#vlan 10
Switch(config-vlan)# name VLAN10
Switch(config-vlan)#
Switch(config-vlan)#end
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#interface FastEthernet0/3
Switch(config-if)#
%SYS-5-CONFIG_I: Configured from console by console

Switch(config-if)#
Switch(config-if)#switchport access vlan 10
Switch(config-if)#

```

### CONFIGURING FAST0/3 PORT TO VLAN10

```

Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#write memory
Building configuration...
[OK]
Switch#show vlan

```

VLAN	Name	Status	Ports
1	default	active	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	VLAN10	active	Fa0/1, Fa0/2, Fa0/3, Fa0/4 Fa0/5, Fa0/6, Fa0/7, Fa0/8 Fa0/9
1002	fddi-default	active	
1003	token-ring-default	active	
1004	fddinet-default	active	
1005	trnet-default	active	

VLAN	Type	SAID	MTU	Parent	RingNo	BridgeNo	Stp	BrdgMode	Trans1	Trans2
1	enet	100001	1500	-	-	-	-	-	0	0
10	enet	100010	1500	-	-	-	-	-	0	0
1002	fddi	101002	1500	-	-	-	-	-	0	0
1003	tr	101003	1500	-	-	-	-	-	0	0
1004	fdnet	101004	1500	-	-	-	ieee	-	0	0

```

--More--

```

IN VLAN10 ALL PORTS ARE CONNECTED TO VLAN10

CEO\_PC1

Physical **Config** Desktop Programming Attributes

**GLOBAL**

Settings

Algorithm Settings

**INTERFACE**

FastEthernet0

Bluetooth

Global Settings

Display Name CEO\_PC1

Interfaces FastEthernet0

Gateway/DNS IPv4

☐ DHCP

☒ Static

Default Gateway 10.10.1.106

DNS Server

Gateway/DNS IPv6

☐ Automatic

☒ Static

Default Gateway

DNS Server

### A PC IN THE CEO'S OFFICE: ASSIGNING DEFAULT GATEWAY

CEO\_PC1

Physical **Config** Desktop Programming Attributes

**GLOBAL**

Settings

Algorithm Settings

**INTERFACE**

FastEthernet0

Bluetooth

FastEthernet0

Port Status ☒ On

Bandwidth ☒ 100 Mbps ☐ 10 Mbps ☒ Auto

Duplex ☐ Half Duplex ☒ Full Duplex ☒ Auto

MAC Address 0001.4204.E646

IP Configuration

☐ DHCP

☒ Static

IPv4 Address 10.10.1.100

Subnet Mask 255.255.255.240

IPv6 Configuration

☐ Automatic

☒ Static

IPv6 Address

Link Local Address: FE80::201:42FF:FE04:E646

CEO\_PC1

Physical

Config

Desktop

Programming

Attributes

IP Configuration

X

Interface

FastEthernet0

IP Configuration

DHCP

Static

IPv4 Address

10.10.1.100

Subnet Mask

255.255.255.240

Default Gateway

10.10.1.106

DNS Server

0.0.0.0

IPv6 Configuration

Automatic

Static

IPv6 Address

/

Link Local Address

FE80::201:42FF:FE04:E646

Default Gateway

DNS Server

802.1X

Use 802.1X Security

Authentication

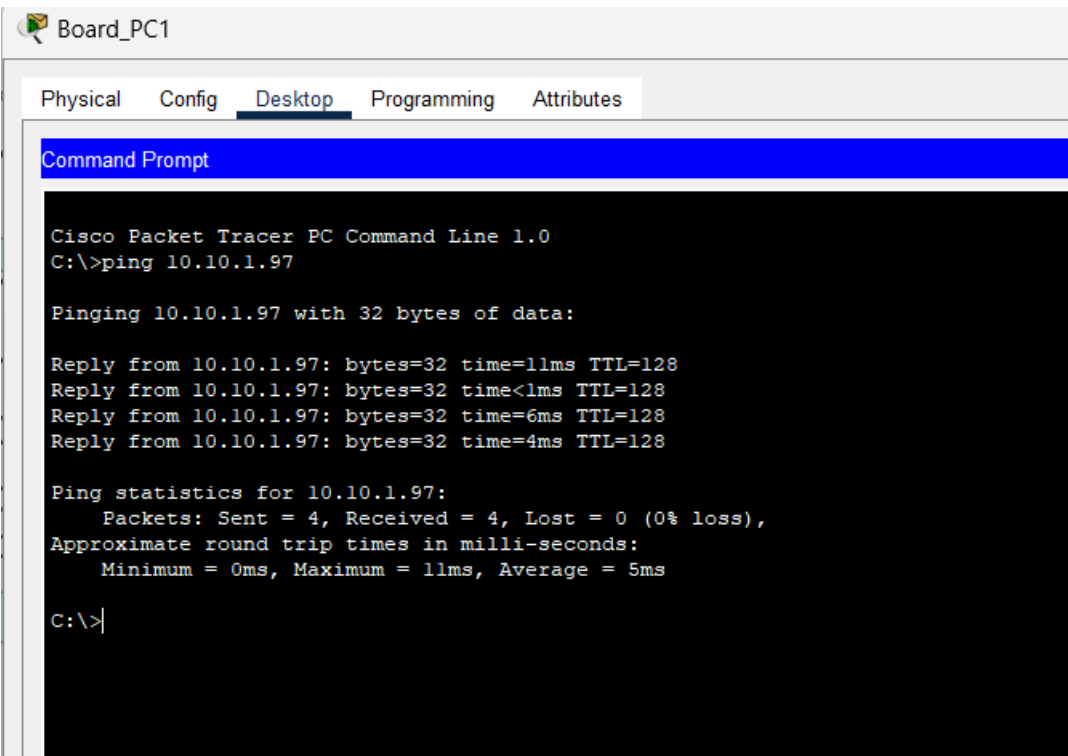
MD5

Username

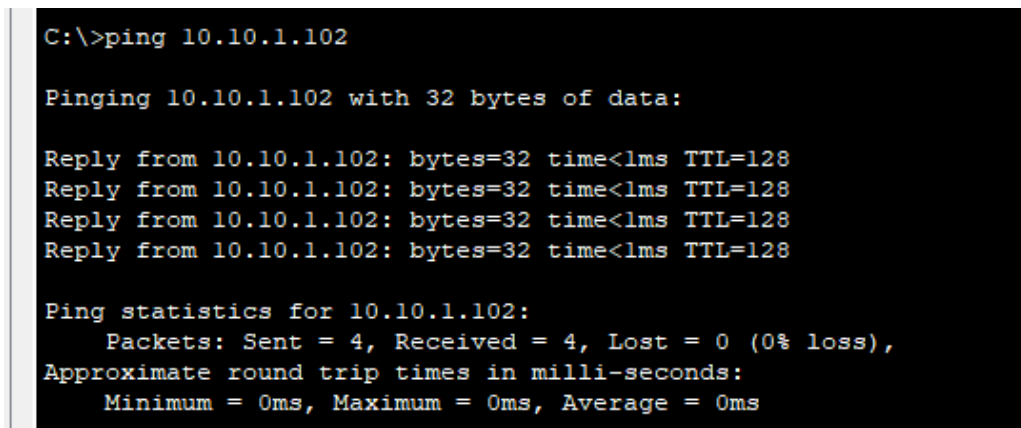
Password

Top

## A PC IN THE DIRECTORS OFFICE: ASSIGNING IP ADDRESS & SUBNET



**A PC IN THE DIRECTOR'S OFFICE: VERIFYING CONNECTION BY PINGING THE SAME PC**



**A PC IN THE COMPUTER LAB 1: VERIFYING CONNECTION BY PINGING OTHER PC**

## PRINTER

The screenshot shows a window titled 'Management\_Printer1' with three tabs: 'Physical', 'Config', and 'Attributes'. The 'Config' tab is active. On the left, there is a sidebar with a tree view containing 'GLOBAL' (with a sub-item 'Settings') and 'INTERFACE' (with a sub-item 'FastEthernet0'). The main area displays the configuration for 'FastEthernet0'. It includes fields for 'Port Status' (set to 'On'), 'Bandwidth' (set to '100 Mbps'), 'Duplex' (set to 'Full Duplex'), and 'MAC Address' (set to '0002.1699.8957'). Below these are sections for 'IP Configuration' and 'IPv6 Configuration'. In the 'IP Configuration' section, 'Static' is selected, with 'IPv4 Address' set to '10.10.1.104' and 'Subnet Mask' set to '255.255.255.240'. In the 'IPv6 Configuration' section, 'Static' is selected, with 'IPv6 Address' set to 'FE80::202:16FF:FE99:8957' and 'Link Local Address' set to 'FE80::202:16FF:FE99:8957'.

### A PRINTER IN THE PRINTING OFFICE: BASE CONFIGURATION

```
C:\>ping 10.10.1.104

Pinging 10.10.1.104 with 32 bytes of data:

Reply from 10.10.1.104: bytes=32 time<1ms TTL=128
Reply from 10.10.1.104: bytes=32 time<1ms TTL=128
Reply from 10.10.1.104: bytes=32 time<1ms TTL=128
Reply from 10.10.1.104: bytes=32 time=11ms TTL=128

Ping statistics for 10.10.1.104:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 11ms, Average = 2ms

C:\>
```

```
C:\>ping 10.10.1.52

Pinging 10.10.1.52 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.10.1.52:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

**Printers available at the admin department can't access by the other department.**

```
Cisco Packet Tracer PC Command Line 1.0
C:\>ping 10.10.1.104

Pinging 10.10.1.104 with 32 bytes of data:

Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.10.1.104:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\>
```

**Printer available at the management office printing room can't access by any other departments.**

## WIRELESS ROUTER CONFIGURATION

Lobby\_WiFi

Physical **Config** GUI Attributes

**GLOBAL**

Settings

Algorithm Settings

**INTERFACE**

Internet

**LAN**

Wireless 2.4G

Wireless 5G(1)

Wireless 5G(2)

Wireless Guest 2.4G

Wireless Guest 5G(1)

Wireless Guest 5G(2)

**LAN Settings**

IP Configuration

IPv4 Address: 10.10.1.113

Subnet Mask: 255.255.255.252

Lobby\_WiFi

Physical Config **GUI** Attributes

**Setup**

Setup Wireless Security Access Restrictions Applications & Gaming Administration

Basic Setup DDNS MAC Address Clone Advanced Router

**Internet Setup**

Internet Connection type: Automatic Configuration - DHCP

Optional Settings (required by some internet service providers)

Host Name:

Domain Name:

MTU: Size: 1500

**Network Setup**

Router IP

IP Address: 10 . 10 . 1 . 113

Subnet Mask: 255.255.255.248

DHCP Server Settings

DHCP Server: ☒ Enabled ☐ Disabled

DHCP Reservation

Start IP Address: 10.10.1. 113

Maximum number of Users: 1

IP Address Range: 10.10.1. 113 - 113

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

**ISP Vlans**



Lobby\_WiFi

Physical

Config

GUI

Attributes

GLOBAL

Settings

Algorithm Settings

INTERFACE

Internet

LAN

Wireless 2.4G

Wireless 5G(1)

Wireless 5G(2)

Wireless Guest 2.4G

Wireless Guest 5G(1)

Wireless Guest 5G(2)

Wireless 2.4G Settings

SSIDDefault

2.4 GHz Channel6 - 2.437GHz

Coverage Range (meters)250.00

Authentication

☐ Disabled

☒ WEP

☐ WPA-PSK

☐ WPA

☐ WPA2-PSK

☐ WPA2

WEP Key9999999999

PSK Pass Phrase

RADIUS Server Settings

IP Address

Shared Secret

Encryption Type40/64-Bits (10 Hex digits)

**ASSIGN WEP KEY FOR WIFI CONNECTION**

## LAPTOP WIFI CONFIGURATION

Laptop0

Physical Config Desktop Programming Attributes

Physical Device View

Zoom In Original Size Zoom Out

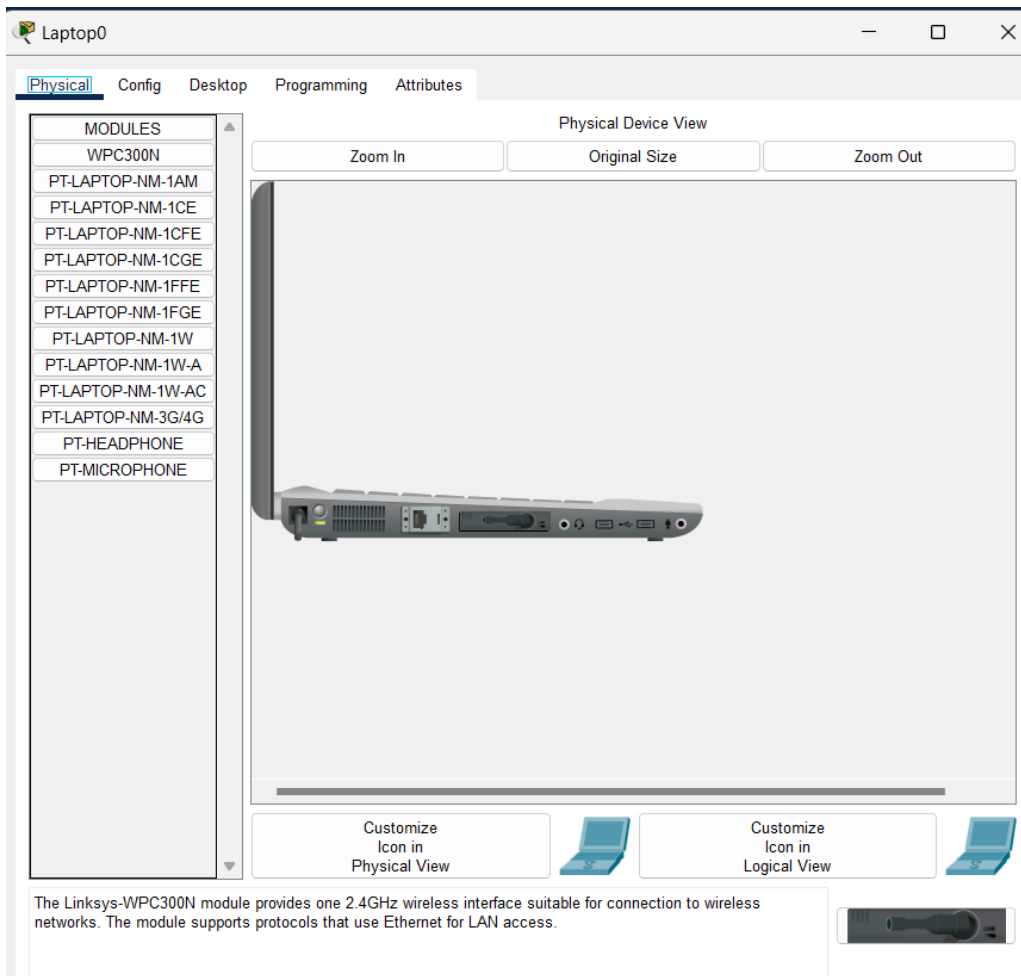
MODULES

- 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.

Customize Icon in Physical View

Customize Icon in Logical View



Link Information Connect Profiles

More Information Infrastructure Mode

2.4GHz

You have successfully connected to the access point

Signal Strength Link Quality Adapter is Active

Wireless-N Notebook Adapter Wireless Network Monitor v1.0 Model No. WPC300N



WEP Key Needed for Connection

This wireless network has WEP encryption enabled. To connect to this network, select the level of WEP encryption. Enter the required passphrase or WEP key in the appropriate field below. Then click the **Connect**.

Security

WEP

Please select the wireless security method used by your existing wireless network.

WEP

64-bit

To use WEP encryption, select 64-bit or 128-bit

Passphrase

The Passphrase is case-sensitive and should be no more than 16 characters in length.

WEP Key 1

9999999999

When entering this manually, it should be 10 characters for 64-bit encryption or 26 characters for 128-bit encryption. Valid hexadecimal characters are "A" through "F" and numbers "0" through "9".

Cancel

Connect

Active

Wireless-N Notebook Adapter

Wireless Network Monitor v1.0

Model No. WPC300N

The diagram illustrates a network setup within a 'Lobby Area' (VLAN\_60). A laptop, labeled 'Laptop-PT Laptop0', is connected via a dashed line to a 'HomeRouter-PTAC Lobby WiFi'. The IP address '10.10.1.113' is shown at the bottom of the connection line.

