

# VxLEARN Networks

Networking & Cybersecurity Track  
Simulated Employment Program

## **Lab Report: Create a LAN**

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Date: 14 November 2025

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## 1. Introduction

In this lab, I created a local area network (LAN) for a new branch office using Cisco Packet Tracer.

The goal was to connect all network devices, configure IPv4 addressing, verify connectivity to both local and remote resources, and demonstrate understanding of key networking commands.

This lab simulates a realistic office setup where the router provides DHCP, a switch connects local hosts, and a web server represents an external internet service.

## 2. Network Topology (Before Configuration)

Device	Interface	IPV4 Address	Subnet Mask	Function
Admin PC	NIC	DHCP	----	Receives IP dynamically
Manager PC	NIC	DHCP	----	Receives IP dynamically
Printer	NIC	192.168.1.100	255.255.255.0	Static local device
Office Router	G0/0 → ISP1	-----	----	Internet connection
Office Router	G0/1 → Switch	-----	----	LAN connection
Web Server	NIC	209.165.200.225	----	External internet server

The LAN's IPv4 network is 192.168.1.0/24, with the router's default gateway as 192.168.1.1.

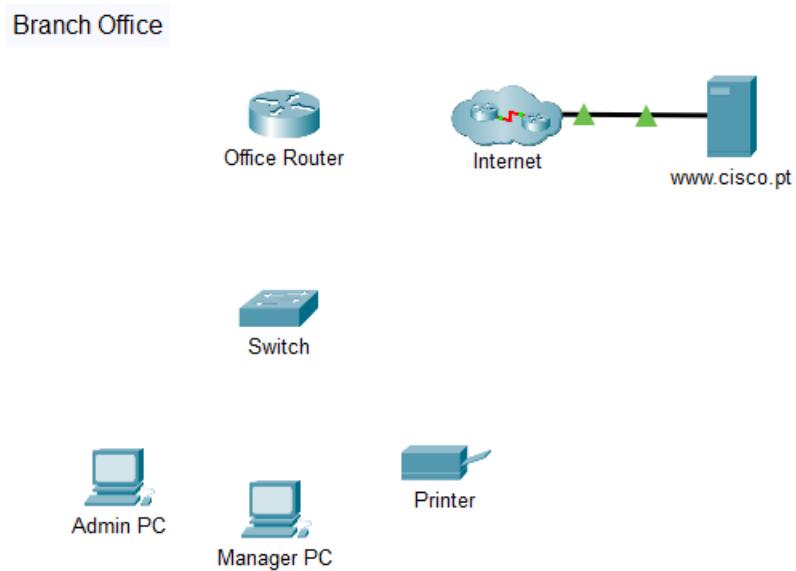
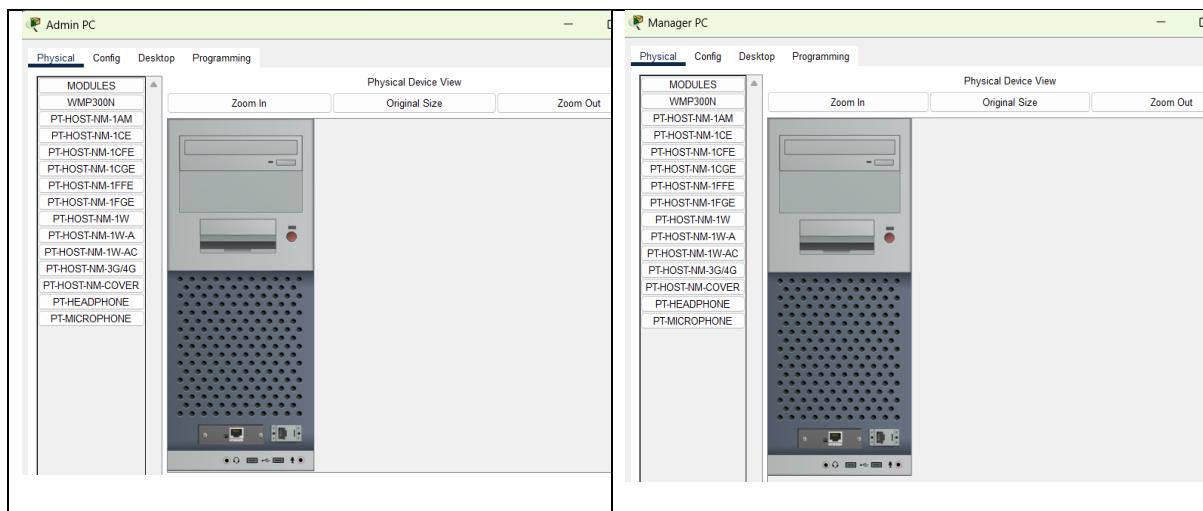


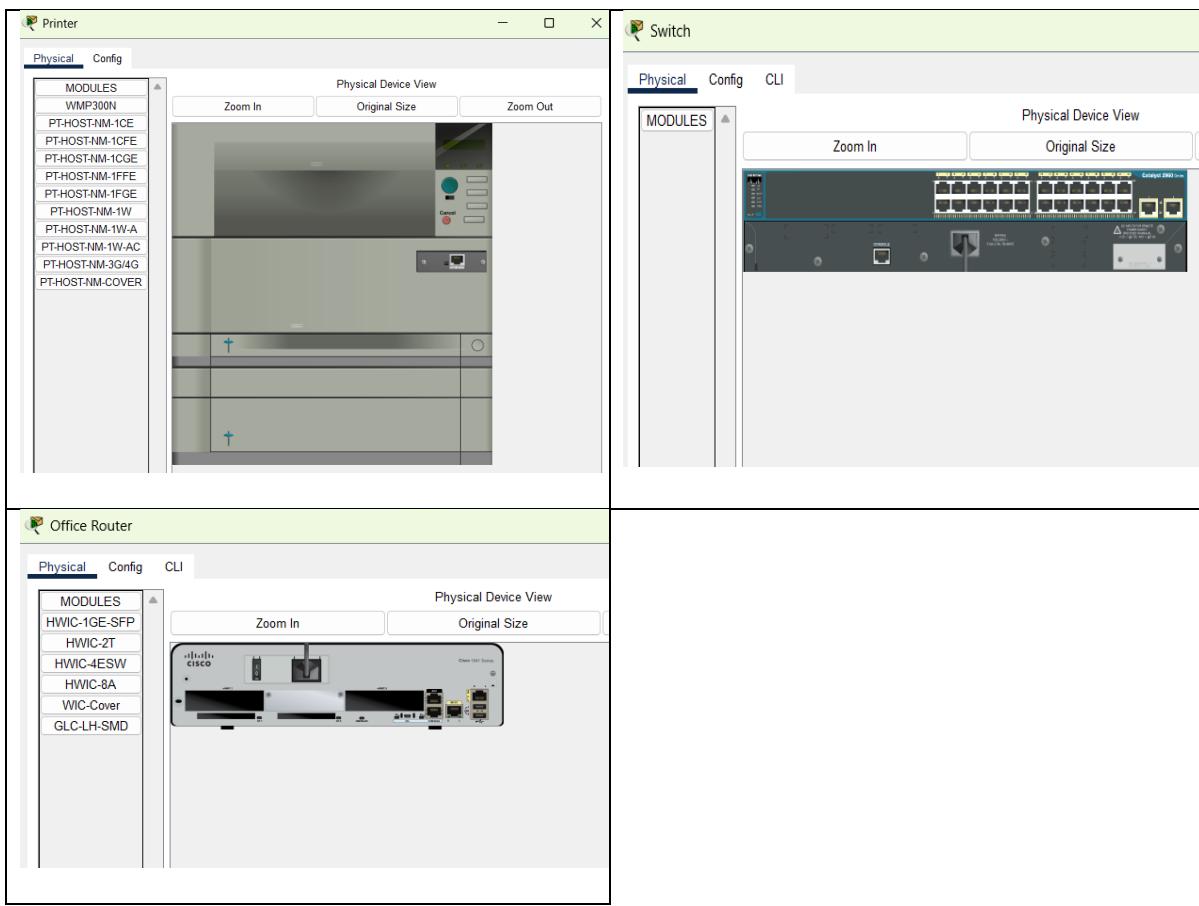
Figure 1: Initial Packet Tracer layout showing all end devices and network equipment before setup.

### 3. Part 1: Connect Network Devices and Hosts

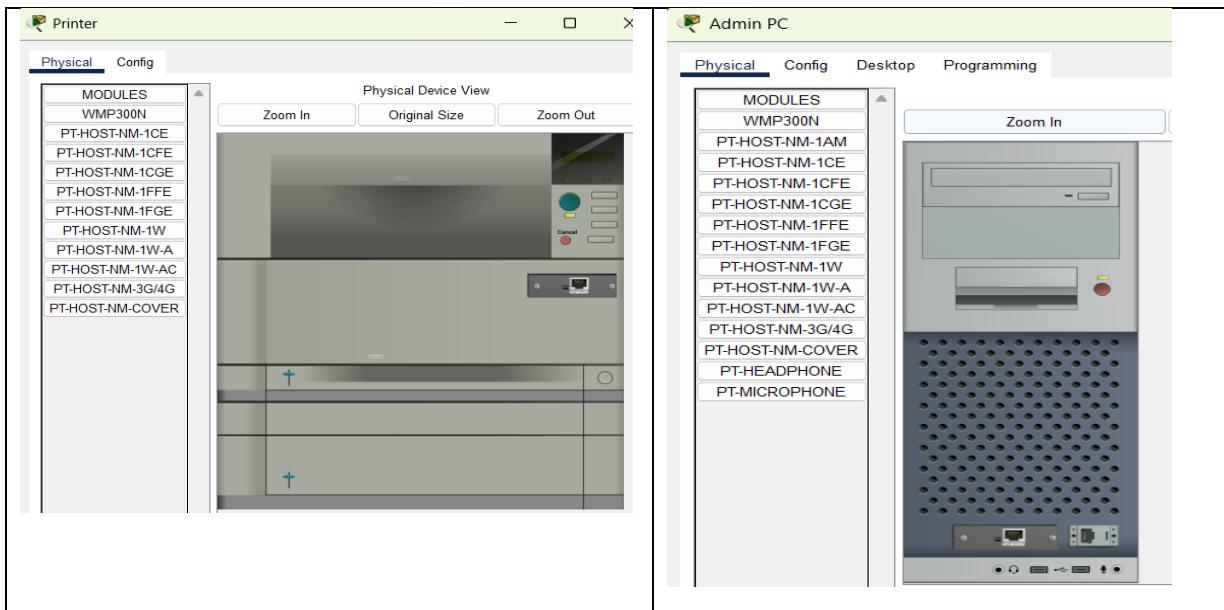
#### Step 1: Powering on the Devices

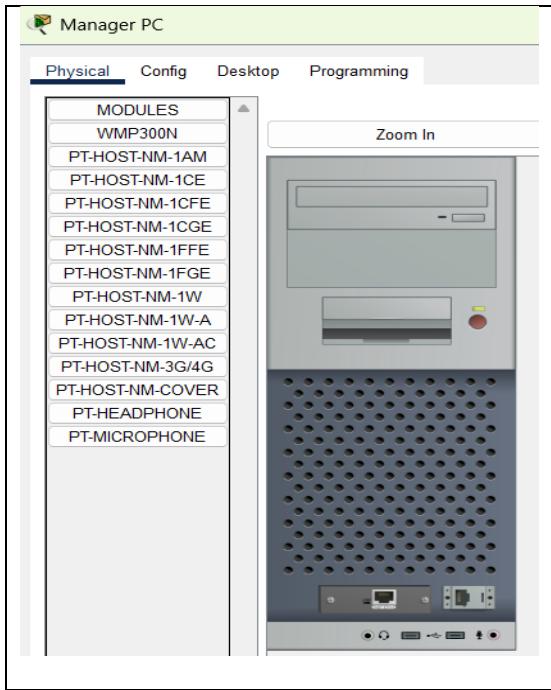
1. Click each device → Physical Tab.





2. Toggle the power switch ON.
3. The green light indicator confirms each device is active.

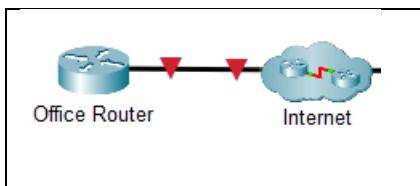


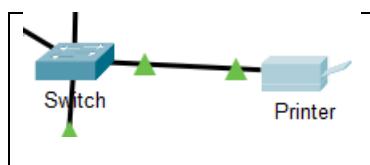
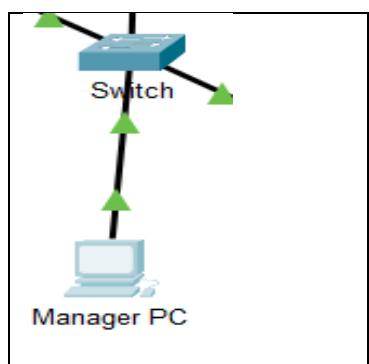
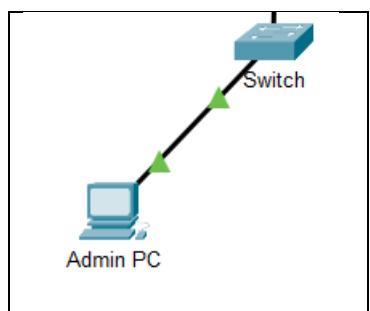
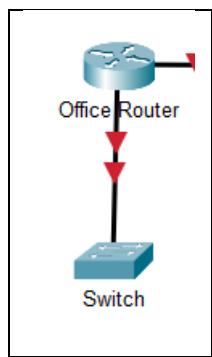


## Step 2: Connecting Devices with Correct Cables

From Device	Interface	To Device	Interface	Cable Type
Office Router	G0/0	ISP1	G0/0	Copper Straight-Through
Office Router	G0/1	Switch	G0/1	Copper Straight-Through
Admin PC	NIC (F0)	Switch	F0/1	Copper Straight-Through
Manager PC	NIC (F0)	Switch	F0/2	Copper Straight-Through
Printer	NIC (F0)	Switch	F0/24	Copper Straight-Through

After all connections were made, I waited a few seconds for **green link lights** to appear, confirming physical connectivity.





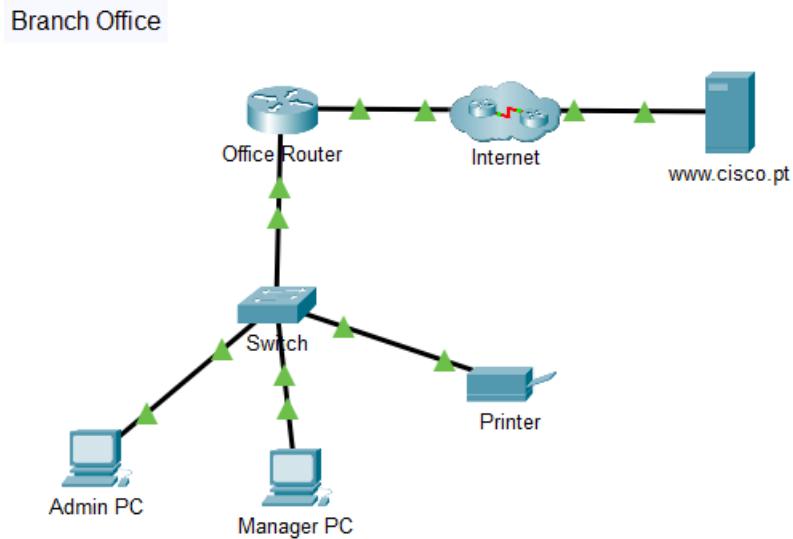


Figure 2: All devices connected to their correct interfaces. Green link lights confirm active connections.

#### 4. Part 2: Configure Devices with IPv4 Addressing

Step 1: Enable DHCP on PCs

1. Click Admin PC → Desktop Tab → IP Configuration → DHCP  
→ Wait until it displays an IP such as:

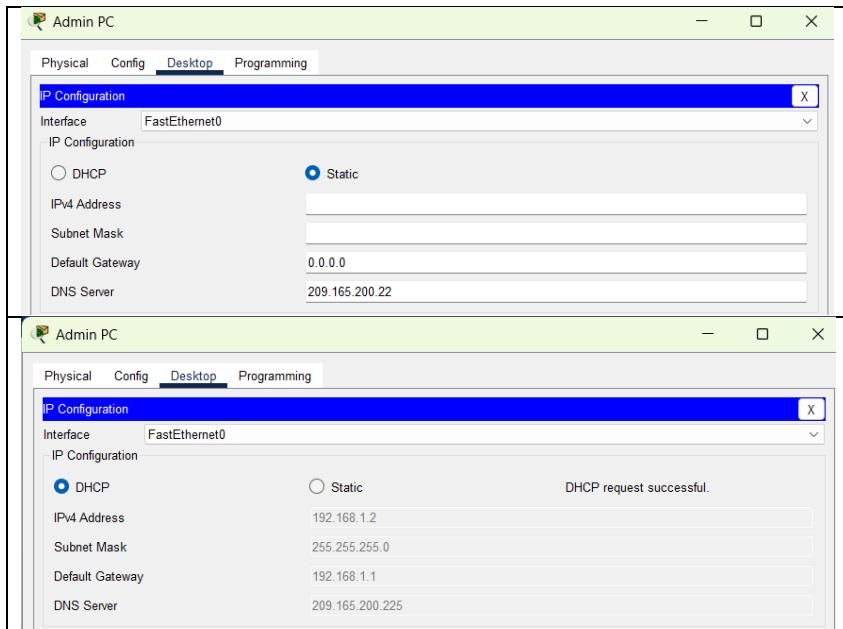
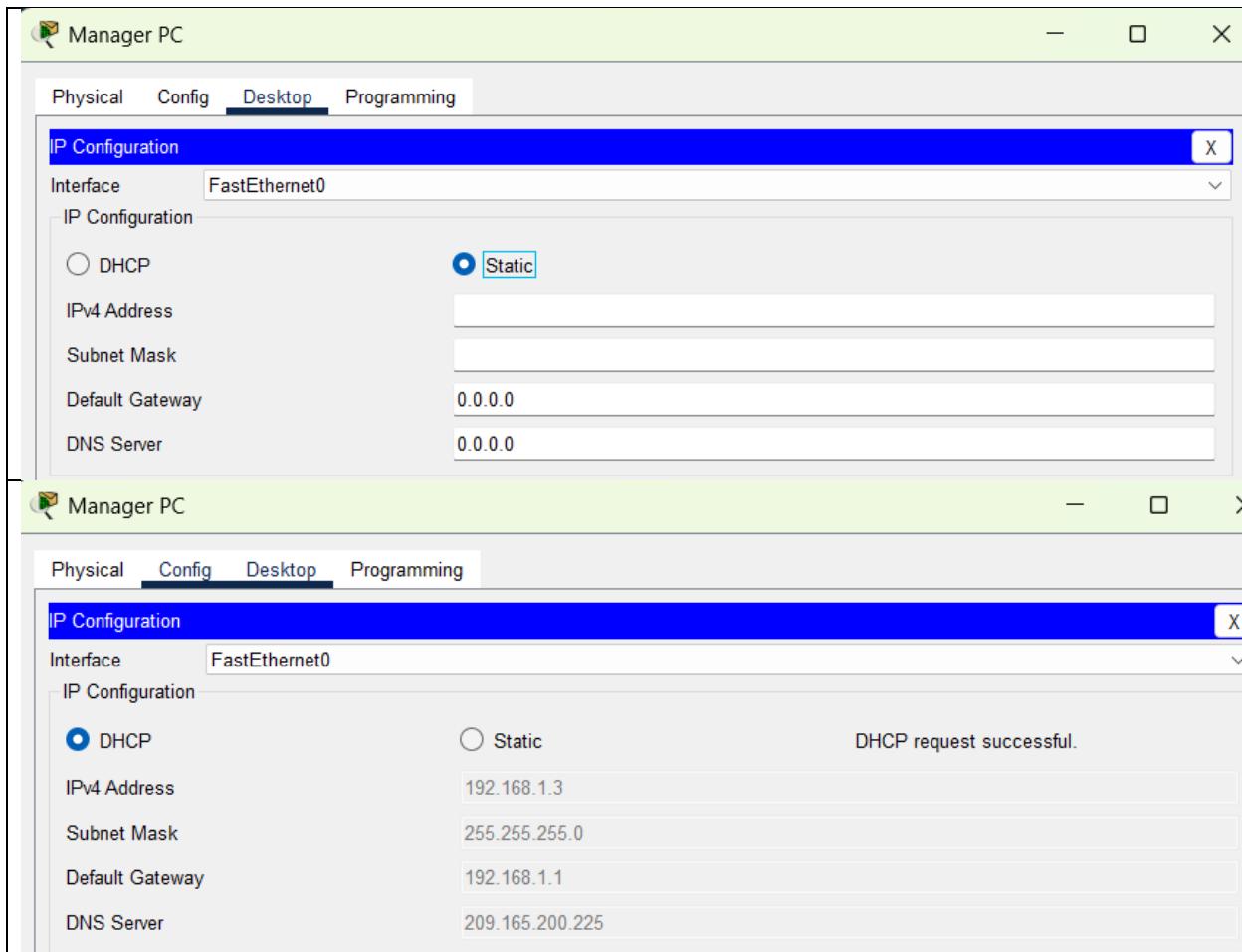


Figure 3: Admin PC automatically receiving an IP address via DHCP.

2. Repeat for **Manager PC** (will get a similar IP like 192.168.1.3).



The router's DHCP service assigns each PC an IP automatically. The subnet mask and gateway remain identical across hosts because they belong to the same network.

## Step 2: Configure Static IP for Printer

1. Open Printer → Config Tab → FastEthernet0
2. Enter:

- IP Address: 192.168.1.100
- Subnet Mask: 255.255.255.0



Figure 4: Printer manually assigned IP address 192.168.1.100

Printers use static IPs so users can always reach them using the same address. DHCP isn't used for network-critical devices.

Question 1: Why are the IPs different, but subnet masks and gateways the same?

Because each host must have a **unique IP** within the same subnet to avoid conflicts, but they share the **same subnet mask and default gateway**, which define their common network and exit point.

Question 2: What gateway would the printer use if needed?

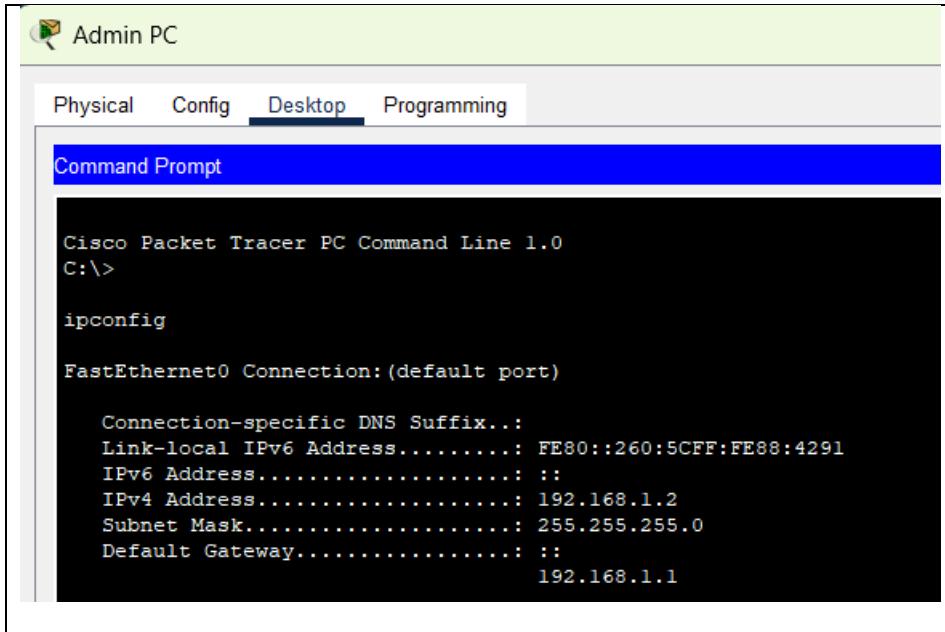
It would use **192.168.1.1**, the Office Router's LAN interface.

You can verify this by running `ipconfig` on a PC and checking its **Default Gateway** value.

## 5. Part 3: Verify Device Configuration and Connectivity

### Step 1: Verify IP Configuration

- On **Admin PC**: open Command Prompt → ipconfig



The screenshot shows the Cisco Packet Tracer interface with the title bar "Admin PC". Below it is a menu bar with tabs: Physical, Config, Desktop (which is selected), and Programming. A blue header bar says "Command Prompt". The main window displays the command line output:

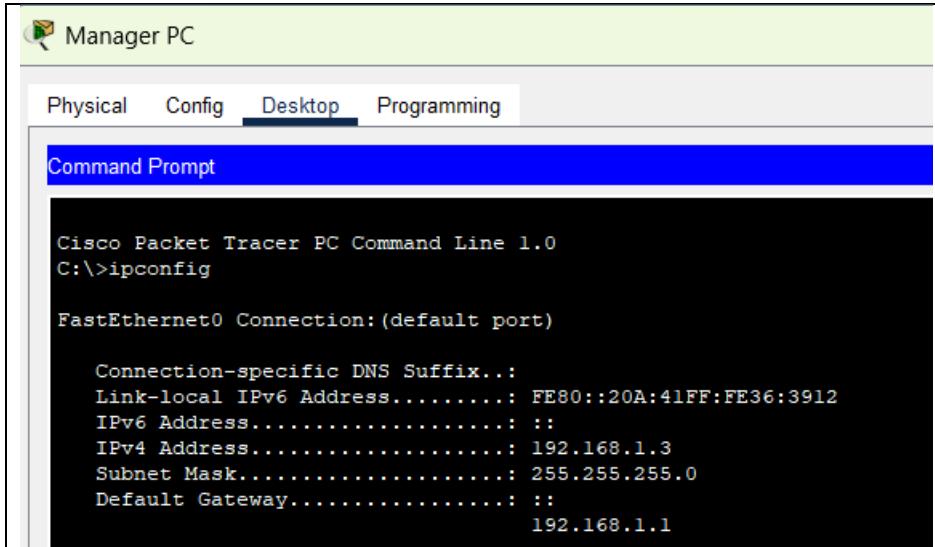
```
Cisco Packet Tracer PC Command Line 1.0
C:\>

ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address.....: FE80::260:5CFF:FE88:4291
    IPv6 Address.....: ::
    IPv4 Address.....: 192.168.1.2
    Subnet Mask.....: 255.255.255.0
    Default Gateway.....: ::
                           192.168.1.1
```

- Repeat on **Manager PC** and confirm similar addressing.



The screenshot shows the Cisco Packet Tracer interface with the title bar "Manager PC". Below it is a menu bar with tabs: Physical, Config, Desktop (which is selected), and Programming. A blue header bar says "Command Prompt". The main window displays the command line output:

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

FastEthernet0 Connection:(default port)

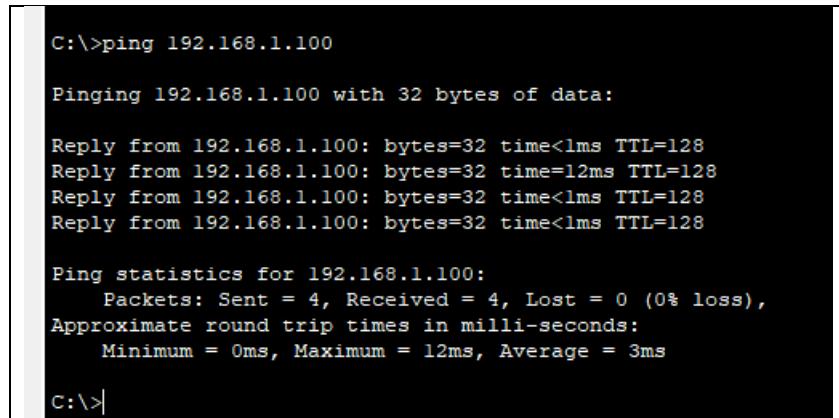
    Connection-specific DNS Suffix...:
    Link-local IPv6 Address.....: FE80::20A:41FF:FE36:3912
    IPv6 Address.....: ::
    IPv4 Address.....: 192.168.1.3
    Subnet Mask.....: 255.255.255.0
    Default Gateway.....: ::
                           192.168.1.1
```

## Step 2: Test Connectivity Within LAN

1. From **Admin PC**, run:

```
ping 192.168.1.100
```

Expect 4 successful replies (Printer reachable).



```
C:\>ping 192.168.1.100

Pinging 192.168.1.100 with 32 bytes of data:

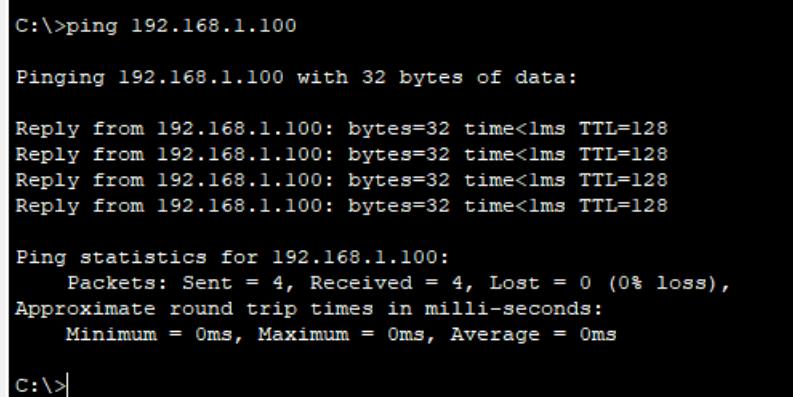
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time=12ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128
Reply from 192.168.1.100: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 12ms, Average = 3ms

C:\>
```

Figure 5: Admin PC successfully pings Printer at 192.168.1.100.

2. From **Manager PC**, repeat the same ping.



```
C:\>ping 192.168.1.100

Pinging 192.168.1.100 with 32 bytes of data:

Reply from 192.168.1.100: bytes=32 time<1ms TTL=128

Ping statistics for 192.168.1.100:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\>
```

Manager PC successfully pings Printer at 192.168.1.100.

### Step 3: Test Internet Connectivity

1. From Admin PC → **Web Browser** → type:

`http://209.165.200.225`

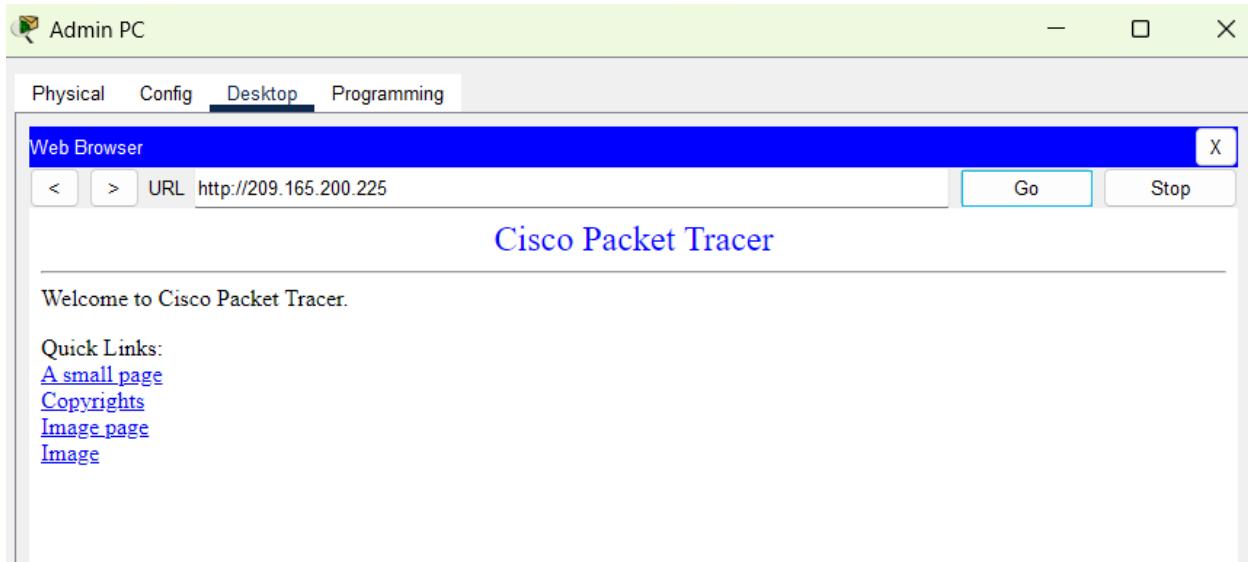
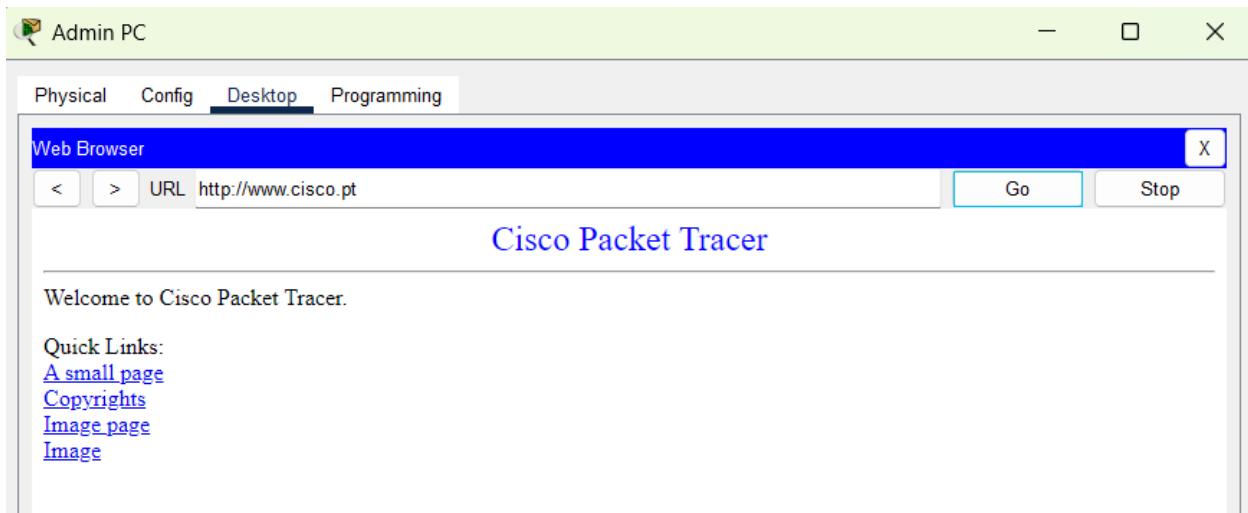


Figure 6: Admin PC successfully accessing the Cisco web server using IP address.

Cisco web page loads (indicating internet connectivity).



If page fails to load but IP works, DNS configuration may be incorrect or DNS service is unreachable.

## 6. Part 4: Use Networking Commands to View Host Information

### Step 1: ipconfig / ipconfig /all

Command:

Ipconfig

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Link-local IPv6 Address.....: FE80::260:5CFF:FE88:4291
    IPv6 Address.....: ::
    IPv4 Address.....: 192.168.1.2
    Subnet Mask.....: 255.255.255.0
    Default Gateway.....: ::
                           192.168.1.1
```

Shows basic addressing details (IP, subnet mask, gateway).

Command:

ipconfig /all

```
C:\>ipconfig /all

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix...:
    Physical Address.....: 0060.5C88.4291
    Link-local IPv6 Address.....: FE80::260:5CFF:FE88:4291
    IPv6 Address.....: ::
    IPv4 Address.....: 192.168.1.2
    Subnet Mask.....: 255.255.255.0
    Default Gateway.....: ::
                           192.168.1.1
    DHCP Servers.....: 192.168.1.1
    DHCPv6 IAID.....:
    DHCPv6 Client DUID.....: 00-01-00-01-DC-6C-63-D7-00-60-5C-88-42-91
    DNS Servers.....: ::
                           209.165.200.225
```

Figure 7: Admin PC showing IP, MAC, DHCP, and DNS configuration details.

## Step 2: tracert Command

Command:

```
tracert www.cisco.pt
```

```
C:\>tracert www.cisco.pt

Tracing route to 209.165.200.225 over a maximum of 30 hops:

 1  0 ms      0 ms      0 ms      192.168.1.1
 2  0 ms      0 ms      0 ms      209.165.200.233
 3  0 ms      0 ms      0 ms      209.165.200.225

Trace complete.

C:\>|
```

Figure 8: Traceroute from Admin PC to Cisco web server showing 3 hops.

Results show:

- The number of **hops** (routers) between the PC and the destination.
- Each hop's **IP address** and **response time**.

## 7. Reflection

### 1. Why are subnet masks and gateways the same for all hosts?

Because they're all in the same broadcast domain (192.168.1.0/24), meaning they share the same network boundary and route traffic through one default gateway.

### 2. If a PC can connect via IP but not URL, what's wrong?

The **DNS server** is either misconfigured or unreachable. The PC can reach the internet but cannot resolve domain names.

### 3. What was the biggest facility challenge in setting up the LAN?

Ensuring all devices are cabled correctly, ports powered on, and DHCP services configured. In real installations, **cable management and labeling** are critical for troubleshooting.

## 8. Summary

This lab demonstrated the complete process of designing and configuring a functional LAN:

- Correct cabling and port selection,
- DHCP configuration for dynamic clients,
- Static addressing for printers,
- Verifying IP and internet connectivity, and
- Using commands (ipconfig, tracert) for diagnostics.

Through these steps, I developed a deeper understanding of how hosts communicate within a local network and how the router enables access to external networks.

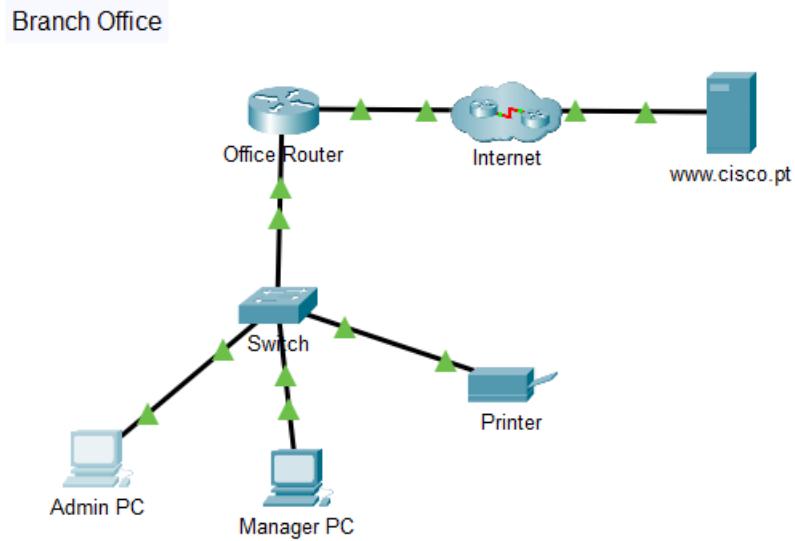


Figure 9: Final network topology showing all devices connected and configured with working connectivity.