



Lecture 10- Basic IP Addressing & CLI Commands



Lecture Objective

This lecture focuses on **building a basic router lab**, **assigning IP addresses**, **understanding default gateway**, and **using Cisco router CLI commands**. This is a **very important CCNA hands-on topic** 🧠⚙️.

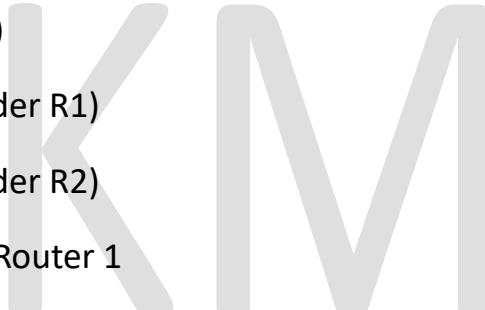


Lab Topology (What We Build)



Devices Used

- Router 1 (R1)
- Router 2 (R2)
- Switch 1 (under R1)
- Switch 2 (under R2)
- 💻 4 PCs under Router 1
- 💻 1 PC under Router 2



Physical Connections

- Router 1 → Router 2 (direct link)
- Router 1 → Switch → 4 PCs
- Router 2 → Switch → 1 PC



Why this lab?

This simulates **two branch offices** connected together, each having its own local network.



IP Addressing Plan

◆ Network Between Router 1 and Router 2

Network: **192.168.10.0/24**

Device Interface IP Address

Router 1 G0/1 192.168.10.1

Router 2 G0/0 192.168.10.2

◆ Router 1 Local Network

Network: **192.168.20.0/24**

Device IP Address

Router 1 (to switch) 192.168.20.1

PC 1 192.168.20.2

PC 2 192.168.20.3

PC 3 192.168.20.4

PC 4 192.168.20.5

◆ Router 2 Local Network

Network: **192.168.30.0/24**

Device IP Address

Router 2 (to switch) 192.168.30.1

PC 192.168.30.2



Default Gateway Concept (VERY IMPORTANT)

📌 What is Default Gateway?

The **default gateway** is the router's IP address in the same network.

- It allows a PC to **send data outside its own network**.

🧠 Example

- PC IP: 192.168.20.2
- Default Gateway: 192.168.20.1

🌐 Daily Life Example:

Your home PC sends internet traffic to your WiFi router (192.168.1.1). That router forwards traffic to the internet 🌐 .



Router 1 Configuration Commands

```
Router> enable
```

```
Router# configure terminal
```

```
Router(config)# interface g0/1
```

```
Router(config-if)# ip address 192.168.10.1 255.255.255.0
```

```
Router(config-if)# no shutdown
```

```
Router(config)# interface g0/0
```

```
Router(config-if)# ip address 192.168.20.1 255.255.255.0
```

```
Router(config-if)# no shutdown
```

```
Router(config)# hostname R1
```

⭐ Why no shutdown?

All router interfaces are **OFF by default** for safety.

Daily Example:

Like switching ON a power switch before using a device .

Router 2 Configuration Commands

```
Router> enable
```

```
Router# configure terminal
```

```
Router(config)# interface g0/0
```

```
Router(config-if)# ip address 192.168.10.2 255.255.255.0
```

```
Router(config-if)# no shutdown
```

```
Router(config)# interface g0/1
```

```
Router(config-if)# ip address 192.168.30.1 255.255.255.0
```

```
Router(config-if)# no shutdown
```

```
Router(config)# hostname R2
```



PC IP Configuration (Packet Tracer)

Steps:

1. Click PC
2. Go to **Desktop**
3. Open **IP Configuration**
4. Enter:
 - o IP Address
 - o Subnet Mask (auto-filled)
 - o Default Gateway (router IP)

Cisco Router Modes

1 User EXEC Mode

- Prompt: Router>
- Basic commands only
- Cannot configure device
- Used for monitoring & basic troubleshooting
- Example: ping,traceroute,ssh,telnet

2 Privileged EXEC Mode

- Prompt: Router#
- Enter using: enable
- Used for show commands
- Can view the full router configuration
- Cannot make major configuration changes

3 Global Configuration Mode

- Prompt: Router(config)#
- Enter using: configure terminal
- Used for full configuration
 - Setting hostname
 - Setting passwords
 - Configuring interfaces
 - Assigning IP addresses
 - Enabling routing protocols

Daily Life Example:

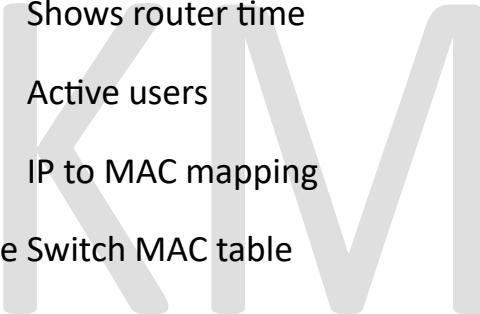
- User Mode → Checking status

- Privileged Mode → Viewing settings
 - Config Mode → Changing settings 
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Important Show Commands

Command	Purpose
show version	IOS version, uptime, model
show running-config	Current config (RAM)
show startup-config	Saved config (NVRAM)
show history	Previously used commands
show clock	Shows router time
show users	Active users
show arp	IP to MAC mapping
show mac-address-table	Switch MAC table



Saving & Reloading

- Save configuration:

copy running-config startup-config

or

do write

- Restart router:

reload

- Delete startup config:

erase startup-config



Router Password Protection

◆ Enable Password (Weak ✗)

enable password 1234

- **Uses MD5**
- Easily cracked
- Can be cracked easily
- Not recommended in real companies
- Shown as plain-text unless encryption is enabled

◆ Enable Secret (Strong ✓)

enable secret mysecret123

- **Uses MD5**
- Industry standard
- Strong
- Cannot be reversed easily
- **ALWAYS preferred over enable password**



Console Password

line console 0

password 123

login

- Prevents unauthorized **physical access**.



Telnet Password (Not Secure ✗)

Telnet is an **insecure** remote login method.

line vty 0 15

password telnet123

login

🚫 Telnet sends data in **plain text**.

Meaning:

- VTY 0–15 → allows 16 simultaneous Telnet users
 - Everyone must enter this password
-

🔒 SSH Configuration (MOST IMPORTANT ✅)

SSH uses encryption and is the preferred remote access method.

Step 1: Set hostname

hostname Router1

Step 2: Set domain name

ip domain-name codingseekho.in

Step 3: Generate RSA key

crypto key generate rsa

It will ask:

How many bits in the modulus?

You can give:

- 1024
- 2048 (recommended)

More bits = more secure.

Step 4: Create a user account

username admin privilege 15 secret adminpass123

privilege 15 = full admin access

Step 5: Enable SSH-only access on VTY

```
line vty 0 4  
transport input ssh  
password 12345  
login
```

Now only SSH is allowed.

★ Daily Life Example of SSH:

When engineers manage routers in:

- Banks
- Data centers
- Cloud networks
- IT companies

They ALWAYS use SSH (port 22).

Telnet is banned.



💾 Final Step – Save Everything

do write

or

do wr



1 SUMMARY



This lecture explains how to **build a basic router lab**, assign **IP addresses**, configure **default gateway**, and work with **Cisco Router CLI commands**. It is a **core hands-on CCNA topic** because it combines **theory + practical configuration** .

In this lab:

- Two routers (**R1 & R2**) are connected together
- Each router has its **own LAN**
- PCs communicate using **IP addressing**
- Routers forward traffic between different networks

Key concepts covered:

- ✓ IP Addressing
- ✓ Default Gateway
- ✓ Router Interfaces (G0/0, G0/1)
- ✓ Router CLI modes
- ✓ Show commands
- ✓ Saving configuration
- ✓ Router security (Console, Telnet, SSH)



👉 This chapter builds **real networking skills**, not just exam theory 🔥



2 CONCLUSION



Basic IP addressing and CLI configuration are the **foundation of networking**. If IP addressing or default gateway is wrong, **communication will completely fail** ✗.

This lecture teaches:

- How routers and PCs communicate
- How traffic moves between networks
- How engineers configure and secure routers in real companies

A candidate who understands this chapter clearly:

- ✓ Can build real labs
 - ✓ Can troubleshoot connectivity issues
 - ✓ Can configure routers securely
 - ✓ Is ready for **CCNA + real-world networking roles** 🚀
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MIND MAP (Text-Based – Easy to Remember)



Basic IP Addressing & CLI

- |
 - |— Lab Topology
 - |— Router 1 & Router 2
 - |— Switches
 - |— PCs
 - |— IP Addressing
 - |— Inter-Router Network (192.168.10.0/24)
 - |— R1 LAN (192.168.20.0/24)
 - |— R2 LAN (192.168.30.0/24)
 - |— Default Gateway
 - |— Router IP
 - |— Used for outside network traffic
 - |— Router CLI Modes
 - |— User EXEC (>)
 - |— Privileged EXEC (#)

| └─ Global Config (config#)

|

└─ Important Commands

| └─ show running-config

| └─ show version

| └─ show ip route

| └─ show arp

|

└─ Saving & Reloading

| └─ copy run start

| └─ reload

| └─ erase startup-config

|

└─ Security

 └─ Enable Password ✘

 └─ Enable Secret ✓

 └─ Console Password

 └─ Telnet ✘

 └─ SSH ✓





Q & A

◆ Q1. What is the purpose of IP addressing?

Answer:

IP addressing uniquely identifies devices on a network so they can communicate with each other.

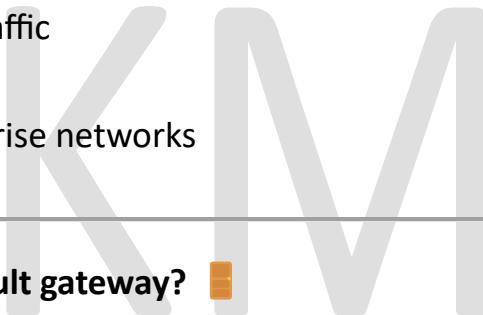
👉 Without IP address, no data transmission is possible.

◆ Q2. Why do we use different networks in a lab?

Answer:

Different networks help:

- ✓ Reduce broadcast traffic
 - ✓ Improve security
 - ✓ Simulate real enterprise networks
-



◆ Q3. What is a default gateway?

Answer:

A default gateway is the **router's IP address** used by a PC to send traffic **outside its local network**.

👉 Example:

PC → Router → Other Network / Internet

◆ Q4. What happens if default gateway is wrong?

Answer:

The PC can communicate **inside its network**, but **cannot access other networks or internet**.

◆ Q5. Why do routers need IP addresses on interfaces?

Answer:

Router interfaces need IP addresses so they can:

- ✓ Identify networks
 - ✓ Forward packets
 - ✓ Act as default gateway
-

◆ Q6. Why is no shutdown command required?

Answer:

Router interfaces are **administratively down by default**.
no shutdown activates the interface.

👉 Like switching ON a power button .

◆ Q7. What are Cisco router modes?

Answer:

Mode	Prompt	Purpose
User EXEC	Router>	Basic monitoring
Privileged EXEC	Router#	Show commands
Global Config	Router(config)#	Full configuration

◆ Q8. Difference between User EXEC & Privileged EXEC?

Answer:

User EXEC:

- ✓ Limited access
- ✓ Cannot view full config

Privileged EXEC:

- ✓ Full monitoring access
- ✓ Can enter config mode

-
- ◆ Q9. What is show running-config used for? 

Answer:

Shows the **current active configuration** stored in **RAM**.

- ◆ Q10. What is show startup-config used for? 

Answer:

Shows the **saved configuration** stored in **NVRAM**.

- ◆ Q11. How do you save router configuration? 

Answer:

copy running-config startup-config

or

write

- ◆ Q12. What happens if router reloads without saving? 

Answer:

All configuration changes are **lost** .

- ◆ Q13. Difference between Enable Password and Enable Secret? 

Feature	Enable Password	Enable Secret
Security	Weak 	Strong 
Encryption	MD7	MD5
Industry Use	Not recommended	Always used

 **Enable secret is always preferred.**

◆ Q14. What is console password used for? 

Answer:

Console password prevents **unauthorized physical access** to the router.

◆ Q15. Why is Telnet not secure? 

Answer:

Telnet sends:

- ✗ Username
- ✗ Password
- ✗ Data

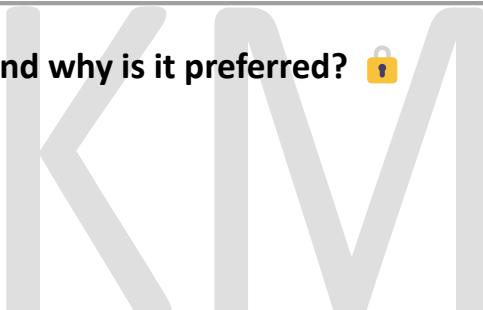
...in **plain text**, which can be easily captured.

◆ Q16. What is SSH and why is it preferred? 

Answer:

SSH (Secure Shell):

- ✓ Uses encryption
- ✓ Protects credentials
- ✓ Industry standard



👉 Used in banks, data centers, cloud networks.

◆ Q17. What port does SSH use? 

Answer:

SSH uses **Port 22**.

◆ Q18. Why do we generate RSA keys for SSH? 

Answer:

RSA keys enable **encrypted communication** between client and router.

👉 More bits = more security.

- ◆ Q19. What does line vty 0 15 mean? 

Answer:

Allows **16 simultaneous remote users** (VTY lines).

- ◆ Q20. Why Packet Tracer is important? 

Answer:

- ✓ Practice CCNA labs
 - ✓ No physical devices needed
 - ✓ Safe learning environment
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