[55958- Aman Goswami, Documentation – 3, Date- 11 Dec 2025]

Q- IP Address, Subnet, and NAT

1. What is an IP Address?

An IP address (Internet Protocol address) is a unique numerical identifier assigned to each device connected to a network.

It helps devices identify and communicate with each other over the internet or a local network.

Example:
192.168.1.10

Just like a home address helps in delivering letters, an IP address helps in delivering data to the correct device.

Types of IP Address

Public IP Address

A **Public IP address** is assigned by the **Internet Service Provider (ISP)** and is used to identify a device on the **Internet**.

- Accessible over the internet
- Must be unique worldwide
- Used by websites, servers, and routers

Example:
8.8.8.8

Private IP Address

A **Private IP address** is used **within a local network** (home, office, college).

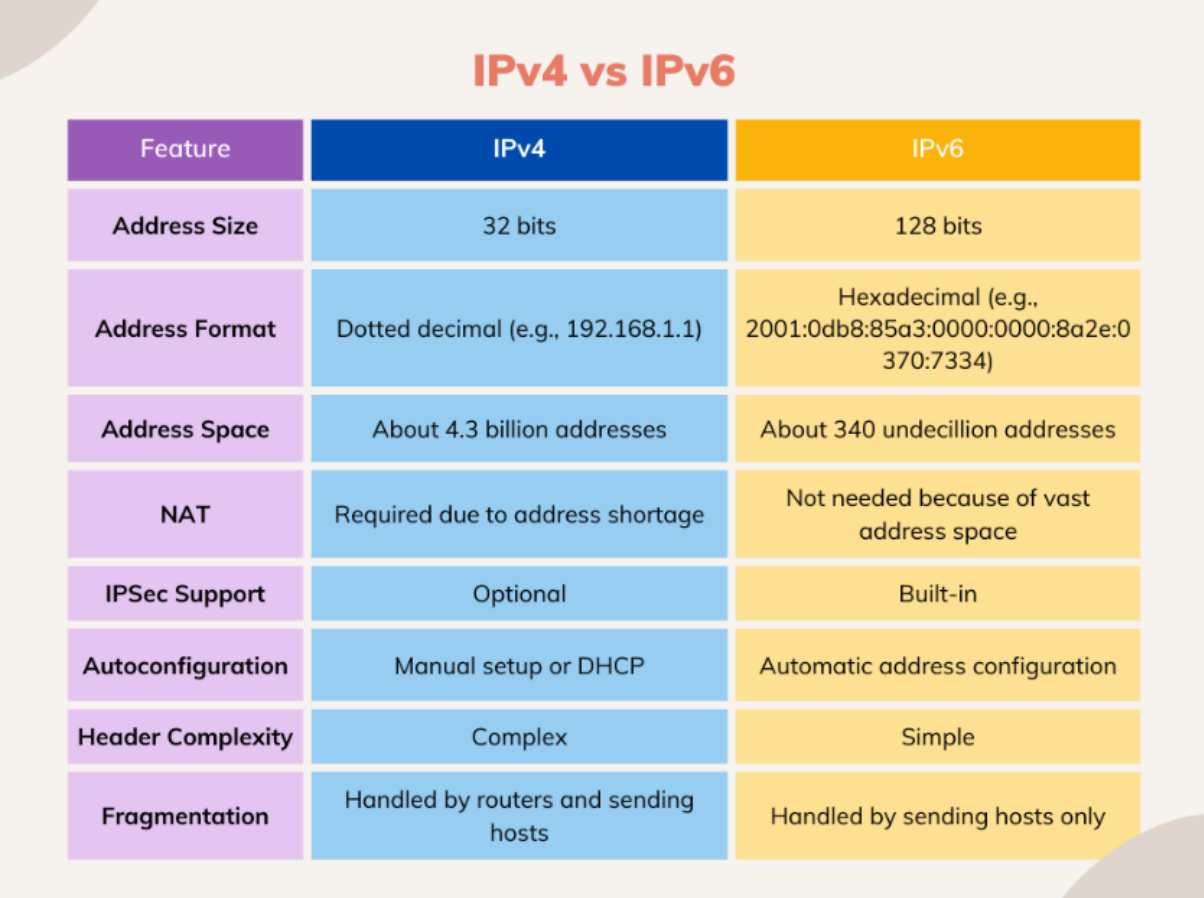
- Not accessible directly from the internet
- Can be reused in different networks
- Used by internal devices like laptops, mobiles, and printers

Common Private IP ranges:

- 192.168.0.0 – 192.168.255.255
- 10.0.0.0 – 10.255.255.255

- 172.16.0.0 – 172.31.255.255

Example:
192.168.1.5



2. What is a Subnet?

A **Subnet (Sub-network)** is a smaller network created by dividing a large network into smaller parts.
It helps in **better network management, security, and performance**.

Why is it used:

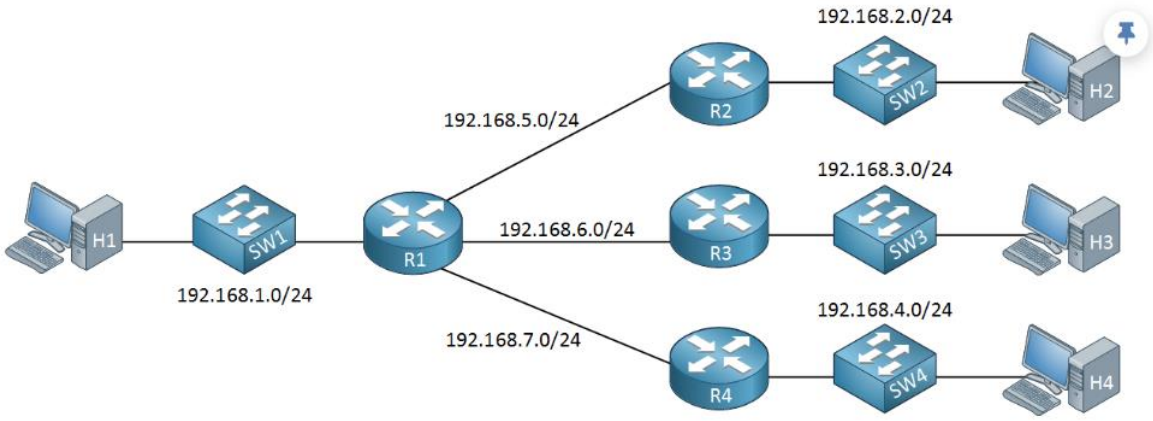
- Reduces network traffic
- Improves security
- Makes IP management easier

Example:

If a network has IP range:
192.168.1.0/24

It can be divided into multiple subnets for different departments, like:

- Admin
- Development
- Testing



3. What is NAT (Network Address Translation)?

NAT is a technique used by routers to **translate private IP addresses into public IP addresses** and vice versa.

Why NAT is needed:

- ISP provides **only one public IP**
- Many devices need internet access
- NAT allows **multiple devices** to share a single public IP

How NAT works (simple example):

- Laptop → 192.168.1.10 (private IP)
- Router → Converts it to a public IP
- Internet → Sends response back to router
- Router → Forwards it to the correct device

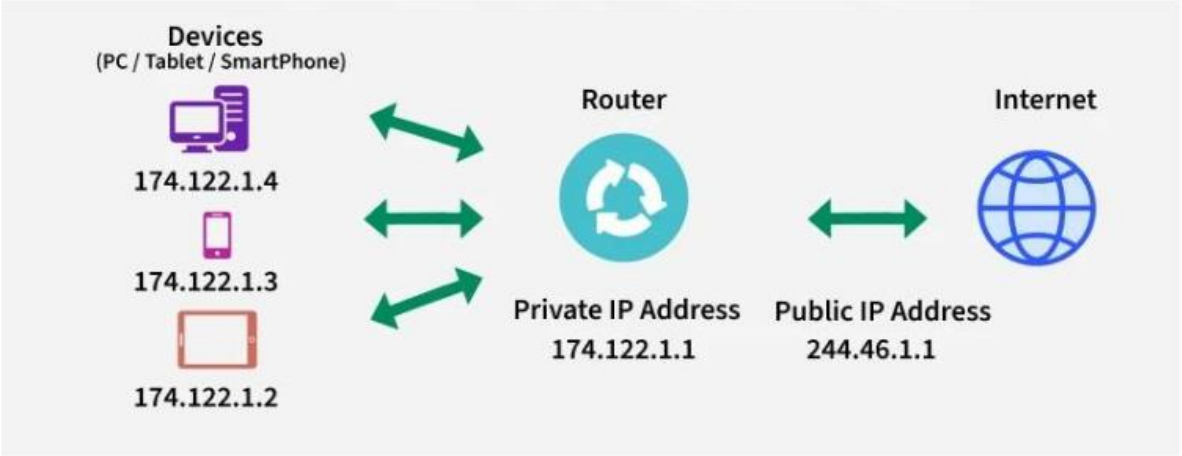
Real-Life Example of NAT

At home:

- Phone → 192.168.1.2

- Laptop → 192.168.1.3
- TV → 192.168.1.4

All devices use **one public IP** provided by ISP.
This is possible because of **NAT**.



Network Address Translation