What Are IPv4 Address Classes?

IPv4 addresses are **32-bit numbers**, split into **four octets** (e.g., `192.168.1.1`). Each octet is **8 bits**, and the address is divided into two parts:

- **Network ID** → Identifies the **network** (like a city name).
- **Host ID** → Identifies a **specific device** in that network (like a house number).

To organize the entire IPv4 address space, IP addresses are divided into **five classes (A, B, C, D, E)** based on the **first octet value** (the first part of the address).

Class A (Large Networks)

- **First octet range:** `1 - 127`
- **Network ID:** First octet
- **Host ID:** Last three octets
- **Total IPs per network:** `16.7 million` (2^{24})

◆ **Example:**

- **IP Address:** `10.5.6.7`
- **Network ID:** `10`
- **Host ID:** `5.6.7`
- **Who uses it?** Large organizations like **IBM, Google, and the U.S. military**.

Class B (Medium Networks)

- **First octet range:** `128 - 191`
- **Network ID:** First two octets
- **Host ID:** Last two octets
- **Total IPs per network:** `65,536` (2^{16})

◆ **Example:**

- **IP Address:** `172.16.45.10`
- **Network ID:** `172.16`
- **Host ID:** `45.10`
- **Who uses it? Universities and large businesses**.

Class C (Small Networks)

- **First octet range:** `192 - 223`

- **Network ID:** First three octets
- **Host ID:** Last octet
- **Total IPs per network:** `256` (2⁸)

◆ **Example:**

- **IP Address:** `192.168.1.5`
- **Network ID:** `192.168.1`
- **Host ID:** `5`
- **Who uses it? Small businesses and home networks**.

How to Identify an IP Address Class?

You can tell the class of an IP address just by looking at the **first octet (first number before the dot)**:

First Octet Range	Class	Usage
`1 - 127`	**A**	Large networks
`128 - 191`	**B**	Medium networks
`192 - 223`	**C**	Small networks

Why Do We Have Address Classes?

- Before **subnetting** and **CIDR (Classless Inter-Domain Routing)**, networks were assigned **fixed-size blocks** of IPs.
- Today, **CIDR is more flexible** and replaces the rigid **Class A, B, and C system**.

◆ **Key Takeaway:**

- **Class A → Big companies & governments** (lots of devices).
- **Class B → Universities & medium businesses**.
- **Class C → Small offices & homes** (like your Wi-Fi router).