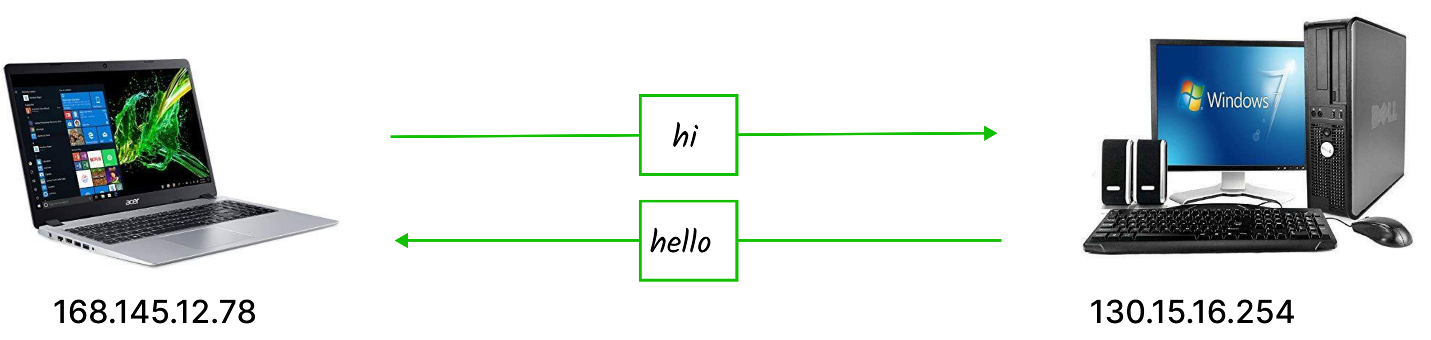
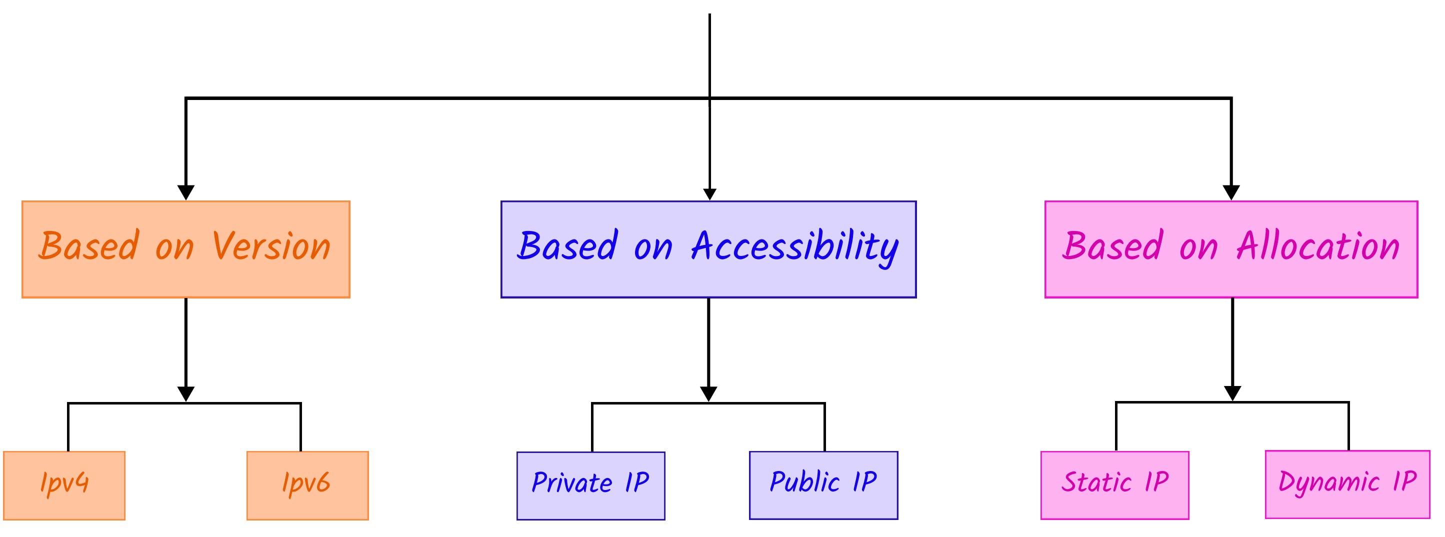
IP address

An IP (Internet Protocol) address is a ***unique numerical identifier*** *assigned to each device connected to a network. It helps in identifying and locating devices.*



Types of IP Addresses



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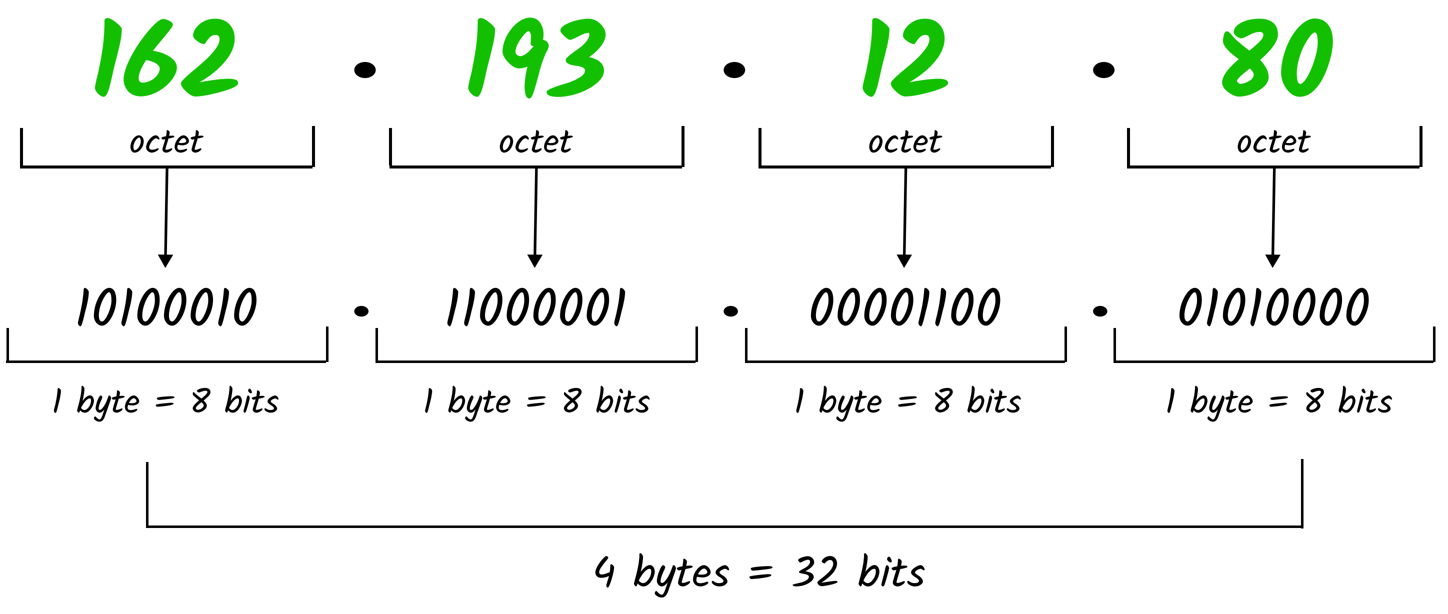
1. Based on Version

1 byte = 8 bits

- IPv4 (Internet Protocol Version 4):
  - *Uses a* ***32-bit*** *addressing system.*
  - *Written in dot-decimal format*

    (Example- 192.168.1.1)
  - *Supports approximately 4.3 billion unique addresses.*

IPv4 Range: Minimum 0.0.0.0 to Maximum 255.255.255.255



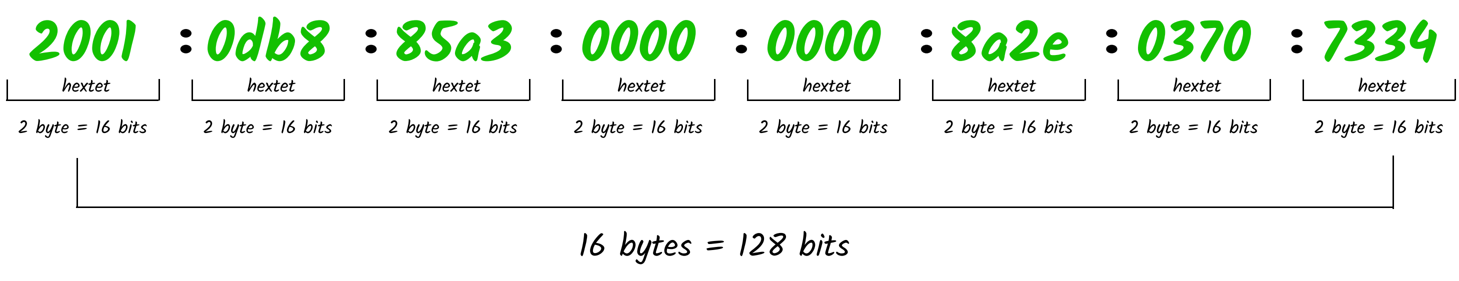
- IPv6 (Internet Protocol Version 6):
  - *Uses a* ***128-bit*** *addressing system.*
  - *Written in hexadecimal format with colons*

    (Example - 2001:0db8:85a3:0000:0000:8a2e:0370:7334)
  - *Provides trillions of unique addresses*
  - *Improves security and efficiency over IPv4.*

IPv6 Range:

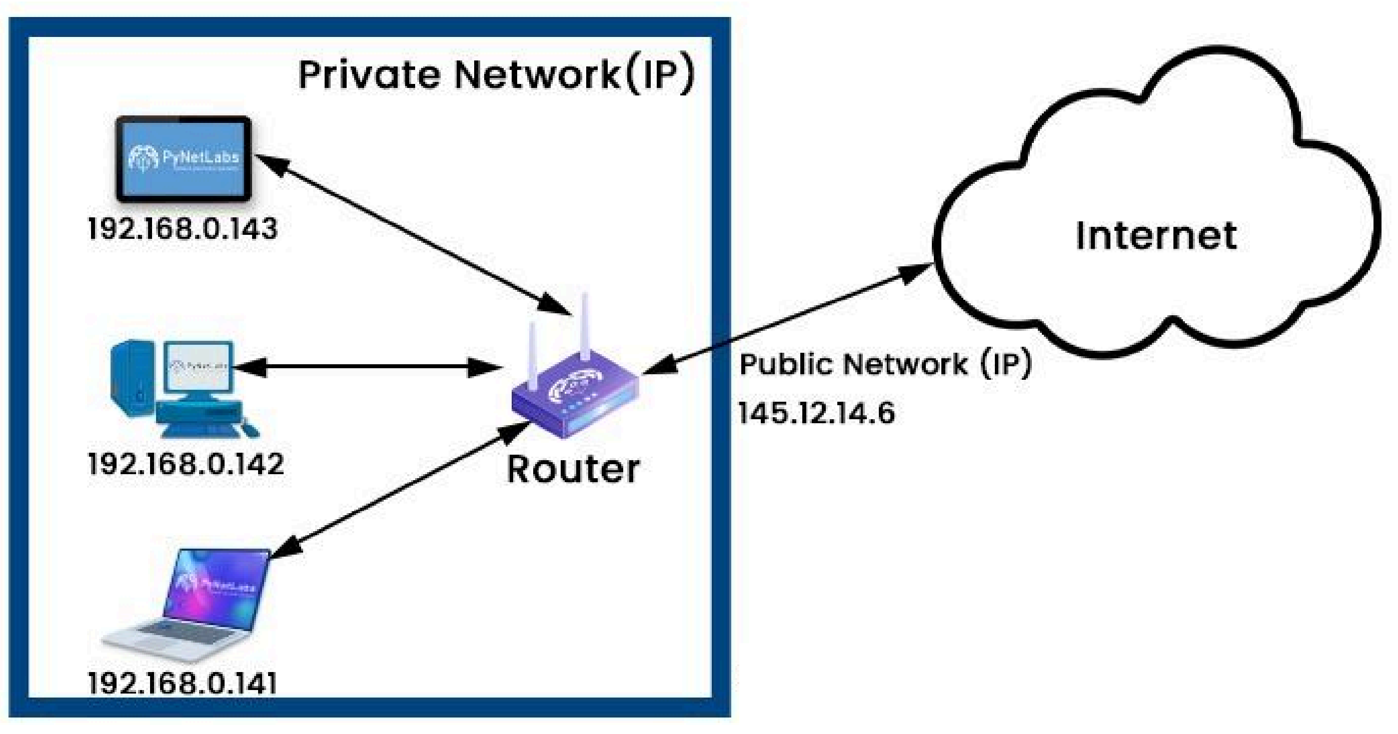
Minimum 0000:0000:0000:0000:0000:0000:0000:0000 to

Maximum ffff:ffff:ffff:ffff:ffff:ffff:ffff:ffff



2. Based on Accessibility

- Private IP Addresses:
  - *Used in local networks (LANs) for internal communication.*
  - *Not accessible over the public internet.*
  - *Assigned by routers or network administrators.*
  - *Common private IP address 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
- Public IP Addresses:
  - *Assigned by Internet Service Providers (ISPs).*
  - *Used to identify devices on the internet.*
  - *Unique across the entire web.*



3. Based on Allocation

- Static IP Addresses:
  - *Assigned permanently to a device.*
  - *Used for hosting websites, servers, and remote access systems.*
  - *More stable but can be expensive.*
- Dynamic IP Addresses:
  - *Assigned temporarily by a DHCP (Dynamic Host Configuration Protocol) server.*
  - *Commonly used for home and business networks.*
  - *Changes periodically for better security and efficient address usage.*