



IP Addressing

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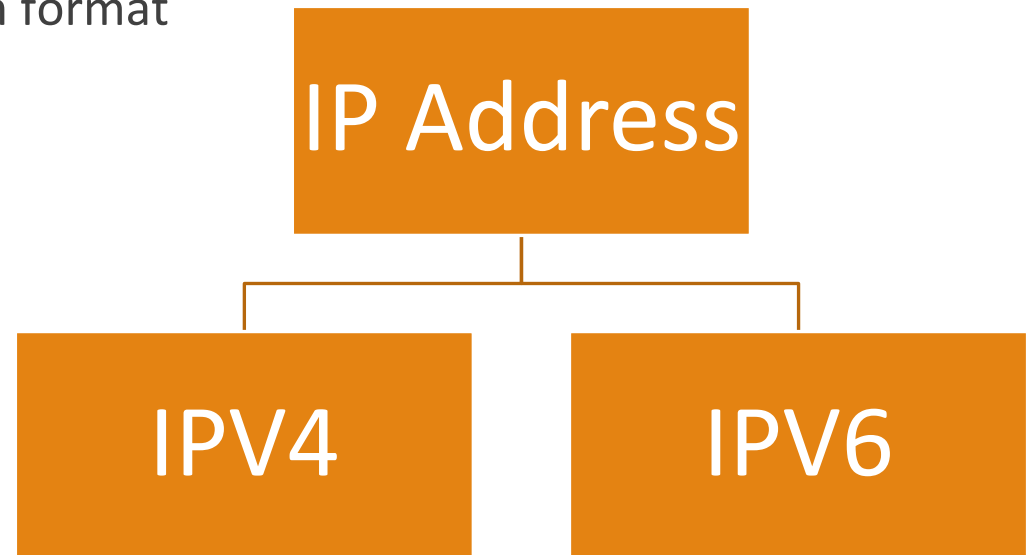


What is an IP address?

IP address stands for Internet Protocol address. The Internet Protocol is a set of rules for communication over the internet. An IP address identifies a network or device on the internet.

A unique IP address is required for each host and network component that communicates using TCP/IP

IP address must be globally unique and have a uniform format





Binary Numbers and Decimal Numbers

Convert Following Binary Numbers in to Decimal

1. 10110101_2

2. 11111110_2

3. 10111010_2

4. 11110010_2

5. 11111100_2

Convert Following Decimal Numbers in to Binary

1. 255

2. 224

3. 192

4. 172

5. 128

Convert Following Decimal Numbers in to Binary

$$1.255 = 11111111_2$$

$$2.224 = 11100000_2$$

$$3.192 = 11000000_2$$

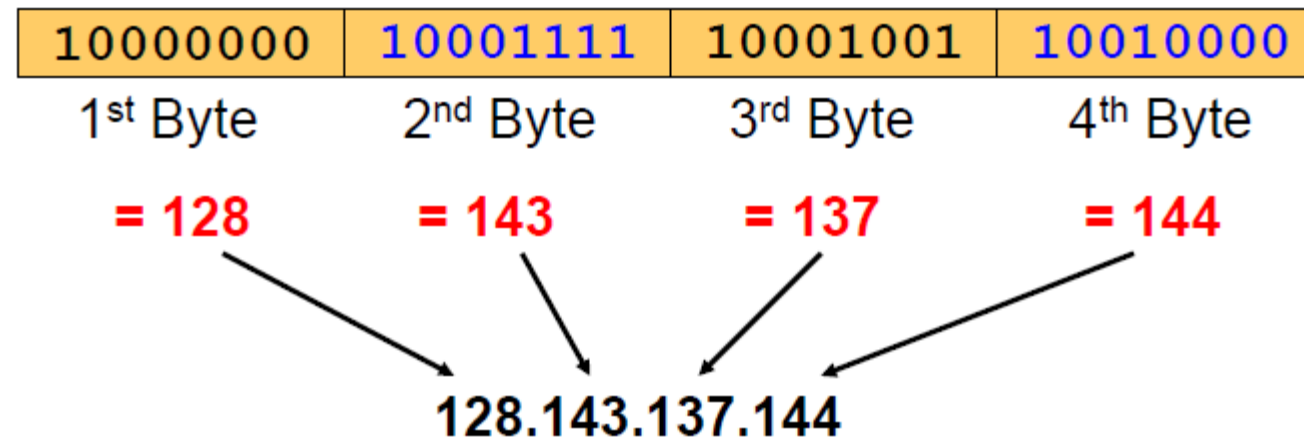
$$4.172 = 10101100_2$$

$$5.128 = 10000000_2$$

IPV4 : Dotted Decimal Notation

IP addresses are written in a so called dotted decimal notation

Each byte is identified by a decimal number in the range 0 255



IPV4 : IP Classes

IPV4 : IP Classes

Class A	0 - 127	For internetwork communication
Class B	128 - 191	For internetwork communication
Class C	192 - 223	For internetwork communication
Class D	224 - 239	Reserved for multicasting
Class E	240 - 254	Reserved for research and experiments

IPv4 : Finding the IP Class

	First byte	Second byte	Third byte	Fourth byte
Class A	0			
Class B	10			
Class C	110			
Class D	1110			
Class E	1111			

Exercise: Find The class of following IP addresses.

IP Address	Class
192.168.10.2	
10.20.30.40	
171.16.25.257	
172.16.30.5	
1.2.3.4	
224.26.10.26	
128.165.23.2	
145.168.2.3	

Exercise: Find The class of following IP addresses.

IP Address	Class
192.168.10.2	C
10.20.30.40	A
171.16.25.257	?
172.16.30.5	B
1.2.3.4	A
224.26.10.26	D
128.165.23.2	B
145.168.2.3	B

IPV4 : Private vs Public Ips

Internet Assigned Numbers Authority (IANA) is the organization responsible for registering IP address ranges to organizations and Internet Service Providers (ISP)

To allow organizations to freely assign private IP addresses, the Network Information Center (InterNIC) has reserved certain address blocks for private use

IPv4 : Private vs Public IPs

Private IP address space	
From	To
10.0.0.0	10.255.255.255
172.16.0.0	172.31.255.255
192.168.0.0	192.168.255.255

Exercise: Find whether the following IPs are public or private.

IP Address	Private/ Public
192.168.10.2	
10.20.30.40	
171.16.25.254	
172.16.30.5	
1.2.3.4	
224.26.10.26	
128.165.23.2	
145.168.2.3	

Exercise: Find whether the following IPs are public or private.

IP Address	Private/ Public
192.168.10.2	Private
10.20.30.40	Private
171.16.25.254	Public
172.16.30.5	Private
1.2.3.4	Public
224.26.10.26	Public
128.165.23.2	Public
145.168.2.3	Public

IPV4 : Subnet Mask

- A subnet mask is a number that defines a range of IP addresses available within a network.
- A subnet mask hides (or masks) the network part of a system's IP address and leaves only the host part as the machine identifier.

Class A
Subnet Mask

Network	Host	Host	Host
255	0	0	0

Class B
Subnet Mask

Network	Network	Host	Host
255	255	0	0

Class C
Subnet Mask

Network	Network	Network	Host
255	255	255	0

IPV4 : Subnet Mask

Class	Default subnet mask	No. of networks	No. of hosts per network
A	255.0.0.0	256	16,777,214
B	255.255.0.0	65,536	65,534
C	255.255.255.0	16,777,216	254

IPv4 : Subnetting

- Subnetting is the strategy used to partition a single physical network into more than one smaller logical sub networks (subnets).
- An IP address includes a network segment and a host segment.
- Subnets are designed by accepting bits from the IP address's host part and using these bits to assign a number of smaller sub networks inside the original network.

IPV4 : Benefits of Subnetting

Reduced network traffic

Optimized network performance

Simplified management

Facilitated spanning of large geographical distances

How many networks can be created, and host can connect to below network

193.169.5.12/26

199.120.74.63/28

198.152.60.40/29

FZR Organization has perched below network and would like to create networks to IT department, stores office and customers.

Find the number of networks.

Number of Hosts

which subnetwork below Ip addres belong to

write network ID, first IP address, last IP address and broadcast id in a table

216.21.5.75

XYZ is a organizations has perched below network and would like to create networks to IT department, stores, office, Front office, customer care and custommers.

Find the number of networks.

Number of Hosts

which network below Ip addres belong to

write network ID, first IP address, last IP address and broadcast id in a table

198.168.6.15/24

Class B

XYZ is a large organizations has perched below network and would like to create 1000 networks

Number of Hosts

write 6 network ID, first IP address, last IP address and broadcast id in a table

170.60.20.30

Class A

PQR is a large organizations has perched below network and would like to create 25 networks

Number of Hosts

write 4 network ID, first IP address, last IP address and broadcast id in a table

15.30.19.60



