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IP Addressing

Radhe Krishna

Whats is the Internet?

The Internet is a vast network that connects computers all over the world. Through the Internet, people can share information and communicate from anywhere with an Internet connection.

The Internet is **a global network of billions of computers and other electronic devices**.

What is a protocol in networking?

Network protocols are **a set of rules outlining how connected devices communicate across a network to exchange information easily and safely**. Protocols serve as a common language for devices to enable communication irrespective of differences in software, hardware, or internal processes**.**

Internet Protocol

Internet protocol (IP) address are the unique numbers assigned to every computer or devices to communicate with each other

IP Version

IP version numbers

As the version number is carried in a 4-bit field, only numbers 0-15 can be assigned.

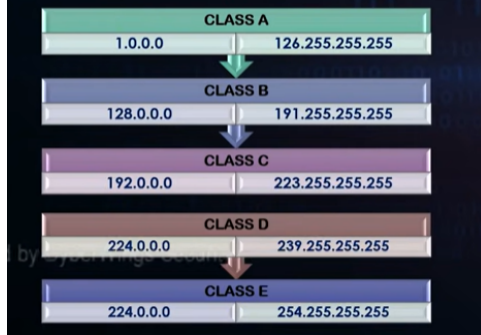| IP version	Description	Status
0		Reserved.[3]
1-3		Unassigned.
4	Internet Protocol version 4 (IPv4)[1]	Active.
5	Internet Stream Protocol or ST	Obsolete; superseded by ST-II.
5	Internet Stream Protocol or ST-II[4]	Obsolete.
6	Simple Internet Protocol (SIP)	Obsolete; merged into IPv6.[3]
6	Internet Protocol version 6 (IPv6)[2]	Active.
7	TP/IX The Next Internet (IPv7)[5]	Obsolete.[6]
8	P Internet Protocol (PIP)[7]	Obsolete; merged into SIP in 1993.
9	TCP and UDP over Bigger Addresses (TUBA)	Obsolete.[8]
9	IPv9	April fools' day joke.[9]
10-14		Unassigned.
15		Reserved.

What do IP Address Look like ?

- Ip address are actually just long string of numbers, Like **32211226037**

- We write them down in a special way. IPV4 addresses are written as a string of four numbers between 0 and 255, separated by dots.

- A typical IPv4 address looks like this: 192.168.0.1

- IPv6 addresses are considerable longer sting of numbers, so they are written using hexadecimals

- A typical IPv6 address looks like this: 2001:0db8::53

IPv4 vs IPv6

- IPv4 is 32-Bit IP address whereas IPv6 is a 128-Bit Ip address.

- IPv4 binary bits are separated by a dot(.) Where IPv6 binary bits are separated By a colon(:).

- IPv4 supports broadcast whereas IPv6 doesn`t support broadcast.

- IPV4 offers 12 header fields whereas IPv6 offers 8 header fields.

IP Address Classes

CLASS A		
1.0.0.0		126.255.255.255
CLASS B		
128.0.0.0		191.255.255.255
CLASS C		
192.0.0.0		223.255.255.255
CLASS D		
224.0.0.0		239.255.255.255
CLASS E		
224.0.0.0		254.255.255.255

Any address that begins with 127. is considered a loopback address.

How are IP addresses Distributed ?

▼ AINA (Internet Assigned Numbers Authority) →

- → RIR (Regional Internet Registries) →
- ISP (internet service provider)

Private And Public IP Addresses

▼ Private IP address of a system is the IP address which is used to communicate within the same network.

- RANGE

10.0.0.0 → 10.255.255.255,

172.16.0.0 → 172.31.255.255

192.168.0..0 → 192.168.255.255

▼ Public IP address of a system is the IP address Which is used to communicate outside the network. Public IP address is basically assigned by

the ISP (Internet service Provider) .

▼ 168.254.0.0→ 169.254.255.255: This is a Special range used by a protocol named Automatic private IP Addressing (APIPA)

1 bit = 0,1
8 bit = 1 Byte or 1 Octet

- 8 bit (Bit = 0,1)

11000000 . 10101000 . 00001010 . 00000001

IP Address Parts

1. NETWORK ID

- Identifies the specific network on which the device is located

2. HOST ID

- Identifies a specific device on that network.

▼ A network mask helps you know which portion of the address identifies the network and which portion of the address identifies the node

- Class A → 255.0.0.0

- Class B → 255.255.0.0

- Class C → 255.255.255.0

A broadcast address refers to **a special IP address that is used to send a message or packet to all devices on a network**. Broadcast addresses are commonly used for network management tasks, such as sending out configuration updates or discovery requests.

How To Find Broadcast ip

120	15	10	100
120	0	0	0
120	255	255	255

CLASS A
1.0.0.0 126.255.255.255

N	H	H	H
1	0	0	0

How To Find Usable Host

180	168	10	100
180	168	0	0
		2^8	2^8

CLASS B
128.0.0.0 191.255.255.255

N	N	H	H
1	1	0	0

$2^{16} - 2 = 65,534$

IP Address Construction

CLASS A
10.0.0.0 10.255.255.255

CLASS B
172.16.0.0 172.31.255.255

CLASS C
192.168.0.0 192.168.255.255

N	N	N	H
1	1	1	0

192	168	100	10
255	255	255	0