



## 16. IP Address v4

## What is IP Address?

- An IP address is a 32-bit number or 4 Octet number which uniquely identifies a
- host or network node over a TCP/IP network.
- IP addresses are normally expressed in dotted-decimal format In which 4 Octet are separated by dots.
- For Example: 192.168.123.132.

# Subnet mask

Subnet mask also is 32 bit number, every IP address has its own subnet mask. Subnet mask helps to identify, how many bits out of 32 belongs to network and how many bits belong to host.

This way, the subnet mask is used by the TCP/IP protocol to determine whether a host is on the local subnet or on a remote network.

IPv4 are divided into 5 classes such as Class A, B, C, D and E  
Class A, B and C are used for commercial purposes.

# IPv4 Address Table

IP Address Classes

Address Class	1st octet range (decimal)	1st octet bits (green bits do not change)	Network(N) and Host(H) parts of address	Default subnet mask (decimal and binary)	Number of possible networks and hosts per network
A	1-127**	00000000-01111111	N.H.H.H	255.0.0.0	128 nets ( $2^7$ ) 16,777,214 hosts per net ( $2^{24-2}$ )
B	128-191	10000000-10111111	N.N.H.H	255.255.0.0	16,384 nets ( $2^{14}$ ) 65,534 hosts per net ( $2^{16-2}$ )
C	192-223	11000000-11011111	N.N.N.H	255.255.255.0	2,097,150 nets ( $2^{21}$ ) 254 hosts per net ( $2^{8-2}$ )
D	224-239	11100000-11101111	NA (multicast)		
E	240-255	11110000-11111111	NA (experimental)		

## Class A Host/Subnet Table

Class A Number of Bits Borrowed from Host Portion	Subnet Mask	Effective Subnets	Number of Hosts/Subnet	Number of Subnet Mask Bits
1	255.128.0.0	2	8388606	/9
2	255.192.0.0	4	4194302	/10
3	255.224.0.0	8	2097150	/11
4	255.240.0.0	16	1048574	/12
5	255.248.0.0	32	524286	/13
6	255.252.0.0	64	262142	/14
7	255.254.0.0	128	131070	/15
8	255.255.0.0	256	65534	/16
9	255.255.128.0	512	32766	/17
10	255.255.192.0	1024	16382	/18
11	255.255.224.0	2048	8190	/19
12	255.255.240.0	4096	4094	/20
13	255.255.248.0	8192	2046	/21
14	255.255.252.0	16384	1022	/22
15	255.255.254.0	32768	510	/23
16	255.255.255.0	65536	254	/24
17	255.255.255.128	131072	126	/25
18	255.255.255.192	262144	62	/26
19	255.255.255.224	524288	30	/27
20	255.255.255.240	1048576	14	/28
21	255.255.255.248	2097152	6	/29
22	255.255.255.252	4194304	2	/30
23	255.255.255.254	8388608	2*	/31

## Class B Host/Subnet Table

Class B Bits	Subnet Mask	Effective Subnets	<u>Effective Hosts</u>	Number of Subnet Mask Bits
1	255.255.128.0	2	32766	/17
2	255.255.192.0	4	16382	/18
3	255.255.224.0	8	8190	/19
4	255.255.240.0	16	4094	/20
5	255.255.248.0	32	2046	/21
6	255.255.252.0	64	1022	/22
7	255.255.254.0	128	510	/23
8	255.255.255.0	256	254	/24
9	255.255.255.128	512	126	/25
10	255.255.255.192	1024	62	/26
11	255.255.255.224	2048	30	/27
12	255.255.255.240	4096	14	/28
13	255.255.255.248	8192	6	/29
14	255.255.255.252	16384	2	/30
15	255.255.255.254	32768	2*	/31

## Class C Host/Subnet Table

Class C Bits	Subnet Mask	<u>Effective</u> Subnets	<u>Effective</u> Hosts	Number of Subnet Mask Bits
1	255.255.255.128	2	126	/25
2	255.255.255.192	4	62	/26
3	255.255.255.224	8	30	/27
4	255.255.255.240	16	14	/28
5	255.255.255.248	32	6	/29
6	255.255.255.252	64	2	/30
7	255.255.255.254	128	2*	/31

## Private IP Addresses

A private IP address is an **IP address** that's reserved for internal use behind a **router** or other Network Address Translation (NAT) devices, apart from the public.

Public IP addresses are allocated to Internet faced routers and Servers, which can be able to access internet directly.

The **Internet Assigned Numbers Authority** (IANA) reserves the following IP address

blocks for use as private IP addresses:

Class	Private IP address range	Subnet mask	No. of hosts
A	10.0.0.0 – 10.255.255.255	255.0.0.0	16,777,212
B	172.16.0.0 – 172.16.31.255	255.255.0.0	8190
C	192.168.0.0 – 192.168.255.255	255.255.255.0	65,534

Private IP Addresses



## **Reserved IP addresses:**

### **Loopback Addresses**

The IP address range 127.0.0.0 – 127.255.255.255 is reserved for loopback, i.e. a Host's self-address, also known as localhost address.

Loopback addresses, enable the Server and Client processes on a single system to communicate

### **Link-Local Addresses**

In case a host is not able to acquire an IP address from the DHCP server and it has not been assigned any IP address manually, the host can assign itself an IP address from a range of reserved Link-local addresses. Link local address ranges from 169.254.0.0 -- 169.254.255.255.

## CIDR (Classless Inter-Domain Routing)

This is a way to allow more flexible allocation of IP addresses than was possible with the original system of IP address classes. As a result, the number of available Internet addresses now increased, which along with widespread use of network address translation (NAT), has significantly extended the useful life of IPv4.

For  
Example: 10.10.10.0/24 By default 10.X.X.X range belongs to class A with /8 notation But here, you see, we can use /24 notation instead of /8