# IPv4 Addressing Rules

Host ID cannot be all ones or zeros.

When Host ID is all zeros that IP represents the Network ID eg.
172.16.0.0 /16 or
192.168.1.0 /24 or
192.168.0.4 /30

When Host ID is all ones that IP represents the Directed Broadcast IP address for that network eg.
172.16.255.255 /16 or
192.168.1.255 /24 or
192.168.0.7 /30

Network ID cannot be all ones or zeros.

# IP Address Classes

| Class | Binary | Range | Default Subnet Mask/Net Prefix | Notes |
|---|---|---|---|---|
| A | 0 | 1-126 | 255.0.0.0<br>/8 | 16,777,214 IPs per net ID |
| B | 10 | 128-191 | 255.255.0.0<br>/16 | 65,534 IPs per net ID |
| C | 110 | 192-223 | 255.255.255.0<br>/24 | 254 IPs per net ID |
| D | 1110 | 224-239 | none | Used for Multicast |
| E | 1111 | 240-255 | none | Reserved for experimentation |

Unicast IP addresses are taken from Classes A, B and C.

Multicast IP addresses are taken from Class D

Class E is reserved for experimentation by the Internet Authorities.

127.x.y.z - loopback IP address range

Number of IP addresses per Network ID

h = number of host id bits

$2^h - 2$

## Private IP Address Ranges

10.0.0.0 - 10.255.255.255
255.0.0.0 /8
Network ID : 10.0.0.0
No of IPs per Network ID: 16Mil+ (16,777,214)

172.16.0.0 -
172.31.255.255
255.255.0.0 /16

Network ID: 172.16.0.0 - 172.31.0.0
(16 Network IDs)
No of IPs per Network ID: 65,534

192.168.0.0 -
192.168.255.255
255.255.255.0 /24

Network ID: 192.168.0.0 -
192.168.255.0 (256 Network IDs)
No of IPs per Network ID: 254

## Automatic Private IP Address Range (APIPA)

169.254.x.x
255.255.0.0

## Public IP Address

Anything that is not a Private IP address, an APIPA address or a loopback IP address is a Public IP and may already be in use on the Internet.