Network Basics

What is a computer network

A computer network is a set of computers connected together for a purpose of sharing resources. These shared resources can include file servers or printers. The internet itself can be considered as a network

Types of networks

- PAN(Personal Area Network)
- LAN (Local Area Network)
- WAN(Wide Area Network)
- WLAN(Wireless Local Area Network)
- MAN(Metropolitan Area Network)

LAN and WAN are the primary and best known categories, while the others have emerged with technological advances

LAN (LOCAL AREA NETWORKS)

A LAN connects network devices over a relatively short distance. A networked office, building, school networks, or home networks usually contain a single LAN though sometimes one building may contain a few small LANs

In addition to operation in a limited space, LANs are also typically owned, controlled and managed by single person or organization

WAN (WIDE AREA NETWORKS)

WAN spans over a large distance. Our internet is the largest WAN spanning the earth

A WAN is a geographically-dispersed collection of LANs. A network device called a router connects LANs to WANs.

In IP Networking the router maintains both a LAN address and a WAN address

Most WANs are not owned by any one organization but rather exist under collective or distributed ownership and management

What is a MAC Address

It is a unique value associated with a network adapter. It is also known as the hardware or physical address. They uniquely identify a device over LAN

MAC Addresses are 12-digit hexadecimal number (48 bit length) usually written in following format

MM:MM:MM:SS:SS:SS

The first half of mac address(M part) contains id number of adapter manufacturer & second half represents serial number assigned to the adapter by manufacturer.

What is an IP Address

A unique string of numbers separated by full stops that identifies each computer using Internet Protocol to communicate over a network. It is a number of 32-bit binary length usually divided into 4 octets separated by dots like X.X.X.X or 11000000.10001100.11000011.1000010 or 192.140.195.66

In early stages it was interpreted in 2 parts, network address and host address

So, we could only have 4,29,49,67,295 or around 4.2 billion addresses

But current world population is around? 7.6 billion

How do we accomplish this magic?

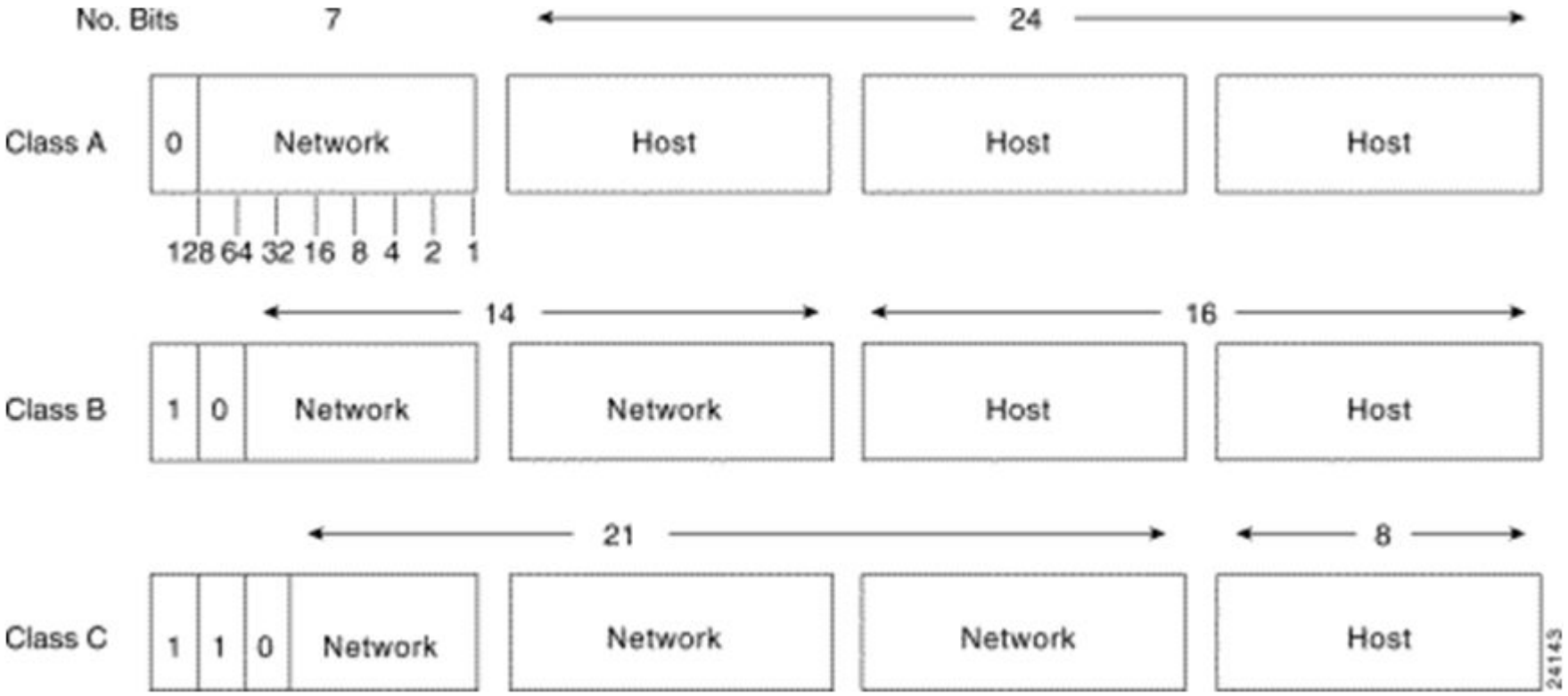
With a concept called subnetwork designing and implementing classes. The first 3 bits of MSB(Most Significant Bit) octet defined the class of address.

Class A	0-126
Class B	128-191
Class C	192-223
Class D	224-239
Class E	240-254

We also needed some private space conserved for computers which did not want to be connected to internet but still wished to be over network

So, based on classes reserved private IPv4 classes were created

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


No. Bits
7
24
Class A
0
Network
Host
Host
Host
128 64 32 16 8 4 2 1
14
16
Class B
1
0
Network
Network
Host
Host
21
8
Class C
1
1
0
Network
Network
Network
Host
24143

Subnet Mask

Consider IP Address 192.168.2.64/26

- First few bits (left to right) identify network/subnet
- Remaining bits identify host/interface

We need to find out

- Number of hosts
- Network Address
- Broadcast Address

Difference between NAT and Bridged

With NAT the IPs of the virtual machines and the network your host is connecting to are separated. Meaning your VMs are on a different subnet. You can access the network because your host is doing Network Address Translation. The IP is assigned by a DHCP running on the host

With a bridged interface your virtual machines are directly connected to the network the network interface they are using is connected to. This means in your case that they will be directly connected to the network your host connects to, getting IP addresses from the DHCP server running on the network (which probably also gives your host its IP).