



# IP v4 Addressing

# Class D address

32 bit

1110 Multicast ID

1 1 1 0 4 bit 8 bit 8 bit 8 bit

$2^7$   $2^6$   $2^5$   $2^4$   $2^3$   $2^2$   $2^1$   $2^0$

1 1 1 0 0 0 0 0 00000000 00000000 00000000

224

0

0

0

224.0.0.0

$2^7$   $2^6$   $2^5$   $2^4$   $2^3$   $2^2$   $2^1$   $2^0$

1 1 1 0 1 1 1 1 11111111 11111111 11111111

255

255

255

239

239.255.255.255

## Note

***Class D addresses  
are used for multicasting;  
there is only  
one block in this class.***

# Class E address

32 bit

1111

Reserved for future use

1 1 1 1

4 bit

8 bit

8 bit

8 bit

$2^7$   $2^6$   $2^5$   $2^4$   $2^3$   $2^2$   $2^1$   $2^0$

1 1 1 1

0 0 0 0

00000000

00000000

00000000

240

0

0

0

240.0.0.0

$2^7$   $2^6$   $2^5$   $2^4$   $2^3$   $2^2$   $2^1$   $2^0$

1 1 1 1

1 1 1 1

11111111

11111111

11111111

255

255

255

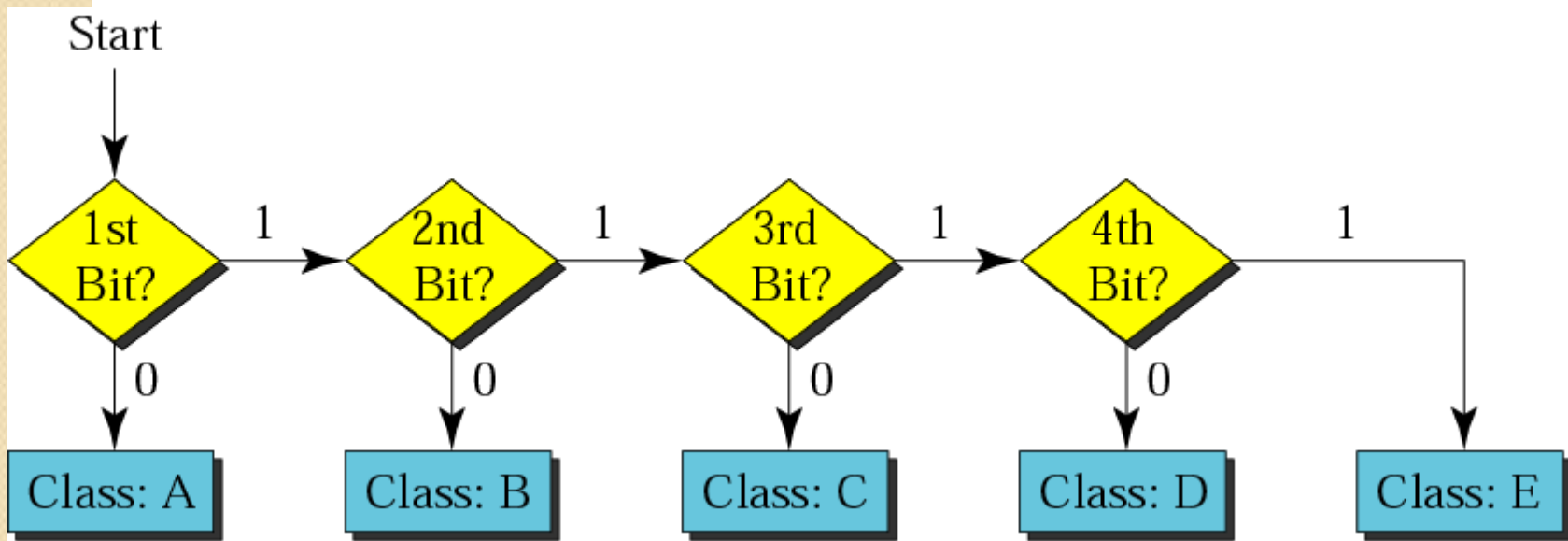
255

255.255.255.255

## Note

***Class E addresses are reserved for special purposes; most of the block is wasted.***

# Finding the address class



## *Example 6*

Find the class of the address:

00000001      00001011      00001011  
11101111

## *Solution*

The first bit is 0. This is a class A address.

## *Example 6 (Continued)*

Find the class of the address:

11000001      10000011      00011011  
11111111

## *Solution*

The first 2 bits are 1; the third bit is 0.  
This is a class C address.



## Finding the class in decimal notation

	First byte	Second byte	Third byte	Fourth byte
Class A	<b>0 to 127</b>			
Class B	<b>128 to 191</b>			
Class C	<b>192 to 223</b>			
Class D	<b>224 to 239</b>			
Class E	<b>240 to 255</b>			

### *Example 7*

Find the class of the address:

**227.12.14.87**

### *Solution*

The first byte is 227 (between 224 and 239)  
the class is D.

## *Example 7 (Continued)*

Find the class of the address:

**193.14.56.22**

### *Solution*

The first byte is 193 (between 192 and 223)  
the class is C.

# Network Addresses

The network address is the first address.

The network address defines the network to the rest of the Internet.

Given the network address, we can find the class of the address, the block, and the range of the addresses in the block

## Note

***In classful addressing,  
the network address  
(the first address in the block)  
is the one that is assigned  
to the organization.***

## ***Example 9***

Given the network address 17.0.0.0, find the class, the block, and the range of the addresses.

## ***Solution***

The class is A because the first byte is between 0 and 127. The block has a netid of 17. The addresses range from 17.0.0.0 To 17.255.255.255.

## ***Example 10***

Given the network address 132.21.0.0, find the class, the block, and the range of the addresses.

## ***Solution***

The class is B because the first byte is between 128 and 191. The block has a netid of 132.21. The addresses range from 132.21.0.0 to 132.21.255.255

## ***Example 11***

Given the network address 220.34.76.0, find the class, the block, and the range of the addresses.

## ***Solution***

The class is C because the first byte is between

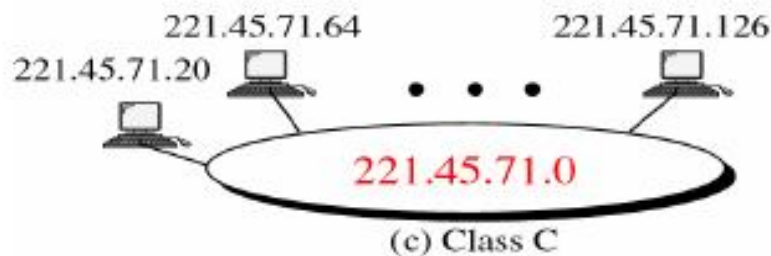
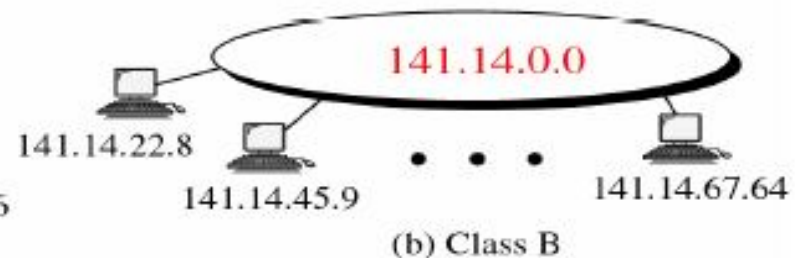
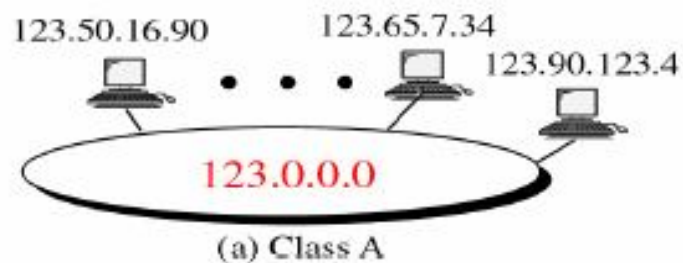
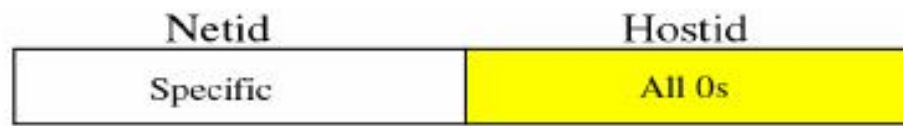
192 and 223. The block has a netid of 220.34.76.

The addresses range from 220.34.76.0

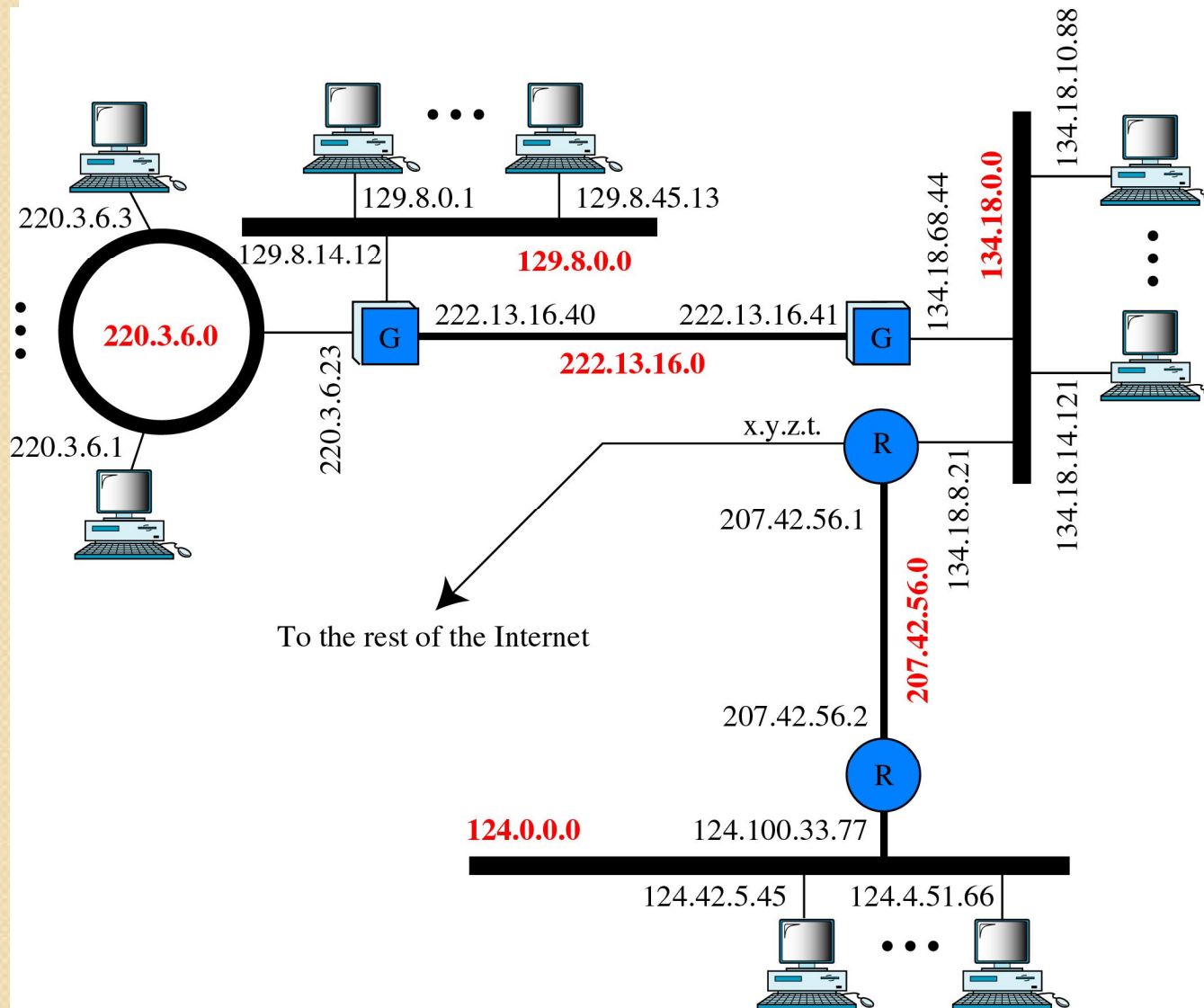
to 220.34.76.255



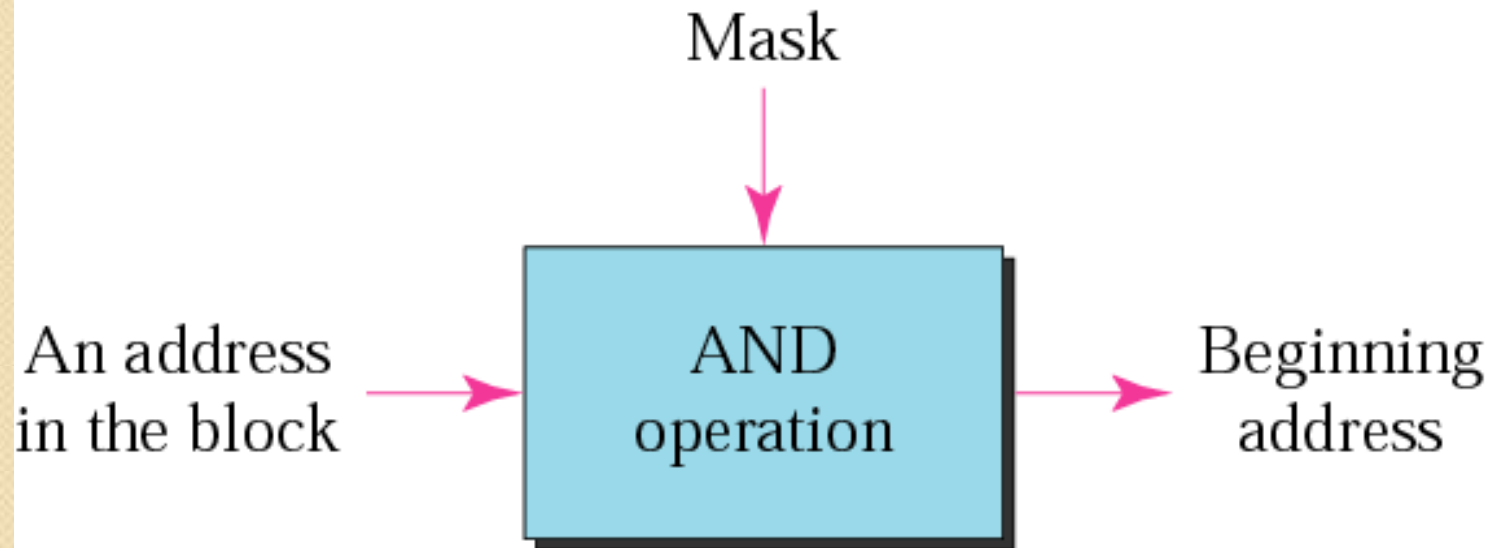
# Network Address



# Network and Host Addresses



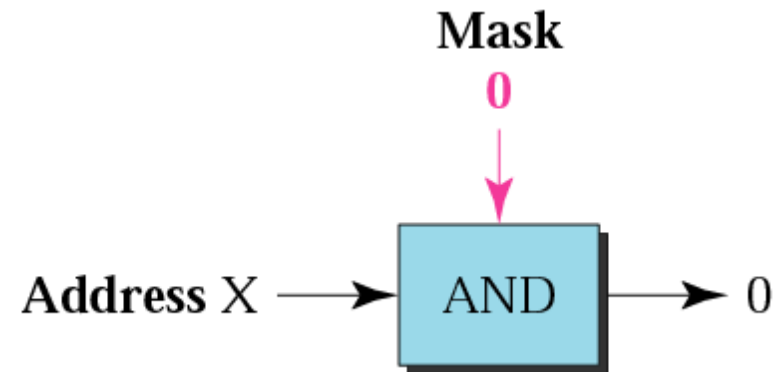
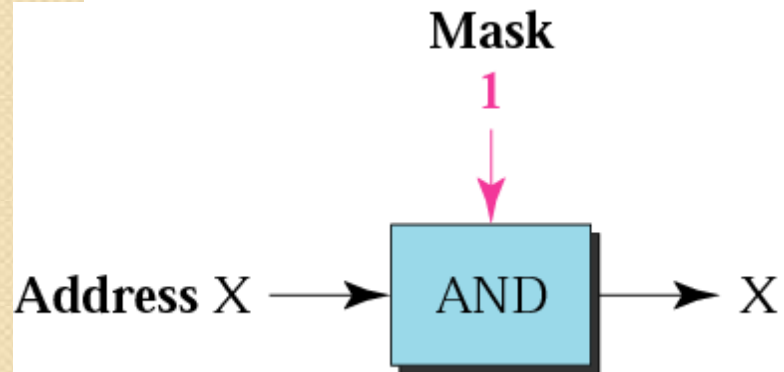
# Masking concept



# Mask

A mask is a 32-bit binary number that gives the first address in the block (the network address) when bitwise AND with an address in the block. An address mask determines which portion of the IP address is identify the network and which identify the host.

# AND operation

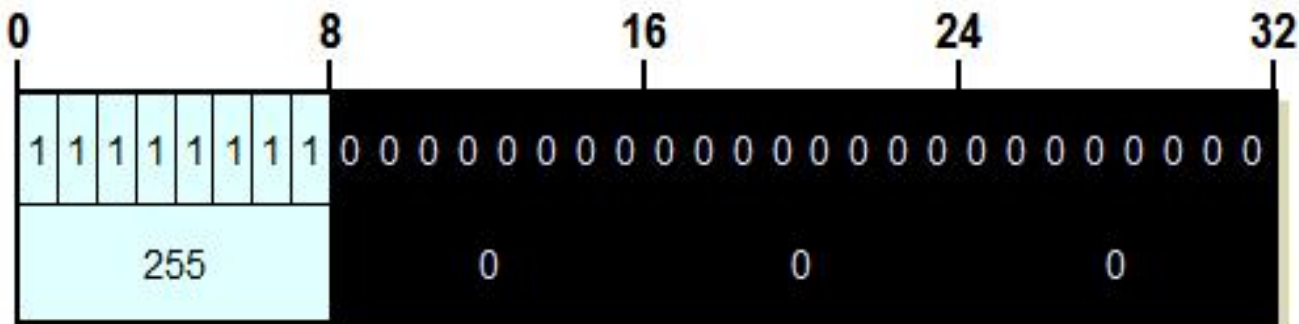


## Note

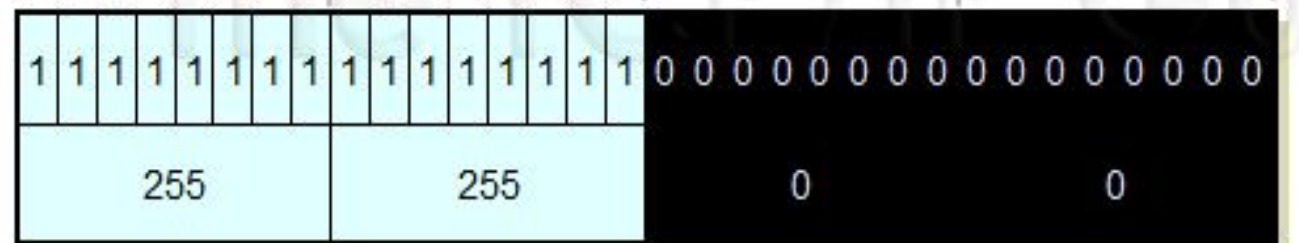
***The network address is the beginning address of each block. It can be found by applying the default mask to any of the addresses in the block (including itself). It retains the **netid** of the block and sets the **hostid** to zero.***

# Default masks

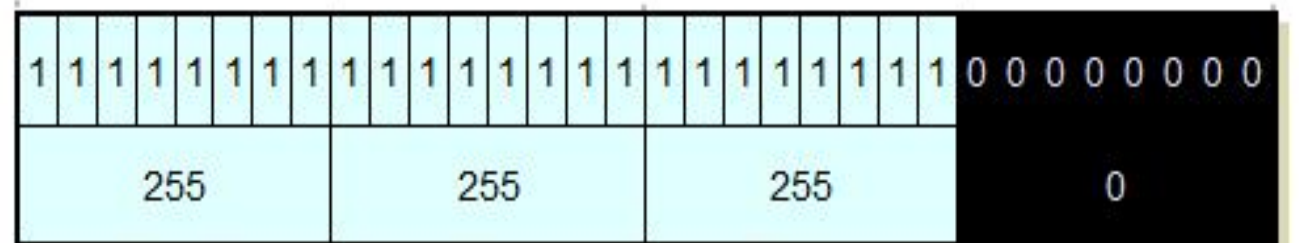
<i>Class</i>	<i>Binary</i>	<i>Dotted-Decimal</i>
A	11111111 00000000 00000000 00000000	255.0.0.0
B	11111111 11111111 00000000 00000000	255.255.0.0
C	11111111 11111111 11111111 00000000	255.255.255.0



**Class A Default Subnet Mask (255.0.0.0)**



**Class B Default Subnet Mask (255.255.0.0)**



**Class C Default Subnet Mask (255.255.255.0)**



### *Example 12*

Given the address 23.56.7.91 and the default class A mask, find the beginning address (network address).

### *Solution*

The default mask is 255.0.0.0, which means that only the first byte is preserved and the other 3 bytes are set to 0s. The network address is 23.0.0.0.

### *Example 13*

Given the address 132.6.17.85 and the default class B mask, find the beginning address (network address).

### *Solution*

The default mask is 255.255.0.0, which means that the first 2 bytes are preserved and the other 2 bytes are set to 0s. The network address is 132.6.0.0.

### *Example 14*

Given the address 201.180.56.5 and the class C default mask, find the beginning address (network address).

### *Solution*

The default mask is 255.255.255.0, which means that the first 3 bytes are preserved and the last byte is set to 0. The network address is 201.180.56.0.

## Note

***We must not  
apply the default mask  
of one class to  
an address belonging  
to another class.***



# Application

- To identify the Networks and hosts.
- To communicate with hosts belonging to different networks.
- To resolve the issues related with **PACKET LOSSES.**



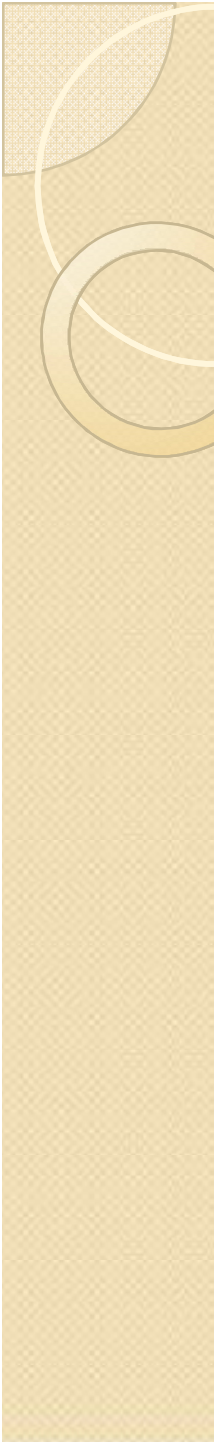
# Scope of Research

- Geolocating IP Addresses on 3G Networks
- New Formats for IP Addressing with the increasing of Networks



# Assignment

1. Your Organization is currently having 200 hosts in the network. Which class of IP addresses will be assigned to each host in the network?
2. Under certain circumstances, if number of hosts are increased to 500; how those IP addresses will be managed? Whether we need to change the class of Addressing (Yes/No) and Why?

- 
- **Given the ip 130.11.200.1**
  - Find
    - Which class it belongs to?
    - Netid of this ip address
    - Range of ip addresses in the network
    - What is the subnet mask?





# Applications

- IPv4 addressing is needed to uniquely identify each node on the network. This addressing provides a logical address to each node in the network.



# Scope of Research

- Dynamic addressing in mobile domain



# Assignment

- How do you find the class of address given you the ip address?