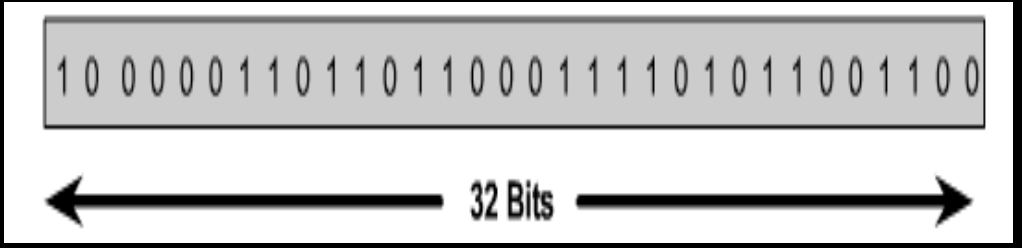
IP Addressing

What is an IP address

- An IP address is a 32-bit sequence of 1s and 0s.
- A way to identify machines on a network
- A unique identifier
- A numerical label



IP usage

- Used to connect to another computer
- Allows transfers of files and e-mail

What is an Internet Protocol

- Protocol used for communicating data
- Across a packet-switched

Services provided by IP

- Addressing
- Fragmentation

Part of IP Address

- Network Part
- Local or Host Part

IP Structure

- IP addresses consist of four sections
- Each section is 8 bits long
- Each section can range from 0 to 255
- Written, for example, 128.35.0.72

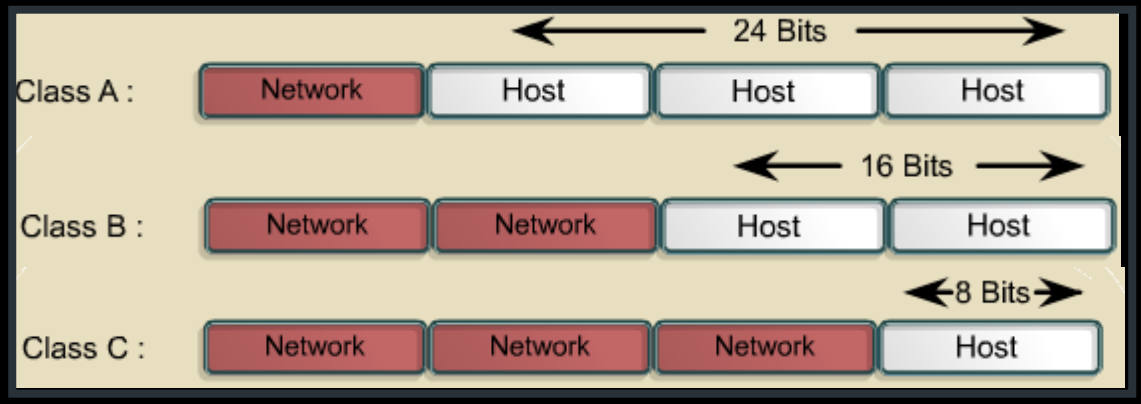
IP structure

- 5 Classes of IP address A B C D and E
- Class A reserved for governments
- Class B reserved for medium companies
- Class C reserved for small companies
- Class D are reserved for multicasting
- Class E are reserved for future use

IP ranges

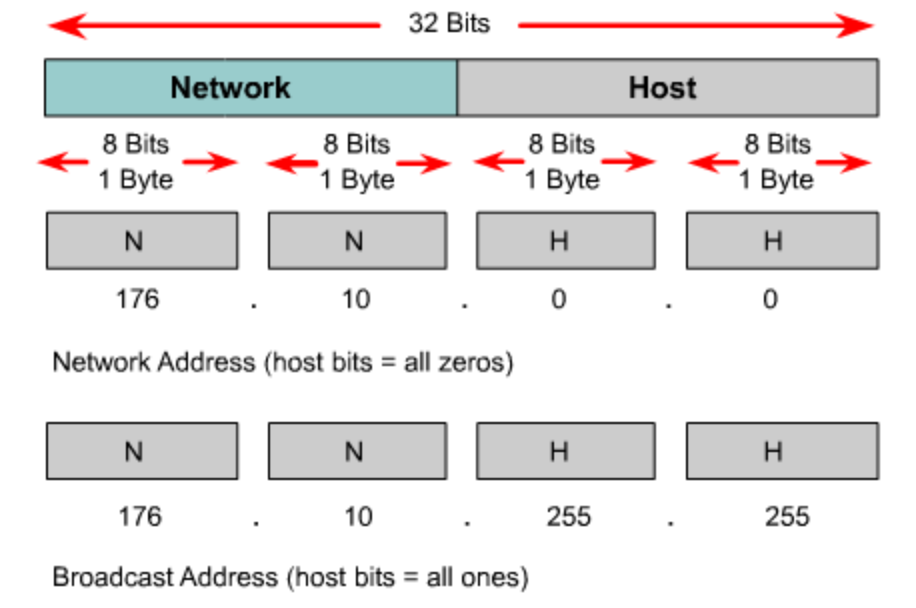
Class	Address Range	Supports
Class A	1.0.0.1 to 126.255.255.254	Supports 16 million hosts on each of 127 networks.
Class B	128.1.0.1 to 191.255.255.254	Supports 65,000 hosts on each of 16,000 networks.
Class C	192.0.1.1 to 223.255.254.254	Supports 254 hosts on each of 2 million networks.
Class D	224.0.0.0 to 239.255.255.255	Reserved for multicast groups.
Class E	240.0.0.0 to 254.255.255.254	Reserved for future use, or Research and Development Purposes.

IP addresses are divided into classes A,B and C to define large, medium, and small networks.



Address Class	High-Order Bits	First Octet Address Range	Number of Bits in the Network Address	Number of Networks	Number of Hosts per Network
Class A	0	0-127	8	126	16,777,216
Class B	10	128-191	16	16,384	65,536
Class C	110	192-223	24	2,097,152	254
Class D	1110	224-239	28	N/A	N/A

Example

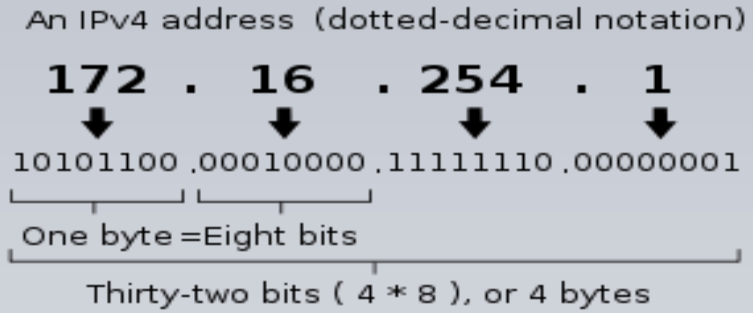

32 Bits
Network
Host
8 Bits
1 Byte
8 Bits
1 Byte
8 Bits
1 Byte
8 Bits
1 Byte
N
N
H
H
176
.
10
.
0
.
0
Network Address (host bits = all zeros)
N
N
H
H
176
.
10
.
255
.
255
Broadcast Address (host bits = all ones)

How to Calculate

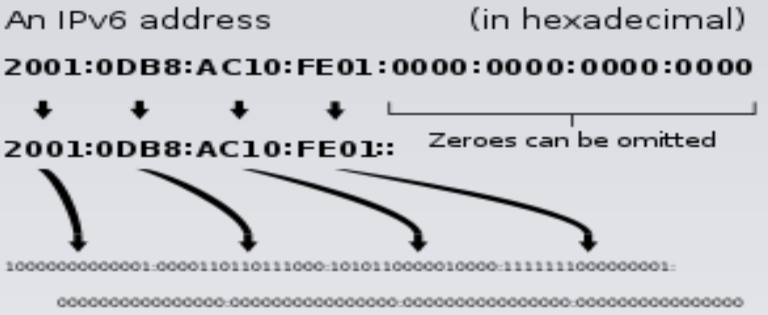
Historical classful network architecture						
Class	First octet in binary	Range of first octet	Network ID	Host ID	Number of networks	Number of addresses
A	0XXXXXXX	0 - 127	a	b.c.d	$2^7 = 128$	$2^{24}-2 = 16,777,214$
B	10XXXXXX	128 - 191	a.b	c.d	$2^{14} = 16,384$	$2^{16}-2 = 65,534$
C	110XXXXX	192 - 223	a.b.c	d	$2^{21} = 2,097,152$	$2^8-2 = 254$

IP versions

- IP version 4 addresses



- IP version 6 addresses



IP versions

- IPv4: 32-bit* number: Written in Dotted Decimal Notation

205.150.58.7

4 billion different host addresses

- IPv6: 128-bit* number: Written in Hex Decimal Notation

2001:0503:0C27:0000:0000:0000:0000:0000

16 billion billion network addresses

Types of IP address

- Static address
- Dynamic address

Types of IP address

- Static IP address
  - manually input by network administrator
  - manageable for small networks
  - requires careful checks to avoid duplication

Types of IP address

- Dynamic IP address
- examples - BOOTP, DHCP
  - assigned by server when host boots
  - derived automatically from a range of addresses
  - duration of ‘lease’ negotiated, then address released back to server

How to determine an IP address.

- Microsoft Windows Users
- Click Start / Run and type: **cmd** or **command** to open a Windows command line.
- From the prompt, type **ipconfig** and press enter. This should give you information similar to what is shown below.
- Windows XP IP Configuration
- Ethernet adapter Local Area Connection:
- Connection-specific DNS Suffix . :
  IP Address. . . . . : 192.168.1.101
  Subnet Mask . . . . . : 255.255.255.0
  Default Gateway . . . . . : 192.168.1.1

How do I determine the IP address of another computer or website?

- We must either the computer name or domain name
- use the ping command
- Example:

c:\>ping google.com

Pinging google.com [209.85.231.104] with 32 bytes of data:

Reply from 209.85.231.104: bytes=32 time=29ms TTL=54 ....

Ping statistics for 204.228.150.3: Packets: Sent = 4, Received = 4, Lost = 0 (0% loss), Approximate round trip times in milli-seconds: Minimum = 28ms, Maximum = 29ms, Average = 28ms

in the above example the IP address 209.85.231.104 is the IP address of the google.com domain.

Troubleshoot Basic IP Problems

- Series of commands :

c:\>IPCONFIG /RELEASE
c:\>IPCONFIG /RENEW
c:\>IPCONFIG /ALL

- Communications Failure

References :

- www.howstuffworks.com
- www.ip-adress.com
- Ip.com
- Webopedia.com

Thanks For Your Time