Basics Of Networking

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Basics Of Networking

Brief History Of Networking (Ethernet)

1968 Norman Abramson

University of Hawaii - ALOHA System

1972 Bob Metcalfe

Xerox Palo Alto Research Center

ALTO ALOHA System

Turned Ethernet Into Industry Standard

Founded Computer, Communication, and Compatibility Corporation

Seven Layer Open System Interconnection (OSI) Model

- Develop to resolve incompatibility issues and allow hardware from different manufacturers to communicate.
- Important to understand for network troubleshooting
- Modularizes different pieces of the network

Seven Layer Open System Interconnection (OSI) Model

- Structured approach to the transmission of data
- Lower levels (layers 1-4) deal with the interconnection of processors
- Upper levels (layers 5-7) deal with the interconnection of applications

Seven Layer Open System Interconnection (OSI) Model

7	Application
6	Presentation
5	Session
4	Transport
3	Network
2	Data Link
1	Physical

Seven Layer Open System Interconnection (OSI) Model: *Seven Layers In Detail*

7 Application

window for applications to access network services

network apps that come with TCP/IP

examples: Berkeley & Arpa Services

6 Presentation

responsible for protocol conversion, translation, encryption, and graphic command expansion

how data is presented

example: ascii

Seven Layer Open System Interconnection (OSI) Model: *Seven Layers In Detail*

5 Session Layer

allows for communication: setting up sockets

examples: NFS & Automounter

4 Transport Layer

ensures packets are delivered error-free,
in sequence, without losses or duplication

how to transport data

examples: TCP & UDP

Seven Layer Open System Interconnection (OSI) Model:
Seven Layers In Detail

3 Network Layer

responsible for addressing messages and translating logical names and addresses into physical address.

how data is routed

example: IP Address

2 Data Link Layer

adds control information used for frame type, routing, and segment information

lan card or network interface card hardware address

examples: Ethernet Address

Seven Layer Open System Interconnection (OSI) Model: *Seven Layers In Detail*

1 Physical Layer

transmits the unstructured raw bit stream over a physical media

specifies characteristics of cable

examples: twisted pair, coaxial, & fiber optic

Seven Layer Open System Interconnection (OSI) Model: *Additional Information*

7	Application	host name
6	Presentation	host name
5	Session	socket address
4	Transport	port address
3	Network	internet address
2	Data Link	link level address
1	Physical	“no addressing”

Seven Layer Open System Interconnection (OSI) Model:
HP-UX Specific Information

7	Application	hostname
6	Presentation	hostname
5	Session	netstat -an
4	Transport	netstat -an
3	Network	ifconfig lan0
2	Data Link	lanscan
1	Physical	linkbeat lights

Internet Protocol Address: *Definition*

- Unique number representing a node on a network
- Part of the seven layer OSI model
- Used to route packets along a network

Internet Protocol Address: *Two Parts*

- Network Address

  Common to all hosts / devices on same physical network
- Node Address

  Unique to the host on that network

Internet Protocol Address: *Structure*

- 32 bits (four bytes) long
- Written in “dotted decimal” format:

  15.24.190.4

- Includes both network and node address information
- Divided into five major classes:

  A B C D & E

Internet Protocol Address: *Dotted Decimal Format*

- Address in binary:

  01000001 00010010 00001011 10000111

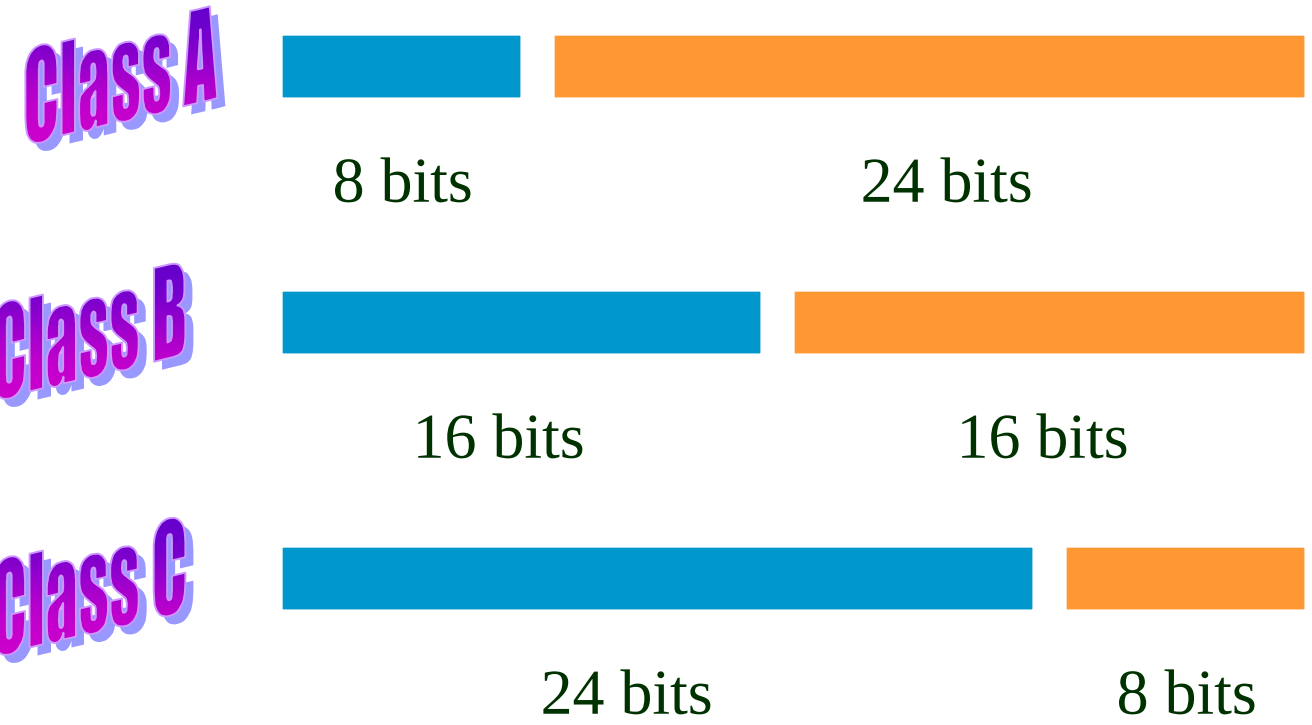
- Written in “dotted decimal” format:

  65.18.11.135

Network Portion

Host Portion

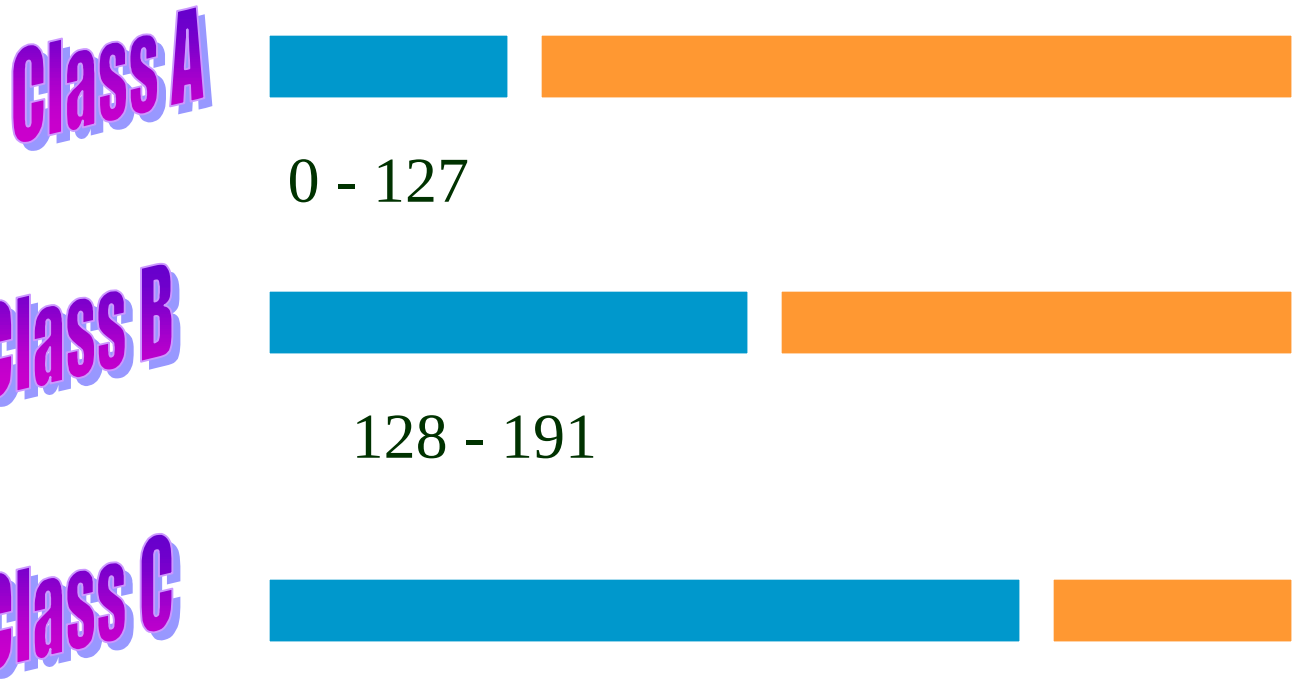
Internet Protocol Address:
Formulation Of IP Address



Network Range

Host Portion

Internet Protocol Address:
Formulation Of IP Address



Internet Protocol Address:
Class D & E

Range: 224 - 239

Multicast Group ID

Range: 240 - 247

Reserved for future use

Internet Protocol Address:
Two Reserved Addresses

Broadcast Address

Network Address

Internet Protocol Address: *Broadcast Address*

- A host uses the broadcast address to send a packet to every host within its same network
- Broadcast address is obtained by setting all bits of the host part to 1

Internet Protocol Address:
Broadcast Address Examples

Class A 15.255.255.255

Class B 148.22.255.255

Class C 192.161.32.255

Internet Protocol Address: *Network Address*

- Network address is used to specify a remote network.
- The *route command* uses the network address to configure routing.
- The network address is obtained by setting all bits of the host address to zero

Internet Protocol Address:
Network Address Examples

Class A 15.000.000.000

Class B 148.22.000.000

Class C 192.161.32.000

Link Level Address: *Definition*

- Unique address of a LAN interface.
- Value is usually set by the manufacturer
- Changing Link Level Address is not recommended

Link Level Address:
Also know as ...

- MAC address
- Ethernet address
- IEEE 802.3 address

Link Level Address: *Example*

- Address is usually provided in hexadecimal form:

  0x0800090012ab