Computer networking

Assignment - 01

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Computer Networking

IP addressing

Bit → Binary digit (0, 1)

1 Byte → 8 bit

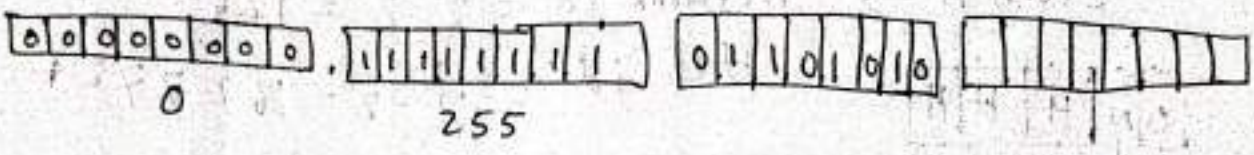
Octet → ..... (8 bit)

N = Network
H = Host

32 bits | 4 octets | 0-255 | 5 classes | N/H

Ip-addressing

- IPV4 (4 octets) = 32 bits
- IPV6 (16 octets) = 128 bits



IP addressing (class)

- class A — N H H H
- class B — N N H H
- class C — N N N H
- class D
- class E

(1) Notation of IP address

(2) IP range of different class

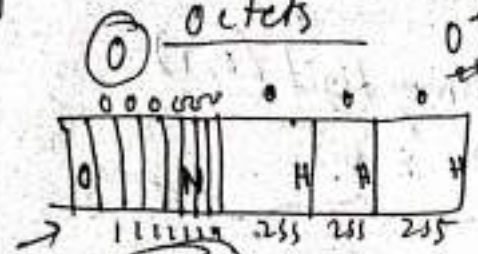
Notation:

- Binary → 10000000 . 00001100 . 00001111 . 00001010
- Decimal → 128 . 12 . 15 . 10
- Hexadecimal → 80 . C . F . A

Ip Range for different classes:-

128.12.15.10

Class Name

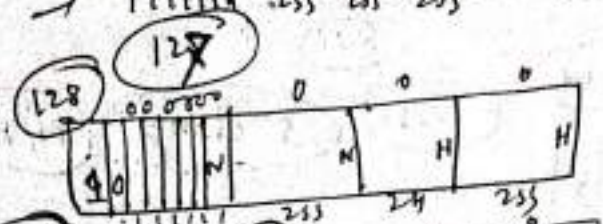


Network Id range

1 → 0.0.0.0

126.255.255.255

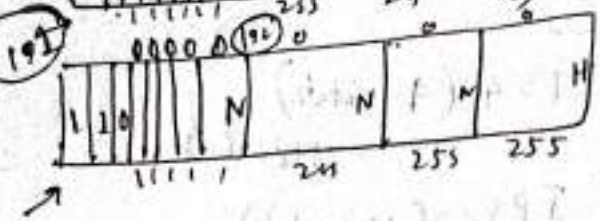
class A :



128.0.0.0

191.255.255.255

class B :

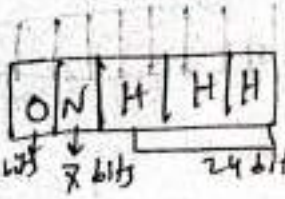


192.0.0.0

223.255.255.255

class C :

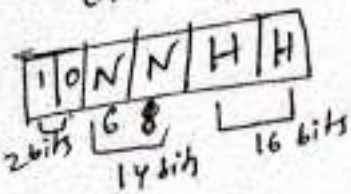
class A →



Network id = $2^7 - 2 = 126$

Host id = $2^{24} - 2 = 16777214$

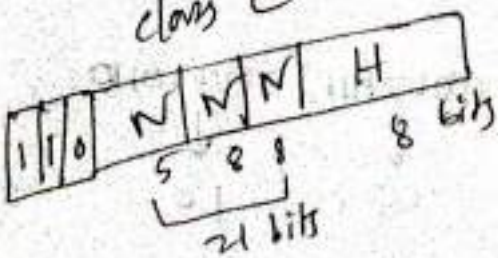
class B



Network id = $2^{14} = 16384$

Host id = $2^{16} - 2 = 65,534$

class C



Network id = $2^{21} = 20,97,152$

Host id = $2^8 - 2 = 254$

Subnetting

192.168.10.0

N

← 256

255

D	64
C	64
B	64
A	64

192 – 255

128 – 191

64 – 127

0 – 63

Network address

Broadcast address

1, 2, 3, 4, 5, ... 62

valid host

Subnet mask

computer কে বলে কোন কতটুকু অংশ Network এবং কতটুকু অংশ Host এ আছে।

IP → 192.168.10.10

subnet mask: 255.255.255.0

11111111.11111111.11111111.00000000

network

Host

মাস্ক (mr bits)

network = 1

Host = 0

not changeable

255

changable

Question-1

IP → 192.168.10.0

subnet mask: 255.255.255.224

Find out

1. Block size ?
2. Number of subnets ?
3. Number of valid hosts ?
4. What are the valid subnets on subnet ID ?
5. What are the first valid host & Last valid host ?
6. What's the Broadcast address ?

255 . 255 . 255 . 224

Sol^n: 11111111 . 11111111 . 11111111 . 11100000 → x = 3

① Block size = 256 − 224 = 32

② Number of subnets = 2^x ← number of 1's

$= 2^3 = 8$ subnets

③ valid hosts = $2^y - 2$ → number of 0's

$= 2^5 - 2 = 30$

④

192.168.10.0 → 192.168.10.32 →

Subnet ID	0	32	64	96	128	160	192	224
first V.H	1	33	65	97	129	161	193	225
L.V.H	30	62	94	126	158	190	222	254
Broadcast	31	63	95	127	159	191	223	255

* 175.231.232.116/27 ← CIDR classless Inter Domain Routing

→ number of 1's

11111111 . 11111111 . 11111111 . 11100000

subnet mask: 255 . 255 . 255 . 224

Difference between Connection-oriented and Connectionless Service.

Connection-Oriented	connectionless
connection is established before data transfer	No prior connection is established
Reliable data transfer	Unreliable delivery
Guarantees order of packets	packets may arrive out of order
Uses acknowledgements	No acknowledgements
More overhead	Less overhead
Example: TCP	EX: UDP

Differentiate between point to point link and broadcast link.

Aspect	point to point link	Broadcast link
Definition:	A communication link that connects exactly two devices	A communication link where a single sender can transmit to multiple receivers simultaneously.
Number of devices:	Only two devices (one sender one reciever)	More than two devices share the same link
Addressing:	No need for destination addressing	Requires addressing
Bandwidth uses:	Between two devices	Between all devices
Security:	more secure	Less secure
Examples:	Telephone line, leased line	Ethernet LAN, wireless LAN
	one to one	one to many

Note: Suggestion

① Data circuit & data datagram

② Lecture 8 - 13 no → 1 set

③ Inter Routing / adaptive / Lecture 8 full

④ Flooding, Dijkstra, Distance vector Lecture-9

⑤ split Horizon

⑥ Link state

1 set { Lecture - 10 → most question
Ipv4, Ipv6, short to long in Ipv6,
3 way Handshake, connection release, connection control all type

1 set → VLSM, classless, - CT

#1 Differentiate between circuit-switched networks and packet-switched networks.

The primary difference lies in how data is transmitted and how the "path" is established between the sender and receiver.

Feature	Circuit-Switched	Packet-Switched
Connection	Dedicated path established for the duration of the session.	no dedicated path; data is divided into packets.
Path	All data follows the same physical path	packets may take different routes to the destination
Efficiency	Low	High
Example	Traditional Landline Telephone	The Internet (TCP/IP)

Write the subnet address, broadcast address and valid host range for the following:

IP address: 172.20.75.130

Subnet mask: 255.255.248.0

Solⁿ: Subnet mask in Binary: 11111111.11111111.11111000.00000000

Block size = 256 - 248 = 8

finding the subnet: In the third octet 75 the multiples of 8 are 0, 8, ... 64, 72, 80. since 75 falls between 72 and 80. the subnet starts at 72.

Results:

Subnet address: 172.20.72.0

Broadcast address: 172.20.79.255

valid host range: 172.20.72.1 to 172.20.79.254

An organization is assigned the network address 180.25.40.0. The organization requires six subnets with equal numbers of hosts. Design an appropriate subnetting scheme.

Soln:

Given Network 180.25.40.0

Requirement : 6 subnets.

Determine Borrowed Bits: we need $2^n \geq 6$

$n = 3 \quad (2^3 = 8)$

Default mask for class B → 255.255.0.0/16

new subnet mask → 255.255.0.0/19

11111111.11111111.11100000.00000000

= 255.255.224.0

Block size = 256 - 224 = 32

Subnet No.	Subnet address	Host Range
1	180.25.0.0	180.25.0.1 — 180.25.31.254
2	180.25.32.0	180.25.32.1 — 180.25.63.254
3	180.25.64.0	180.25.64.1 — 180.25.95.254
4	180.25.96.0	180.25.96.1 — 180.25.127.254
5	180.25.128.0	180.25.128.1 — 180.25.159.254
6	180.25.160.0	180.25.160.1 — 180.25.191.254