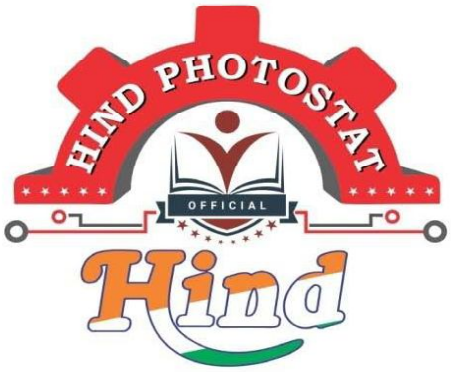

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Computer Network

By-Ram sir

- Theory
- Explanation
- Derivation
- Example
- Shortcuts
- Previous Years Question With Solution

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Computer Network

NIC Card

or

Physical address

or

Ethernet address

or

Implicit address

or

MAC address

48 bit address

Hexadecimal notation: 14:1A:12:13:12:16

SA·D·C

SMAC, DMAC

→ scope is local.

IP address

↓

IPv4 version

32 bit address

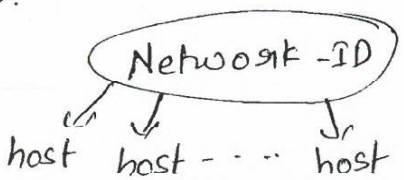
IANA → Internet Assign Number Authority.

Classful Addressing (Class) → A, B, C, D, E

ABCD Supports Unicasting

D Supports multicasting

E is reserved.



⇒ Two level hierarchy

Host → whenever an IP address is assign to computer it is known as host.

Classful addressing:

i) Binary notation:

01000000 . 10101010 . 10001101 . 11100010

2) Dotted decimal Notation.

41.89.99.121

41 → 00110011

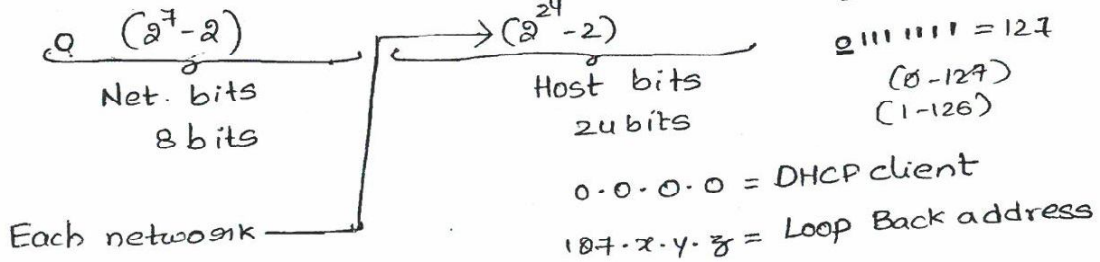
189 → 10111110

121 → 01111001

In Binary notation starting few Bits will decide the type of class

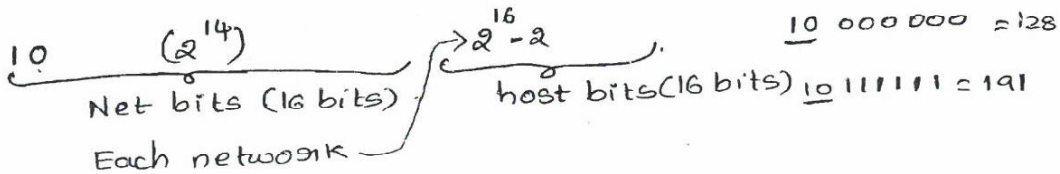
In the dotted decimal notation first octet will decide the type of class.

class A :



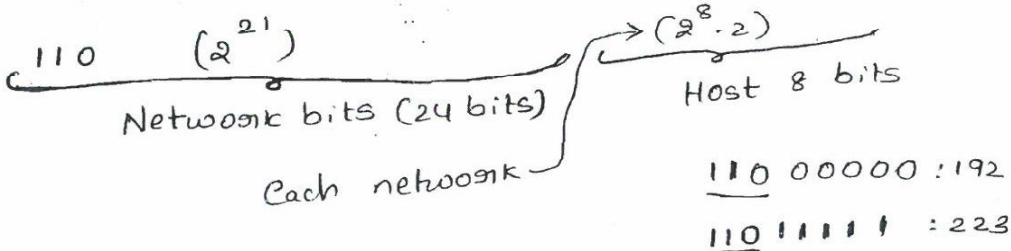
Eg: 40.50.60.70
↳ class A.

class B :



Eg: 136.41.93.89
↳ class B

class C :



Eg: 194.89.99.112
↳ class C

class D: 1110 — multicasting

225.14.16.17 → class D

1110 0000 : 224

1110 1111 : 239

class E: 1111

1111 0000 = 240

1111 1111 = 255

i) Network mask (or) Default mask { N bits = 1's, Host bits = 0's }

Allowing Something & Stopping Something

Class A : 11111111 00000000 00000000 00000000

255.0.0.0

Class B : 11111111 11111111 00000000 00000000

255.255.0.0

Class C : 255.255.255.0

1) IP_1 = 201.44.89.99

Net ID: ?

Direct Broadcast address of Network: ?

IP: 201.44.89.99 & Bitwise AND

mask: 255.255.255.0

201.44.89.0

201 : 11001001

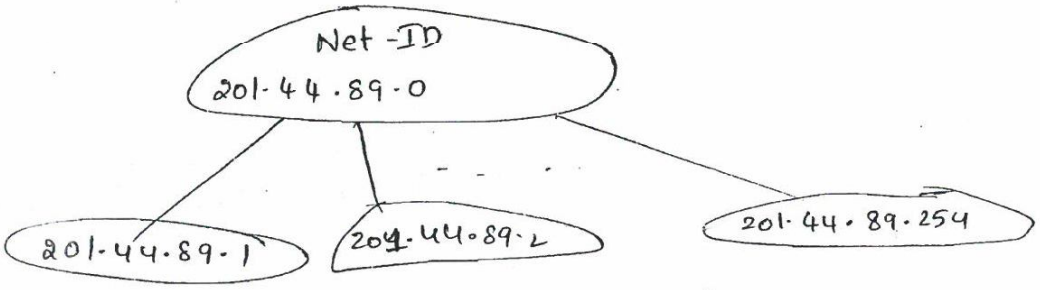
255 : 11111111

201 : 11001001

Net - ID = 201.44.89.0

By performing Bitwise AND b/w IP address & Network mask will get Network ID.

2)



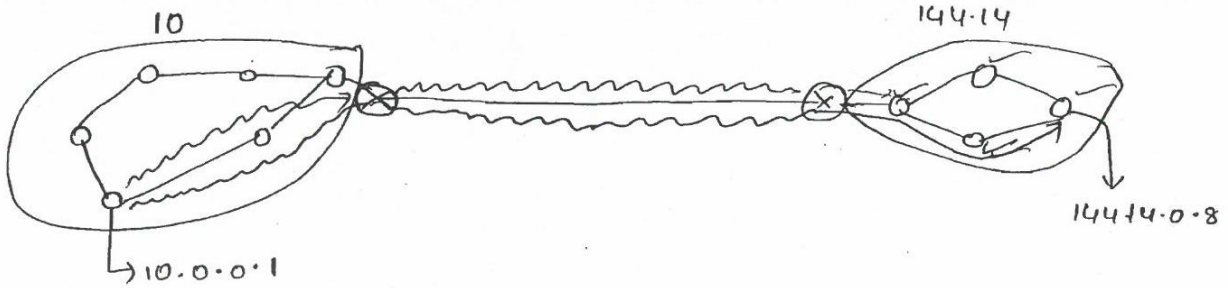
the Direct Brodcast address = 201.44.89.255 → to send data to all hosts in the N/w Id.

we are subtracting two addresses in the number of hosts in each Network because one is used for Net-ID and other one is used for DBA of the Network.

2) IP_1 : 144.89.99.142

Net-ID: 144.89.0.0 DBA: 144.89.255.255

Pseudo approach of N/w :-



①

D	S.IP	D.IP
	10.0.0.1	144.14.0.8

Data

⇒ unicasting packet b/w Networks

②

D	S.IP	D.IP
	10.0.0.1	144.14.255.255

(D.IP → Direct Broadcast address)

⇒ Broadcasting on the other Network

D.B.A is always used as destination IP.

3)

D	S.IP	D.IP
	10.0.0.1	10.0.0.6

⇒ unicasting is same network

4) Special case

D	S.IP	D.IP
	10.0.0.1	255.255.255.255

(D.IP → LBA)

⇒ Broadcasting with in Network.

Limited Broadcast address

(Scope is local)

D	255.255.255.255	10.0.0.1

which of the following is used as destination IP only.

a) 10.255.255.255

b) 172.16.0.1

c) 191.168.8.3

a) 255.255.255.255

Drawbacks of classful addressing:

Class A : $(2^7 - 2)$ Networks ⇒ each network $(2^{24} - 2)$ hosts

5000 — 90,00,000

Class B : (2^{14}) Networks ⇒ each Network $(2^{16} - 2)$ hosts

5000 — 65534

Subnetting

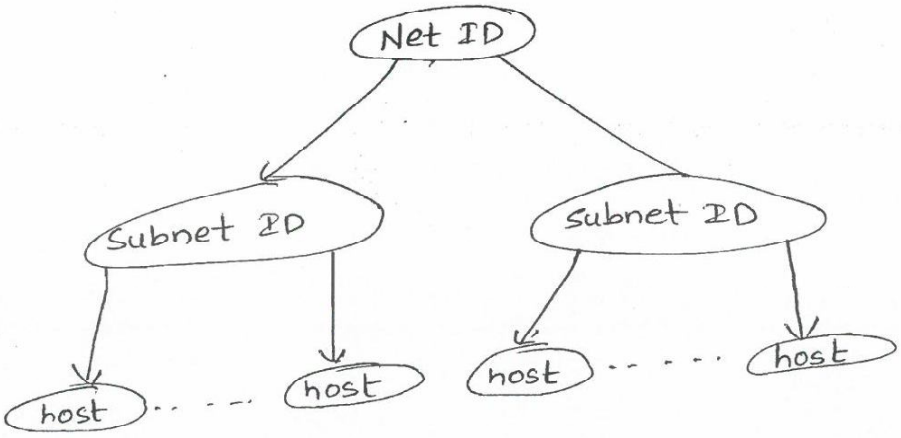
Class C : 2^{21} Networks ⇒ each Network $(2^8 - 2)$ hosts

1000 — 254

Supernetting

Subnetting

Dividing a Network into small parts for effective utilisation of IP addresses. is known as what Subnetting.



In class C:

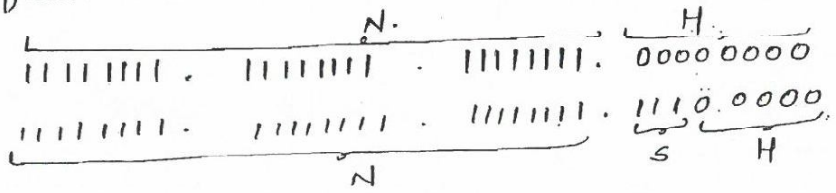
if subnet mask: 255.255.255.224

No. of subnets: $2^3 - 2 = 6$

No. of hosts in each subnet: $2^5 - 2 = 30$

Sol:

default subnet mask of C:



During Subnetting Subnet bits are borrowed from Host bits.

2) In class B

if subnet mask = 255.255.252.0

No. of subnets = ? $2^6 - 2 = 62$.

No. of hosts in each subject = ? $2^{10} - 2 = 1022$

252
128
64
62
2

Subnet mask of class B:

N H

11111111 . 11111111 . 00000000 . 00000000

Given N S H

11111111 . 11111111 . 111111 00 . 00000000

3) IP_1 : 201.44.89.99 → class C

Subnet mask : 255.255.255.224.

(1) subnet Id: 201.44.89.96

99: 01100011
224: 11100000
96: 01100000

3rd.

11111111 . 11111111 . 11111111 . 111 00000

Network bits | Subnet bits | Host bits

2) Subnet no: 3rd subnet.

For a subnet ID host bits will always be zero's

∴ Subnet mask will give the information how many are the subnet bits and host bits.