CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

Lecture No-04

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Classful Addressing

IP Address Representation

255
-8
247

- Binary: 11001000 . 00111111 . 11111100 . 11110111
- Decimal: 200 . 63 . 252 . 247
- Hexadecimal: C8 . 3F . FC . F7

$(\text{Hexadecimal})_{16}$

No → 0 to 15

0000 → 0
0001 → 1
0010 → 2
0011 → 3
0100 → 4
0101 → 5
0110 → 6
0111 → 7
1000 → 8
1001 → 9

1010 → 10 → A
1011 → 11 → B
1100 → 12 → C
1101 → 13 → D
1110 → 14 → E
1111 → 15 → F

{0-9, A-F}

Range of IP Addresses

Class-A → 0 → 2^{31} (1-126)

NID=8bit | HID=24bit

8bit	.	8 bit	.	8bit	.	8bit

0	7bits

0 - - - - - - -

0 0 0 0 0 0 0 0 → 0 X

0 0 0 0 0 0 0 1 → 1

0 0 0 0 0 0 1 0 → 2

0 0 0 0 0 0 1 1 → 3

. . . . .

0 1 1 1 1 1 1 0 → 126

0 1 1 1 1 1 1 1 → 127 X

0.0.0.0 → Default Route
or
DHCP client

127.X.X.X → Loop Back testing
or
Self Connectivity
or
Interprocess comm^{n}

Note:

Whenever we Have all 0's or all 1's either in the NID or in the HID of any IP Addresses. These IP Addresses are reserved For some special purpose. We can't assign these IP Addresses to any Computer (Host)

NID | HID

8 | 24

2^8 N/w's 2^{24} Host/Network

$2^7 - 2 = 126$ N/w's

$2^{24} - 2$ Host/Network

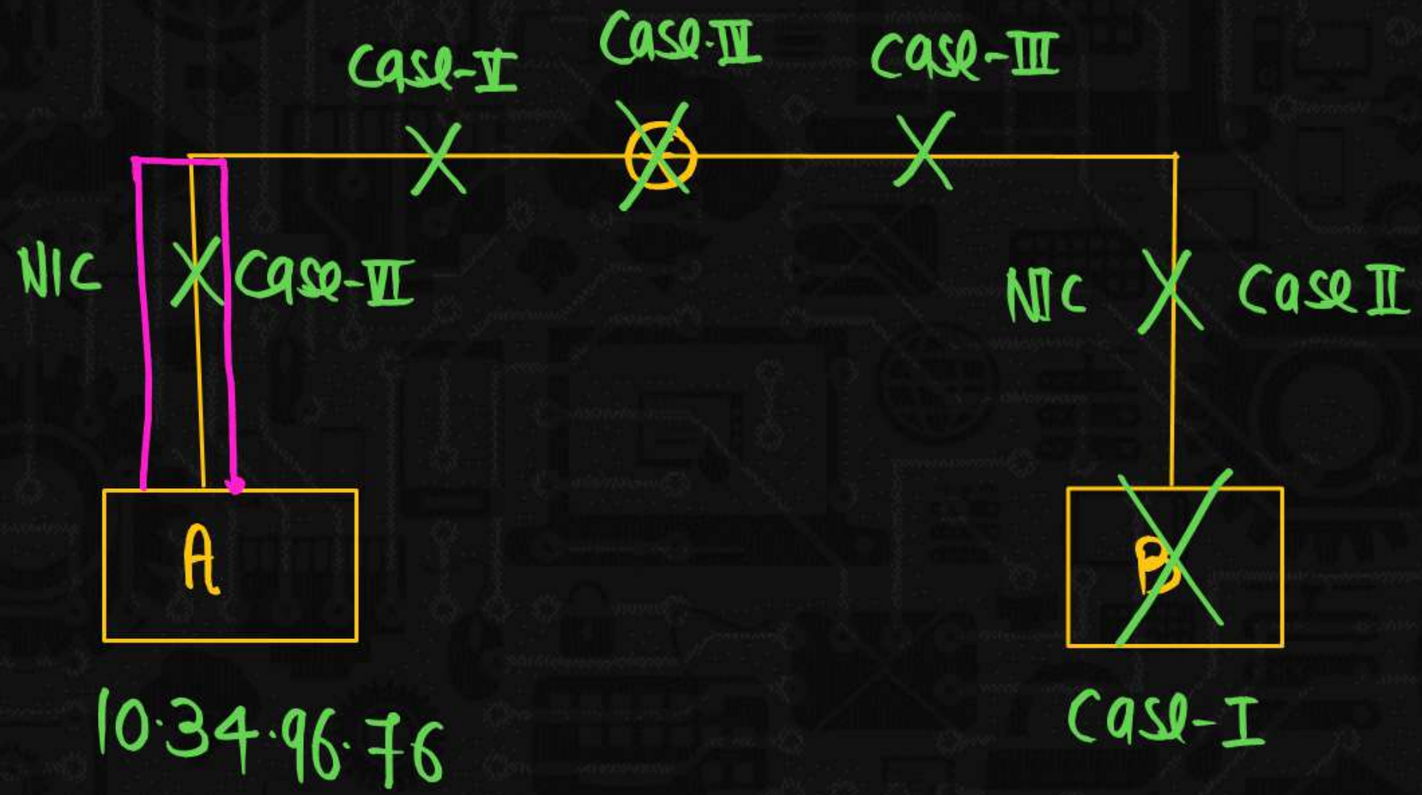
X.0.0.0 X

X.255.255.255 X

HID = 24bit

00000000.00000000.00000000 → 0.0.0 X

11111111.11111111.11111111 → 255.255.255 X



S.I.P	D.I.P
10.34.96.76	127.X.X.X

✓

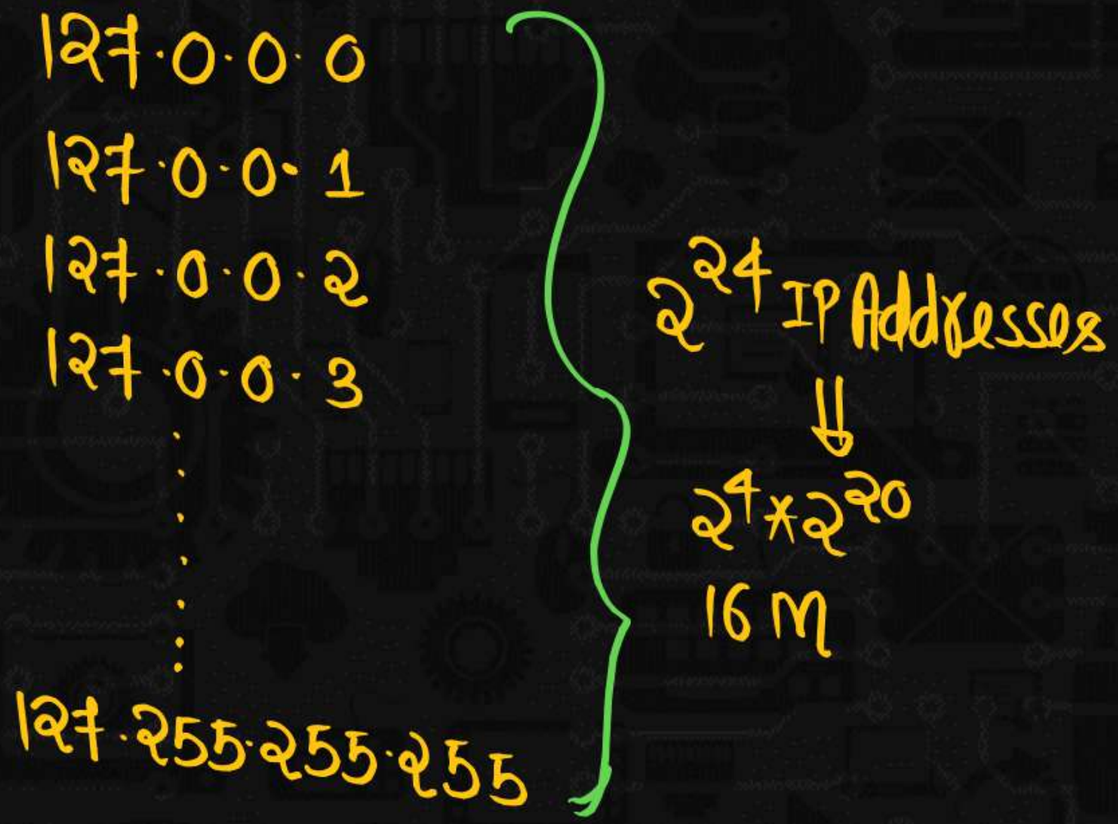
S.I.P	DIP
127.X.X.X	10.34.96.76

Note:

① 127.x.x.x can't be used as source IP Addresses

② 127.x.x.x will Always be used as a Destination IP Address

③ 127.x.x.x is reserved For some special purpose. so we can't assign these IP Addresses to any Host(computer)



127.0.0.0 X

127.255.255.255 X

Class-B → 10 → 2^{30} (128-191)

10 - - - - - -

10 0 0 0 0 0 0 → 128
10 0 0 0 0 0 1 → 129
10 0 0 0 0 1 0 → 130
⋮
10 1 1 1 1 1 1 → 191

64

NID
16
↓
2^{16} Networks
↓
2^{14} Networks

HID
16
↓
2^{16} Host/Network
↓
$2^{16} - 2$ Host/Network

X.X.0.0 → X

X.X.255.255 → X

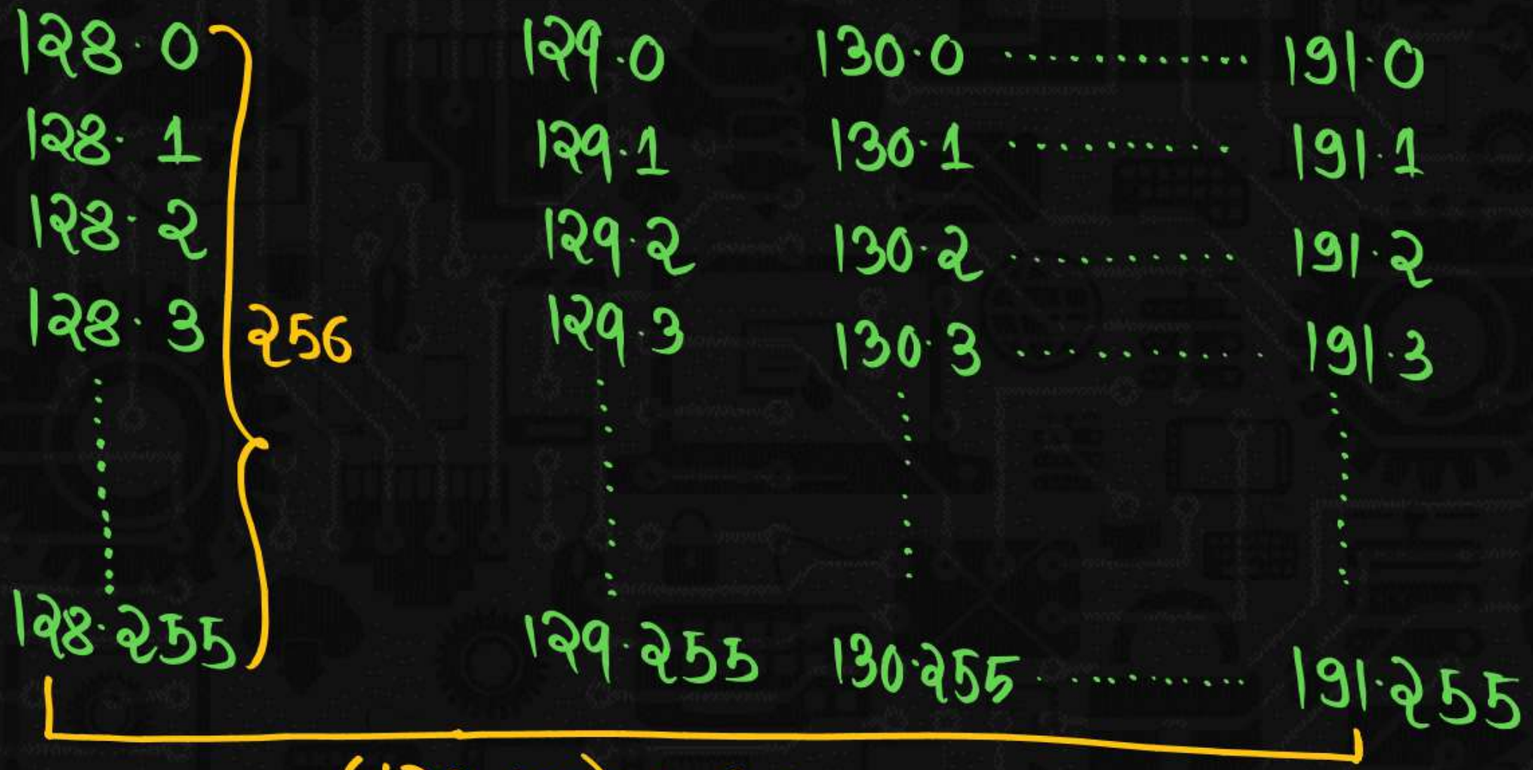
can't Assign to any computer

HID = 16 bit

00000000.00000000 → 0.0 X

⋮

11111111.11111111 → 255.255 X



$256 * 64 = 2^8 * 2^6 = 2^{14}$ Networks

128.0.0.0 ✗

128.0.0.1 ✓

128.0.0.2 ✓

⋮

128.255.255.254 ✓

128.255.255.255 ✗

Class-C → 110 → 2^{29} (192-223)

110 - - - - -

110 0 0 0 0 0 → 192
110 0 0 0 1 → 193
110 0 0 1 0 → 194
⋮
110 1 1 1 1 1 → 223

32

$(32 * 2^8 * 2^8 = 2^5 * 2^8 * 2^8 = 2^{21}$ Networks)

NID
24

2^{24} Networks

2^{21} Networks

HID
8

2^{8} Host/Network

$2^{8}-2$ Host/Network

① X.X.X.0
② X.X.X.255

Can't Assign to any computer

HID = 8 bit

00000000 → 0

⋮

11111111 → 255

Class-D → 1110 → 2^{28} (224-239)

1110 ----

1110 0000 → 224

1110 0001 → 225

⋮ ⋮

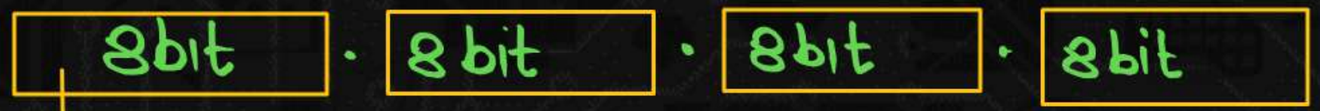
1110 1111 → 239

Note:

① No Network-id and No Host-id in class-D

② class-D is reserved for multicasting

Class-E → 1111 → 2^{28} (240-255)



1111 ----

1111 0000 → 240

1111 0001 → 241

⋮

1111 1111 → 255

Note

① No Network-id and No-Host-id in class-E

② class-E is reserved For Research and Future purpose

CLASSFUL ADDRESSING

Short- Notes

- Class A → 0 → (1 - 126), No. of IP Addresses = 2^{31}
- Class B → 10 → (128 - 191), No. of IP Addresses = 2^{30}
- Class C → 110 → (192 - 223), No. of IP Addresses = 2^{29}
- Class D → 1110 → (224 - 239), No. of IP Addresses = 2^{28}
- Class E → 1111 → (240 - 255), No. of IP Addresses = 2^{28}

CLASSFUL ADDRESSING

Class	Number of Networks	Number of hosts / Network
Class A	$2^7 - 2 = 126$	$2^{24} - 2$ = 1,67,77,214 hosts
Class B	$2^{14} = 16,384$	$2^{16} - 2$ = 65,534 hosts
Class C	$2^{21} = 20,97,152$	$2^8 - 2$ = 254 hosts
Class D	No NID and HID, all 28 remaining bits are used to define multicast address	
Class E	No NID and HID, it is meant for research and future purpose	

PROBLEMS Solving on Classfull Addressing

Q

Find the class B address from the following.

A. 01111111.01010101.11111110.00001111

B. 11101111.01001110.11001100.01010011

C. 10001111.00000011.11111100.00111100 ✓

Class-B

D. 11011111.11001111.11100010.11111010

Class-A → 0
Class-B → 10
Class-C → 110
- D → 1110
E → 1111

Q. Find the invalid IP address from the following choices? (Assuming Classful addressing scheme is followed)

A. 150.168.10.1

B. 190.100.1.100

C. 10.256.100.100

D. 80.10.254.100

Q. Which of the following addresses can be used for interprocess communication in a host?

A. 192.168.100.100

B. 127.100.100.100

C. 10.100.100.100

D. 172.16.100.100

127.X.X.X → Self Connectivity
or
Loop Back testing
or
Interprocess Commn

Q. The Dotted decimal notation (DDN) format for the given Hexadecimal notation (HDN) C22F1582 is

A. 194.50.21.145

B. 194.47.21.130 ✓

C. 194.45.21.120

D. 194.47.20.130

11000010.00101111.00010101.10000010

194. 47. 21. 130

or

$(C2)_{16}$ $(2F)_{16}$ $(15)_{16}$ $(82)_{16}$

$16^1\ 16^0$

$12*16^1+2*16^0$

$192+2$

194

$2*16+15$

$32+15$

47

$1*16+5$

$16+5$

21

$8*16+2$

$128+2$

130

194.47.21.130

Q. The Dotted decimal notation (DDN) format for the given Hexadecimal notation (HDN) 172A84C8

A. 24.40.132.200

B. 23.42.132.200

C. 23.42.130.200

D. 23.42.132.198

Q.

Suppose, instead of using 16 bits for network part of a Class B, 20 bits had been used. Then the number of Class B networks and hosts per network are

A. $2^{10}, 2^{12}$

B. $2^{18}, 2^{12}$

C. $2^{18}, 2^{12} - 2$

D. $2^{10}, 2^{12} - 2$

Q. Number of Networks and Number of Host in class B are 2^m,$(2^n - 2)$ respectively. Then the relation between m and n is

A. $3m = 2m$

B. $7m = 8n$

C. $8m = 7n$

D. $2m = 3n$

Q. How many networks are possible in a class B addressing system ? (Assuming Classful addressing scheme is followed.)

A. 2^{16}

B. 2^{14}

C. $2^{8} - 2$

D. $2^{16} - 2$

Q. How many hosts can be present in a class C network ? (Assuming Classful addressing scheme is followed.)

A. 2^{21}

B. $2^{21} - 1$

C. 2^{16}

D. $2^{8} - 2$

Q. How many bits are allocated for NID and HID in 23.192.157.234 address ? (Assuming Classful addressing scheme is followed.)

A. 16, 16

B. 8, 16

C. 8, 24

D. 24, 8

Q. In classful addressing, a large part of the available addresses are _____.

A. Dispersed

B. Blocked

C. Wasted

D. Reserved

Q. What is the possible number of networks and addresses in each network under class B addresses in IPv4 addressing format .

A. $2^{16}, 2^{16}$

B. $2^{16}, 2^{16} - 2$

C. $2^{14}, 2^{16} - 2$

D. $2^{14}, 2^{16}$

Q. IP Address 200.198.32.65 belong to which class ?

A. Class A

B. Class B

C. Class C

D. Class D

Q. Percent of Addresses occupied by Class D ?

A. 50 %

B. 25 %

C. 6.25 %

D. 12.5 %

Q. In IPv4 addressing format, the number of networks all allowed under class C addresses is

A. 2^{24}

B. 2^{7}

C. 2^{14}

D. 2^{21}

Q

A host with IP address 10.100.100.100 wants to use loopback testing. What are the source and destination addresses ? (Assuming Classful addressing scheme is followed.)

A. 10.100.100.100 and 10.100.100.100

B. 10.100.100.100 and 255.255.255.255

C. 10.100.100.100 and 127.1.100.1

D. 127.100.100.100 and 10.100.100.100


THANK YOU
GW
SOLDIERS !