

CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

Lecture No-04



By- Ankit Doyla Sir

TOPICS TO
BE
COVERED

Classful Addressing ✓

class-B $\rightarrow 10 \rightarrow 2^{30}$ (128-191)

NID=16 bit

HID=16 bit



10 | 6 bit

10 - - - - -

10 0 0 0 0 0 0 \rightarrow 128

10 0 0 0 0 0 1 \rightarrow 129

10 0 0 0 0 1 0 \rightarrow 130

...

10 1 1 1 1 1 1 \rightarrow 191

64

2^{16} N/w's



2^{14} Networks

2^{16} Host/Network



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

128.157.0.0 X

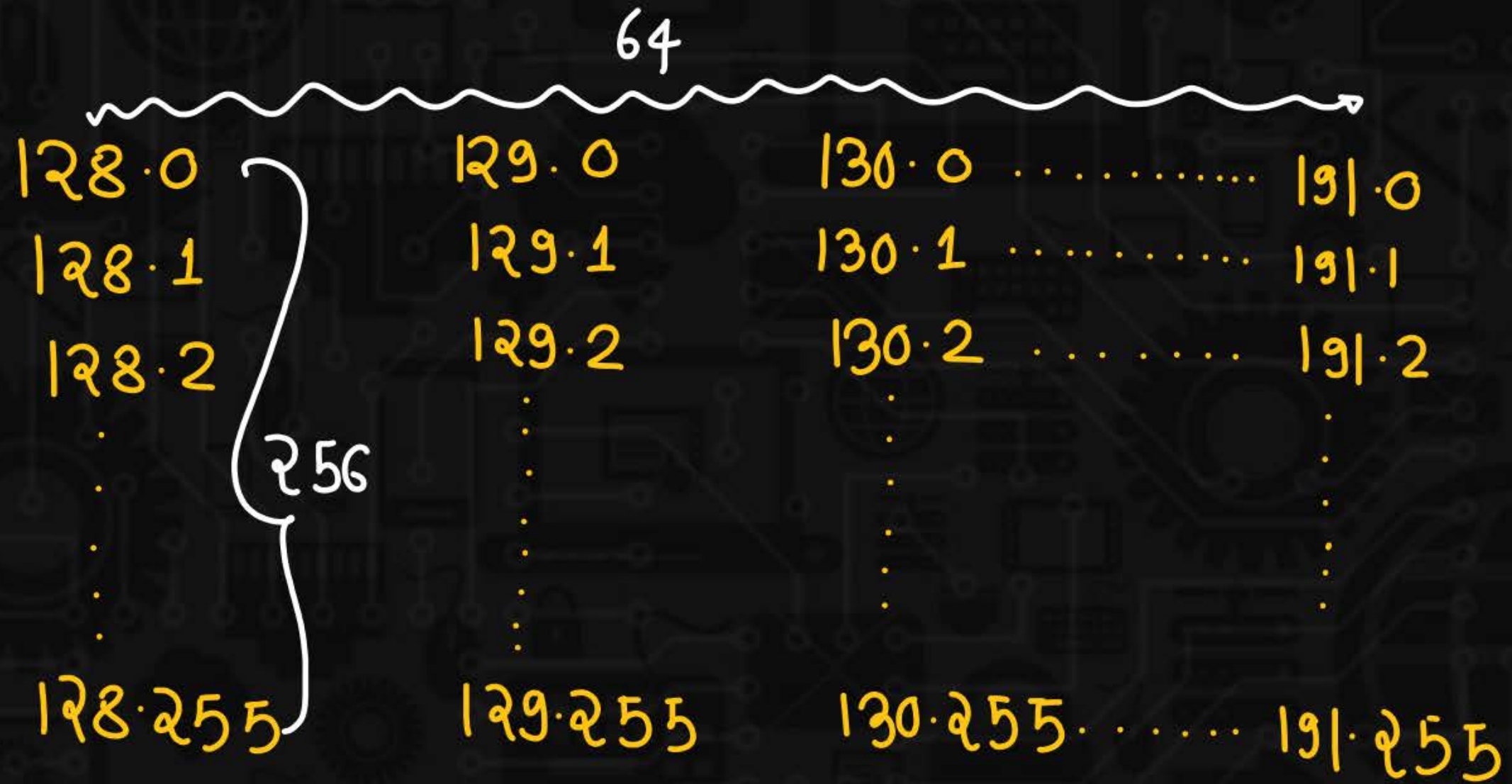
128.57.255.255 X

HID = 16 bit

00000000.00000000 → 0.0 X



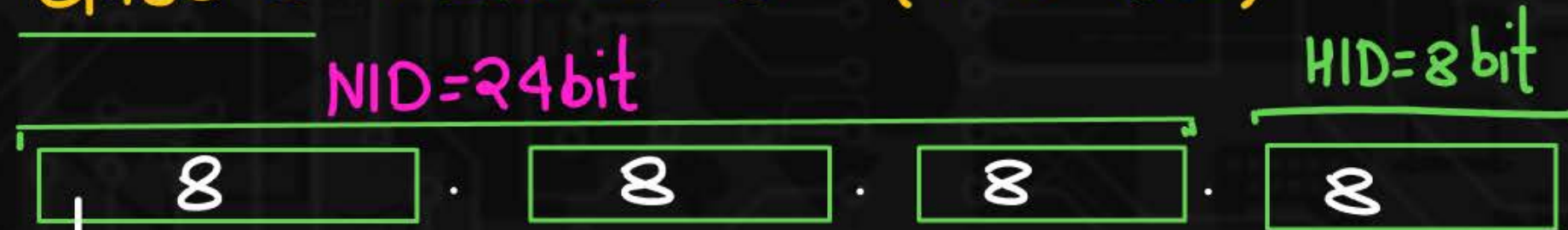
11111111.11111111 → 255.255 X



$$256 \times 64$$

$$2^8 \times 2^6 = 2^{14} \text{ Networks}$$

class-c $\rightarrow 110 \rightarrow 2^{29} (192-223)$



110 | 5bit

110 - - - - -

<u>110</u>	00000	\rightarrow	192	} 32
<u>110</u>	00001	\rightarrow	193	
\vdots	\vdots			
\vdots	\vdots			
<u>110</u>	11111	\rightarrow	223	

2^{24} Networks



2^{21} Networks

2^8 Host/Network



$2^8 - 2$ Host/Network

$$32 * 2^8 * 2^8$$

$$2^5 * 2^8 * 2^8 = 2^{21} \text{ Networks}$$

HID = 8 bit

00000000 → 0 X



11111111 → 255 X

class-D $\rightarrow 1110 \rightarrow 2^{28}$ (224-239)

$$\begin{array}{r} 255 \\ 16 \\ \hline 239 \end{array}$$



1110 | 4 bit

1110 - - - -

1110 0000 \rightarrow 224

1110 0001 \rightarrow 225

\vdots

1110 1111 \rightarrow 239

Note

- ① No Network-id and No Host-id in class-D
- ② class-D is reserved for Multicasting

class-E $\rightarrow 1111 \rightarrow 2^{28} \quad (240-255)$



1111 - - - -

1111 0000 $\rightarrow 240$

1111 0001 $\rightarrow 241$

\vdots
 \vdots

1111 1111 $\rightarrow 255$

Note

- ① No Network-id and No Host-id in class-E
- ② class-E is reserved for research and future purpose

CLASSFUL ADDRESSING

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

CLASSFUL ADDRESSING

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

PROBLEMS Solving on Classfull Addressing



Find the class B address from the following.

- A. 01111111.01010101.11111110.00001111
- B. 11101111.01001110.11001100.01010011
- ☒ C. 10001111.00000011.11111100.00111100
- D. 11011111.11001111.11100010.11111010

class A \rightarrow 0

class B \rightarrow 10

class C \rightarrow 110

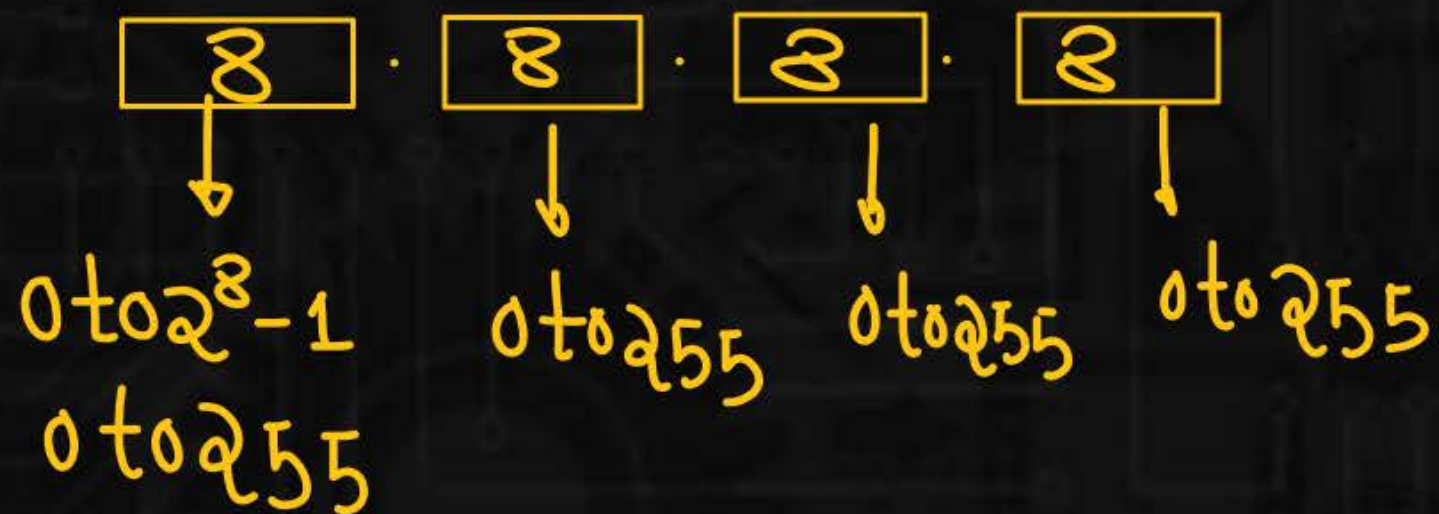
class D \rightarrow 1110

class E \rightarrow 1111



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





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

Loop Back Addressing

127.0.0.0

127.0.0.1

127.0.0.2

⋮

127.255.255.255

2^{24} IP Addresses

$2^4 * 2^{20}$

16 m IP Addresses

127.0.0.0 X

127.255.255.255 X



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

1100 0010 . 0010 1111 . 0001 0101 . 1000 0010

194 . 47 . 21 . 130

$(C2)_{16}$

$16^1 16^0$

$12 \times 16^1 + 2 \times 16^0$

$192 + 2$

194

$(2F)_{16}$

$2 \times 16 + 15$

$32 + 15$

47

$(15)_{16}$

$1 \times 16 + 5 = 21$

$(82)_{16}$

$8 \times 16 + 2$

$128 + 2 = 130$

194 . 47 . 21 . 130



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

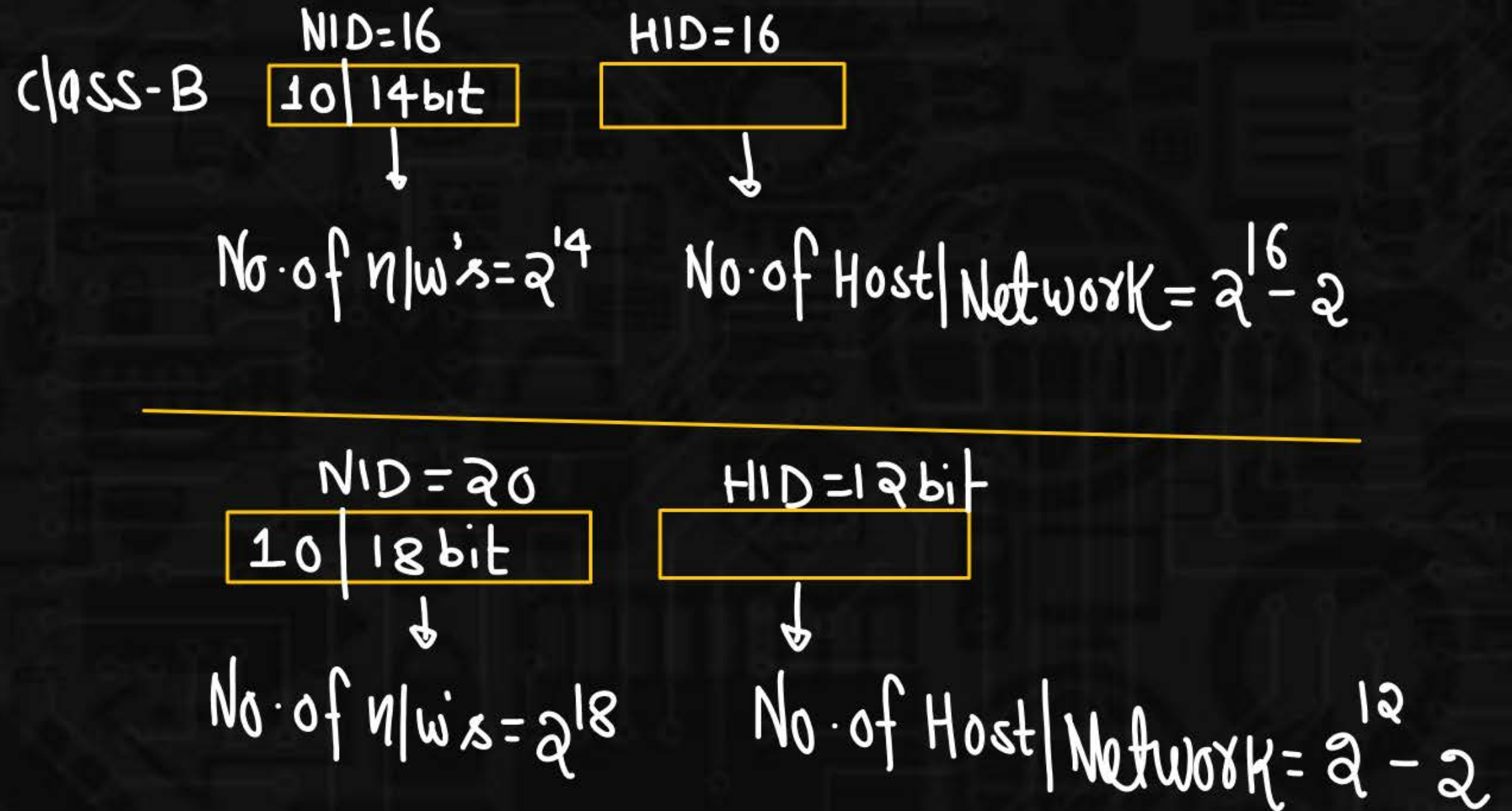
$(17)_{16}$	$(2A)_{16}$	$(84)_{16}$	$(C8)_{16}$
$1 \times 16 + 7$	$2 \times 16 + 10$	$8 \times 16 + 4$	$12 \times 16 + 8$
23	42	132	200

23.42.132.200



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





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. $3m = 2n$
- B. $7m = 8n$
- ☒ C. $8m = 7n$
- D. $2m = 3n$

$$\text{No. of networks in class-B} = 2^m = 2^{14}$$

$$\text{No. of Host in class B} = 2^n - 2 = 2^{16} - 2$$

$$m = 14, n = 16$$

$$\frac{m}{n} = \frac{14}{16} = \frac{7}{8}$$

$$\frac{m}{n} = \frac{7}{8}$$

$$8m = 7n$$



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. $2^{16} - 2$



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. $2^8 - 2$



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

Class A (1-126)

<u>NID</u>	<u>HID</u>
8	24

- A. 16, 16
- B. 8, 16
- ☒ C. 8, 24
- D. 24, 8



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



H.W

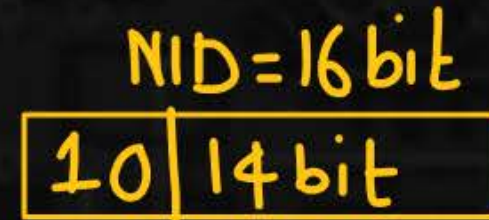
- A. Dispersed
- B. Blocked
- C. Wasted
- D. Reserved



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

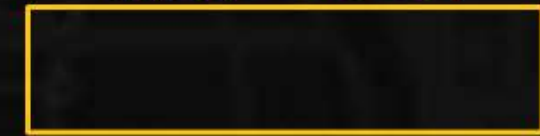
- A. $2^{16}, 2^{16}$
- B. $2^{16}, 2^{16} - 2$
- ~~C. $2^{14}, 2^{16} - 2$~~
- ☒ D. $2^{14}, 2^{16}$

class-B



No. of netw's = 2^{14}

HID = 16 bit



No. of IP Addresses
Per Network = 2^{16}

No. of Host/Network
= $2^{16} - 2$



IP Address 200.198.32.65 belong to which class ?

class-c(192-223)

class A(1-126)

" B (128-191)

" C (192-223)

" D (224-239)

" E (240-255)

A. Class A

B. Class B

☒ C. Class C

D. Class D

$$2^{14} \times 2^{16} = 2^{30}$$



Percent of Addresses occupied by Class D ?



- A. 50 %
- B. 25 %
- ☒ C. 6.25 %
- D. 12.5 %



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

Gate-2014

A. 2^{24}

B. 2^7

C. 2^{14}

☒ D. 2^{21}



↓
No. of networks = 2^{21}



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

SIP	DIP
10.100.100.100	127.X.X.X

☒ 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

