CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

Lecture No-14

By- Ankit Doyla Sir

Subnetting Part-7

Subnetting Category 9

(1)

NID — HID

200.200.200.0

128 64	128 64
00 (SID) — 6bit HID	01 (SID) — 6bit HID
0-63	64-127
1st subnet	2nd subnet
3rd subnet	4th subnet
128-191	192-255
10 (SID) — 6bit HID	11 (SID) — 6bit HID

NID 24 | HID 8

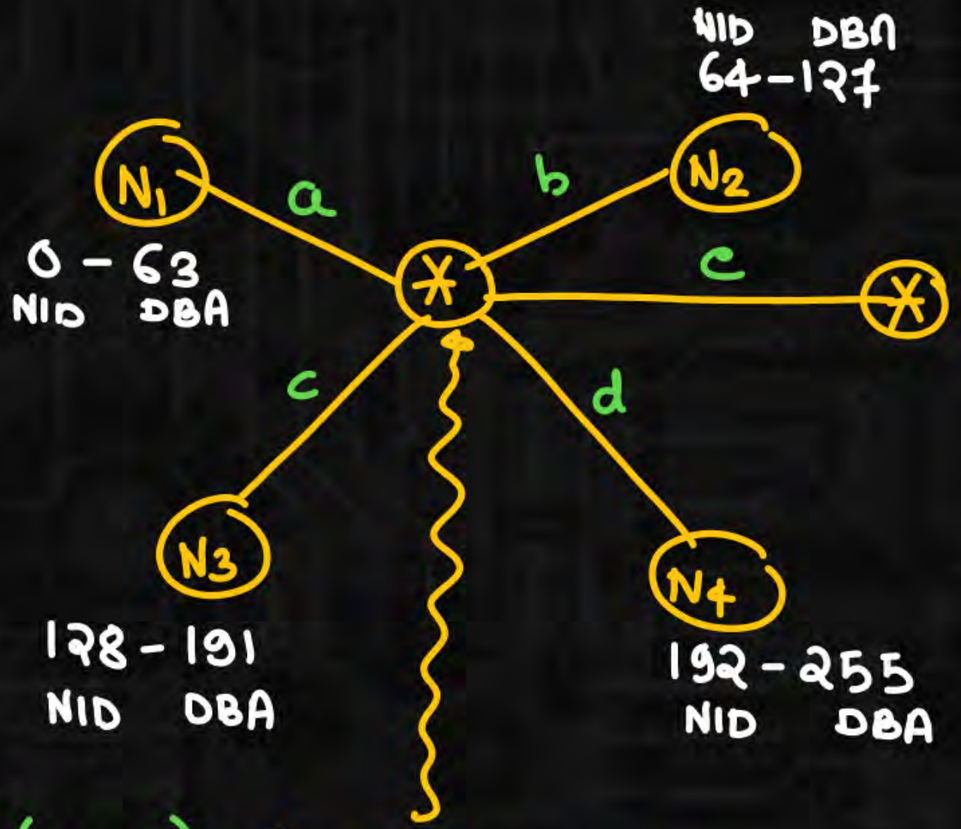
4 subnet

2 (SID) | 6 (HID)

$2^2 = 4$ subnet

$2^6 - 2 = 62$ Host/subnet

Subnet Mask: 255.255.255.192



(DIP) DA = 200.200.200.160

Routing table

NID	subnet mask	IIF
200.200.200.0	255.255.255.192	a
200.200.200.64	255.255.255.192	b
200.200.200.128	255.255.255.192	c
200.200.200.192	255.255.255.192	d
0.0.0.0	0.0.0.0	e

→ Default entry

Q: A Packet Bearing a destination Address 200.200.200.160 Arrives at a Router, on which Interface of will be Forwarded ?

(A) a (B) b (C) c (D) d

Soln

I DIP = 200.200.200.10100000 (160)

AND AND

SM1 = 255.255.255.11000000 (192)

NID = 200.200.200.128

Not matched with Interface

II DIP = 200.200.200.160

AND AND

SM2 = 255.255.255.192

NID = 200.200.200.128

Not matched with Interface (b)

III DIP = 200.200.200.160

AND AND

SM3 = 255.255.255.192

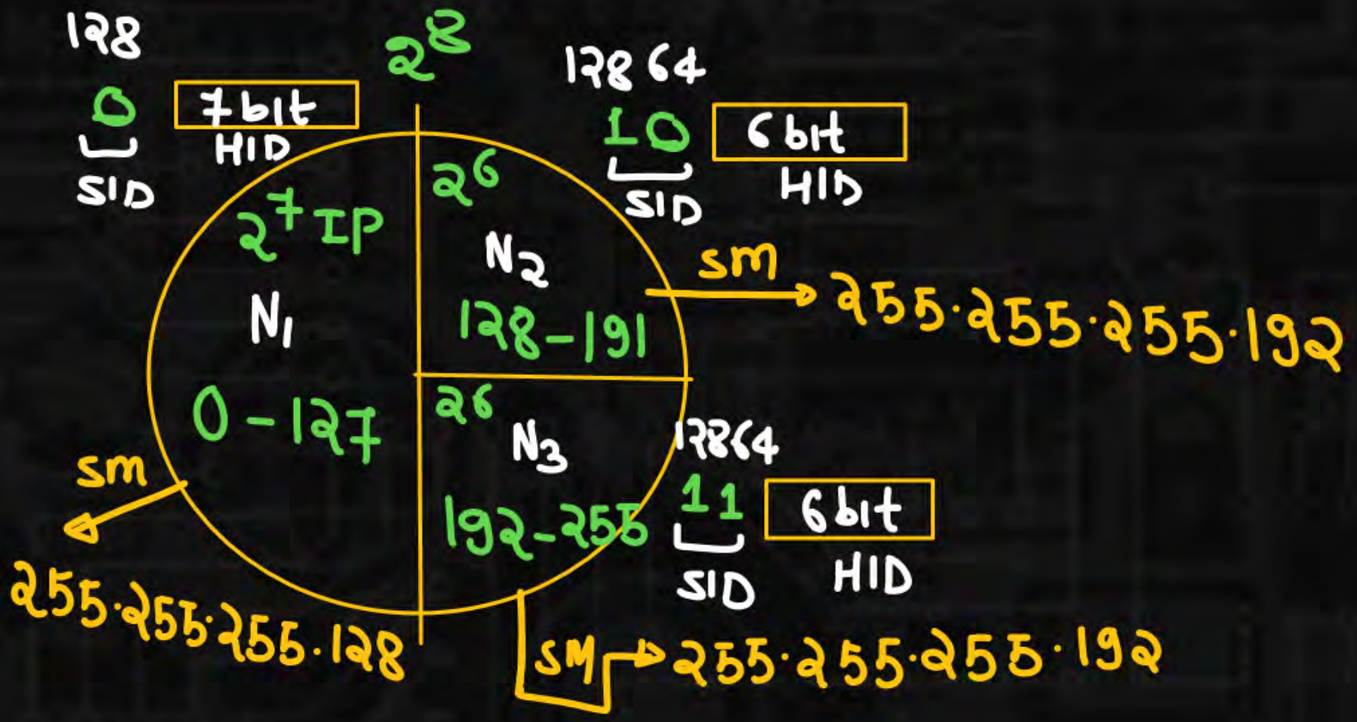
NID = 200.200.200.128

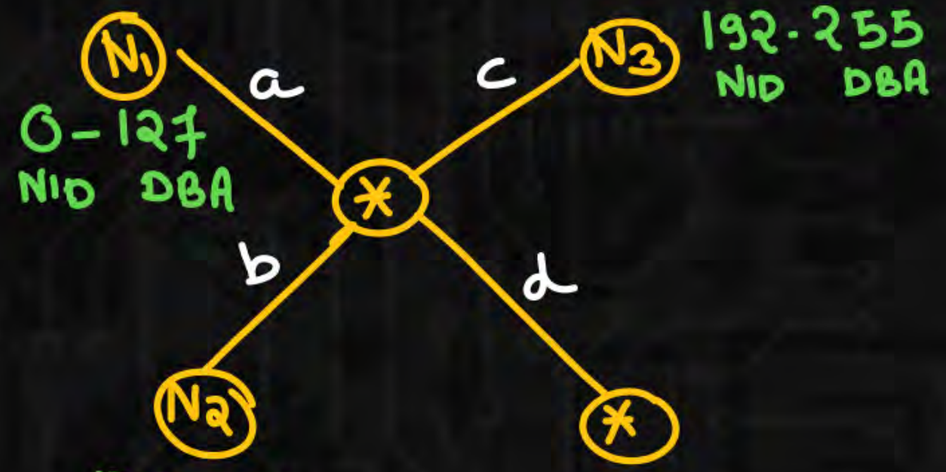
matched with interface (c)

So Router will Forward this Packet on to the Interface (c)

2. NID HID

200.200.200.0





NID	subnet mask	IF
200·200·200·0	255·255·255·128	a
200·200·200·128	255·255·255·192	b
200·200·200·192	255·255·255·192	c
0·0·0·0	0·0·0·0	d

↳ Default entry

Q

A Packet Bearing a destination Add 200·200·200·221 Arrives on a Router, on which interface it will be Forwarded ?

(A). a (B). b (C). c (D). d

Sol^{n}

I DIP = 200·200·200·11011101

AND AND

SM_1 = 255·255·255·10000000

NID = 200·200·200·128

Not matched with Interface (a)

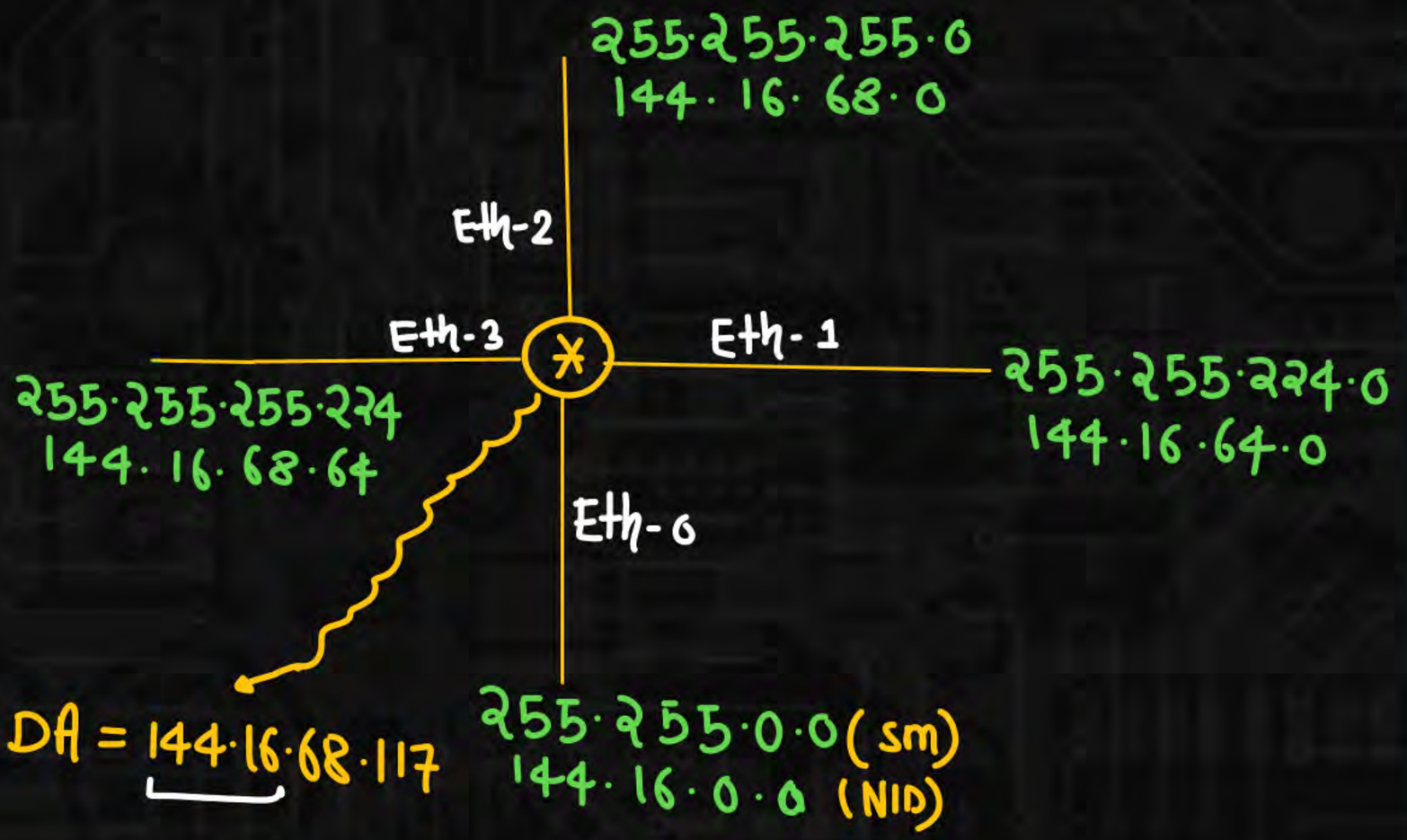
II DIP = 200.200.200.11011101 (221)
AND AND
SM2 = 255.255.255.11000000 (192)
NID = 200.200.200.192

Not matched with Interface (b)

III DIP = 200.200.200.221
AND AND
SM3 = 255.255.255.192
NID = 200.200.200.192

Matched with Interface (c)
So Router will Forward this Packet on to the Interface (c)

Longest subnet mask



Q

A Packet Bearing a Destination Address 144.16.68.117 arrives at a Router, on which Interface it will be Forwarded ?

I DIP : 144.16.68.117
AND AND
SM = 255.255.0.0
NID = 144.16.0.0

Matched with Eth0

II DIP = 144.16.68.117
AND AND
SM = 255.255.224.0
NID = 144.16.64.0

Matched with Eth-1

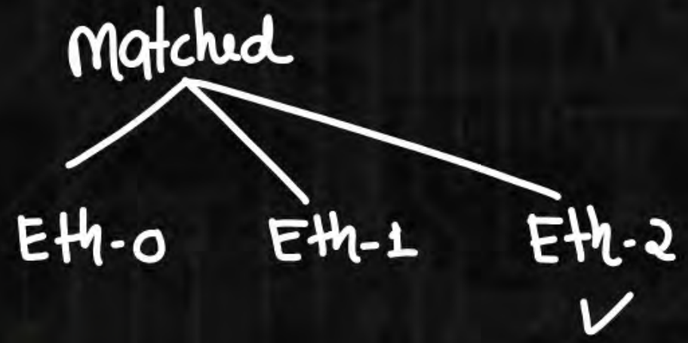
III DIP = 144.16.68.117
AND AND
SM = 255.255.255.0
NID = 144.16.68.0

Matched with Eth-2

IV DIP = 144.16.68.117 (64+32+16+4+1)
AND AND
SM = 255.255.255.224 (128+64+32)
NID = 144.16.68.96

Not matched with Eth-3

Packet Matched with Eth0, Eth-1, Eth-2



Note

If DIP matched with more than one Interface then Router will forward the Packet to interface which Have Longest subnet mask (i.e more No. OF 1's in the subnet mask)

Q.1 The routing table of a router is shown below:

Destination (NID)	Subnet Mask	Interface
128.75.43.0	255.255.255.0	Eth0
128.75.43.0	255.255.255.128 (2nd Longest)	Eth1
192.12.17.5	255.255.255.255 (1st Longest)	Eth3
default		Eth2

On which interfaces will the router forward packets addressed to destinations 128.75.43.16?

[GATE CS 2004]

A. Eth1

B. Eth0

C. Eth3

D. Eth2

AD Rule: First start with the longest subnet mask

I DIP = 128.75.43.16
AND
SM = 255.255.255.255
NID = 128.75.43.16

Not matched with Eth-3

II DIP = 128.75.43.16 [00010000]
AND
SM = 255.255.255.128 [10000000]
NID = 128.75.43.0

Matched with Eth1

Q.2 A router uses the following routing table:

Destination	Mask	Interface
144.16.0.0	255.255.0.0	eth0
144.16.64.0	255.255.224.0	eth1
144.16.68.0	255.255.255.0	eth2
144.16.68.64	255.255.255.224	eth3

2nd longest

1st longest

A packet bearing a destination address 144.16.68.117 arrives at the router. On which interface will it be forwarded? [GATE CS 2006]

A. Eth0

B. Eth1

C. Eth2 ✓

D. Eth3

First start with longest subnet mask

I DIP = 144.16.68.117 (64+32+16+4+1)
AND AND
SM 255.255.255.224 (128+64+32)
NID = 144.16.68.96

Not matched with Eth-3

II DIP = 144.16.68.117
AND AND
SM = 255.255.255.0
NID = 144.16.68.0

Matched with Eth-2

Q.3 The forwarding table of a router is shown below.

Subnet Number	Subnet Mask	Interface ID
200.150.0.0	255.255.0.0	1
200.150.64.0	255.255.224.0	2
200.150.68.0	255.255.255.0	3
200.150.68.64	255.255.255.224	4
Default		0

1st Longest

A Packet addressed to a destination address 200.150.68.118 arrives at the router. It will be forwarded to the interface with ID 3.

118: 01110110

[GATE CS 2023] (2m)

I DIP = 200.150.68.01110110 (118)
AND AND
SM = 255.255.255.11100000 (224)
NID = 200.150.68.01100000

NID = 200.150.68.96

Not matched with Interface (4)

II DIP = 200.150.68.118
AND AND
SM = 255.255.255.0
NID = 200.150.68.0

matched with Interface (3)

Q.4 An IP router implementing Classless Inter-domain Routing (CIDR) receives a packet with address 131.23.151.76. The router's routing table has the following entries:

Prefix (NID)	SM	Output Interface Identifier
131.16.0.0/12	255.240.0.0	3
131.28.0.0/14	255.252.0.0	5
131.19.0.0/16	255.255.0.0 (1st Longest)	2
131.22.0.0/15	255.254.0.0 (2nd Longest)	1

The identifier of the output interface on which this packet will be forwarded is __(1)__ .

[GATE CS 2014]

Soln

First start with the Longest subnet Mask

I DIP = 131.23.151.76
AND
SM = 255.255.0.0
NID = 131.23.0.0

Not matched with interface (2)

II DIP = 131.23.151.76
AND
SM = 255.254.0.0
NID = 131.22.0.0

matched with interface (1)

23: 16+4+2+1

254: 128+64+32+16+8+4+2

Subnetting Category 10

1. IF $NID_{AA} = NID_{BA}$ then A assume that B is present in the same Network.
2. IF $NID_{AA} \neq NID_{BA}$ then A assume that B is present in the different Network.

Q. Two computers C1 and C2 are configured as follows. C1 has IP address 203.197.2.53 and netmask 255.255.128.0. C2 has IP address 203.197.75.201 and netmask 255.255.192.0. which one of the following statements is true? [GATE CS 2006]

A. C1 and C2 both assume they are on the same network

B. C2 assumes C1 is on same network, but C1 assumes C2 is on a different network

C. C1 assumes C2 is on same network, but C2 assumes C1 is on a different network

D. C1 and C2 both assume they are on different networks.


THANK YOU
GW
SOLDIERS !