CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

Lecture No-14

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Subnetting Part-6

Subnetting Category 9

1. NID HID

200.200.200.0

Class-C

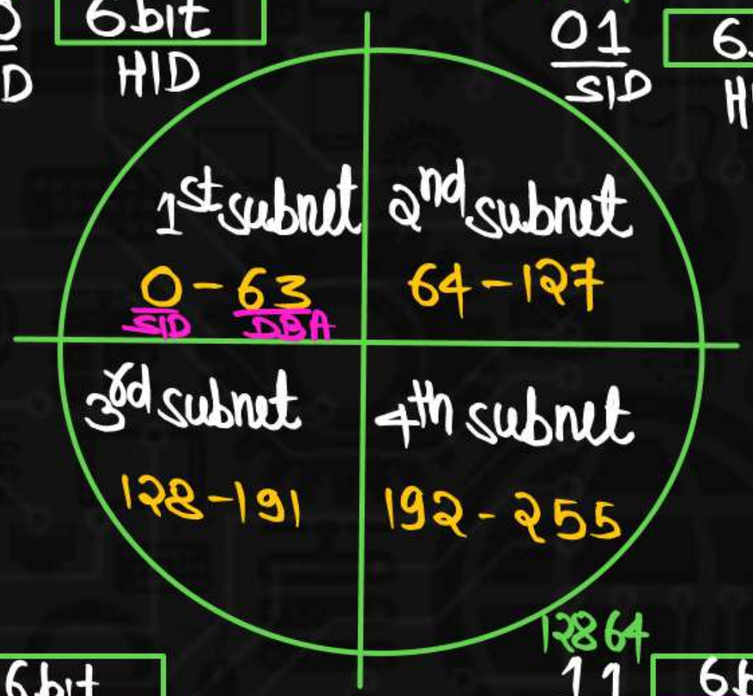
NID	HID
24	8

4 subnet

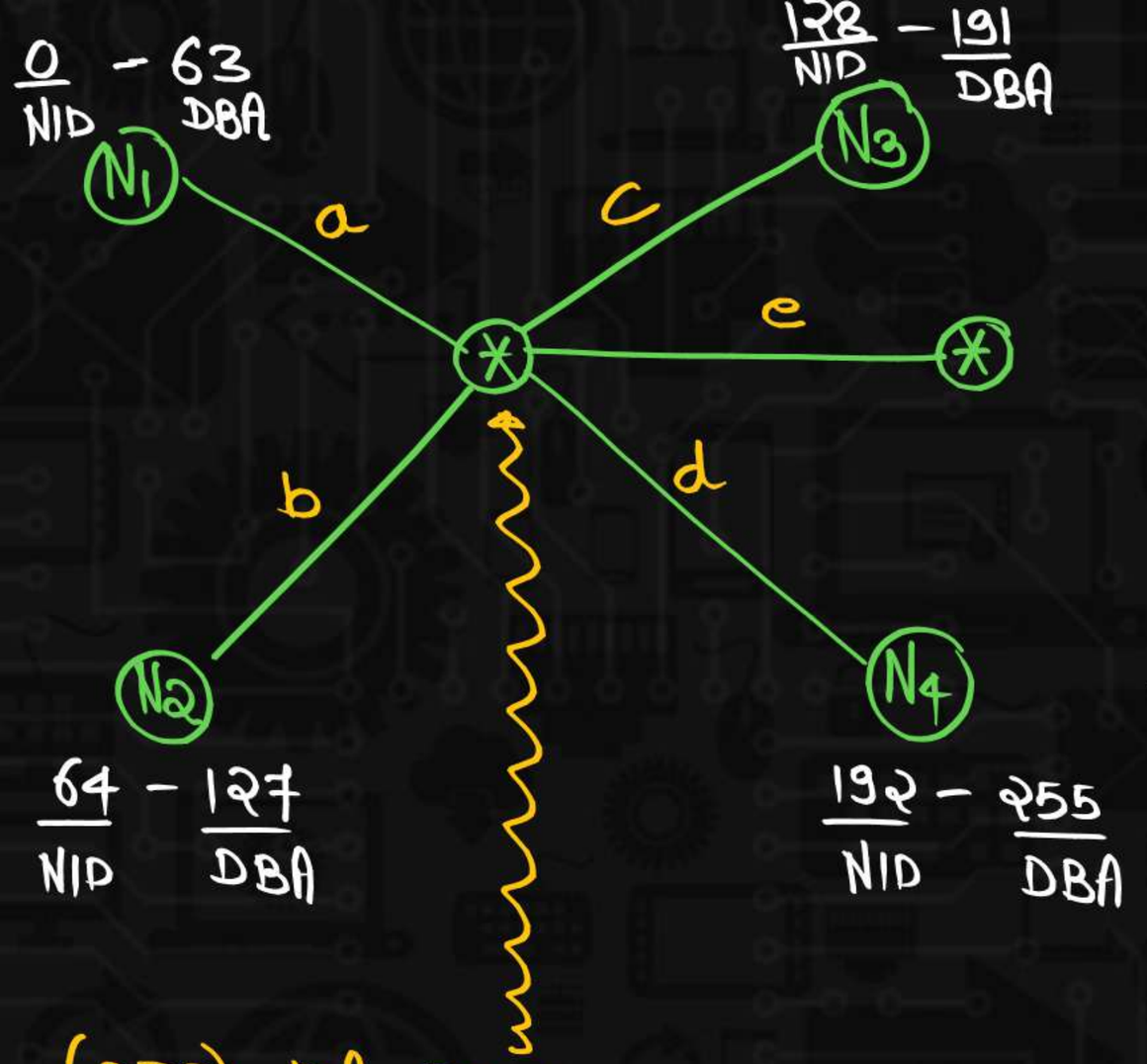
24	2	6
NID	SID	HID

$2^2 = 4$ subnet

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



Subnet Mask: 255.255.255.192(128+64)



(DIP) DA = 200.200.200.160

Routing table

NID	SM	Interface
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 this Packet will be Forwarded by the Router

(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 = 200.200.200.10000000

NID = 200.200.200.128

Not Matched with Interface (a)

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 to interface (c)

2.

NID	HID
200.200.200	0

class-C

NID	HID
24	8

128 → 0 (SID) — 7 bit HID

2^8

128 64 → 10 (SID) — 6bit HID

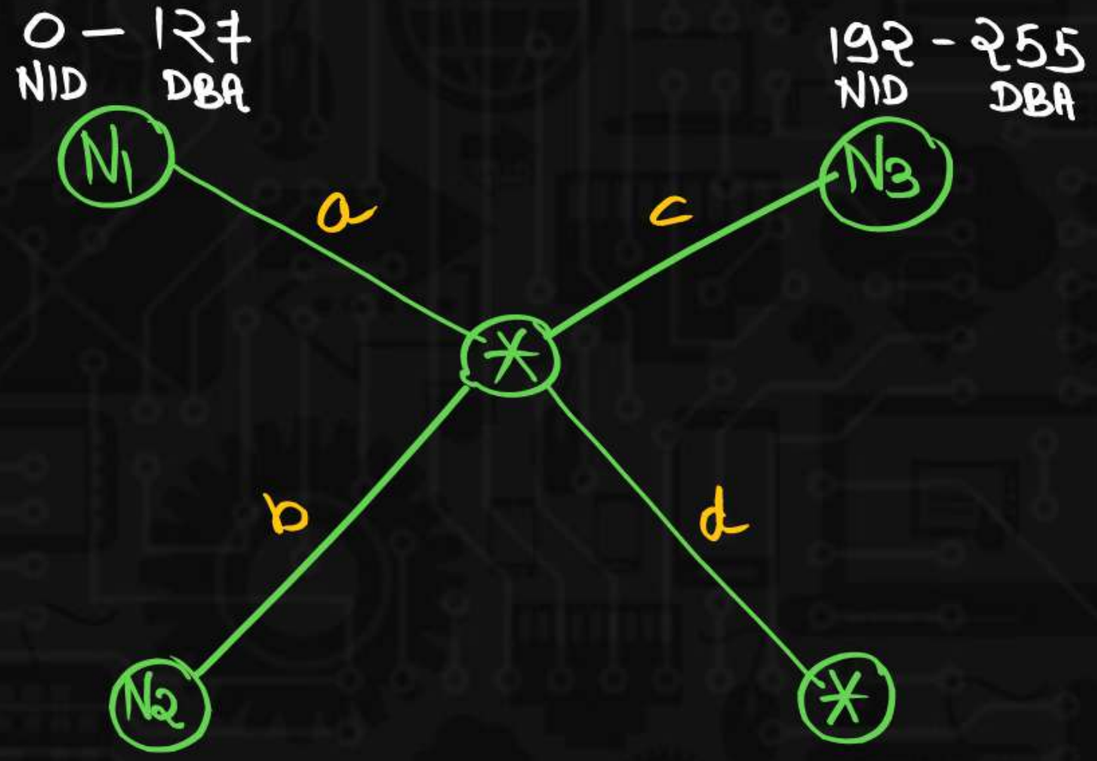
N1: 0 – 127 (NID DBA)

N2: 128 – 191 (NID DBA) → S.M → 255.255.255.192

N3: 192 – 255 (NID DBA) → S.M → 255.255.255.192

S.M → 255.255.255.128

128 64 → 11 (SID) — 6bit HID



Routing table

NID	SM	Interface
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 Address 200.200.200.221 Arrives on a Router. on which Interface this Packet will be Forwarded by the Router

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

Soln:

I DIP = 200.200.200.11011101 (221)
AND AND
SM_1 = 255.255.255.10000000 (128)
NID = 200.200.200.10000000
NID = 200.200.200.128

Not matched with Interface (a)

II DIP = 200.200.200.11011101 (221)
AND AND
SM_2 = 255.255.255.11000000 (192)
NID = 200.200.200.11000000
NID = 200.200.200.192

Not matched with Interface (b)

III DIP = 200.200.200.221
AND AND
SM_3 = 255.255.255.192
NID = 200.200.200.192

Matched with Interface (c)

So Router will Forward this Packet to the interface (c)

Longest subnet mask

255.255.255.0
144.16.68.0

Q: If a Packet Bearing a destination Address 144.16.68.117 arrives on a Router. on which Interface this Packet will be Forwarded by the Router

I DIP = 144.16.68.117
AND AND
SM1 = 255.255.0.0
NID = 144.16.0.0

Matched with Eth-0

II DIP = 144.16.01000100.117
AND AND
SM2 = 255.255.11100000.0
NID = 144.16.64.0

Matched with Eth-1

III DIP = 144.16.68.117
AND AND
SM3 = 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
SM4 = 255.255.255.224 (128+64+32)
NID = 144.16.68.96

Not matched with Eth-3

DIP matched with Eth-0, Eth-1, Eth-2

Note: If DIP matched with more than one Interface the Router will Forward the Packet to the Interface which Have Longest subnet mask (means more No of 1's in the subnet mask)

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

Destination	Subnet Mask	Interface
128.75.43.0	255.255.255.0	Eth0
128.75.43.0	255.255.255.128	Eth1
192.12.17.5	255.255.255.255	Eth3
default		Eth2

2nd Longest

1st Longest

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 Longest subnet Mask

I DIP = 128.75.43.16
AND AND
SM = 255.255.255.255
NID = 128.75.43.16

Not matched with Eth-3

II DIP = 128.75.43.16
AND AND
SM = 255.255.255.128
NID = 128.75.43.0

Matched with Eth-1

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]

AD Rule: First start with the longest subnet mask

A. Eth0

B. Eth1

C. Eth2 ✓

D. Eth3

I DIP = 144.16.68.117
AND AND
SM = 255.255.255.224
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

H·W

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

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

[GATE CS 2023] (2m)

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:

H.W

Prefix	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	2
131.22.0.0/15	255.254.0.0	1

The identifier of the output interface on which this packet will be forwarded is _____ .

[GATE CS 2014]


THANK YOU
GW
SOLDIERS !