CS & IT ENGINEERING

COMPUTER NETWORKS

IPv4 Addressing

Lecture No-18

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1. Problem solving on subnetting Part - 3
2. Classless Addressing Part-1

Problem Solving on Subnetting Part – 3

Q.1 The subnet mask for a particular network is 255.255.31.0. Which of the following pairs of IP addresses could belong to ~~this~~ same network?

[GATE CS 2003]

(d) : 255.255.00011111.00000000
NID SID

129 : 10000001
161 : 10100001

A. 172.57.88.62 and 172.56.87.233

B. 10.35.28.2 and 10.35.29.4

C. 191.203.31.87 and 191.234.31.88

D. 128.8.129.43 and 128.8.161.55 ✓

AD Ryle

255.255.00011111.00000000
NID SID SID

(b) 28 : 00011100
29 : 00011101

(a) ~~(a)~~

172.57.88.62 ⌐ 64+16+8

AND

255.255.31.0 ⌐ 16+8+4+2+1

NID = 172.57.24.0 ≠

172.56.87.233 ⌐ 64+16+4+2+1

AND

255.255.31.0 ⌐ 16+8+4+2+1

NID = 172.56.23.0

(b) ~~(b)~~

10.35.28.2 ⌐ 16+8+4

AND

255.255.31.0 ⌐ 16+8+4+2+1

10.35.28.0 ≠

10.35.29.4 ⌐ 16+8+4+1

AND

255.255.31.0 ⌐ 16+8+4+2+1

10.35.29.0

(d) $128.8.129.43$ ↦ $128+1$

AND ↦ $16+8+4+2+1$

$255.255.31.0$

NID = $128.8.1.0$

$=$

$128.8.161.55$ ↦ $128+32+1$

AND

$255.255.31.0$

NID = $128.8.1.0$

Q.2 Suppose computers A and B have IP addresses 10.105.1.113 and 10.105.1.91 respectively and they both use the same netmask N. Which of the values of N given below should not be used if A and B should belong to the same network? [GATE CS 2010]

A. 255.255.255.0

B. 255.255.255.128

C. 255.255.255.192

D. 255.255.255.224

A: 10 · 105 · 1 · 01110001

B: 10 · 105 · 1 · 01011011

a) 255 · 255 · 255 · 0
NID SID

b) 255 · 255 · 255 · 10000000
SID

(c) 255.255.255.11000000
NID SID

(d) 255.255.255.11100000
NID SID

OR

10.105.1.113: 01110001
x

10.105.1.91: 01011011
x

(b) 255.255.255.1000000

(c) 255.255.255.11000000

(d) ✓ 255.255.255.11100000

Soln (a) 10.105.1.113
AND
255.255.255.0
NID = 10.105.1.0

=

10.105.1.91
AND
255.255.255.0
NID = 10.105.1.0

(b) 113 (64+32+16+1)
AND
128 (128)
NID = 0

=

91
AND
128
NID = 0

(c) 113 (64+32+16+1)
AND
192 (128+64)
NID: 64

=

91
AND
192
NID = 64

(d) 113 (64+32+16+1)
AND
224 (128+64+32)
NID = 96

≠

91 (64+
AND
224 (128+64+32)
NID = 64

Q.3 The address of a class B host is to be split into subnets with a 6-bit subnet number. What is the maximum number of subnets and the maximum number of hosts in each subnet?

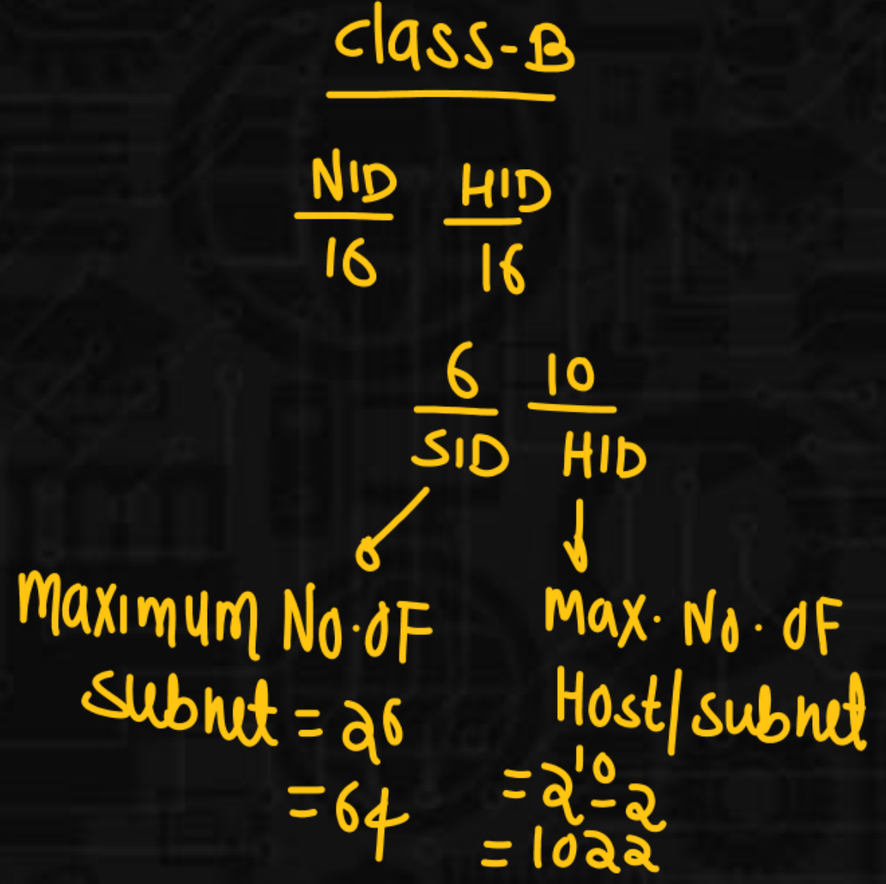
[GATE CS 2007]

A. 62 subnets and 262142 hosts.

B. 64 subnets and 262142 hosts.

C. 62 subnets and 1022 hosts.

D. 64 subnets and 1024 hosts.



RFC-950

SID = n bit ($n = 6$)

Maximum No. of subnet $= 2^n - 2$

$= 2^6 - 2$

$= 62$

RFC-1812

SID = n bit ($n = 6$)

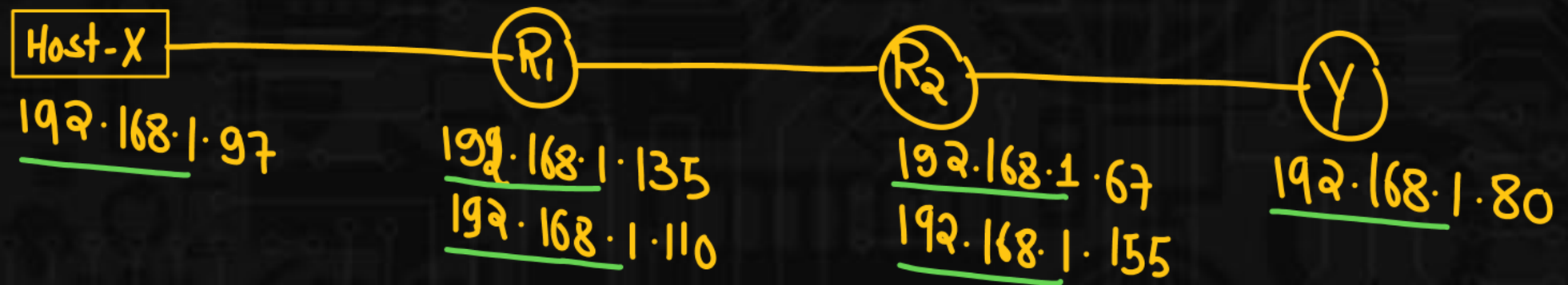
Maximum No. of subnet $= 2^n = 2^6 = 64$

Q.4 2M+2M

Host X has IP address 192.168.1.97 and is connected through two routers R1 and R2 to another host Y with IP address 192.168.1.80. Router R1 has IP addresses 192.168.1.135 and 192.168.1.110. R2 has IP addresses 192.168.1.67 and 192.168.1.155. The netmask used in the network is 255.255.255.224.

Given the information above, how many distinct subnets are guaranteed to already exist in the network? [GATE CS 2008]

Network Mask: 255.255.255.224



A. 1

B. 2

C. 3 ✓

D. 6

ADRule

SM: 255.255.255.11100000

NID | SID | HID

128 64 32

97: 0 1 1

135: 1 0 0

110: 0 1 1

67: 0 1 0

155: 1 0 0

80: 0 1 0

DIFFerent SID's

128 64 32

011 → 96

100 → 128

010 → 64

} 3 subnet

Sol

(i) 192.168.1.97 (64+32+1)
AND
255.255.255.224 (128+64+32)
SID = 192.168.1.96

(ii) 135 (128+4+2+1)
AND
224 (128+64+32)
SID = 128

(iii) 110 (64+32
AND
224 (128+64+32)
SID = 96

(iv) 67 (64+2+1)
AND
224 (128+64+32)
SID = 64

(v) 153 (128+
AND
224 (128+64+32)
SID = 128

(vi) 80 (64+16)
AND
224 (128+64+32)
SID = 64

Different SID's

96
128
64
] 3 subnet

Q.5 Host X has IP address 192.168.1.97 and is connected through two routers R1 and R2 to another host Y with IP address 192.168.1.80. Router R1 has IP addresses 192.168.1.135 and 192.168.1.110. R2 has IP addresses 192.168.1.67 and 192.168.1.155. The netmask used in the network is 255.255.255.224.

Which IP Address should X Configure its gateway as ?

[GATE IT 2008]

A. 192.168.1.67

B. 192.168.1.110

C. 192.168.1.135

D. 192.168.1.155

X:

192.168.1.97

AND

255.255.255.224

SID = 192.168.1.96

~~(a)~~ 192.168.1.67

AND

255.255.255.224

SID = 192.168.1.64

✓(b) 192.168.1.110 (64+32+...)

AND

255.255.255.224 (128+64+32)

192.168.1.96

Classless Addressing


THANK YOU
GW
SOLDIERS !