Lab-3
SSK

classmate
Date 09/02/18
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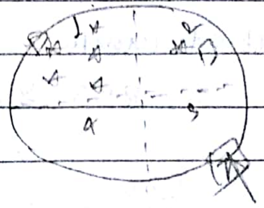
Subnetting

Sub-dividing a large network into smaller group (or sub-networks).



8000 more complex
↓
30] of 100

Net ID		

↑ Subnet ID
↑ Host ID for the specific subnet

Ex-

Subnetting a network having 256 addresses into 4 subnets

2 bits, 6 bits (0-63)

Net ID	2	

↑ Subnet ID → 0-3
↑ Host ID

$\frac{256}{4} = 64$ hosts/subnet

~~2000~~ 212.50.61.89

→ 01011001

$2^6 + 2^4 + 2^3 + 2^0$

212.50.61.0 ← Network address

01 → subnet ID

011001 → Host ID

Subnet Mask

All 1's	All 1's	All 0's
Net ID	Host ID	

Q. A company is granted the site address 201.70.64.0. The company needs six subnets. Design the subnets.

Class C network address → 201.70.64.0

256 addresses → can't be divided into six subnets as 6 is not a power of 2.

∴ we opt for the provision of dividing into 8 subnets.

SI HI

	3 ⁞ 5

↓ ↓
111 00000

Subnet mask
= 255.255.255.224

$\frac{256}{8}$ = 32 hosts/ subnets

1st subnet
201.70.64.0
to 201.70.64.31

2nd subnet
201.70.64.32
to 201.70.64.63

Last 2 subnets (64 addresses) will go waste.

Q1. Given the IP address 180.25.21.172 and the subnet mask 255.255.192.0, what is the subnet address.

Q2. The subnet mask for a network is 255.255.255.192. How many subnetwork are available.

Q3. The subnet mask for a class C network is 255.255.255.248 How many subnetworks are available?

1) 180.25.21.172 → class B

& 255.255.192.0

11000000. 00000000
→ 4 subnets

00010101
& 11000000
00000000

& 172
0
0

Subnet address = 180.25.0.0
→ first address of the subnet (directly OD)

2. 255.255.255.192

class A → 2^{18} subnets

class B → 2^{10} subnets

class C → 4 subnets

3. $\underbrace{255.255.255}_{\text{Net ID}}.\underbrace{248}$

$\underbrace{11111}_{SI}\ \underbrace{000}_{HI}$

$\therefore$ 2^5 subnets $= 32$ subnets

Class-less addresses

- The problem of address space depletion
- ~~Class A~~ Most of the addresses of class A and B got wasted.
- The addresses can be allocated to customers in the power of 2, as per their requirement.
- ~~The address~~ wastage reduces.
- IPv4 uses classless address.
- Classless inter-domain routing (CIDR) - classless notation

A.B.C.D/n

↳ prefix → the portion of address that doesn't change

~~analogous to NetID of classful addressing~~

suffix = 32 - n

167.199.170.82/27 ↳ prefix   suffix = 32 - 27 = 5

First address of 167.199.170.82

= 167.199.170.64   (5 bits which 0)

Q. An organization is granted the block 130.34.12.64/26. The organization needs to have 4 subnets. What are the subnet addresses & the range of addresses for each student?

130.34.12.64/26

Prefix = 26 Suffix = 32-26 = 6

2^6 = 64 addresses should be there for the network.

01000000

first address

4 subnets = 2 bit for subnet ID

$\therefore$ 4 bits left for hosts in a subnet (6-2)

$\therefore$ 26 + 2 bit for SI will vary

$\therefore$ suffix = ~~28~~ 4

$\therefore$ Prefix = 28

130.34.12.64/28 → starting address

130.34.12.79/28 → ending address

2nd subnet [.80/28, .95/28] 3rd [.96, .111] 4th [.112, .127]

Q. An ISP is ~~grated~~ granted a block of addresses specified as 190.100.0.0/16. The ISP needs to distribute these addresses to three groups of customers as follows:

i) The first group has 64 customers; each needs 256 addresses.

ii) The second group has 128 customers; each needs 128 address.

iii) The third group has 128 customers; each needs 64 addresses.

Design the sub block & give slash notation for each subblock. Find out how many addresses are available after allocation.

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Remaining addresses

= 65536 − (64×256 + 128×128 + 128×64)

Group-1

1st customer of group-1

190.100.0.0/24

190.100.0.255/24

→ as for 256 address, 8 bits are required. ∴ suffix = 8

64th customer of group 1

190.100.63.0/24

190.100.63.255/24

Group 2 : first customer

190.100.64.0/25

190.100.64.127/25

→ as for 128 address, suffix = 7

2nd customer 190.100.64.128/25

190.100.64.255/25

128th customer 190.100.127.128/25

190.100.127.255/25

Group 3 :

first customer

for 64 address suffix = 6

190.100.128.0/26

to 190.100.128.63/26

second custm 190.100.128.64/26

190.100.128.127/26

:

:

Last customer 190.100.159.192/26

190.100.159.255/26

$\frac{128}{4} = 32$

$256 - 64 = 192$

Q. Starting with 150.80.0.0/16

First group : 200 customers ; 128 addresses

2nd group : 400 customers ; 16 addresses

3rd group : 2048 customers ; 4 addresses each

Remaining addresses

$= 65536 - (200 \times 128 + 16 \times 400 + 4 \times 2048)$

First group

128 addresses

∴ suffix = 7

1st customer

starting: 150.80.0.0/25

ending: 150.80.0.127/25

Last customer

starting : 150.80.99.128/25

150.80.99.255/25

2nd group

16 address

suffix = 4

1st customer

starting : 150.80.100.0/28

ending : 150.80.100.15/28

~~2nd cu~~ Last customer

starting : 150.80.124.240/28

150.80.124.255/28

4 address

suffix : 2

3rd group

$\frac{256}{4} = 64$ $\frac{2048}{64} = 32$

$\frac{2048}{4}$

512

1st customer

starting: 150.80.125.0/30

ending : 150.80.125.3/30

Last customer

starting : 150.80.156.252/30

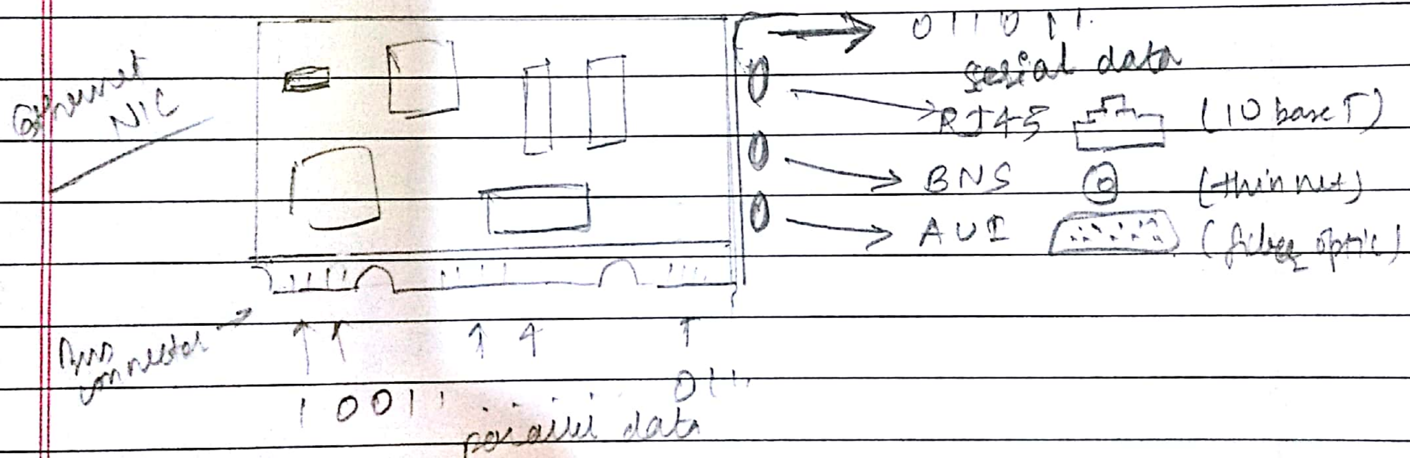
150.80.156.255/30

Scanned by CamScanner

SDC

NIC

- Network board
- Established and manages computer's network connection.
- Translates digital data to signals
- Established & manages link.
- Connects networked components to the physical cable.
- From parallel to serial & vice versa
  - Transforms data to network's data form.
  - Computer has series of parallel data lines.
  - All networking media operates on serial data
  - NIC does the conversion.
  - It has a memory that acts as buffer.



PCI - Peripheral component interconnect

PCMCIA

ISA - Industry standard architecture

Q1. Properly install the NIC in the motherboard of the computer.

Q2. Set the networking properties in the operating system.