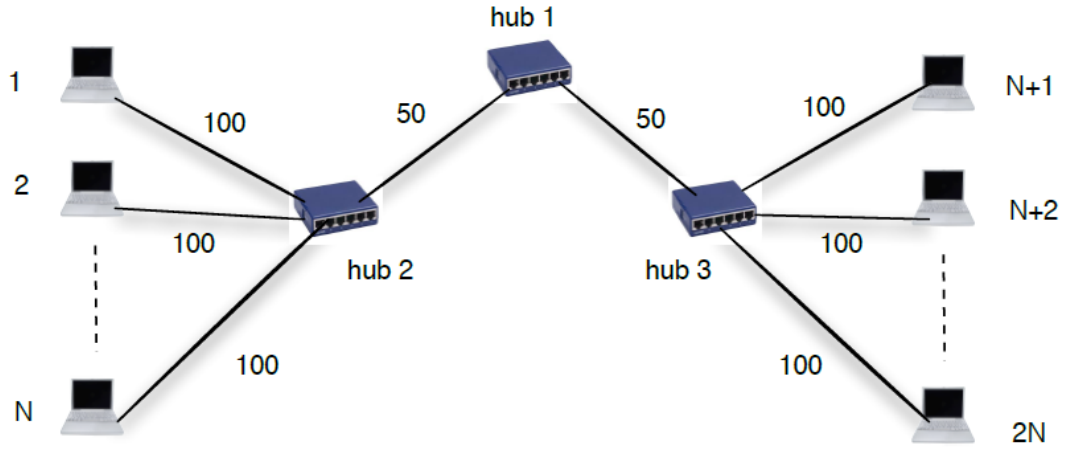
COMP9121 Tutorial Week 4

1. CSMA-CD Performance

2N computers have been connected in a network as illustrated. The length of each link is written in meters. Each computer generates 1000 packets per second with each packet being 500 bytes. The maximum rate of all links is 1 Gbps. The propagation speed in the medium is 2.0×10^8 meters/second.



(1) What is the maximum number of nodes supported in the network if CSMA-CD is used on the shared medium? (Recall that the CSMA-CD efficiency is $\frac{1}{1+5\frac{t_{prop}}{t_{trans}}}$)

(2) Assume that hub1 is replaced with a switch. Find the maximum number of nodes supported in the network if CSMA-CD is used on the shared medium. Assume that half of the traffic is kept in its own side and half of the traffic goes to the other side.

2. Routing Table

A company has been granted a block of IP addresses starting with 150.12.16.0/24. The address space should be allocated to four subnets A, B, C and D. Subnet A needs 9 addresses, subnet B needs 18 addresses, subnet C needs 28 addresses, and subnet D needs 12 addresses. The IP addresses have been assigned in the following order A, B, C, and D (subnet A has the smallest IP addresses and subnet D has the largest IP addresses). What is the starting IP address of subnet C?

3. Routing Table

A router has the following CIDR entries in its routing table (Table **1):**
Table **1:** Routing table

Address/ mask	**Interface**
150.12.192.0/19	Interface 1
150.12.0.0/16	Interface 2
150.12.216.0/21	Interface 3
Default	Interface 4

A packet with address 150.12.218.51 arrives. Which interface would the packet be forwarded to?

1. CSMA-CD Performance

frame = packet

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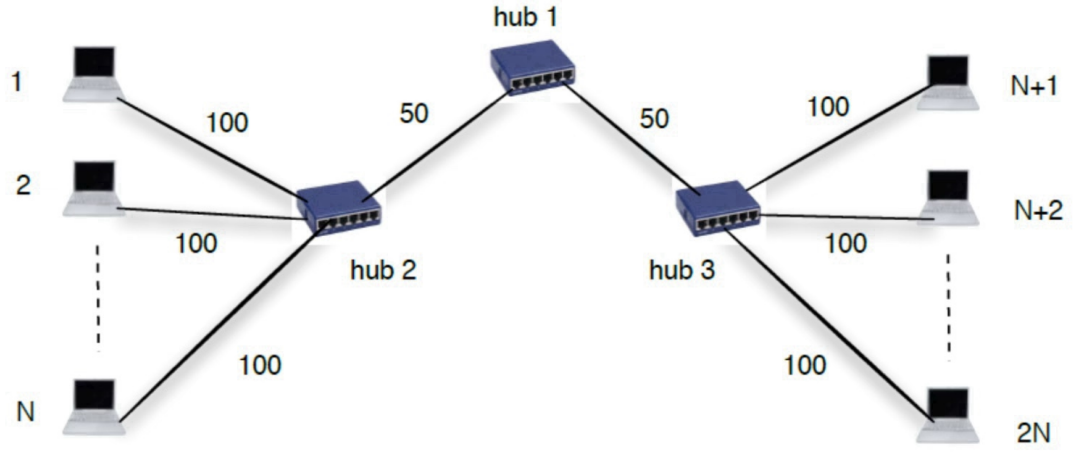

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(1) $t_{trans} = \frac{500 \times 8}{1\,Gb} = \frac{500 \times 8}{10^9\,bps} = 4 \times 10^{-6}$

$t_{prop} = \frac{100 \times 6 + 50 \times 2 + 100 \times 2}{2.8 \times 10^8}$ longest distance = 300

Effi $= 0.3478$

$\frac{1}{1+5\frac{t_{prop}}{t_{trans}}}$

0.3478 10^9

$$2N = \frac{\text{efficiency} \times \text{channel rate}}{\text{traffic of each node}}$$

$$= \frac{(1000 \times 500 \times 8)}{}$$

$$= \lfloor 86.95 \rfloor = 86$$

(2) ① hub ⇒ switch means the cable length is cut in half

② 2N become N in each subnet

longest distance = computer – hub – computer
(they in same subnet)

$= 200$

$$t_{prop} = \frac{200}{2\times10^8} = 1\mu s$$

$$t_{tran} = \text{same} = 4\mu s = 4\times10^{-6}$$

$$\text{efficiency} = 0.444$$

$$\frac{N}{2} + N = \frac{0.444\times10^9}{1000\times500\times8} = 111$$

因为题目中
绿色说了
这个 condition

$$N = 74 \Rightarrow 2N = 148$$

这个指所有 computer

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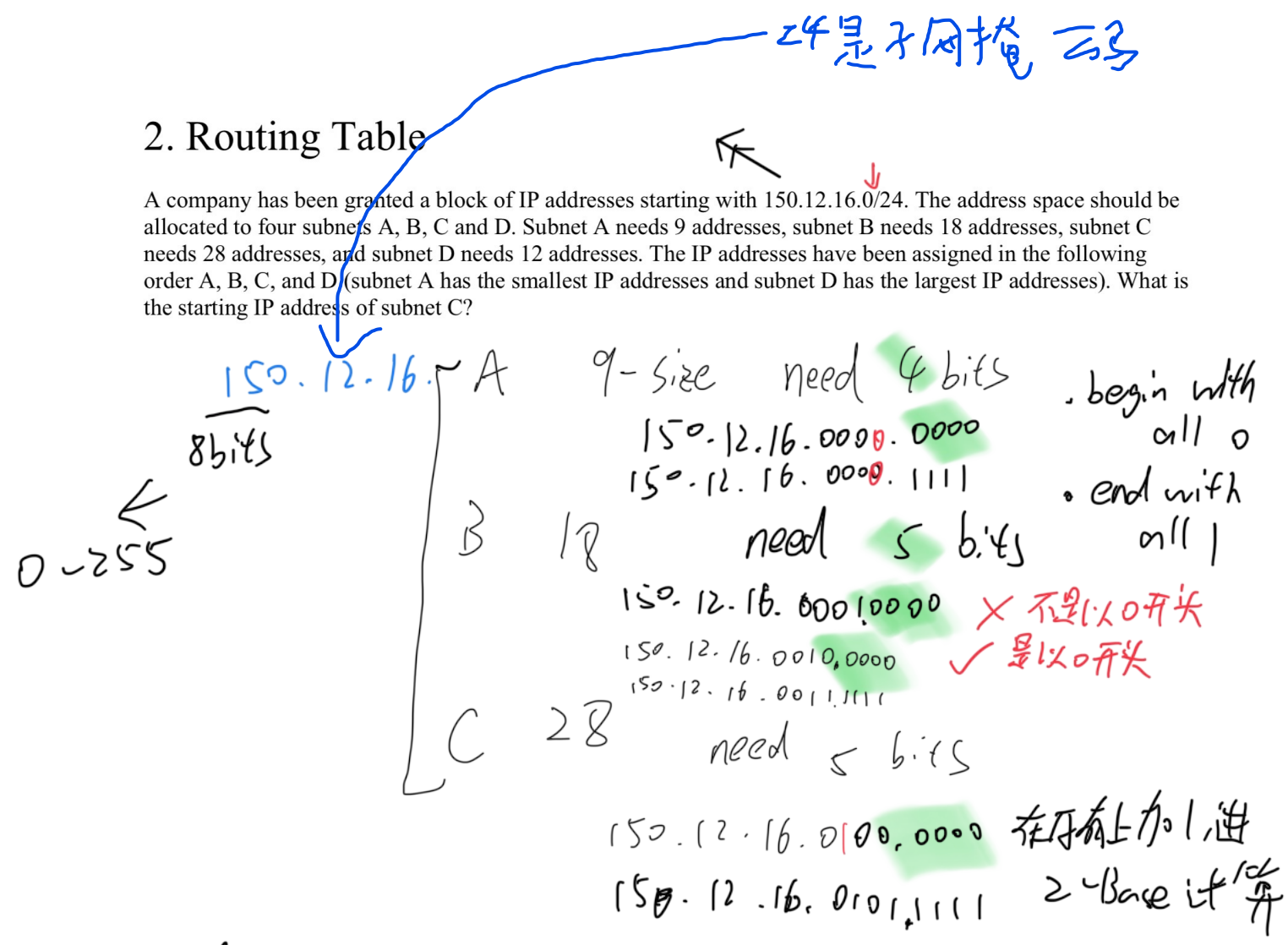

Note:

# of elements			num of address
1 bit	2	{0,1}	2-2=0
2 bit	4	{00,01,10,11}	4-2=2
3 bit	8	...	8-2=6

之所以减2是因为不能有 all 0 or all 1 addr

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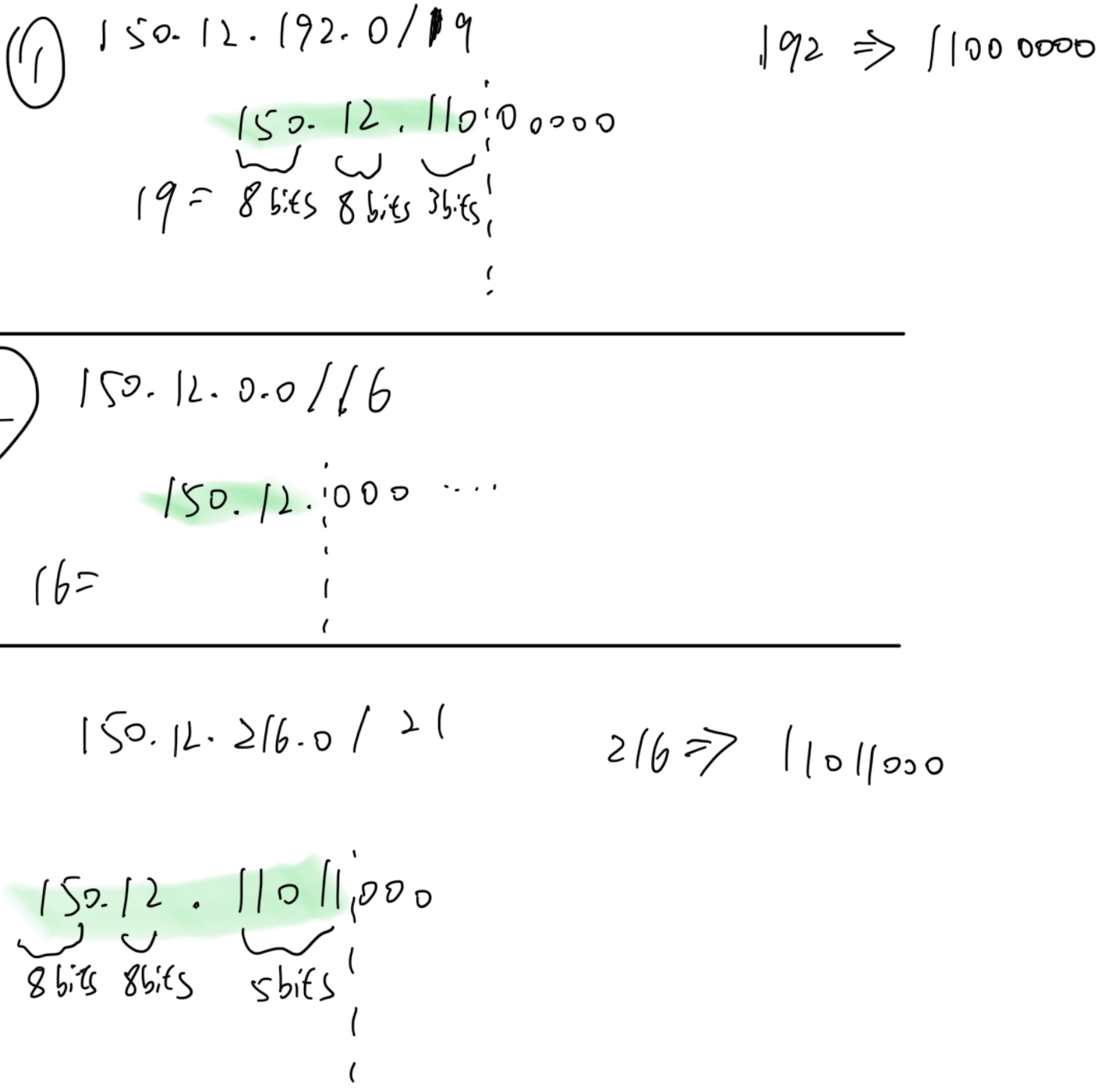

150.12.218.51

218 → 11011010

51 → .....

150.12.11011010.....

8bits 8bits

使用 longest prefix matching

we goto interface 3