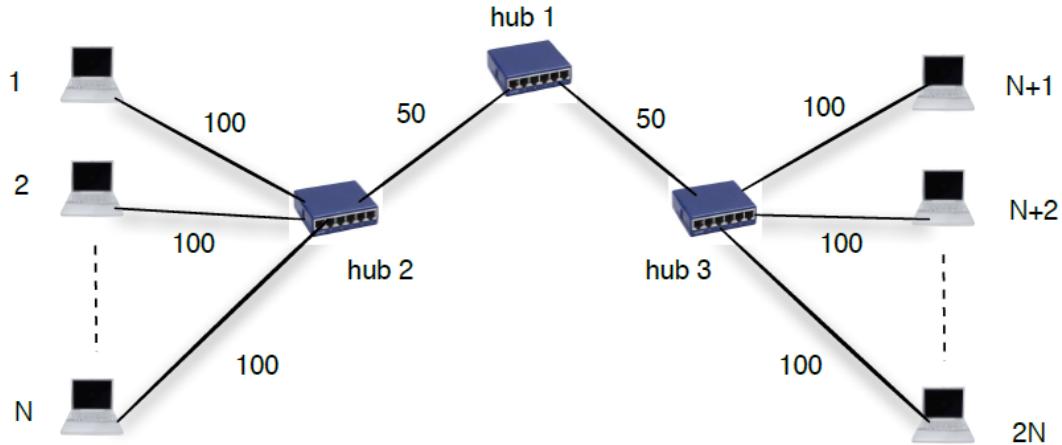


COMP9121 Tutorial Week 4

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

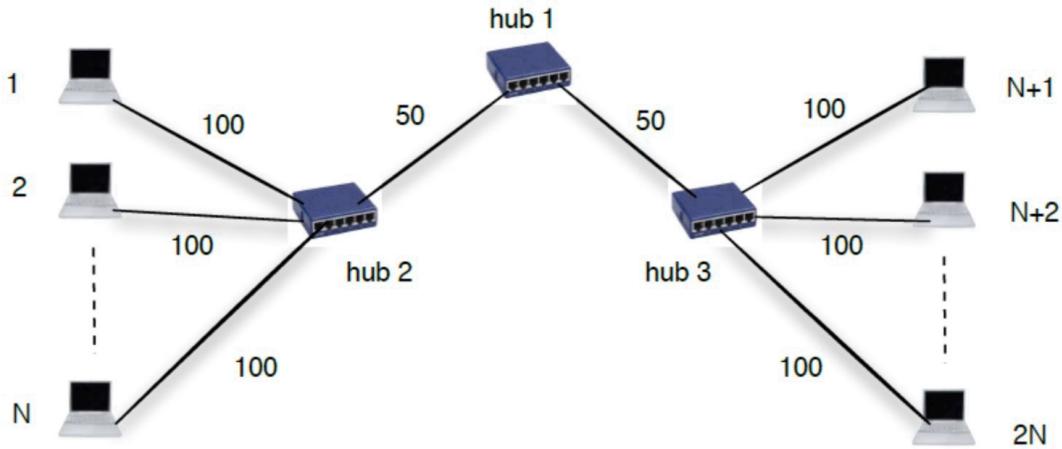
Address/ mask	Interface
150.12.192.0/19	Interface 1
150.12.0.0/16	Interface 2
150.12.216.0/21	Interface 3
Default	Interface 4

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

$$t_{prop} = \frac{[00 \times 6 + 50 \times 2 + 100 \times 2] \text{ longest distance}}{2.8 \times 10^8}$$

$$\text{Efficiency} = 0.3478 ??$$

0.3478

10^9

efficiency \times channel rate

$$2N = \frac{\text{traffic of each node}}{(100 \times 50 \times 8)}$$
$$= [86.95] = 86$$

(z) ① hub \Rightarrow 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

$$t_{prop} = \frac{2^{10}}{2 \times 508} = 1 \text{ ms}$$

$$t_{tran} = \text{same} = 4 \text{ ms} = 4 \times 10^{-6}$$

$$\text{efficiency} = 0.444$$

$$\frac{N}{2} + N = \frac{0.444 \times 10^9}{1000 \times 500 \times 8} = 111$$

因為題目中

綠色說]

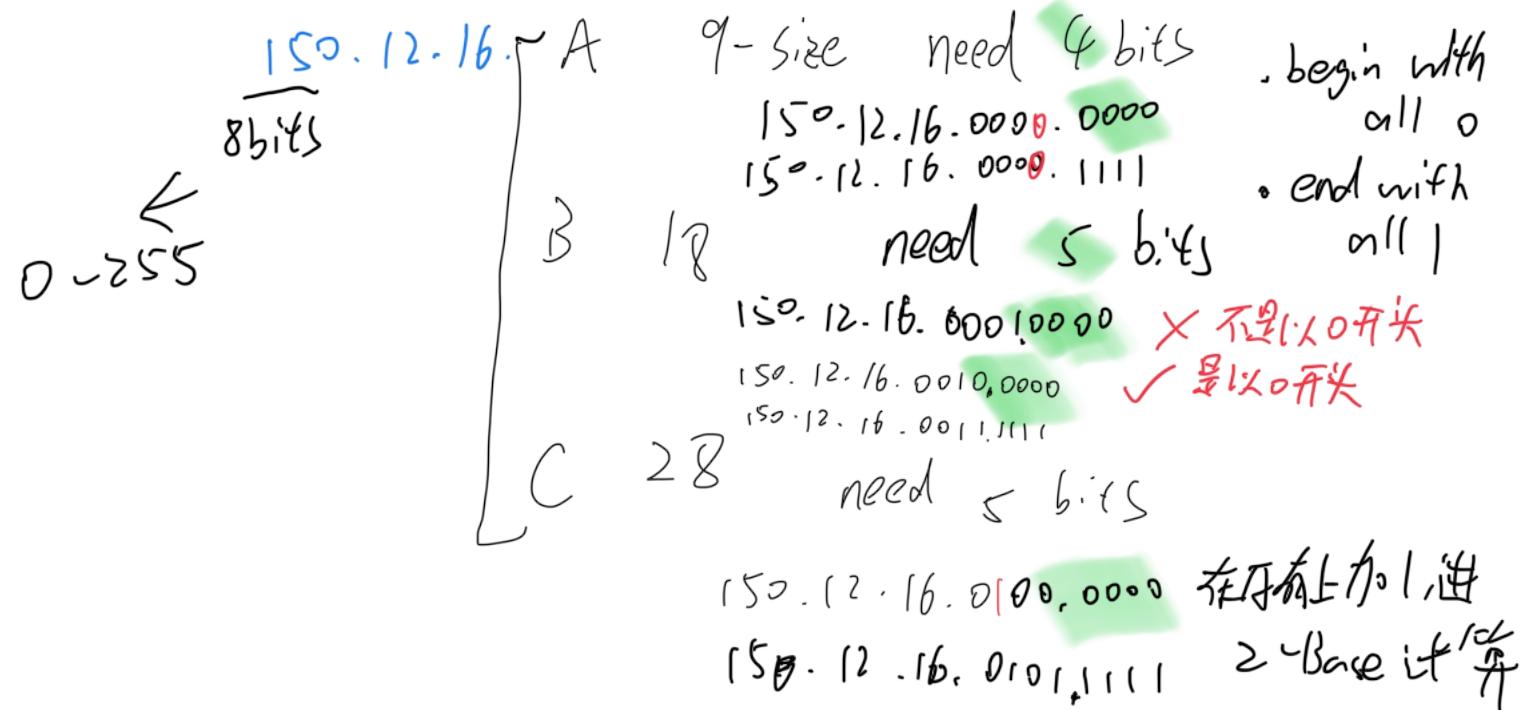
這個 condition

$$N = 74 \Rightarrow \underline{2N} = 148$$

這代表所有 computer

2. Routing Table

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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

之所以只有 2 是 因为 不能
all 0 or all 1 addr

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) 150.12.192.0/19 $19 \Rightarrow 1100000$

150.12.1100000
 \underbrace{\hspace{1cm}} \underbrace{\hspace{1cm}} \underbrace{\hspace{1cm}}
19 = 8 bits 8 bits 3 bits

(2) 150.12.0.0/16

150.12.000 ...
 \underbrace{\hspace{1cm}}
16 = 8 bits

150.12.216.0/21 $21 \Rightarrow 1101100$

(3) 150.12.1101100
 \underbrace{\hspace{1cm}} \underbrace{\hspace{1cm}} \underbrace{\hspace{1cm}}
21 = 8 bits 8 bits 5 bits

| 50.12.218.51

218 \rightarrow 11011010

51 $\rightarrow \dots$

| 50.12.11011010 ...

8 bits 8 bits

依照 longest prefix
matching

we go to interface 3