THE UNIVERSITY OF MELBOURNE

# COMP90007 Internet Technologies SM2, 2018
# Assignment 2

Peiyong Wang 955986 (username:peiyongw)

September 6, 2018

## 1 QUESTION ONE

Since CB = 5, CD = 4, CE = 3, to reach A, we have:

$$CBA = 5 + 5 = 10$$

$$CDA = 4 + 15 = 20$$

$$CEA = 3 + 8 = 11$$

$$CBF = 5 + 4 = 9$$

$$CDF = 4 + 4 = 8$$

$$CEF = 3 + 6 = 9$$

So to reach A, the transmission will go through B first; and to get to F, the transmission will go thtough D first.
The expected delay and the outgoing line of C are shown as follows (Table 1.1):

Table 1.1: Expected delay and outgoing line of C

| To | Delay | Line |
|---|---|---|
| A | 10 | B |
| B | 5 | B |
| C | 0 | - |
| D | 4 | D |
| E | 3 | E |
| F | 8 | D |

Then we can have C's routing table as follows (Table 1.2):
And the updated routing vectors for B, D, E repectively (Table 1.3):

Table 1.2: Routing table of C

| Dest. | Line |
|---|---|
| A | B |
| B | B |
| C | - |
| D | D |
| E | E |
| F | D |

Table 1.3: Routing vectors for B, D and E

| Dest. | B | D | E |
|---|---|---|---|
| A | 10 | 19 | 11 |
| B | 5 | 17 | 8 |
| C | 14 | 11 | 7 |
| D | 16 | 4 | 12 |
| E | 12 | 12 | 3 |
| F | 9 | 8 | 9 |

# 2 QUESTION TWO

A Convert 255.255.240.0 to binary we can have 11111111.11111111.11110000.00000000, there are 16 network bits and 4 bits for subnets, so the number of subnets allowed is $2^4 = 16$

B Firstly, we round up the number of addresses to 2048, 1024, 2048, 2048 repectively. For A, since $2048 = 2^{11}$, so we can see that it need 11 bits for hosts. For there are already 8 bits in the last part of the IP address, the hosts from A will only need the last three bits of the third part of the IP address, then the ending address of A will be 128.16.7.255, and the subnet mask will be 128.16.8.0/21. It goes the same for B.
However, when it comes to C, the original 3 bits of the third part of the IP address is not enough, so the C will start from the first one of the last four bits, hence 00001000. The rest calculation part is the same as A. So we can have C starting from 128.16.16.0 and ending at 128.16.23.255 with mask 128.16.16.0/21. The calculation process for D is the same as C. Results see Table 2.1.

Table 2.1: Answer for question 2B

| Organisation | Starting Add | Ending Add | Adds Allocated | Mask |
|---|---|---|---|---|
| A | 128.16.0.0 | 128.16.7.255 | 2048 | 128.16.0.0/21 |
| B | 128.16.8.0 | 128.16.11.255 | 1024 | 128.16.8.0/22 |
| C | 128.16.16.0 | 128.16.23.255 | 2048 | 128.16.16.0/21 |
| D | 128.16.32.0 | 128.16.47.255 | 4096 | 128.16.32.0/20 |

# 3 QUESTION THREE

According to Carrier Sense Multiple Access Protocol, when station C wants to transmit to station B, it will send a small impulse of signal to check whether there is any other signal currently occupying the channel.

Since C detects no collision, which means currently no one else is transmitting messages.

However, when the propagation delay is extremely high, in such a case even other stations have sent out a transmission (which have not reached its destination yet since the high delay) C can still reach the conclusion that currently the channel is idle. So when C send out a transmission, it will collide with others.

Therefore we can conclude that there is a possibility that B will not recieve the transmission from C.

However, when using Multiple Access with Collision Avoidance Protocol, things can be different. The MACA requires sender C send a RTS to reciever B, and the data transmission will not commence until B replies with a CTS.

For other stations sharing the same channel, when they detect RTS or CTS they will remian silent until the data transmission process is complete. So in the MACA case the transmission will be successful.

## 4 QUESTION FOUR

A To make it easier to distinguish valid frames from garbage.

B When transmitted by Ethernet, the minimum length of Ethernet frame is 64 bytes, including the destination address and the source address, the type/length field, and the checksum, summing up to 18 bytes. Plus the 62-byte packet, the total length of the frame is 80 bytes, which exceeds the minimum length of 64 bytes. Hence there is no need for padding.

## 5 QUESTION FIVE

11 slots are needed to resolve the contention.

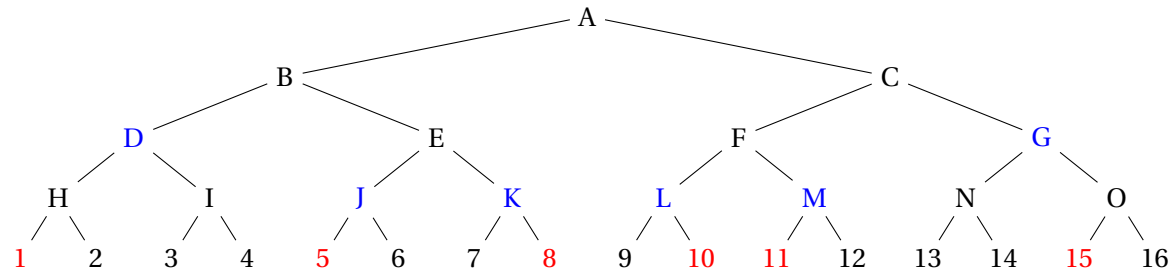


Figure 5.1: Adaptive tree walk protocol for solving contention. Red digits are stations which are ready, blue characters are the nodes where the contention is resolved.

SLOT 1: 1,5,8,10,11,15;(Node A)
SLOT 2: 1,5,8;(Node B)
SLOT 3: 1;(Node D)
SLOT 4: 5,8;(Node E)
SLOT 5: 5;(Node J)
SLOT 6: 8;(Node K)
SLOT 7: 10,11,15;(Node C)
SLOT 8: 10,11;(Node F)
SLOT 9: 10;(Node L)
SLOT 10: 11;(Node M)
SLOT 11: 15.(Node G)