# Quiz

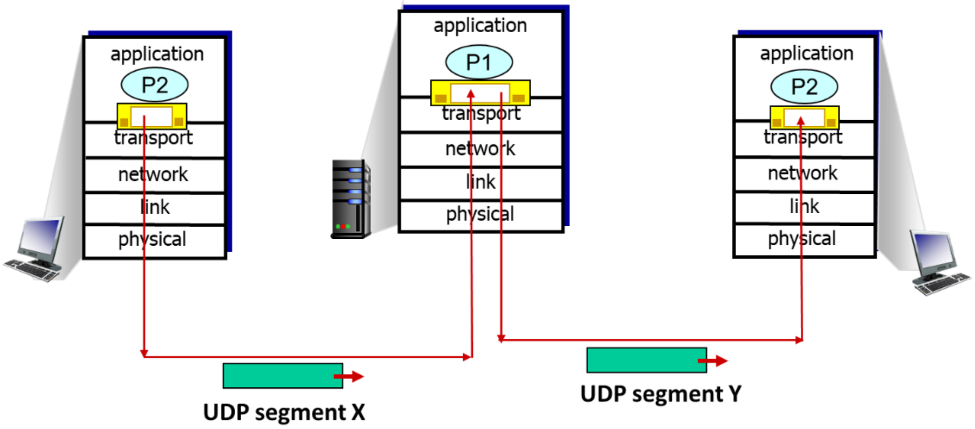
## Question 1

Host A sends a packet of **WXYZ** bytes to host B via 2 routers. **WXYZ** are the first 4 digits of your student ID number (in decimal). The distance between host A and the first router is 30 m. The distance between host B and the second router is 35 m. The distance between the two routers is 400 m. The propagation speed is 2 x $10^8$ m/sec. The recommended transmission rates are: 3 Mbps between host A and the first router, 200 Gbps between the 2 routers, and 5 Mbps between the second router and host B. Each router spends 1 msec to perform error detection.

(a) At what time the last bit of the packet leaves host A?
(b) At what time the last bit of the packet reaches the second router?
(c) If there is no congestion in the network, calculate the total end-to-end transmission delay for host A to send the packet to host B.

[5 marks]

## Question 2


application
P2
transport
network
link
physical
application
P1
transport
network
link
physical
application
P2
transport
network
link
physical
UDP segment X
UDP segment Y

| | |
|---|---|
| | 3009 |
| | |
| 2021 | **WXYZ** |

UDP segment X

| | |
|---|---|
| | 3315 |
| | |
| 2602 | 5678 |
| **WXYZ** | CDEF |

UDP segment Y

**WXYZ** are the last 4 digits of your student ID number (in hexadecimal).

(a) Determine all the unknown fields of UDP segment X. All numbers are in hexadecimal.
(b) Similarly, determine all the unknown fields of UDP segment Y.

[5 marks]

## Question 3

Host A sends a file of 51,300 bytes to Host B over a TCP connection. Assume the maximum segment size (MSS) is 144 bytes. The segment has no options field. The transport layer, network layer, and data-link layer add headers of a total size of 66 bytes to each segment before the resulting packet is sent out over a 100 Mbps link.

(a) What is the size of the first packet?

(b) What is the size of the last packet?
(c) What is the sequence number (in 8 hexadecimal digits) of the last segment?
(d) Assume no congestion, calculate the time (in msec, round to 3 decimal places) required to transmit the file.

[5 marks]

# Quiz Solution

## Question 1

For reference only. Assume WXYZ is 1234.

(a) 1234 x 8 / 3 x $10^6$ = 3.29 msec

(1 mark)

(b) 3.29 msec + (30 / 2 x $10^8$) + 1 msec + (1234 x 8 / 200 x $10^9$) + (400 / 2 x $10^8$) = 4.29 msec

(2 marks)

(c) 4.29 msec + 1 msec + (1234 x 8 / 5 x $10^6$) + (35 / 2 x $10^8$) = 7.27 msec

(2 marks)

## Question 2

For reference only. Assume WXYZ is 1234.

(a)

| | |
|---|---|
| 3315 | 3009 |
| 000C | 6A80 |
| 2021 | 1234 |

(2 marks)

(b)

| | |
|---|---|
| 3009 | 3315 |
| 0010 | 4033 |
| 2602 | 5678 |
| 1234 | CDEF |

(3 marks)

## Question 3

(a) 210 bytes

(1 mark)

(b) 102 bytes

(1 mark)

(c) 0000 C840

(2 marks)

(d) 5.989 msec

(1 mark)