# Mokhtari (9831143) – Computer Networks 2 - HW 06

**P27** from Chapter **6** of Kurose & Ross's Computer Networking, A Top-D own Approach, **8**th edition:

a) transmission Rate = 128 kbps (or) $128 \times 10^3$ bps

time required to fill the packet with length $\Rightarrow 8 \times L$ bits

$$= \frac{L \times 8}{128 \times 10^3} \text{ sec}$$

The packetization delay $= \frac{L}{16}$ msec

b) Packetization delay (L) = 1,500

total length of the packet is 1500 bytes

$$\text{Packetization delay} = \frac{1500}{16} \text{ msec}$$

$P_1 = 93.75$ msec

Packetization delay for L = 50 → ATM packet

When total length of the packet is 50 bytes then

$$\text{Packetization delay} = \frac{50}{16} \text{ m.sec}$$

$P_2 = 3.125$ m.sec

Packetization delay with greter than 20 msec causes noticeable and unpleasant echo.

$P_1$ will cause echo whereas $P_2$ will not cause echo.

c) Transmission Rate = 622 mbps

$= 622 \times 10^6$

Store and forward delay $= \frac{L \times 8 + 40}{R}$

Store and forward delay $L = 1500$

When total length of the packet is 1500 bytes

Store and Forward delay $= \frac{1500 \times 8 + 40}{622 \times 10^6}$ sec

$= \frac{12040}{622 \times 10^6}$ m.sec

$= 19.36$ m.sec

∴ store and forward delay for $L = 1500$ is 19.36 m.sec

In store and forward delay for $L = 50$ is

ATM packet :

Total length of the packet is 50 bytes

then

store and forward delay $= \frac{50 \times 8 + 40}{622 \times 10^6}$ sec

$= 0.7\,\mu\text{sec}$ $(<1)$

∴ store and forward delay for $L = 50$ is $0.7\,\mu\text{sec}$

(d) The store and forward delay is less in both cases for different link speeds

The size of the length of the packet varies from 1500 bytes to 50 bytes

The store and forward delay is also very less when the size of the packet is too small

The delay is negligible when small packets are used.

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**P29** from Chapter **6** of Kurose & Ross's Computer Networking, A Top-Down Approach, **8**th edition:

The following are the three requested tables:

**MPLS table at router R6:**

The packets from router R6 that are destined for A are switched to A using the route R6-R4-R3-R1. R6 doesn't have anything on the label. The interface 0 is used to forward the frame. The label used for the outgoing interface is 7.

| In label | Out label | dest | Out Interface |
|---|---|---|---|
| | 7 | A | 0 |

**MPLS table at router R5:**

The path R5-R4-R2-R1 is used by the router R5 to transfer the packets that are destined for A. R5 doesn't have anything in the label. The interface 0 is used to forward the frame. The label used for the outgoing interface is 5.

| In label | Out label | dest | Out Interface |
|---|---|---|---|
| | 5 | A | 0 |

**MPLS table at router R4:**

The packets from the routers R5 and R6 are forwarded to A by the router R4. Using the label values, the router R4 updates its MPLS table.

The router R6 out label is used as an in label for R4 to forward the frame from router R6 to destination A. Similarly, the router R5 out label is used as an in label for R4 to forward the frame from router R5 to destination A.

| In label | Out label | dest | Out Interface |
|---|---|---|---|
| 7 | 10 | A | 0 |
| | 12 | D | 0 |
| 5 | 8 | A | 1 |

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**P30** from Chapter **6** of Kurose & Ross's Computer Networking, A Top-Down Approach, **8**th edition:

The tables are as follows:

**MPLS table at router R6:**

| In label | Out label | dest | Out Interface |
|---|---|---|---|
| | 3 | D | 0 |

**MPLS table at router R5:**

| In label | Out label | dest | Out Interface |
|---|---|---|---|
| | 2 | D | 0 |

**MPLS table at router R4:**

| In label | Out label | dest | Out Interface |
|---|---|---|---|
| 3 | 12 | D | 0 |
| 2 | 4 | D | 1 |

**MPLS table at router R3:**

| In label | Out label | dest | Out Interface |
|---|---|---|---|
| 12 | | D | 0 |

**MPLS table at router R2:**

| In label | Out label | dest | Out Interface |
|---|---|---|---|
| 4 | 1 | D | 0 |

**MPLS table at router R1:**

| In label | Out label | dest | Out Interface |
|---|---|---|---|
| 1 | 12 | D | 1 |