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SEC: E
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SUB: Computer Networks
Assignment 1

1 Transmission delay $= \frac{L}{R} = \frac{500}{\cancel{0.04}} = \frac{0.4 \times 500}{50 \cancel{0} 85} = 0.08 \cancel{28 \times 10^{-8}} s$
$= 0.08 s$//

Transmission rate (R) $= \frac{0.4}{5} = 0.08 s$

2. I wouldn't choose the dedicated link for this very purpose transmitting at 100Mbps as the $t = L/R = 800{,}000$. But 1 day = 86,400s. Therefore I choose 1 day delivery.

3. Given that,

Prop-delay = 1000 * Trans-delay.

$3 \times 10^{-3} = d_{Trans} + 1000 d_{Trans}$

$d_{Trans} = 3 \times 10^{-6}$ seconds//

$\therefore$ Trans-delay $= \frac{\text{Prop-delay}}{1000} = \frac{d}{s \times 10^3} = \cancel{\frac{2 \times 10^3}{3 \times 10^6 \times 10^3}} = \cancel{0.66} \mu s$

$\therefore$ The transmission delay is $\cancel{0.66}\ 3 \times 10^{-6}$ seconds.

4 By considering transferring data over link:

Propagation delay $= \frac{d}{s} = \frac{350 \times 10^3}{2 \times 10^8} = 17.5 \times 10^{-4}$ sec.

Transmission delay $= \frac{L}{R} = \frac{100 \times 10^{-12}}{1 \times 10^9} = 10^5$ sec.

$\therefore$ The total delay is, $17.5 \times 10^{-4} + 10^5 \approx 10^5$ sec //

By considering driving to Chennai & comming back:

7hrs + 7hrs = 14 hrs = 50400 sec //

$\therefore$ Transferring data through data link is dominant when compared to driving to Chennai & Coming back.

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5. Propagation delay $= \frac{10^4 \times 10^3}{2.5 \times 10^8} = \frac{10^{-1}}{2.5} = 0.4 \times 10^{-1} = 0.04s = 40ms$

Transmission delay $= \frac{100 \times 10^3 \times 8}{10 \times 10^6}$

$= \frac{10^5 \times 8}{10^7} = 8 \times 10^{-2}$

$= 0.08s$

$= 80ms$

$\therefore$ Total end to end delay = Propagation delay + Transmission delay

$= 40ms + 80ms$

$= 120ms \; > 5ms$

$\therefore$ ISP cannot delives theis promise.

6. In Circuit Switching,

setup delay = 500ms

transmission rate (R) = 100Mbsp.

Packet size (L) = 16Kbsp $= 16 \times 8 \times 10^3$ bits

$\therefore$ End to End delay $= \frac{8 \times 16 \times 10^3}{100 \times 10^6} = 8 \times 16 \times 10^{-5} = 128 \times 10^{-5}$

$+ 500 \times 10^{-3}$

$= 1.28 \times 10^{-3} + 500 \times 10^{-3}$

$= 501.28 \times 10^{-3} s.$

In Packet Switching,

Queing delay = 10ms/packet

Transmission speed = 10 Mbsp.

Packet size = n.

$\therefore$ End to End delay $= 10n + \frac{16 \times 10^3}{10 \times 10^6}$

$= 10n + 1.6 \times 10^{-3} s$

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$$\therefore 10n + 1.6\times10^{-3} = 501.28\times10^{-3}$$

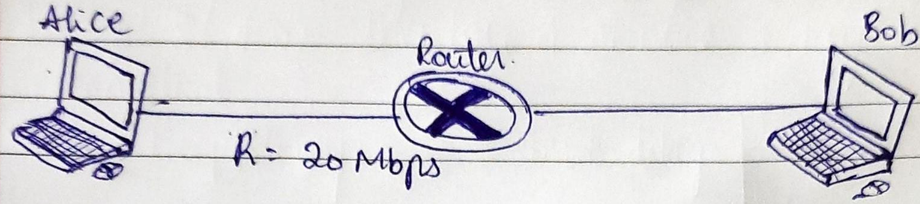
$$\Rightarrow 501.28 = 10n + 1.6\times8$$

$$10n = 488.48$$

$$n = 48.848$$

$n \approx 49$ packets

7.



$R = 20\text{Mbps}$

$L = 1000$ bits.

$$\text{Transmission delay} = \frac{L}{R} = \frac{1000}{20\times10^{6}} = 5\times10^{-6}s = 5000ms$$ //

8. $R = 200\text{Mbps}$ ④ links from servers & ④ links from clients

$R_s = 70\text{Mbps}$ Bottleneck $= \min[R_c, R_s, R/4]$

$R_c = 90\text{Mbps}$ $= \min[90, 70, 50]$

$\therefore$ Bottleneck in shared link.

a) link Utilization at shared link $= \frac{R_{Bottleneck}}{R_{shared\ link}} = \frac{50}{50} = 1$ //

Maximum available throughput is 50Mbps. //

b) link Utilization at shared link $= \frac{R_{Bottleneck}}{R_{shared\ link}} = \frac{50}{50} = 1$ //