Tarea #2 redes Diego Cerda 21988

Calculate the total delay to transfer a 10 mb file from the host 1 to host 2 (from the begining until the host 2 receives the last bit of the file) using circuit switching & message switching and datagram switching networks. Datagram size is 75kb the following is known

- The distance between the two hosts is 2000km
- there are 3 routers (nodes) at the same distance in between the hosts
- Propagation speed is 200 000 km/s
- Transmition bandwith is 1 Mbps
- Node processing delay is 100 ms
- Neglect processing delays in hosts
- Comment on the obteined results

- R) 1) Circuit switching

tenemos que recordar que:

Total delay = $d_{proc} + d_{prop} + d_{trans}$

- Processing delay: d_{proc}
- Propagation delay: d_{prop}
- Transmission delay: d_{trans}

Transmission delay = $\frac{P}{r}$ donde p = packet length

donde r = transmition rate

- en este caso = $\frac{P = 10\,Mb}{r = 1\,Mbs}$

Transmition delay = $\frac{1000}{200} = 10s$

Propagation delay = $\frac{I}{c}$ donde I = length of the physical link

donde c = propagation speed in medium

Propagation delay = $\frac{2000}{200\,000} = 0.01s$

Processing delay: Number of links · transmition delay

- En este caso tenemos 4 links:

(El Host → Router 1 → Router 2 → Router 3 → Recieve)

Processing delay = $4 \cdot \frac{2000}{4 \times 200\,000} = 0.01s$

Total delay = $10s + 0.01s + 0.01s = 10.02s$

2) Message switching

- Para este caso ya poseemos el transmition delay por link del ejemplo pasado = 10s

transmition delay = 4 (cantidad de links) · 10s = 40s

$$\text{Propagation delay} = 4 \cdot \frac{2000}{4 \cdot 200\,000} = 0.01s$$

Processing delay: El enunciado nos dice que cada router nos añade 100ms de delay, osea 0.1s y tenemos 3 routers

Processing delay = 3 · 0.1s = 0.3s

Total delay for message switching = 40s + 0.01s + 0.3s = 40.031 s

3) Datagram Switching

- Para el datagrams tenemos que definir primero la cantidad de paquetes (subpaquetes - datagrams)

$$N = \frac{10000 \text{ (tamaño del paquete)}}{75 = \text{pedacitos que puedo dividir}}$$

D = 134

N = 134

Transmition delay = $\frac{\text{Datagram size}}{\text{bandwith}} = \frac{75}{1000} = 0.075s$

propagation delay = $\frac{2000}{200\,000}$ → router to router propagation

$= 0.01s$

↓ cada datagram experimenta este propagation delay

sin embargo se experimenta una sola vez porque se ejecuta en paralelo

Processing delay:

$3 \cdot 200ms = 300ms = 0.3s$

↓ routers

- Aquí tenemos que considerar pipelined y la ejecución en paralelo

total delay = transmition delay + propagation delay + processing delay + $(N-1) \cdot$ transmition delay

$= 0.075 + 0.01s + (133 \cdot 75) = 10.362$