**Worksheet 3 - Throughput**

1. Suppose Host A wants to send a large file to Host B. The path from Host A to Host B has three links, of rates R1 = 500 kbps, R2 = 2 Mbps, and R3 = 1 Mbps.
   1. Assuming no other traffic in the network, what is the throughput for the file transfer?

R1 = 500x10^3bps

R2 = 2x10^6bps

R3 = 1x10^6bps

* 1. Suppose the file is 4 million bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B?

dt = 4 x 10^6 x 8 b / 500 x 10^3 bps

* 1. Repeat (a) and (b), but now with R2 reduced to 100 kbps.
  2. Assume link 2 is shared by 3 other connections, and link 3 is shared between 2 other connections(these connections connect some other unknown hosts), what is the throughput for file transfer now?
  3. Suppose the file is 3 million bytes. Dividing the file size by the throughput, roughly how long will it take to transfer the file to Host B?

1. Suppose a host wants to send a large file to another host. The bandwidth between each pair of directly connected hosts is given in the figure. Calculate the throughput between:

A

B

C

D

X

Y

E

250Kbps

1.1Mbps

1000Kbps

0.1Mbps

0.9Mbps

0.005Gbps

* 1. A and E
  2. B and D
  3. B and E
  4. X and Y
  5. What is the transmission delay in each of the cases a to d if you need to send 100,000 B.
  6. Assuming, the distance between any 2 directly connected hosts is 2500Km, what is the propagation delay in each of the cases from a to d.
  7. FInd the total delay, assuming all information given in e. and f. for cases a to d.