**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?
   2. 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?
   3. Repeat (a) and (b), but now with R2 reduced to 100 kbps.
   4. 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?
   5. 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?
2. 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:



* 1. A and E
  2. B and Z
  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.