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CSE 530 Data Communications

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Homework 1

1. The circuit switch is able to guarantee a bandwidth why the packet-switched network may lose its control on the bandwidth. The FDM requires analog hardware to connect to the internet via a “twisted pair.” While the TDM is digital and can handle multiple bit streams simultaneously.
2. 1. When circuit switching is used, only 2 users can be supported because each user requires half of the bandwidth
   2. Since the link has a bandwidth of 2 Mbps, if there are two or fewer users on at the same time; then there will not be able queuing delay because the users only use 1Mbps each. However; if there are three or more users then the link needs a 3+ Mbps bandwidth to meet the demand without delaying.
   3. The probability that a given user is transmitting is 0.2
   4. The probability that all three users a transmitting simultaneously is (0.2)^3 = 0.008. While the queue grows the fraction of time is the same as the probability (0.008).
3. The time to propagate the packet is 10 milliseconds. Generally the time does not matter how long the packet is so the time is given by distance/speed. No packet length and transmission rate both do not change the delay.
4. 1. The throughput of the file is the smallest bandwidth of the links so the throughput is the 500 kbps
   2. The file will transfer to Host B in 64 seconds.
   3. If R2 is reduced to 100 kbps then the throughput of the transfer is reduced to 100 kbps and the time to transfer is lengthened to 320 seconds.
5. A router processes through the network, link and physical layers. The link-layer switch processes through just link and physical layers. And the Host processes through all 5 layers. (Application, Transport, Network, Link, Physical).