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Assignment 1

1.) Transport Protocols such as User Datagram Protocol and Transport Control Protocol are essential to the transfer of data over an network by providing essential data such as Sender and Receiver addresses and ensure that data reaches the end user in the case of TCP. It also ensures that different edges systems can communicate efficiently by having a fixed standard on which most systems can decode. Different protocols can be used for varying applications to best suit the needs of the given application.

2.) The process of data encapsulation involves adding header information for example sender and receiver IP addresses and socket numbers or sometimes segment numbers to a message as it passes through the various layer of the transfer protocol. This method allows for the secure transfer of data to it is intended recipients and also allows for a message to in turn be sent to the point of origin of the message since the addresses are included in the header. It also helps prevent the loss data since missing packets can always be resent instead of the entire message.

3.) For end to end delay there are 4 major components which are Processing delay, Transmission delay, Propagation delay and Queuing delay. Processing delay, transmission delay and Propagation delay are all constants since it takes a fixed amount of time to transmit a fixed amount of time to transmit a certain number a bits over a fixed route however queuing delay would vary since different packet sizes would affect the rate at which packets are transmitted.

4.) 3TB= $3*10^6$ mb
1mb over 1 mbps link takes 1second
$3*10^6$ seconds to transfer 3TB over 1Mbps link
To send 3Tb over a 1Mbps Link would take 35 days
While TTPOST overnight would take approximately 12 hours.
TTPOST would be the faster option.

5.) A.) Since each user only uses 0.5 mbps 4 users would be able to successfully use that link at any given time

B.) If each of the 4 users use the 2 mbps link there will be no queuing delay since the links can meet the demands of the 0.5 mbps required by each user however if 5 persons use the link there will now be a queuing delay since 2.5 mbps is now required.

C.) The probability of a given user is transmitting is 0.1

D.) Probability that 6 people out of 10 are transmitting simultaneously = $1-(210(0.1)^6(1-.01)^{(10-6)})= 0.999$

6.) UDP is a faster yet more unreliable than TCP since the TCP datagrams have larger header due to the Acknowledgement field and results in a larger overall file and slower transfer speed. UDP would allow for faster transactions however they may not be reliable.

7.) a.) A circuit-switched network would be best for this scenario, since the application involves extended sessions with smooth bandwidth requirements such as a known transmission rate and transmit in fixed intervals and bandwidth can be reserved for each application session without waste.

b.) Given a sufficient data link little to no queuing would occur and since each data link has sufficient bandwidth the worst case scenario of all users transmitting at the same time is covered