**Networking Questions and Activities**

**Q1. What is statistical Multiplexing?**

- Statistical multiplexing is a method used in Packet Switching, where communication links are shared by dynamically allocating bandwidth to each channel on an as-need basis.

- This is done by dividing communication channels into data streams, where each stream is divided into packets.

- Pipeline View: Packets get forwarded —> If there are back-to-back packets (Transient Overload), they are placed in a queue —> If the amount of packets exceed the size of the queue buffer, then packets will be lost (Persistent Overload) —> Packets are transmitted.

**Q2.) Sending Packets**

Two hosts separated by M meters. Propagation speed is S meters / sec. A —> B sending packet of size L. They are connected by a single link of rate R b.p.s

(note: propagation speed measures the speed at which a bit moves through a medium.)

(a)

- Propagation Delay: The amount of time for the head of the signal to travel from host A to Host B.

- d\_prop = M (link length) / S m.p.s (propagation speed)

(b)

- Transmission Delay: Time it takes to place the whole packet on the link / wire

- d\_trans = L (size of packet) / R (bps rate)

(c)

- End to End delay: Sending one packet from src to dest over a path with N links at rate R

- N = 1 link, R bps.

- End to End Delay = N \* (transmission delay + propagation delay)

= 1 \* (L/R + M/S)

(d) Host A transmits at t=0. At t=d\_trans, where is the last bit of the packet?

- At d\_trans, the entire packet should be on the link/wire. So the last bit would be on the link/wire, leaving Host A.

(e)

- If d\_prop > d\_trans —> at d\_trans, the first bit on the link would be between host A and B

- Even if entire packet is already on the link/wire, because propagation is longer than transmission, the first bit of the packet would NOT have reached host B / the next node yet.

(f)

- If d\_prop < d\_trans —> at d\_trans, the first bit on the link would be at host B.

- If the entire packet is / has already on the link/wire, because transmission is longer than propagation, the first bit of the packet would have already reached host B

**Q3.) Transmission**