

Fall Term 2006
TelCom 2310
Computer Networks
Monday 3:00 pm - 5:50 pm
Sennott Square 6110
<http://www.cs.pitt.edu/~znati/tel2310.html>

Homework 2
Due Date : 9/25/2006

Problem 1

Packets arrive at a node to be transmitted. The packets arrive at random times $T_1, T_2, \dots, T_n, \dots$, and are transmitted in the order of their arrivals (FIFO). Packets that cannot be transmitted immediately are stored in a buffer until they can be.

1. Assume that each packet is P bits long and the transmission rate is R bps. Draw a diagram showing how many bits are stored in the node buffer as a function of time. Using your diagram, determine the delay faced by the first, second, and third packets as a function of (T_1, T_2, T_3) . Note that the delay of the packet is the sum of transmission time P/R and some queueing time. Give a simple condition on the arrival times (T_1, T_2, T_3) for the queueing time to be zero.
2. Show arrival times $\{T_n, n \geq 1\}$ that lead to a very large average queueing time per packet, even though the average arrival rate (in packets per second) is very small. (*Hint: Consider infrequent arrivals of large batches of packets*)

Problem 2

Solve Problem 6, page 64 in Computer Networking, a Top-Down Approach Featuring the Internet, 3rd Edition.

Problem 3

Solve Problem 7, page 64 in Computer Networking, a Top-Down Approach Featuring the Internet, 3rd Edition.

Problem 4

Solve Problem 8, page 64 in Computer Networking, a Top-Down Approach Featuring the Internet, 3rd Edition.

Problem 5

Solve Problem 9, page 64 in Computer Networking, a Top-Down Approach Featuring the Internet, 3rd Edition.