ECE - Computer Networks II
Winter 2008

Problem Set #4

1. Consider the traffic of an MPEG video stream that is regulated with a leaky bucket with average rate $\rho = 0.15$ $Mbps$ (Mbps = Megabits per second), and maximum burst size size $\sigma = 15,000$ $bits$.

   (a) The output of the regulator feeds into a constant rate link with capacity $C = 300$ $kbps$. Determine the maximum backlog and the maximum delay at the link.

   (b) Suppose that the regulator is a dual leaky bucket with peak rate $P = 1$ $Mbps$ (in addition to $\rho = 0.15$ $Mbps$ and $\sigma = 15,000$ $bits$). Determine the maximum backlog and the maximum delay at the link.

   (c) Continue with the assumptions in (b). Instead of a single link, now assume that the traffic goes through a sequence of three links with rates $C_1 = 400$ $kbps$, $C_2 = 200$ $kbps$, and $C_3 = 300$ $kbps$, for the first, second and third link, respectively. Determine the maximum backlog and the maximum delay in the network.

2. Consider the traffic of a voice stream that is regulated with a leaky bucket with average rate $\rho = 50$ $kbps$ (kbps = Kilobits per second), and maximum burst size size $\sigma = 1000$ $bits$.

   The regulated traffic is transmitted over a link with constant rate C. Determine the minimum rate of C so that the delay at the link does not exceed 10 $msec$ and the backlog at the link does not exceed 100 $bits$.