ECE - Computer Networks II Winter 2008

Problem Set #5 : Scheduling

1. Consider a link with a capacity of C = 10 Mbps that sees traffic from four leaky-bucket constrained flows with parameters (σ_i, ρ_i) and delay bound d_i for flow *i* as follows:

Flow	σ_i	$ ho_i$	d_i
	(bits)	(Mbps)	(μsec)
1	10	1	2
2	5	2	3
3	10	2	4
4	5	1	5

Verify that the above flows are schedulable at an EDF and an SP scheduler (Schedulable means that the flows do not have a violation of delay bounds). Use the schedulability conditions derived in class to determine that the flows are schedulable.

For SP assume that a flow with a lower delay bound has a higher priority, i.e., Flow 1 has the highest priority, and Flow 4 has the lowest priority.

If the set of flows is not schedulable, determine the increase of delay bounds needed to make the flows schedulable.

2. Consider a link with a capacity of C = 10 Mbps and EDF scheduling. There are currently three active flows at the link. All flows are leaky-bucket constrained flows with parameters (σ_i, ρ_i) and delay bound d_i for flow *i* as follows:

Flow	σ_i	$ ho_i$	d_i
	(bits)	(Mbps)	(μsec)
1	5000	1	2000
2	1000	4	3000
3	10000	2	4000

Suppose that a new flow is added at the linke with parameters $\sigma_4 = 10$ bits and $\rho_4 = 4$ Mbps. bound d_i for flow *i*. Use the schedulability condition for EDF to find a delay bound d_4 for Flow 4, without causing delay bound violation of any flow. (Can you make a statement about the *smallest* delay bound that can be assigned to the flow, again without violating any delay bounds?)