Computer Networks Group

University of Göttingen, Germany

Homework #10

(Due Thursday, Jan 20, 2011)

What are the four building blocks of Quality of Service?

Name and characterize four scheduling policies that were introduced in the lecture.

What are the criteria that policing mechanisms can use to control a data stream?
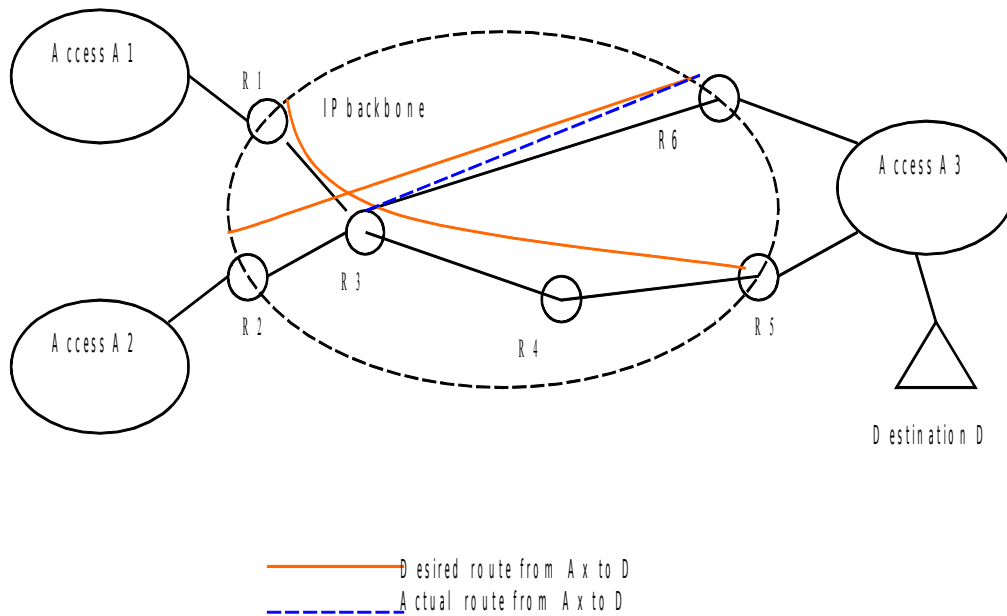
Illustrate in what sequence packets from three different queues (a, b, c) can be sent from a sending buffer that implements a WFQ scheduling policy. Suppose the weights for the queues are 0.25, 0.25, and 0.5. How could the sequence look like if there are no packets in queue 'c'?

Consider a token bucket that is filled with a rate of 1,000 tokens/min and has a size of 500 tokens. Each bit of data consumes one token. Does a flow of 20bps conform to this bucket?

Assume a router maintains QoS garantees for two data flows. Flow a is policed by a token bucket with a capacity of 100 tokens a fill rate of 20 token/sec. Flow b is policed by a token bucket with a capacity of 200 tokens and a fill rate of 12 token/sec. The router uses weighted fair queuing to schedule the packets with a weight of 3 for flow a and a weight of 2 for flow b. It's sending rate is 40 packets/sec. What is the upper bound delay that the router can guarantee for both flows?

Briefly compare the IntServ to the DiffServ architecture.

Consider the scenario illustrated by the following figure. How can MPLS be deployed in such a scenario to engineer traffic flows from Access Network A1 to Destination D via the routers R4 and R5 instead of router R6 (R6 would be chosen by R3 as next-hop using hop-by-hop shortest path routing)?

Access A 1

R 1

IP backbone

R 6

Access A 3

R 3

R 2

R 4

R 5

Access A 2

Destination D

———— Desired route from A x to D
------- Actual route from A x to D

Traffic Engineering to override shortest path route