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**The University of Queensland**  
**School of Information Technology and Electrical Engineering**  
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**COMS3200 – Tutorial 11**

**Questions**

1. It is possible to define flows on either a host-to-host basis or on process-to-process basis.
  - a. Discuss the implications of each approach to application programs.
  - b. IPv6 includes a *FlowLabel* field for supplying hints to routers about individual flows. The originating host is to put here a pseudorandom hash of all the other fields serving to identify the flow; the router can thus use any subset of these bits as a hash value for fast lookup of the flow. What exactly should the *FlowLabel* be based on for each of these two approaches?
2. The transmission schedule (Table 1) for a given flow lists for each second the number of packets sent between that time and the following second. The flow must stay within the bounds of a token bucket filter. What bucket depth does the flow need for the following token rates? Assume the bucket is initially full.
  - a. 2 packets per second
  - b. 4 packets per second

Table 1.

Time (seconds)	Packets sent
0	5
1	5
2	1
3	0
4	6
5	1

3. Suppose a router has accepted flows with the TSpecs shown in Table 2, described in terms of token bucket filters with token rate  $r$  packets per second and bucket depth  $B$  packets. All flows are in the same direction and the router can forward one packet every 0.1 second.
  - a. What is the maximum delay a packet might face?
  - b. What is the minimum number of packets from the third flow that the router would send over 2.0 seconds, assuming that the flow sent packets at its maximum rate uniformly?

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Table 2.

r	B
1	10
2	4
4	1

4. Suppose an RSVP router suddenly loses its reservation state but otherwise remains running.
    - a. What will happen to the existing reserved flows if the router handles reserved and nonreserved flows via a single FIFO queue?
    - b. Eventually the receivers on these flows will request that their reservations be renewed. Give a scenario in which these requests are denied.
  5. Which ATM traffic classes can cause congestion in switches? Which traffic classes are capable of creating short term congestion and which could create longer lasting congestion?
  6. Give an argument why a leaky bucket algorithm should allow just one packet per tick, independent of how large the packet is.
  7. Consider the user of differentiated services with expedited forwarding. Is there a guarantee that expedited packets experience a shorter delay than regular packets? Why or why not?
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