SOLUTION NOTES

Digital Communication II 2003 Paper 8 Question 3 (JAC)

640kbps, 1Kbte (8kbit) packets, with 50ms, 100ms round trip time (assume queueing/story and forward time is negligible!).

peak rate is 10packet per round trip time.

a) 8k is never going to get out of slow start - i.e.
Syn/Syn ack - takes 1 RTT
1 packet then 1 ack - takes 1 RTT
2 packets, 2 acks - takes 1 RTT
4 packets 4 acks - takes 1 RTT
1 more packet, (even with packet headers would all be done in) last RTT and then Fin/Fin Ack

so 5 RTTs or 1/2 sec.

b) 8M will spend most its time in steady state so assuming fast retransmit, we will get the data rate of the line plus or minus the 1 packet per rtt due to aliasing effects of window size v. actual line rate....

c) if the router only has 4k (4 packet buffer) congestion avoidance Will go horribly wrong - we wont be able to exceed the line rate by a factor of 2 (needed every ln(W) rtts to allow 1 packet loss to trigger fast recovery) = basically, a naive answer will be we get 1/2 the line rate - more sophisticated answer is that we will lose enough packets every 4 RTTs to slow start....so we will get the rate above from question a)...which is only 2 packet per rtt (not 4 as in a naive answer, or 8 as we should if the buffer was adequately provisioned.)

This material is item 6 in the syllabus, and is partly a rehash of digicom 1 material on TCP anyhow (at least on sliding window and congestion control). It is in lecture 3 in the online slides, handouts and presented by Crowcroft.