

Quiz 3 Solution

10/8/2013

1. (5 points). Suppose a movie studio wants to distribute a new movie as a digital file to 1,000 movie theaters across country using peer-to-peer file distribution. Assume that the studio and all the theaters have DSL connections with an 8 Mb/s downstream rate and a 4 Mb/s upstream rate and that the file is 10 GB long. Approximately, how much time is needed to distribute the file to all the theaters under ideal conditions?

The total upstream bandwidth is about 4 Gb/s. Since the file must be delivered to 1,000 studios, we have 10 TB of data to be delivered. At 4 Gb/s, this takes 20,000 seconds, or roughly 6 hours.

Suppose the studio wanted to use the client-server method instead. What is the smallest link rate that is required at the studio that will allow the file to be distributed in under 40,000 seconds?

This time period is twice the time used for the first part, so the server's upstream bandwidth must be half as large as the upstream bandwidth of the peers in the first part. So, 2 Gb/s is enough.

2. (5 points). Consider a go-back- N protocol with cumulative acknowledgements that uses sequence numbers 0-3 and has a window size of 2. Assume that the sender transmits four packets P_0, P_1, P_2 and P_3 and that P_1 is discarded before it reaches the receiver. No other packets or acks are lost. The beginning of this scenario is shown at right, with the timeout interval shown.

Complete the diagram to show all the acknowledgements and all packet transmissions and retransmissions.

Label all packets and acknowledgements with their sequence numbers.

Also, note when each packet is available to the application at the receiver.

Continue the scenario until all four packets have been delivered and acknowledged.

