Department of Computer Science and Engg, IIT Bombay

CS 716: Introduction to Communication Networks — Quiz 1: 26 Aug 2011; 11:00–12:20

Handwritten notes permitted. No photocopies. — Weightage: 10%, Max Marks – 30

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1. Answer the following in 5-6 sentences each: **15 marks**

   (a) In ALOHA protocol, a station transmits whenever it has data. In slotted-ALOHA, a station transmits only at the beginning of the next time slot. State one advantage of using slotted-ALOHA over ALOHA. State one drawback.

   (b) Your friend claims that the non-persistent CSMA protocol performs better than the 1-persistent CSMA protocol. Do you agree? If yes, justify your answer. If not, give a counter-example scenario.

   (c) List the delay components that make up the end-to-end delay experienced by a packet from a source host to a destination host via intermediate routers. Also specify which of these delay components are constant and which variable?

2. Solve the following problems: **15 marks**

   (a) You are working on your laptop and need a 2GB file that is on the server. The entire file is also on your pen drive but you have left the pen drive in another room. You have a dog, sitting beside you, that is trained to bring the pen drive to you. The average speed of the dog is 20 km/hour. For what range of distances does the dog have a higher data rate than a 100 Mbps Ethernet link?

   (b) Two nodes are communicating using the CSMA/CD protocol (as in Ethernet). Suppose the bandwidth is 100 Mbps, the frame size is 1500 bytes and the propagation speed is 3×10^8 m/sec. Calculate the maximum possible distance between the nodes such that the sender can detect if any collision occurs.

   (c) Suppose there are N users who share a bottleneck link of bandwidth R bits/sec. Each user continuously downloads files through this link, i.e., as soon as one download completes, the next download for that user begins. Assume that each file is of size F bits, and that each user gets an equal share of the link. What is the average time to download a file?
