HOME WORK ASSIGNMENT#1

Due Date October 4, 2007 (10x100=1000 points)
CS 4/55201 COMPUTER NETWORKS
Fall 2007, Department of Computer Science, Kent State University

1. (Chapter 1, Problem P7) What is the principal difference between connectionless communication and connection-oriented communication?

2. (Chapter 1, Problem 17) A system has an n-layer protocol hierarchy. Applications generate messages of length M bytes. At each of the layers, an h-byte header is added. What fraction of the network bandwidth is filled with headers?

3. Discover what you can find out about the network technologies that are used in our department. (a) Identify the types of hardware, links, switches and routers. (b) Identify the high level protocols those are supported, (c) Sketch the network topology, and (d) Estimate the number of hosts those are connected.

4. (Chapter 1, Problem 20) The Internet is roughly doubling in size every 18 months. Although no one really knows for sure, one estimate put the number of hosts on it at 7 million in January 1996. Use this data to compute the expected number of Internet hosts in the year 2008.

5. (Chapter 1, Problem 22) Imagine that you have trained your St. Bernard, Bernie, to carry a box of three 8mm Exabyte tapes instead of a flask of brandy (When your disk fills up, you consider it an emergency). These tapes each contain 7gigabytes of data. The dog can travel to your side, wherever you may be at 19km/hour. For what range of distance does Bernie have a higher data rate than a 155 Mbps ATM line?

6. (Chapter 2, Problem 3) Television channels are 6 MHz wide. How may bits/sec can be sent if four-level digital signals are used? Assume a noiseless channel.

7. (Chapter 2, Problem 5) What signals-to-noise ratio is needed to put a T1 carrier on a 50kHz line?

8. (Chapter 2, Problem 12) Multipath fading is maximized when the two beams arrive 180 degrees out of phase. How much of a path difference is required to maximize the fading for a 50 Km long 1GHz microwave link?

9. (Chapter 2, Problem 41) How long does it take to transmit an 8 inch by 10 inch image by facsimile over an ISDN B channel? The facsimile digitizes the image into 300 pixels per inch and assigns 4 bits per pixel. Current FAX machines go faster than this over ordinary telephone lines. How do you think they do it?

10. (Chapter 2, Problem 48) Make a rough estimate of the number of PCS microcells 100 m in diameter it would take to cover San Francisco (120 square km).

All problems are from Computer Networks, Andrew S Tanenbaum, Third Edition. If there is any inconsistency please email TA (ydrabu@cs.kent.edu)