CS 422 (Park) **Assignment I** **Due: Jan. 30 (Mon.), 2006**

Submission instructions: Please type your answers and submit electronic copies using `turnin` *by 5pm on the due date. You may use any number of word processing software (e.g., Framemaker, Word, LaTeX), but the final output must be in pdf or ps format that uses standard fonts (a practical test is to check if the pdf/ps file prints on a CS Department printer without problem). For experiments and programming assignments that involve output to terminal, please use* `script` *to record the output and submit the output file. Use* `gnuplot` *to plot graphs. Use* `ps2gif` *to convert a eps/ps plot to gif format (e.g., for inclusion in Word) if there is a need.*

PROBLEM 1 (25 pts)

Read Chapters 1, 2 and 4 from Comer. Access `http://www.greatachievements.com/` and read the parts on Radio and Television, Telephone, and Internet. Although useful for historical background, the information contained therein is already outdated missing important—i.e., not incremental—developments that have taken place in the last 5 years. What is digital radio (think of satellite radio and the recent splash by a talk radio host moving to Sirius)? What is digital TV and why is Feb. 17, 2009, an important date? What are some recent technological developments on the Internet, not described in `www.greatachievements.com`, that you yourself have been exposed to as a student at Purdue University? For the first two questions, find relevant articles on the web (there are lots of technology news related websites such as technology/science sections in major newspapers, search engines, CNET news, Wired news, etc.) to support your statements and conclusions. Include the URLs in your write-up.

PROBLEM 2 (60 pts)

Carry out the experiments specified in `http://www.cs.purdue.edu/~park/cs422-hw1-06s.html`. Consult the TA notes (`http://www.cs.purdue.edu/homes/heoh/422`) for additional information.

PROBLEM 3 (45 pts)

(a) When a toll booth on a highway segment becomes busy, cars can line up on the road, coming to a full stop and waiting in place. Technically speaking, a segment of road is a "memory device." Why can the bits in packet not do the same—i.e., wait on the fiber or copper wire—when a router is busy and its buffers full? Or can they?

(b) Use the web to find out how fast a single bit travels on copper wires. Present your finding as a percentage of the speed-of-light. Assuming that bits on fiber wires indeed travel at the speed-of-light, if X (bps) is the physical bandwidth of a copper wire network technology, what would be the gain in speed (bps) by switching the communication medium from copper to fiber? Is this gain in speed worth the effort of replacing all copper links with fiber links? Explain your reasoning.

(c) Create a top 10 list of "killer applications" that are driving Internet usage today. Include in the list some apps that may not be killer apps today but, in your opinion, are likely to be so in the future. In an expanded top 12 list, include two apps that do not exist at all today but have potential to be killer apps in the future if someone bothered to create them. (Note, Napster and such are straightforward to code—maybe 2 weeks by a competent programmer to have a working prototype—so implementation effort is not the primary bottleneck in the derth of killer apps today.)