Syllabus and General Information

Instructor

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Course Description

This is an advanced graduate class on computer networks. The course will cover topics from current research literature in networking, with some emphasis on switching and traffic management.

Prerequisites

CMPE 252B or equivalent. The course requires familiarity with performance modeling of communication networks and common protocols such as TCP/IP.

Text

There is no text book. Copies of relevant papers will be made available as necessary. A full reading list of papers has been posted on the class Web page.

Project

The project will be done individually. I will distribute a list of potential project topics next week. You may choose one from the list or come up with your own idea. In general, the project involves the following:

1. Study a problem in depth, collect and read relevant references to understand proposed solutions to the problem.
2. Evaluate the proposed solutions by simulation or measurement.
3. Explain results and summarize any insights gained.
4. Supplement results by analysis, if appropriate.
5. Present results to the class.

The following deadlines will be used to ensure that projects will be completed on schedule:

April 15: Project proposal due (1–2 pages in length). The proposal must contain the topic, summary of work to be done, and the software tools to be used. It must also provide a list of key references.
May 13: Progress report due. The report must outline the progress so far, provide a complete list of references used, discuss any interesting results, and describe any problems encountered.
June 4: Final written reports due.

Project presentations will be scheduled during the weeks of May 24th and May 27th.

Software Tools

The simulation packages available on the department machines include CSIM (from Mesquite Software) and NS (from Lawrence Berkeley Labs).

Evaluation Criteria

Midterm – 30 percent
Homeworks – 20 percent
Project – 50 percent

A total of 4 to 5 homeworks will be assigned during the quarter. The course does not have a final exam. The midterm exam will be on May 11th.

Outline of Topics

1. Introduction:

2. Physical layer: Fiber-optics, single-mode and multimode technologies, types of optical sources and detectors, link design, transmitter and receiver design, transmission coding.

3. High-speed LANs: Switched versus multiple-access LANs, virtual circuits versus datagrams, Layer-3 switching, IP lookup algorithms, packet classification algorithms.


5. Traffic Scheduling in High-Speed Networks: Fair queueing algorithms, delay bounds, fairness measures, traffic shaping, implementation issues.

6. All-Optical Networks: Wavelength-division multiplexed (WDM) networks, photonic switching.

Academic Integrity: All work submitted, including homework solutions, must be your own. Any unauthorized collaboration will be treated as a case of Academic Dishonesty and handled according to University policies (see rule book at http://www2.ucsc.edu/judicial/index.html for details). Academic sanctions may include a reduced grade or failure in the course. Incidents of academic dishonesty will also be noted in the narrative evaluations.