Term Projects

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Adapted from Prof. Raj Jain’s slides
Expectations

- Choose a non-trivial networking design problem.
  - Original research problems leading to high-impact, externally publishable solutions will get an outright A in the class => think big!
- Outline an approach to the problem (project proposal)
- Make a 15 min interim project progress presentation, get peer feedback and refine your design
- Use simulation, experiment design and implementation (eg: Click) techniques to validate your design
- Write a final report describing the project in detail, including both positive and negative experiences
- Make a 15 min final project presentation & demo
Some Initial Term Project Ideas

Week 11-14 Nov 7, 14, 21, 28

1. Design a scheme (end-system and/or AQM) to ensure maximum performance of applications over multiple 802.11 hops (eg: in a community network)

2. Design an AQM scheme that will scalably detect and punish misbehaving flows with $O(\log N)$ state and $O(1)$ time complexity. Compare to current-state-of-the-art (eg: BLUE or CHoKe)

3. Design a video-conferencing (or VoIP) proxy that intercepts packets and sends them on multiple paths (eg: in an overlay or peer-to-peer network) to maximize the perceived performance.

4. Design a video streaming system (or proxy) that leverages multiple paths (eg: in an overlay or peer-to-peer network) to maximize streaming performance.

5. Design measurement tools to study the impact of broadband connectivity on the traffic patterns generated by such broadband users.

6. Write a tool to remotely manage the spectrum allocations for a campus-wide (or a community) 802.11 network

7. Architect and study the performance of a multi-hop, OSPF-routed 802.11 with a mix of directional (pringles can) antennas and omni-directional antennas

8. Design measurement tools to study the characteristics and impact of peer-to-peer file-transfer applications on the Internet

9. Design an edge-shaper to flexibly combat misbehaving or uncooperative TCP sessions (eg: with new congestion control scheme)
REMINDER: Schedule
Every Thursday 4pm – 8pm in Fall’02, Aug 29 ~ Dec 5

Basic Labs: Tools and Techniques

**Week 1** Aug 29
Lab 1, Networking commands and socket programming

**Week 2-5** Sept 5,12,19,26
Lab 2, Network simulator NS2 (and NAM)
Lab 3, TCP Tahoe, Reno, and SACK comparisons in simulation
Lab 4, Experiment design
Lab 5, Active queue management (AQM): RED scheme

**Week 6** Oct 3
Lab 6, TCP traffic experiment: how to encode/setup/measure real TCP dynamics

**Week 7-8** Oct 10, 17
Lab 7, Routing protocols (RIP, OSPF, BGP etc.)
Lab 8, BGP routing table analysis, Internet Mapping

[MID-TERM EXAM: Oct 17th]

**Week 9-10** Oct 24, 31
Lab 9, MIT Click modular router, Linux kernel programming, Intel IXA Network Processor Platform, Introduction to the Utah Emulab facility