Potential Thesis Topics in Networking

Prof. Geoffrey Xie
xie@cs.nps.navy.mil, SP 544C
April 2002
http://www.saamnet.org

What my Research Projects Offer

- Total learning experience for you
  - You will work on an interesting and practical problem
  - You will have a chance to obtain in-depth knowledge the Internet and other networking technologies

- Typical steps of thesis research
  - accumulate background
    - network track courses
    - independent studies, research group meetings
  - define problem, search literature, and develop solution
  - implement a prototype (in JAVA or C/C++)
  - measure and analyze performance of prototype
  - summarize results in one technical paper / thesis
Related Network Courses

- **CS 3502: Introduction to Computer Networks**
  - physical and link layers, and local area networks

- **CS 4550: Advanced Topics in Networking**
  - network and transport layers, selected advanced topics

- **CS 4552: Network Design and Programming**
  - hands-on experience of building a local area network and writing client/server applications

- **CS 4554: Network Modeling and Analysis**
  - how to model and evaluate performance of network protocols

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How to contact me

- **Office**: SP 544C
  - 656-2693

- **E-mail**: xie@cs.nps.navy.mil

- **Personal Web page**: http://www.cs.nps.navy.mil/people/faculty/xie
Current Research Projects

- **Next Generation Internet --- SAAM project**
  - funded by Defense Advanced Research Project Agency (DARPA), NASA, & National Science Foundation (NSF)
  - direct impact on Internet performance
  - more than 20 students graduated and we have a running prototype!

- **Wireless Networking**
  - funded by NSF
  - chance to learn wireless network technologies

- **Experimental Gigabit ATM switches**
  - a chance to play with state of art equipment (10Gbps!)
  - four students graduated

Sample Thesis Topics

- **Programming of CISCO Routers**
  - How to deploy new services without modifying IOS?

- **Policy-based Networking**
  - How to efficiently detect conflicts among policy rules specified in the Path-based Policy Language (PPL)?
  - How to automate policy deployment via COPS?

- **Smart Routing and Rerouting Algorithms**
  - How to reduce call blocking probability and data loss rate?

- **Study of Distributed Denial of Service attacks**
  - How to identify sources of attacks?
  - How to filter out malicious traffic early?
More Thesis Topics

- **Security Protocols for Wireless LANs**
  - How to strengthen WEP?
  - How to detect intrusions?

- **Extreme (Ad hoc) Networking**
  - How to mitigate effect of large propagation delays?
  - How to guarantee performance to selected traffic?

- **Mobile Agents and Survivable Networking**
  - How to make a service liquid, i.e., moving around the network and regenerating if necessary

- **Software Architecture for Dynamically Reconfigurable Systems**
  - How to reduce programming complexity of these systems?

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**Server-based Approach**

A hierarchy of servers each handles routing of real-time traffic and other management tasks for a group of routers.

Streamlined routers let servers decide how they route QoS sensitive traffic.
For more info about SAAM

- Please visit http://www.saamnet.org
Gigabit Switch Research

- SAAM-NPS participant in GigabitKits Program
  Cutting-edge collaboration with universities world-wide

- ASSETS include two 20 Gb/S ATM switches and a variety of “SMART” linecards — all with open research architecture and support including:
  - APIC - Asynch Peripheral Interface Cards | PCI Bus | ATM
  - SPC - Smart Port Cards | Embedded Intel “PC” ASICs for network controller
  - FPX – Field Programmable Extender Cards | “Line-rate” FPGA controller
  - ATM, NetBSD and Linux, kernel, C/C++, VHDL, FPGA
    Design work

- Hands-on Tutorials and Workshops Jan 10, July 2001 Washington University in St. Louis