

# Geoffrey G. Xie

## ADDRESS

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## RESEARCH INTERESTS

- Design of integrated services computer networks
- Network security and policy management
- Multimedia systems

## EDUCATION

**Ph.D.**    Computer Science, University of Texas at Austin, TX (1996)

**M.S.**    Computer Science, Bowling Green State University, OH (1988)

**M.A.**    Mathematics, Bowling Green State University, OH (1988)

**B.S.**    Computer Science, Fudan University, Shanghai, China (1986)

## ACADEMIC POSITION

9/96 – present    Assistant Professor, Department of Computer Science, Naval Postgraduate School

## HONORS AND AWARD

Intel Graduate Fellowship, 1995-96

NPS Teaching Award, 1999

## JOURNAL PUBLICATIONS

1. Xie, G.G., and Lam, S.S., "Delay Guarantee of Virtual Clock Server," *IEEE/ACM Transactions on Networking*, vol 3, no. 6, pp. 683-689, December 1995.

2. Lam, S.S., and Xie, G.G., "Burst Scheduling Networks," *Performance Evaluation*, vol 31, pp. 133-157, November 1997.
3. Xie, G.G., and Lam, S.S., "Group Priority Scheduling," *IEEE/ACM Transactions on Networking*, vol 5, no. 2, pp. 205-218, April 1997.
4. Xie, G.G., "An Efficient Network Architecture Motivated by Application-Level QoS," *Journal of High Speed Networks*, vol 6, no 3, January 1998.
5. Xie, G.G., and Lam, S.S., "Real-time Block Transfer under A Link Sharing Hierarchy," *IEEE/ACM Transactions on Networking*, vol 6, no. 1, pp. 30-41, February 1998.
6. Stone, G., Lundy, G., and Xie, G.G., "Network Policy Languages: A survey and a new approach," *IEEE Network Magazine*. (to appear)

#### CONFERENCE PUBLICATIONS

1. Xie, G.G., and Lam, S.S., "Delay Guarantee of Virtual Clock Server," in *Proceedings of 9th IEEE Workshop on Computer Communications*, October 1994.
2. Lam, S.S., and Xie, G.G., "Burst Scheduling: Architecture and Algorithms for Switching Packet Video," in *Proceedings of IEEE INFOCOM '95*, Boston, MA, April 1995.
3. Lam, S.S., and Xie, G.G., "Burst Scheduling Networks: Flow Specification and Performance Guarantees," in *Proceedings of Network and Operating Systems Support for Digital Audio and Video Workshop (NOSSDAV '95)*, Durham, New Hampshire, April 1995.
4. "Group Priority Scheduling," (with Simon S. Lam), in *Proceedings of IEEE INFOCOM '96*, San Francisco, CA, March 1996.
5. Xie, G.G., and Lam, S.S., "An Efficient Adaptive Search Algorithm for Scheduling Real-Time Traffic," in *Proceedings of 4th IEEE International Conference on Network Protocols*, Columbus, OH, October 1996.
6. Xie, G.G., "An Efficient Network Architecture Motivated by Application-Level QoS," in *Proceedings of Very High Speed Networking Conference*, Univ. of Maryland at Baltimore County, MD, November 1996.

7. Xie, G.G., and Lam, S.S., "Real-time Block Transfer under A Link Sharing Hierarchy," in *Proceedings of IEEE INFOCOM '97*, Kobe, Japan, April 1997.
8. Xie, G.G., and Lam, S.S., "Admission Control and Loss Management for an Application-Level Statistical Service," in *Proceedings of 5th IEEE International Conference on Network Protocols*, Atlanta, GA, October 1997.
9. Xie, G.G., Hensgen, D., Kidd, T., and Yarger, J., "SAAM: An Integrated Network Architecture for Integrated Services," in *Proceedings of 6th IEEE/IFIP International Workshop on Quality of Service*, Napa, CA, May 1998.
10. Kresho, J., Hensgen, D., Kidd, T., and Xie, G.G., "Determining the Accuracy Required in Resource Load Prediction to Successfully Support Application Agility," in *Proceedings of 2nd IASTED European Conference on Parallel and Distributed Systems*, July 1998.
11. Xie, G.G., "SAAM: A Network Management System for the Next Generation Internet," in *Proceedings of 1998 NASA/NREN Workshop on QoS*, NASA Ames Research Center, CA, August 1998.
12. Xie, G.G., "LLPA: A Protocol for High Speed Packet Authentication," in *Proceedings of IEEE 1999 Workshop on Gigabits Networking*, New York City, NY, March 1999.
13. Xie, G.G., Ludden, F., and Hensley, K., "StarGate: PC-based ATM Cell Authentication Gateway," in *Proceedings of 2nd Washington University Gigabits Switch Kit Workshop*, St Louis, MO, July 1999.

## **NPS TECHNICAL REPORTS**

1. Xie, G.G., and Lam, S.S., "Admission Control and Loss Management for an Application-Level Statistical Service," Department of Computer Science, Naval Postgraduate School, January 1997.
2. Kresho, J., Hensgen, D., Kidd, T., and Xie, G.G., "Determining the Accuracy Required in Resource Load Prediction to Successfully Support Application Agility," Technical report, Department of Computer Science, Naval Postgraduate School, December 1997.
3. Xie, G.G., Hensgen, D., Kidd, T., and Yarger, J., "SAAM: An Integrated Network Architecture for Integrated Services," NPS-CS-98-01, Department of Computer Science, Naval Postgraduate School, February 1998.

4. Xie, G.G, Hensgen, D., Kidd, T., and Yarger, J., "Efficient Management of Integrated Services Using a Path Information Base," NPS-CS-98-013, Department of Computer Science, Naval Postgraduate School, May 1998.
5. Xie, G.G., Irvine, C., and Colwell, C., "LLPA: A Protocol for High Speed Packet Authentication," NPS-CS-99-03, Department of Computer Science, Naval Postgraduate School, February 1999.
6. Stone, G., Lundy, B., and Xie, G.G., "Network Policy Languages: A Survey and a New Approach," Technical Report, NPS-CS-99-003, December 1999.

### **CURRENT GRANTS**

- Principal investigator, "SAAM: Network Management for Integrated Services", from DARPA, \$810,000, 5/1/1998–9/30/2001.
- Principal investigator, "Centralized Policy Management using a SAAM Server", from NASA, \$192,000, 10/1/1998–9/30/2000.
- Principal Investigator, "Two Experimental Gigabits ATM Switches," from NSF, \$100,000, 1998 - 2000.

### **SUMMARY OF RESEARCH OVER LAST FIVE YEARS**

During the first three years, my research had focused on the design of integrated services packet networks that provide delay and loss rate guarantees to multimedia traffic. Specifically, I developed (1) a proof that showed for the first time that the Virtual Clock service discipline provides a delay guarantee, (2) a concept of conditional delay guarantee which has led to a simple technique for determining end-to-end network delay bounds, (3) a useful traffic model for real-time variable bit rate data such as compressed video, (4) a novel network architecture (called Burst Scheduling) and a set of efficient packet scheduling and admission control algorithms for providing delay guarantees to compressed video, (5) theorems that can be used to extend existing delay bounds to networks with hierarchical link sharing, and (6) a framework for efficient support of application-level QoS.

Currently, there are two main thrusts in my research. The first thrust is on developing a server and agent based pro-active network management system (called SAAM) for efficient support of integrated services. The contributions include (1) a soft-state approach for real-time auto-configuration of signaling channels, (2) fault-tolerant server deployment based on an accelerated heartbeat protocol (3) an intelligent resource

management scheme that supports all current Internet service models (IntServ, DiffServ, and MPLS), and (4) a novel path-based language for formally specifying network policies.

The second thrust is on the development of network security protocols. Specifically, a Time-driven Key Sequencing (TKS) system has been developed to minimize the processing overhead for cryptography. The general notion is that with frequent key changes, more efficient, but less time-durable, cryptographic algorithms may be utilized to provide an equivalent level of protection compared to the use of more time-durable algorithms with long-term keys.

### **COURSES DEVELOPED**

- Advanced Network Topics: Service Models and Traffic Engineering
- Network Design and Programming
- Introduction to Multimedia Systems

### **OTHER COURSES TAUGHT**

- Computer Communication and Networks
- Introduction to Object Oriented Programming using C++

### **STUDNETS SUPERVISED**

- Advised 20 MS students
- Advising 4 MS students
- Advising 2 PhD students

### **PROFESSIONAL SERVICE**

- Technical committee member, *IEEE INFOCOM conferences*
- Technical committee member, *IEEE International Workshop on QoS (IWQoS)*
- Publicity chair, *6th IEEE International Conference on Network Protocols (ICNP)*
- Technical committee member, *IEEE ICNP conferences*
- Session chair, *IEEE INFOCOM '98 conference*

- Session organizer and chair, *MILCOM '98 conference*
- Reviewer for NSF proposals, NCR program
- Reviewer for several journals and conferences, including:
  - *IEEE/ACM Transactions on Networking*
  - *IEEE Communications Letter*
  - *ACM SIGCOMM* conferences
  - *IEEE INFOCOM* conferences
  - *IEEE International Conference on Network Protocols* conferences
  - *IEEE IC3N* conferences