

Shamim Begum

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Objective Looking for a challenging position that matches my educational background and experience

Education Ph.D. in Engineering, May 2009
University of Southern California (USC), Los Angeles, CA
Major: Electrical Engineering (Computer Networks), GPA: 3.85/4.0

Masters in Engineering, 2001
University of Southern California (USC), Los Angeles, CA
Major: Electrical Engineering (Computer Networks), GPA: 3.89/4.0

BS in Engineering, 1995
Bangladesh University of Engineering and Technology, Dhaka Bangladesh
Major: Computer Science and Engineering

Ph.D. Dissertation Title: A framework for worst case performance evaluation of MAC protocols for wireless adhoc networks.
Abstract: Actual deployment of a protocol often times reveals many problems that have not been identified by traditional performance evaluation approaches wherein the scenarios are generated manually for average case analysis or are based on intuition. We propose a framework that evaluates a given MAC protocol for wireless adhoc networks by generating scenarios towards the worst performance of a given metric. Our approach is search based and uses a combination of goal-oriented backward and forward search and implications as well as heuristics to generate a library of scenarios towards the worst performance in manageable complexity for our practical purposes. We demonstrate the usefulness of our framework by using it to evaluate worst case delivery ratio, network throughput and fairness of IEEE 802.11 protocol both at MAC level and at the end level under several network load and saturation condition. Some of our scenarios show a reduction of network throughput by upto 36% compared to the scenarios typically used for performance evaluation of the protocol for adhoc networks. We use our insights to improve the worst case performance of the protocols. Some of our modifications show improvement of the worst case performance by upto 89%.

Advisor:

- Dr. Sandeep Gupta, Professor, University of Southern California, Los Angeles, CA
- Dr. Ahmed Helmy, Associate Professor, University of Florida, Gainesville, FL.

Research Experience *Research Assistant*, University of Southern California, LA, CA. Jan 00-Dec 08

- Test generation methodology for wireless adhoc networks
- Test methodology for multicast protocols over ATM networks

Graduate Intern, Wireless Systems Lab, Corporate Technology group, Intel Corporation, Hillsboro, OR, Oct 2007- Feb 2008. Key accomplishments:

- Bluetooth/WiMAX Co-existence test bench: Created and setup co-existence test plan and investigated impact of WiMAX and Bluetooth co-existence with different kinds of traffic and user profiles. The test data gathered was a key deliverable to aid Intel's Mobility Platform Group in negotiations with key OEM partners
- End to end performance evaluation of HTTP over WiMAXQoS test plan analysis: Reviewed WSL's QoS test plans for alignment between test runs on actual hardware vs. simulation research and development. This survey of the performance analysis research team yielded alignment with respect to future QoS testing within the WSL lab

Summer Intern, Corporate R&D group, Qualcomm Inc., San Diego, CA, June-Aug, 2002

- Analysis of next generation wireless LAN (NG WLAN) MAC schemes. Implementation of NG WLAN in *ns-2* network simulator and validation of analytical results

Summer Intern, Hughes Research Laboratory, Malibu, CA, June-Aug, 2001

- Performance analysis of multicast routing protocol for airborne communication systems
- Design improvement of the multicast routing protocol. Performance evaluation of the enhanced protocol using *ns-2* network simulator

Publication

- "Modeling the Interaction Between MAC and Its Interface to Higher Layer: A Systematic Approach To Generate High Level Scenarios from MAC Scenarios", Shamim Begum, Ahmed Helmy and Sandeep Gupta. To appear in *ACM Transactions on Modeling and Computer Simulation, Special Issue on Cross-Layer Interactions in Communication Networks*, Vol. 20, No. 2, 2010.
- "Modeling and Test Generation for Worst-Case Performance Evaluation of MAC Protocols for Wireless Ad Hoc Networks", Shamim Begum, Ahmed Helmy and Sandeep Gupta. In the proceedings of *17th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS) 2009*, pages 205-214.
- "Performance Analysis of Wireless MAC Protocols using Search Based Framework", Shamim Begum, Ahmed Helmy and Sandeep Gupta. In the proceedings of *15th IEEE International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS) 2007*, pages 95-102.
- "ELECTION: An Energy-efficient and Low-latency sleep scheduling Technique for wireless sensor Networks", Shamim Begum, Shao-Cheng Wang, Bhaskar Krishnamachari, Ahmed Helmy. In the proceedings of *IEEE LCN Conference 2004*, pages 60-67.
- "Error Oriented Test Generation (EOTG) Framework for Wireless Ad Hoc MAC Protocols", Shamim Begum, Ahmed Helmy and Sandeep Gupta. *Student poster in 11th IEEE International Conference on Network Protocols (ICNP) 2003*.
- "Systematic Testing of Protocol Robustness: Case Studies on Mobile IP and MARS", Shamim Begum, Meeta Sharma, Sandeep Gupta, Ahmed Helmy, In the proceedings of *IEEE LCN Conference 2000*, pages 369-380.

Presentation

- "Modeling and Test Generation for Worst-Case Performance Evaluation of MAC Protocols for Wireless Ad Hoc Networks", *MASCOTS 2009 Conference, September 2009, London, UK*.
- "ELECTION: An Energy-efficient and Low-latency sleep scheduling Technique for wireless sensor Networks", *IEEE LCN Conference 2004, November 2004, Florida, USA*.
- "Testing Wireless Ad Hoc MAC Protocols", *May 2001, Hughes Research Laboratory, Malibu, CA*.
- "Systematic Testing of Protocol Robustness: Case Studies on Mobile IP and MARS", *IEEE LCN Conference 2000, November 2000, Florida, USA*

Graduate Level Projects

- A survey of power management in mobile and wireless networks
- Qualitative analysis and comparison of Multicast Address Resolution Server (MARS) and Next Hop Resolution Protocol (NHRP): protocols for IP multicast over ATM networks
- Implementation of extended Bellman-Ford algorithm for unicast routing
- Implementation of PIM-DM and multicast error recovery protocol
- Delay bound analysis of decentralized routing algorithms
- Design and analysis of 100 MBPS Wireless LAN in 28 GHz (Ka) band
- Development of an event driven simulator for test scenario generation of network protocols – this tool has been developed in C, total lines of code are about 12,000. Using this scenario generation tool, we can generate all medium access control layer scenarios for a given performance metric – the set of scenarios subsume all scenarios used in different literatures. This tool is the first automatic scenario generation tool for validation of network protocols
- Development of PGM, a reliable multicast protocol for ns-2 network simulator – protocol operation is implemented in C++ and user interface to the simulator is developed in tcl, using ns-2 standard simulation and interface objects. Total lines of codes are about 5,000. The implementation has been used to analyze behavior of the protocol under different loss scenarios in the network
- Development of web based database applications using Javascript and Sybase SQL
- Pattern recognition of isolated handwritten Bengali character set

Computer Skills

- Design, analysis, and simulation of 8x8 content addressable memory
- Systems: Unix (Sun Solaris), Linux
Languages: C/C++, Tcl/OTcl, Perl, Pascal, FORTRAN, Javascript, HTML, Prolog, PC Assembly, Powerbuilder, Sybase SQL
Packages/tools: Network simulator ns-2, magic, spice, irsim, iperf, Chariot, network performance monitoring tools, Linear Programming tool

Professional Experience

Software Engineer, UNICEF Dhaka, Bangladesh, July 1996-March 1999

- Developed web based applications using SQL and Javascript. The developed applications were used within UNICEF Bangladesh country office and field offices to manage various UNICEF projects
- Developed office automation software using Visual basic. The software were used for various office automation in UNICEF Bangladesh country office

Software Engineer, NCR Corporation, Dhaka, Bangladesh, May 1995-June 1996

- Developed share management systems of bank using COBOL. The developed software was used in one of the leading private bank in Bangladesh
- Developed automation of marketing and sales using Visual basic. The developed software were used in a leading private pharmaceutical company for its marketing and sales

Honors and Grants

- Woman in Science and Engineering grant, University of Southern California, 2001-2002.
- Travel grants, IEEE Local Computer Networks Conference, LCN 2004, Tampa, Florida, 2004.

Services

Reviewer: IEEE WCNC 2004, Transaction on Wireless Communications 2005, IFIP Networking 2007, IEEE International Conference on Network Protocols ICNP 2007, IEEE Communication Letters, SECON 2009, ACM Transactions on Modeling and Computer Simulation

Immigration Status

Permanent Resident