A. Bruce McDonald

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EDUCATION

UNIVERSITY OF PITTSBURGH, Pittsburgh, PA.
Ph.D. —December 2000.
Distinction on Ph.D. written exams—network performance section.

UNIVERSITY OF PITTSBURGH, Pittsburgh, PA.
Master of Science , December 1994.
1994 Fritz Froelich Award for outstanding academic achievement and contribution to the program.

NORTHWESTERN UNIVERSITY, Evanston, IL.
Bachelor of Science in Electrical Engineering (BSEE), June 1986.

REFEREED JOURNAL PUBLICATIONS:

A. Bruce McDonald and Taieb Znati. "A Mobility-Based Framework for Adaptive Clustering in Wireless Ad-Hoc Networks." *IEEE Journal on Selected Areas in Communication (J-Sac)*, Special Issue on Wireless Ad-Hoc Networks, Vol. 17, No. 8, August 1999, pp. 1466-1487.

A. Bruce McDonald and Taieb Znati. "ARP Versus ES-IS:Performance Evaluation of Neighbor-Greeting Protocols." *The Computer Journal*, Vol. 39, No. 10, 1996, pp. 856-867.

REFEREED CONFERENCE PUBLICATIONS:

A. Bruce McDonald, Taieb Znati and Sambasiva Rao. "Design and Performance of a Mobility-Adaptive Hybrid Routing Algorithm for Ad Hoc Networks." Submitted to *ACM Mobile Comuting and Networking Conference (MobiCom 2001)*, Rome, Italy, July 2001.

Sambasiva Rao, A. Bruce McDonald and Taieb Znati. "Design and Analysis of Hierarchical Group-Based Mobility for Ad-Hoc Networks." To Appear in *Proc. of Communications, Networks and Distributed Systems—Modeling and Simulation Conference (CNDS)*, Phoeniz AZ, January 2001.

A. Bruce McDonald and Taieb Znati. "A Dual-Hybrid Adaptive Routing Strategy for Wireless Ad-Hoc Networks." In *Proc. of IEEE Wireless Communications and Networking Conference 2000 (WCNC)*, Chicago, IL, September 2000.

A. Bruce McDonald and Taieb Znati. "Predicting Node Proximity in Ad-Hoc Networks: A Least Overhead Adaptive Model for Selecting Stable Routes." In *Proc. IEEE First Annual Workshop for Mobile Ad Hoc Networking and Computing (MobiHOC)*, Boston, MA, August 2000.

A. Bruce McDonald and Taieb Znati. "A Path Availability Model for Wireless Ad-Hoc Networks." In *Proceedings IEEE Wireless Communications and Networking Conference (WCNC)*, New Orleans, LA, September 1999, pp. 35-40.

Gopal Meempat and A. Bruce McDonald. "Mobile Teleconferencing: Design and Performance of Architectures for Inter-Switch Handoff Management and Session Multicasting." In *Proc. of IEEE International Conference on Universal Personal Communications (ICUPC)*, Florence, It., Oct. 1998.

A. Bruce McDonald and Taieb Znati. "ARP Versus ES-IS: Performance Comparison of Neighbor-Greeting Protocols." In *Proceedings of 29th Annual IEEE/ACM Simulation Symposium*, New Orleans LA, April 1996, pp. 71-80.

ABSTRACTS, WORKSHOPS AND TECH REPORTS:

Brahm Goldstein, Susanna Lai, Susan Bratton, Miles Ellenby, A. Bruce McDonald, Donald Krieger, Robert J. Sclabassi. "Correlation of dynamic assessment of organ system coupling with tissue perfusion in pediatric sepsis." *American Academy of Pediatrics Section on Critical Care 2000 Fall Meeting.*

A. Bruce McDonald, D. Krieger, R.J. Sclabassi, and B. Goldstein. "A Real-Time, Continuous

Physiologic Data Acquisition System For The Study Of Dynamical Disease In The Intensive Care Unit." *Society for Critical Care Medicine (SCCM), Annual Symposium*, Orlando, FL, Feb. 2000.

A. Bruce McDonald and Taieb Znati. "Link Availability Models for Wireless Ad-Hoc Networks." TR99-07. *Department of Computer Science*, University of Pittsburgh, May 1999.

Gopal Meempat and A. Bruce McDonald. "Teleconferencing on the Battlefield: Design and Analysis of Architectures and Algorithms for Mobility Management and Conference Bridging." *Bellcore Technical Document*. January 1997.

Gopal Meempat and A. Bruce McDonald. "Simulation Study of Handoff Rerouting Strategies to Support Mobility of Wireless Users in ATM Backbone Networks." *6th IEEE Workshop on Computer Aided Modeling*, October 1996.

Gopal Meempat and A. Bruce McDonald. "Network Design and Evolution for Integrating Wireless Mobility into Broadband Network Infrastructure." *Bellcore Technical Document*. September 1996.

Research Experience

Doctoral Student. Telecommunications Program.
University of Pittsburgh, Pittsburgh PA. Jan. 1995 to Present
Dissertation Title: *A Mobility-Based Framework for Adaptive Cluster-Based Hybrid Routing in Wireless Ad-Hoc Networks*. The focus of this research is the design and analysis of a novel adaptive clustering strategy, the (α, t)–*Cluster*, that dynamically organizes the nodes of a wireless ad-hoc network into clusters in which the probability of path failure due to node movement can be bounded, $\geq \alpha$, over time, t. The (α, t)–*Cluster* supports an adaptive hybrid routing strategy, which dynamically balances the tradeoff between responsiveness and efficiency according to localized mobility characteristics. The main objectives of the scheme are to improve routing scalability and support high rates of node mobility in ad-hoc networks.

Research Associate/Computer Engineer Center for Clinical Neurophysiology (CCN).
University of Pittsburgh Medical Center. Oct. 1996 to Present
Project Title: *Neuronet—Data Acquisition in Critical Care*. The focus of this research is the study of dynamical disease in the Intensive Care Unit using time series analysis of continuous physiological data to build models that predict major clinical events. Contributions include the design and development of a Unix-based data acquisition system that captures data from bedside monitors at the University of Pittsburgh Medical Center and at Oregon Health Sciences University. Data are acquired continuously in a multiple-channel format for real-time display and subsequent analysis.

Research Assistant. Bell Communications Research.
University of Pittsburgh, Pittsburgh PA. Sept. 1996 to Feb. 1997.
Project Title: *Architecture and QoS Support for Teleconferencing on the Battlefield*: Primary Investigator. Gopal Meempat; Earned financial support from Bellcore to extend summer research project. The focus of this research was investigation of the architectural and protocol enhancements required to support multipoint video conferencing in a mobile battlefield environment supported by a high bandwidth fixed infrastructure. Simulation modeling and analysis were used to compare proposed inter-switch handoff and multicast session management strategies.

Visiting Researcher. Bell Communications Research.
Bellcore—Applied Research Group, Redbank NJ. May 1996 to Aug. 1996.
Project Title: *Network Design and Evolution for Integration of Mobility Management into Broadband Public Network Infrastructures*. Summer resident research position focused on investigation of proposed the inter-switch call handoff re-routing aspect of mobility management. Simulation modeling and analysis were used to compare several alternative algorithms.

Research Assistant. DARPA.
University of Pittsburgh, Pittsburgh PA. May 1995 to Apr. 1996
Project Title: *Distributed Interactive Development and Monitoring of Transportation Plans in Dynamic Environments (DIPART)*: Primary Investigators: Taieb Znati and Martha Pollock. Designed and implemented a group communications architecture providing a powerful abstraction for the management of groups and the efficient exchange of group messages. Implemented a connectionless group message service using sockets interface to build a *best-effort-reliable* multicast protocol utilizing UDP. Implemented and compared several dynamic load balancing strategies among distributed intelligent agents used in conjunction with the dynamic planning of goals.

Masters Student. Telecommunications Programs.
University of Pittsburgh, Pittsburgh PA. Sept. 1992 to Dec. 1995
Thesis title: *ARP Versus ES-IS: A Comparison of Neighbor Greeting Protocol Performance*. Neighbor greeting is the process by which network nodes discover adjacent nodes and achieve network-layer reachability. This research is the *only* detailed performance analysis of the most popular neighbor greeting protocols, and investigates how and why one approach might outperform the other. The analysis compared the relative efficiency and effectiveness of each protocol.

Teaching Experience:

Adjunct Professor. Telecommunications Program.
University of Pittsburgh, Pittsburgh PA. May 1997 to Aug. 1997
Taught a course on the performance analysis of networks and computing systems—the only graduate student to teach a core course in the Telecommunications graduate program curriculum. The topics included statistical analysis of measurement data, fundamentals of queuing theory, and discrete event simulation. Texts: "The Art of Computer Systems Performance Analysis" (Jain) and "Simulation Modeling and Analysis" (Law and Kelton).

Teaching Assistant. DEC Network Focused Technical College.
University of Pittsburgh, Pittsburgh PA. Jan. 1993 to Apr. 1994
Taught lab lectures and developed lab experiments focused on protocols and internetworking, which represented a major component of the DEC Network Focused Technical College—a collaborative education program with the Information Networking Institute at Carnegie Mellon University.

Teaching Assistant. Telecommunications Program.
University of Pittsburgh, Pittsburgh PA. Jan. 1993 to Dec. 1994
Achieved a leadership role in the network lab. Developed lab exercises, presented lectures, graded papers and tutored students. Courses: *Fundamentals of Telecommunications*, *Electrical Engineering Concepts for Telecommunications*, and *Computer Science Concepts for Telecommunications*. Developed and taught the following labs: *T-1 and the Asynchronous Digital Hierarchy (ADH)*; *Link-Layer Protocols*; *LAN Performance*; *IP Routing and Address Resolution*; *Routing Protocol Analysis: RIP and OSPF*; *TCP Congestion Management and Flow Control*, and *Novell Protocols*.

Informal Teaching Activities:

Guest Instructor. Telecommunications Program.
University of Pittsburgh, Pittsburgh PA. 2000
Course Title: *Local-Area-Networks (Graduate)*—presented techniques and methodologies for building simulation models to study the performance of LANs using *CSIM* and *tcplib*.

Guest Instructor. Telecommunications Program.
University of Pittsburgh, Pittsburgh PA. 1999
Course Title: *Doctoral Seminar on Mobile Communications*—presented special topics sessions covering the state-of-the-art in routing protocol design for wireless ad-hoc networks.

Guest Instructor. Telecommunications Program.
University of Pittsburgh, Pittsburgh PA. 1999
Course Title: *Local-Area-Networks (Graduate)*—discussed and analyzed MAC-Layer details for IEEE 802.3 and 100Base-T operation, with emphasis on efficacy of CSMA/CD for high speed operation.

Guest Instructor. Telecommunications Program.
University of Pittsburgh, Pittsburgh PA. 1997
Course Title: *Introduction to Computer Networks (Undergraduate)*—discussed and presented examples of communications protocols, interfaces and the ISO network architecture model.

Guest Instructor. Telecommunications Program.
University of Pittsburgh, Pittsburgh PA. 1997
Course Title: *Network Performance (Graduate)*—discussed techniques in discrete event simulation modeling and presented an introduction to *CSIM*—a process oriented simulation language.

Guest Instructor. Telecommunications Program.
University of Pittsburgh, Pittsburgh PA. Spring 1996
Course Title: *Fundamentals of Telecommunications (Graduate)*—discussed fundamental transmission systems, impact of channel noise and cabling systems.

Guest Instructor. Carnegie Mellon University INI.
ATI program: Advanced Technical Institute. 1995
Prepared and presented lecture and protocol analysis demonstrations on data-link protocols with emphasis on the differences between Idle-RQ and sliding window flow-control schemes.

Professional Service:

Telemedicine Steering Committee. Mellon Foundation Grant.
Children's Hospital of Pittsburgh. 1998 to Present
Served as the technical leader in the design and implementation of a multimedia remote diagnostic and consultation system linking Children's Hospital with an affiliated rural hospital. Extensions to the system provide remote tele-visitation services for parents of children in the Intensive Care Units, and support for remote Neurosurgical monitoring.

Faculty Search Committee. Telecommunications Program.
University of Pittsburgh, Pittsburgh PA. Jan. 1999 to Apr. 1999
Served as the student representative on the search committee for a tenure-track faculty position specializing in wireless networks. Reviewed applications, recommended candidates, attended in candidate seminars, interviewed candidates, and made hiring recommendations.

Peer Reviewing.
University of Pittsburgh, Pittsburgh PA. 1996 to 1999
Served as referee for several professional conferences and journals: *Infocom 1996, The International Journal of Parallel and Distributed Systems and Networks, The 32nd IEEE Simulation Symposium, The Computer Network Distributed Systems Conference (CNDS), ACM/Balzer Journal on Special Topics in Mobile Networking and Applications, IEEE First Annual Workshop on Mobile on Mobile Ad Hoc Networking and Computing, and IEEE Journal on Selected Areas in Communications—Wireless Communications Series.*

Non-Academic Professional Technical Experience:

Sr. Computer Engineer. Center for Clinical Neurophysiology (CCN).
University of Pittsburgh Medical Center. Oct. 1996 to Present.
Member of technical staff responsible for managing *Neuronet*, a clinical and research oriented information network; Designed and developed a distributed clinical system that dynamically manages the acquisition and storage of real-time physiological data from 80+ bedside monitors located in five Intensive Care Units (ICU) and the Operating Rooms at the University of Pittsburgh Medical Center; Wrote technical portions of proposal that was awarded $600,000 in equipment from Hewlett-Packard. Initiated a professional association between CCN and researchers at the Oregon Health Sciences University for collaboration in the development of real-time ICU data acquisition systems for heart rate variability analysis; Designed and implemented large-scale network upgrade to hybrid switched gigabit and 10/100 ethernet; Analyzed and maintained dynamic, multichannel, extensible data/file structure (NDF) used to manage, store and retrieve real-time data.

Network Engineer Intern. Center for Computer Technology.
Duquesne University, Pittsburgh PA. Sept. 1992 to Jan. 1993
Consulted with staff regarding the design and deployment of campus-wide network strategy; Installed and supported a variety of network hardware and software, including: Ethernet hubs, Netware File Servers, TCP-IP client software, and personal computer operating systems.

Network Administrator. Dept. of Management Information Systems.
City of Newton, Newton MA. Sept. 1989 to Sept. 1992
Lead transition from mainframe-centric organization to networked orientation by educating the department and consulting with all levels of municipal government regarding the design, implementation and integration of networks and distributed systems; Designed a network-based system for the maintenance and presentation of the municipal budget, and lead the project development team in implementing the new system; Engineered and installed an inter-building fiber-based MAN; installed, maintained and configured network hardware and software; Managed end-user support services; Taught short-courses covering a range of topics related to the use and management of personal computer systems and business software.

Systems Engineer. Regional Sales
MICOM Systems, Newton MA. Apr. 1987 to Sept. 1988
Provided pre and post-sales configuration, installation and fault management support for a range of data PABX related products, TCP-IP terminal servers and ethernet network interface cards for DEC computers and workstations; Conducted technical training and product demonstrations.

PROFESSIONAL REFERENCES:

Prof. Taieb Znati (Dissertation Advisor)
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University of Pittsburgh
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