Elizabeth M. Belding

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RESEARCH INTERESTS

- Wireless and Mesh Networks
- Network Adaptability
- Multimedia Support
- Bridging the Digital Divide
- Monitoring and Measurement
- Mobile Network Deployment
- White Spaces Networking
- Energy Efficiency

EDUCATION

Ph.D., Electrical & Computer Engineering — October 2000
University of California, Santa Barbara
Emphasis: Computer Engineering
Dissertation Title: *Routing in Ad hoc Mobile Networks: On-Demand and Hierarchical Strategies*

M.S., Electrical & Computer Engineering — December 1997
University of California, Santa Barbara
GPA: 3.92/4.0

B.S., Computer Science — April 1996
B.S., Applied Mathematics
Florida State University
Summa Cum Laude, with Honors
GPA: 3.92/4.0

EMPLOYMENT

Vice Chair — July 2009–present
Department of Computer Science, University of California, Santa Barbara

Professor — July 2009–present
Department of Computer Science, University of California, Santa Barbara

Associate Professor — July 2005–June 2009
Department of Computer Science, University of California, Santa Barbara

Assistant Professor — November 2000–June 2005
Department of Computer Science, University of California, Santa Barbara

HONORS AND AWARDS

UCSB Faculty Senate Graduate Mentor Award, 2012.

ACM Distinguished Scientist, 2011.

ACM Senior Member, 2010.

Keynote Speaker, ACoRN MultiHop Wireless Networking Workshop, Sydney, Australia, 2009.

Best Paper Award, Proceedings of the Passive and Active Measurements (PAM) Conference, 2007.

IEEE Senior Member, 2006.

Keynote Speaker, 4th International IEEE Workshop on Wireless Local Networks, 2004.

NSF Career Award, Mobile Network Support for Collaborative Environments, 2004.

Technology Review's TR 100: Top 100 World Young Investigators, MIT Technology Review Magazine, 2002.

Excellent Paper, 5th International Symposium on Wireless Personal Multimedia Communications (WPMC), 2002.

UCSB Junior Faculty Research Incentive Award, UCSB, 2001.

National Science Foundation Graduate Fellowship, 1997-2000.

University of California Doctoral Scholar Fellowship, 1996-2000.

PUBLICATIONS

2013

- **Intelligent Channel Bonding in 802.11n WLANs.**
  Lara Deek, Eduard Garcia-Villegas, Elizabeth M. Belding, Sung-Ju Lee and Kevin Almeroth.
  To appear in IEEE Transactions on Mobile Computing, 2013.

- **WhiteRate: A Context-aware Approach to Wireless Rate Adaptation.**
  Veljko Pejovic and Elizabeth Belding.
  To appear in IEEE Transactions on Mobile Computing, 2013.

- **Kwiizya: Local Cellular Network Services in Remote Areas.**
  Mariya Zheleva, Arghyadip Paul, David L. Johnson and Elizabeth Belding.
  ACM MobiSys, Taipai, Taiwan, June 2013.

- **Joint RAte and Channel Width Adaptation for 802.11 MIMO Wireless Networks.**
  Lara Deek, Eduard Garcia-Villegas, Elizabeth M. Belding, S-J Lee and Kevin C. Almeroth.
  IEEE SECON, New Orleans, LA, June 2013.

- **Delay Tolerant Disaster Communication with the One Laptop Per Child XO Laptop.**
  Daniel Iland, Don Voita and Elizabeth Belding.
  ISCRAM, Baden-Baden, Germany, May 2013.

2012

- **The Bandwidth Divide: Obstacles to Efficient Broadband Adoption in Rural SubSaharan Africa.**
  Veljko Pejovic, David L. Johnson, Mariya Zheleva, Elizabeth Belding, Lisa Parks and Gertjan van Stam.
  International Journal of Communications, 6, pp. 2467–2491, 2012.

- **Shaping Throughput Profiles in Multihop Wireless Networks: A Resource Biasing Approach.**
  Sumit Singh, Upamanyu Madhow and Elizabeth M. Belding.
  Transactions on Mobile Computing, 11(3), March 2012.

- **Network Traffic Locality in a Rural African Village.**
  David L. Johnson, Elizabeth M. Belding and Gertjan van Stam.
  International Conference on Information and Communication Technologies and Development (ICTD), Atlanta, GA, March 2012.

- **VillageCell: Cost Effective Cellular Connectivity in Rural Areas.**
  Abhinav Anand, Veljko Pejovic and Elizabeth M. Belding.
  International Conference on Information and Communication Technologies and Development (ICTD), Atlanta, GA, March 2012.

- **VillageShare: Facilitating Content Generation and Sharing in Rural Networks.**
  David L. Johnson, Veljko Pejovic, Elizabeth M. Belding and Gertjan van Stam.
  ACM DEV, Atlanta, GA, March 2012.

2011

- **The Impact of Channel Bonding on 802.11n Network Management.**
  Lara Deek, Eduard Garcia-Villegas, Elizabeth M. Belding, S-J Lee and Kevin Almeroth.
  ACM CoNext, Tokyo, Japan, December 2011.

- **IdleChat: Enabling High Bandwidth Real-time Applications in Residential Broadband Networks.**
  Ramya Raghavendra, Michael Kaminsky, Konstantina Papagiannaki, Srinivasan Seshan and Elizabeth M. Belding.
  ACM Mobile Computing and Communications Review, 15(3), July 2011.

- **A Context-aware Approach to Wireless Transmission Adaptation.**
  Veljko Pejovic and Elizabeth M. Belding.
  IEEE SECON, Salt Lake City, UT, June 2011.

- **Traffic Characterization and Internet Usage in Rural Africa.**
  Veljko Pejovic, David Johnson and Elizabeth M. Belding.
  WWW, Hyderabad, India, March 2011.

- **MARS: Link Layer Rate Selection for Multicast Transmissions in Wireless Mesh Networks.**
  Prashanth Acharya and Elizabeth Belding.
  Elsevier Ad hoc Networks Journal, 9(1), pp. 48–60, 2011.

2010

- **Unwanted Link Layer Traffic in Large IEEE 802.11 Wireless Networks.**
  Ramya Raghavendra, Elizabeth Belding, Konstantina Papagiannaki and Kevin Almeroth.
  IEEE Transactions on Mobile Computing Journal, 9(9), pp. 1212–1225, September 2010.

- **Rate Adaptation in Congestion Wireless Networks through Real-time Measurements.**
  Prashanth Acharya, Ashish Sharma, Elizabeth Belding, Konstantina Papagiannaki and Kevin Almeroth.
  IEEE Transactions on Mobile Computing Journal, 9(11), November 2010, pp. 1535–1550.

- **Gateway-aware Routing for Wireless Mesh Networks.**
  Prashanth Acharya, David L. Johnson, and Elizabeth M. Belding.
  IEEE International Workshop on Enabling Technologies and Standards for Wireless Mesh Networking (MeshTech), San Francisco, CA, November 2010.

- **Energy Efficient Communication in Next Generation Rural-Area Wireless Networks.**
  Veljko Pejovic and Elizabeth Belding.
  ACM SIGMOBILE Workshop on Cognitive Wireless Networking (CoRoNet), Chicago, Illinois, September 2010.

- **Internet Usage and Performance Analysis of a Rural Wireless Network in Macha, Zambia.**
  David L. Johnson, Elizabeth Belding, Kevin Almeroth and Gertjan van Stam.
  ACM Networked Systems for Developing Regions (NSDR) Workshop, San Francisco, CA, June 2010.

- **Characterizing High Bandwidth Real-Time Video Traffic in Residential Broadband Networks.**
  Ramya Raghavendra and Elizabeth Belding.
  International Workshop on Wireless Measurements (WinMee), Avignon, France, May 2010.

2009

- **Green WLANs: On-Demand WLAN Infrastructures.**
  Amit Jardosh, Konstantina Papagiannaki, Elizabeth M. Belding, Kevin C. Almeroth, Gianluca Iannaccone and Bapi Vinnakota.
  Mobile Networks and Applications (MONET) Journal special issue on Recent Advances in IEEE 802.11 WLANs, 14(6), December 2009.

- **Cool-Tether: Energy Efficient On-the-fly WiFi Hot-spots using Mobile Phones.**
  Ashish Sharma, Vishnu Navda, Ramachandran Ramjee, Venkat Padmanabhan and Elizabeth M. Belding.
  ACM CoNext, Rome, Italy, December 2009.

- **Blockage and Directivity in 60GHz Wireless Personal Area Networks: From Cross-Layer Model to Multihop MAC Design.**
  Sumit Singh, Federico Ziliotto, Upamanyu Madhow, Elizabeth M. Belding and Mark J. Rodwell.
  Journal on Selected Areas in Communications special issue on Wireless Personal Area Networks, 27(8), pp. 1400–1413, October 2009.

- **On the Implications of Routing Metric Staleness in Delay Tolerant Networks.**
  Mike P. Wittie, Khaled A. Harras, Kevin C. Almeroth, and Elizabeth M. Belding.
  Computer Communications Journal special issue of Delay and Disruption Tolerant Networking, 32(16), pp. 1685–1780, October 2009.

- **An Energy-Flow Model for Self-Powered Routers and its Application for Energy-Aware Routing.**
  Veljko Pejovic, Elizabeth M. Belding and Mahesh Marina.
  Networked Systems for Developing Regions (NSDR) Workshop, Big Sky, Montana, October 2009.

- **Cell-Share: Opportunistic Use of Cellular Uplink to Augment Rural WiFi Mesh Networks.**
  Ashish Sharma, Elizabeth M. Belding and Charles E. Perkins.
  VTC Fall '09, Anchorage, AK, September 2009.

- **Linear Representation of Network Traffic with Special Application to Wireless Workload Generation.**
  Stefan Karpinski, Elizabeth M. Belding, John Gilbert, and Kevin Almeroth.
  Mobile Networks and Applications (MONET) Journal, 14(4), pp. 368–386, August 2009.

- **Internet Service in Developing Regions through Network Coding.**
  Mike P. Wittie, Kevin C. Almeroth, Elizabeth M. Belding, Ivica Rimac and Volker Hilt.
  IEEE SECON, Rome, Italy, June 2009.

- **A Case for Application Aware Channel Access in Wireless Networks.**
  Ashish Sharma and Elizabeth M. Belding.
  Proceedings of ACM HotMobile, Santa Cruz, CA, February 2009.

2008

- **A Multi-Radio 802.11 Mesh Network Architecture.**
  Krishna Ramachandran, Irfan Sheriff, Elizabeth M. Belding and Kevin Almeroth.
  Mobile Networks and Applications (MONET) Journal, 13, pp. 132–146, 2008.

- **A Game-Theoretic Analysis of Wireless Access Point Selection by Mobile Users.**
  Kimaya Mittal, Elizabeth M. Belding and Subhash Suri.
  Computer Communications Journal, 31(10), pp. 2049-2062, 2008.

- **FreeMAC: Framework for Multi-Channel MAC Development on 802.11 Hardware.**
  Ashish Sharma and Elizabeth M. Belding.
  Proceedings of the Workshop on Programmable Routers for Extensible Services of Tomorrow (PRESTO), Seattle, WA,
  August 2008.

- **Traffic-Driven Dynamic Spectrum Auctions.**
  Xia Zhou, Shravan Mettu, Heather Zheng and Elizabeth M. Belding.
  Proceedings of the 3rd IEEE Workshop on Networking Technologies for Software Defined Radio (SDR) Networks, San
  Francisco, CA, June 2008.

- **Congestion-Aware Rate Adaptation in Wireless Networks: A Measurement-Driven Approach.**
  Prashanth Aravinda Kumar Acharya, Ashish Sharma, Elizabeth M. Belding, Kevin C. Almeroth and Konstantina Papagiannaki.
  Proceedings of IEEE SECON, San Francisco, CA, June 2008. **Nominated for Best Paper Award.**

- **Measurement-Driven Admission Control on Wireless Backhaul Networks.**
  Irfan Sheriff, Prashanth Aravinda Kumar Acharya and Elizabeth M. Belding.
  Computer Communications Journal, 31(7), pp. 1354-1371, 2008.

- **Antler: A Multi-Tiered Approach to Automated Wireless Network Management.**
  Ramya Raghavendra, Prashanth Aravinda Kumar Acharya, Elizabeth M. Belding and Kevin Almeroth.
  Proceedings of the IEEE Automated Network Management Workshop, Phoenix, AZ, April 2008.

- **SCUBA: Focus and Context for Real-time Mesh Network Health Diagnosis.**
  Amit P. Jardosh, Panuakdet Suwannatat, Tobias Hollerer, Elizabeth M. Belding and Kevin Almeroth.
  Proceedings of the Passive and Active Measurement Conference (PAM), Cleveland, OH, April 2008.

- **Malware in IEEE 802.11 Wireless Networks.**
  Brett Stone-Gross, Christo Wilson, Kevin Almeroth, Elizabeth M. Belding, Heather Zheng and Konstantina Papagiannaki.
  Proceedings of the Passive and Active Measurement Conference (PAM), Cleveland, OH, April 2008.

- **Beyond Proportional Fairness: A Resource Biasing Framework for Shaping Throughput Profiles in Multihop Wireless Networks.**
  Sumit Singh, Upamanyu Madhow and Elizabeth M. Belding.
  Proceedings of IEEE Infocom, Minisymposium, Phoenix, AZ, April 2008.

2007

- **Resource Estimation on Wireless Backhaul Networks.**
  Irfan Sheriff, Prashanth Aravinda Kumar Acharya and Elizabeth M. Belding.
  Proceedings of the ICST Wireless Internet Conference (WICON), Austin, TX, October 2007.

- **Unwanted Link Layer Traffic in Large IEEE 802.11 Wireless Networks.**
  Ramya Raghavendra, Elizabeth M. Belding, Konstantina Papagiannaki and Kevin C. Almeroth.
  Proceedings of the Internet Measurement Conference (IMC), San Diego, CA, October 2007.

- **Perceptive Admission Control for Wireless Network Quality of Service.**
  Ian D. Chakeres and Elizabeth M. Belding-Royer.
  Ad hoc Networks Journal, 5(7), pp. 1129-1148, 2007.

- **Wireless Traffic: The Failure of CBR Modeling.**
  Stefan Karpinski, Elizabeth M. Belding and Kevin C. Almeroth.
  Proceedings of IEEE Broadnets, Raleigh, NC, September 2007.

- **MIST: Cellular Data Network Measurement for Mobile Applications.**
  Mike P. Wittie, Brett Stone-Gross, Kevin C. Almeroth and Elizabeth M. Belding.
  Proceedings of IEEE Broadnets, Raleigh, NC, September 2007.

- **Real-Time Traffic Support in Heterogeneous Mobile Networks.**
  Yuan Sun, Elizabeth M. Belding-Royer, Xia Gao and James Kempf.
  Wireless Networks (WINET), 13, pp. 431-445, 2007.

- **Sticky CSMA/CA: Implicit Synchronization and Real-time QoS in Mesh Networks.**
  Sumit Singh, Prashanth Acharya, Upamanyu Madhow and Elizabeth M. Belding.
  Ad hoc Networks Journal, 5(6), August 2007.

- **Millimeter Wave WPAN: Cross-Layer Modeling and Multihop Architecture.**
  Sumit Singh, Frederico Ziliotto, Upamanyu Madhow, Elizabeth M. Belding and Mark Rodwell.
  Proceedings of IEEE Infocom Minisymposium, Anchorage, AL, May 2007.

- **Towards Realistic Models of Wireless Workload.**
  Stefan Karpinski, Elizabeth M. Belding and Kevin Almeroth.
  Proceedings of the 3rd International Workshop on Wireless Network Measurement (WinMee), Limassol, Cyprus, April 2007.

- **Routing Stability in Static Wireless Mesh Networks.**
  Krishna Ramachandran, Irfan Sheriff, Elizabeth M. Belding and Kevin Almeroth.
  Proceedings of Passive and Active Measurement (PAM) Conference, Louvain-la-neuve, Belgium, April 2007. **Best Paper Award.**

- **ParaNets: A Parallel Network Architecture for Challenged Networks.**
  Khaled Harras, Mike Wittie, Kevin Almeroth and Elizabeth M. Belding.
  Proceedings of HotMobile, Phoenix, AZ, February 2007.

- **Integrated Data Location in Multihop Wireless Networks.**
  Irfan Sheriff, Prashanth Acharya, Ashwin Sampath, Ben Zhao and Elizabeth M. Belding.
  Proceedings of IEEE/Create-Net/ICST COMSWARE, Bangalore, India, January 2007.

2006

- **IPAC: IP-based Adaptive Packet Concatenation for Multihop Wireless Networks.**
  Ramya Raghavendra, Amit P. Jardosh, Elizabeth M. Belding and Haitao Zheng.
  Proceedings of Asilomar Conference on Signals, Systems and Computers, Pacific Grove, Ca, October 2006.

- **Multipath Selection in Multi-Radio Mesh Networks.**
  Irfan Sheriff and Elizabeth M. Belding-Royer.
  Proceedings of IEEE Broadnets, San Jose, Ca, October 2006.

- **RTSS/CTSS: Mitigation of Exposed Terminals in Static 802.11-based Mesh Networks.**
  Kimaya Mittal and Elizabeth M. Belding.
  Proceedings of WiMesh, Reston, VA, September 2006.

- **IQU: Practical Queue-based User Association Management for WLANs.**
  Amit Jardosh, Kimaya Mittal Krishna N. Ramachandran, Elizabeth M. Belding and Kevin Almeroth.
  Proceedings of ACM MobiCom, Marina del Rey, CA, September 2006.

- **Effect of Payload Length Variation and Retransmission on Multimedia in WLANs.**
  Sayantan Choudhury, Irfan Sheriff, Jerry Gibson and Elizabeth M. Belding-Royer.
  Proceedings of the International Wireless Communications and Mobile Computing Conference (IWCMC), Vancouver, Canada, July 2006.

- **Experiences from the Design, Deployment and Usage of the UCSB MeshNet Testbed.**
  Henrik Lundgren, Krishna Ramachandran, Elizabeth M. Belding-Royer, Kevin C. Almeroth, Michael Benny, Andrew Hewatt, Alex Touma and Amit Jardosh.
  IEEE Wireless Communications Magazine, 13(2), pp. 18-29, April 2006.

- **Interference-Aware Channel Assignment in Multi-Radio Wireless Mesh Networks.**
  Krishna N. Ramachandran, Elizabeth M. Belding-Royer, Kevin C. Almeroth and Milind M. Buddhikot.
  Proceedings of Infocom 2006, Barcelona, Spain, April 2006.

- **The Utility of Perceptive Communication between Distant Wireless Nodes.**
  Kimaya Sanzgiri, Ian D. Chakeres and Elizabeth M. Belding-Royer.
  Proceedings of TridentCom 2006, Barcelona, Spain, March 2006.

- **Pre-Reply Probe and Route Request Tail: Approaches for Calculation of Intra-Flow Contention in Multihop Wireless Networks**.
  Kimaya Sanzgiri, Ian D. Chakeres and Elizabeth M. Belding-Royer.
  Mobile Networks and Applications (MONET) Journal, 11(1), pp. 21-35, February 2006.

2005

- **Understanding Congestion in IEEE 802.11b Wireless Networks.**
  Amit P. Jardosh, Krishna N. Ramachandran, Kevin C. Almeroth and Elizabeth M. Belding-Royer.
  Proceedings of the Internet Measurement Conference, Berkeley, CA, October 2005.

- **On the Design and Implementation of Infrastructure Mesh Networks.**
  Krishna Ramachandran, Milind M. Buddhikot, Girish Chandranmenon, Scott Miller, Elizabeth Belding-Royer and Kevin Almeroth.
  Proceedings of WiMesh 2005, Santa Clara, CA, October 2005.

- **Understanding Link-Layer Behavior in Highly Congested IEEE 802.11b Wireless Networks.**
  Amit P. Jardosh, Krishna N. Ramachandran, Kevin C. Almeroth and Elizabeth M. Belding-Royer.
  Proceedings of E-WIND, Philadelphia, PA, August 2005.

- **An Experimental Study of Multimedia Traffic Performance in Mesh Networks.**
  Yuan Sun, Irfan Sheriff, Elizabeth M. Belding-Royer and Kevin C. Almeroth.
  Proceedings of WitMeMo, Seattle, WA, June 2005.

- **Multi-Path Admission Control for Mobile Ad hoc Networks.**
  Anders Lindgren and Elizabeth M. Belding-Royer.
  Proceedings of Mobiquitous 2005, San Diego, CA, July 2005.

- **Delay Tolerant Mobile Networks (DTMNs): Controlled Flooding in Sparse Mobile Networks.**
  Khaled A. Harras, Kevin C. Almeroth and Elizabeth M. Belding-Royer.
  Proceedings of Networking 2005, Waterloo, Canada, May 2005.

- **A Framework for the Management of Large-Scale Wireless Network Testbeds.**
  Krishna Ramachandran, Kevin Almeroth and Elizabeth M. Belding-Royer.
  Proceedings of the 1st Workshop on Wireless Network Measurements (WinMee), Trentino, Italy, April 2005.

- **Allowing Bit Errors in Speech over Wireless LANs**.
  Ian Chakeres, Hui Dong, Elizabeth Belding-Royer, Allen Gersho and Jerry Gibson.
  Elsevier Computer Communication Journal, 28, pp. 1643-1657, March 2005.

- **AODV Implementation Design and Performance Evaluation**.
  Ian D. Chakeres and Elizabeth M. Belding-Royer.
  International Journal of Wireless and Mobile Computing, 2(3) 2005.

- **An Authenticated Routing Protocol for Secure Ad hoc Networks**.
  Kimaya Sanzgiri, Daniel LaFlamme, Bridget Dahill, Brian Levine, Clay Shields and Elizabeth M. Belding-Royer.
  Journal on Selected Areas in Communications special issue on Wireless Ad hoc Networks, 23(3), pp. 598–610, March 2005.

- **Real-World Environment Models for Mobile Network Evaluation**.
  Amit Jardosh, Elizabeth M. Belding-Royer, Kevin C. Almeroth and Subhash Suri.
  Journal on Selected Areas in Communications special issue on Wireless Ad hoc Networks, 23(3), pp. 622-632, March 2005.

2004

- **An Intrusion Detection Tool for AODV-based Ad hoc Wireless Networks**.
  Sumit Gwalani, Kavitha Srinivasan, Giovanni Vigna, Elizabeth M. Belding-Royer and Richard Kemmerer.
  Proceedings of the Annual Computer Security Applications Conference, Tucson, AZ, December 2004.

- **DAMON: A Distributed Architecture for Monitoring Multi-hop Mobile Networks**.
  Krishna Ramachandran, Elizabeth M. Belding-Royer and Kevin Almeroth.
  Proceedings of the 1st IEEE International Conference on Sensor and Ad hoc Communications and Networks (SECON), Santa Clara, CA, October 2004.

- **Model-based Resource Prediction for Multi-hop Wireless Networks**.
  Yuan Sun, Xia Gao, Elizabeth M. Belding-Royer and James Kempf.
  Proceedings of the 1st IEEE International Conference on Mobile Ad hoc and Sensor Systems (MASS), Ft. Lauderdale, FL, October 2004. **Nominated for Best Paper Award.**

- **PAC: Perceptive Admission Control for Mobile Wireless Networks**.
  Ian D. Chakeres and Elizabeth M. Belding-Royer.
  Proceedings of the 1st IEEE International Conference on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine), Dallas, TX, October 2004.

- **Determining Intra-Flow Contention along Multihop Paths in Wireless Networks**.
  Kimaya Sanzgiri, Ian D. Chakeres and Elizabeth M. Belding-Royer.
  Proceedings of the 1st IEEE International Conference on Broadband Networks (BroadNets), San Jose, CA, October 2004.

- **Real-Time Traffic Support in Large-Scale Mobile Ad hoc Networks**.
  Yuan Sun, Elizabeth M. Belding-Royer, Xia Gao and James Kempf.
  Proceedings of the 1st International Workshop on Broadband Wireless Multimedia (BroadWiM), San Jose, CA, October 2004.

- **A Scalable Framework for Wireless Network Monitoring**.
  Camden Ho, Krishna Ramachandran, Kevin Almeroth and Elizabeth M. Belding-Royer.
  Proceedings of the 2nd ACM International Workshop on Wireless Mobile Applications and Services on WLAN Hotspots, Philadelphia, PA, September 2004.

- **Transparent Influence of Path Selection in Heterogeneous Ad hoc Networks**.
  Ian D. Chakeres and Elizabeth M. Belding-Royer.
  Proceedings of the 15th IEEE International Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC), Barcelona, Spain, September 2004.

- **Leveraging Mobility to Improve Quality of Service in Mobile Networks**.
  Kimaya Sanzgiri and Elizabeth M. Belding-Royer.
  Proceedings of the 1st Annual International Conference on Mobile and Ubiquitous Systems (Mobiquitous), Boston, MA, August 2004.

- **Allowing Errors in Speech over Wireless LANs**.
  Ian D. Chakeres, Hui Dong, Elizabeth M. Belding-Royer, Allen Gersho and Jerry Gibson.
  Proceedings of the 4th Workshop on Applications and Services in Wireless Networks (ASWN), Boston, MA, August 2004.

- **Dynamically Adaptive Multipath Routing based on AODV**.
  Perumal Sambasivam, Ashwin Murthy and Elizabeth M. Belding-Royer.
  Proceedings of the 3rd Annual Mediterranean Ad hoc Networking Workshop (MedHocNet), Bodrum, Turkey, June 2004.

- **Address Aggregation in Mobile Ad hoc Networks**.
  Christopher Shiflet, Elizabeth M. Belding-Royer and Charles E. Perkins.
  Proceedings of the IEEE International Conference on Communications (ICC), Paris, France, June 2004.

- **Scalable Service Discovery in Mobile Ad hoc Networks**.
  Uday Mohan, Kevin C. Almeroth and Elizabeth M. Belding-Royer.
  Proceedings of IFIP Networking 2004, Athens, Greece, May 2004.

- **A Lightweight Content Replication Scheme for Mobile Ad hoc Pull-based Information Dissemination Environments**.
  Vineet Thanedar, Kevin C. Almeroth and Elizabeth M. Belding-Royer.
  Proceedings of IFIP Networking 2004, Athens, Greece, May 2004.

- **A Study of Dynamic Addressing Techniques in Mobile Ad hoc Networks**.
  Yuan Sun and Elizabeth M. Belding-Royer.
  Wireless Communications & Mobile Computing Journal, 4, pp. 315–329, April 2004.

- **Selective Bit-Error Checking at the MAC Layer for Voice Over Mobile Ad hoc Networks with IEEE 802.11**.
  Hui Dong, Ian D. Chakeres, Allen Gersho, Elizabeth M. Belding-Royer and Jerry D. Gibson.
  Proceedings of the IEEE Wireless Communications and Networking Conference (WCNC), Atlanta, GA, March 2004.

- **Escape from the Computer Lab: Education in Mobile Wireless Networks**.
  Elizabeth M. Belding-Royer.
  Proceedings of the Workshop on Pervasive Computing Education (PerEd), Orlando, FL, pp. 231-235, March 2004.

- **AODV Routing Protocol Implementation Design**.
  Ian D. Chakeres and Elizabeth M. Belding-Royer.
  Proceedings of the International Workshop on Wireless Ad hoc Networking (WWAN), Tokyo, Japan, pp. 698–703, March 2004.

- **Overview of Routing Approaches in Ad hoc Networks**.
  Elizabeth M. Belding-Royer.
  Mobile Ad hoc Networking, edited by Stefano Basagni, Marco Conti, Silvia Giordano, and Ivan Stojmenovic, IEEE/Wiley Publishers, 2004.

2003

- **The AD-MIX Protocol for Encouraging Participation in Mobile Ad hoc Networks**.
  Swaminathan Sundaramurthy and Elizabeth M. Belding-Royer.
  Proceedings of the International Conference on Network Protocols (ICNP), Atlanta, GA, pp. 156–167, November 2003.

- **Speech Coding for Mobile Ad hoc Networks**.
  Hui Dong, Ian D. Chakeres, C.-H. Lin, Allen Gersho, Elizabeth M. Belding-Royer, U. Madhow and Jerry Gibson.
  Proceedings of the Asilomar Conference on Signals, Systems, and Computers, Pacific Grove, CA, November 2003.

- **Towards Realistic Mobility Models for Mobile Ad hoc Networks**.
  Amit Jardosh, Elizabeth M. Belding-Royer, Kevin C. Almeroth and Subhash Suri.
  Proceedings of the 9th ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom), San Diego, CA, pp. 217–229, September 2003.

- **Multi-Level Hierarchies for Scalable Ad hoc Routing**.
  Elizabeth M. Belding-Royer.
  ACM WINET special issue on Mobile Ad hoc Networks, 9(5), pp. 461–478, September 2003.

- **Evolution and Future Directions of the Ad hoc On-Demand Distance Vector Routing Protocol**.
  Elizabeth M. Belding-Royer and Charles E. Perkins.
  Ad hoc Networks Journal, 1(1), pp. 125–150, July 2003.

- **Ad hoc On-Demand Distance Vector (AODV) Routing**.
  Charles E. Perkins, Elizabeth M. Royer, and Samir R. Das.
  Experimental RFC 3561, July 2003.

- **Application-Oriented Routing in Hybrid Wireless Networks**.
  Yuan Sun and Elizabeth M. Belding-Royer.
  Proceedings of the International Conference on Communications (ICC), Anchorage, AL, May 2003.

- **AODV-PA: AODV with Path Accumulation**.
  Sumit Gwalani, Elizabeth M. Belding-Royer, and Charles E. Perkins.
  Proceedings of the International Conference on Communications (ICC), Anchorage, AL, May 2003.

- **Scalability Study of the Ad hoc On-Demand Distance Vector Routing Protocol**.
  Sung-Ju Lee, Elizabeth M. Belding-Royer, and Charles E. Perkins.
  International Journal of Network Management, 13(2), pp. 97–114, March/April 2003.

2002

- **Transmission Range Effects on AODV Multicast Communication**.
  Elizabeth M. Royer and Charles E. Perkins.
  ACM Mobile Networks and Applications special issue on Multipoint Communication in Wireless Mobile Networks, 7(6), pp. 455–470, December 2002.

- **A Secure Routing Protocol for Ad hoc Networks**.
  Kimaya Sanzgiri, Bridget Dahill, Brian N. Levine, Clay Shields, and Elizabeth M. Belding-Royer.
  Proceedings of the 10th International Conference on Network Protocols (ICNP), Paris, France, November 2002.

- **The Utility of Hello Messages for Determining Link Connectivity**.
  Ian D. Chakeres and Elizabeth M. Belding-Royer.
  Proceedings of the 5th International Symposium on Wireless Personal Multimedia Communications (WPMC), Honolulu, HI, October 2002. **Excellent paper award.**

- **Hierarchical Routing in Ad hoc Mobile Networks**.
  Elizabeth M. Belding-Royer.
  Wireless Communication & Mobile Computing special issue on Ad hoc Networking, 2(5), pp. 515–532, August 2002.

- **Internet Connectivity for Ad hoc Mobile Networks**.
  Yuan Sun, Elizabeth M. Belding-Royer, and Charles E. Perkins.
  International Journal of Wireless Information Networks special issue on Mobile Ad hoc Networks, 9(2), pp. 75–88, April 2002.

2001

- **An Analysis of the Optimum Node Density for Ad hoc Mobile Networks**.
  Elizabeth M. Royer, P. Michael Melliar-Smith, and Louise E. Moser.
  Proceedings of the International Conference on Communications (ICC), Helsinki, Finland, June 2001.

- **Performance Comparison of Two On-demand Routing Protocols for Ad hoc Networks**.
  Charles E. Perkins, Elizabeth M. Royer, Samir R. Das, and Mahesh K. Marina.
  IEEE Personal Communications Magazine special issue on Ad hoc Networking, February 2001, pp. 16-28.

2000

- **The Effects of MAC Protocols on Ad hoc Network Communications**.
  Elizabeth M. Royer, Sung-Ju Lee, and Charles E. Perkins.
  Proceedings of the IEEE Wireless Communications and Networking Conference, Chicago, IL, September 2000.

- **An Implementation Study of the AODV Routing Protocol**.
  Elizabeth M. Royer and Charles E. Perkins.
  Proceedings of the IEEE Wireless Communications and Networking Conference, Chicago, IL, September 2000.

- **Performance Comparison of Two On-demand Routing Protocols for Ad hoc Networks**.
  Samir R. Das, Charles E. Perkins, and Elizabeth M. Royer.
  Proceedings of the IEEE Conference on Computer Communications (INFOCOM), Tel Aviv, Israel, March 2000, pp. 3–12.

- **Ad hoc On-Demand Distance Vector Routing**.
  Charles E. Perkins and Elizabeth M. Royer.
  Ad hoc Networks, edited by Charles E. Perkins, Addison-Wesley Publishers, 2000, pp.173–219.

1999

- **Multicast Operation of the Ad hoc On-Demand Distance Vector Routing Protocol**.
  Elizabeth M. Royer and Charles E. Perkins.
  Proceedings of the 5th ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom), Seattle, WA, August 1999, pp. 207–218.

- **A Review of Current Routing Protocols for Ad hoc Mobile Wireless Networks**.
  Elizabeth M. Royer and C.-K. Toh.
  IEEE Personal Communications Magazine, April 1999, pp.46-55.

- **Ad hoc On-Demand Distance Vector Routing**.
  Charles E. Perkins and Elizabeth M. Royer.
  Proceedings of the 2nd IEEE Workshop on Mobile Computing Systems and Applications (WMCSA), New Orleans, LA, February 1999, pp. 90-100.

SOFTWARE TOOLS

- *SCUBA: Focus and Context for Real-time Mesh Network Health Diagnosis*: Network visualization tool that visualizes multiple metrics representative of mesh network performance. Available at http://moment.cs.ucsb.edu/conan/scuba/

- *Data sets from the IETF Wireless Networks*: Collected data sets from the 62nd IETF meeting, held in Minneapolis, MN in March 2005, that give insight into the performance and operation of the deployed wireless LAN. Available at http://moment.cs.ucsb.edu/conan/

- *AODV-Spanning Tree (AODV-ST)*: Linux client software for the AODV-ST routing protocol. This package has built-in support for spanning tree creation, the ETX routing metric, and tunneling to gateways. Available at http://moment.cs.ucsb.edu/∼krishna/aodv-st/

- *DAMON: A Distributed Architecture for Monitoring Multi-hop Mobile Networks*: Windows and Linux client software for monitoring the performance of multi-hop mobile networks. Available at http://moment.cs.ucsb.edu/damon/

- *AODV@IETF Peer Routing Software*: Windows and Linux client software for ad hoc networking of mobile nodes. Available at http://moment.cs.ucsb.edu/aodv-ietf/

- *Obstacle Mobility Model*: Simulation model for the Glomosim and NS-2 simulators that enables the placement of obstacles in a network terrain. After the placement of the obstacles, a set of pathways is generated using a Voronoi computation. The obstacles restrict user movement and degrade signal quality. This is based on our MobiCom 2003 publication. Available at http://moment.cs.ucsb.edu/mobility

- *AODV Glomosim Module*: Simulation model of the AODV routing protocol for the Glomosim network simulator. This module is compliant with version 11 of the AODV Internet Draft. Available at http://moment.cs.ucsb.edu/aodv

- *AODV Linux Implementation*: Linux implementation of the AODV routing protocol. This software was interoperability tested with three other AODV implementations and is commonly referred to as AODV-UCSB. Available at http://moment.cs.ucsb.edu/aodv

INVITED TECHNICAL PRESENTATIONS

Selected Invited Talks (2007-present)

- "VillageNet: Localized Wireless Network Solutions for Developing Regions," *HP Laboratories*, July 2012.
- "Wireless Networks in Developing Regions: Internet for the Next 3 Billion," *Global Awareness Week*, April 2012.
- "VillageNet: Localized Wireless Network Solutions for Developing Regions," *Reykjavik University*, August 2011.
- "Bridging the Digital Divide: A Case for Wireless Networking," *UCSB Media Arts and Technology Seminar Series*, February 2011.
- "Wireless Networks: Bringing the World's Population Online," *California Polytechnic State University, San Luis Obispo*, February 2011.
- "Bridging the Digital Divide: A Case for Wireless Networking," *UCSB Center for Information Technology in Society (CITS) Faculty Lecture Series*, October 2010.
- "Bridging the Digital Divide: A Case for Wireless Networking," *University of Colorado, Boulder*, December 2009.
- "GrowMesh: Organic Growth Mesh Networks for Developing Regions," *ACoRN Multihop Wireless Networking Workshop*, July 2009.
- "Wireless Network Health: An Adaptation a Day Keeps the System Administrator Away," *University of South Australia*, June 2009.
- "Wireless Network Health: An Adaptation a Day Keeps the System Administrator Away," *Duke University*, April 2008.
- "Wireless Network Health: An Adaptation a Day Keeps the System Administrator Away," *University of North Carolina*, April 2008.
- "Wireless Network Health: An Adaptation a Day Keeps the System Administrator Away," *North Carolina State University*, April 2008.
- "Wireless Network Health: An Adaptation a Day Keeps the System Administrator Away," *University of Oregon*, April 2008.
- "Understanding Congestion and Flash Crowds in WLANs," *University of Canterbury*, February 2007.

PROFESSIONAL ACTIVITIES

Editorship

- **Editorial Board Member**, IEEE Pervasive Computing Magazine, 2011 - present.
- **Guest Editor**, IEEE Pervasive Computing Magazine special issue on Pervasive Information and Communication Technologies for Development (ICT4D), July-September 2012.
- **Guest Editor**, Wireless Networks Journal, Selected papers from MobiCom 2005, 13(6), December 2007.
- **Editorial Board Member**, IEEE Transaction on Mobile Computing, 2005 - 2007.
- **Editorial Board Member**, Mobile Computing and Communications Review (MC2R), 2004.
- **Editorial Board Member**, Ad hoc Networks Journal, Elsevier Science, 2002 - 2005.

Selected Technical Program Committees

- **ACM International Conference on Mobile Computing and Networking (MobiCom)**, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013.
- **ACM SIGCOMM**, 2013.
- **ACM International Conference on Mobile Systems, Applications and Services (MobiSys)**, 2005, 2007, 2010.
- **ACM Symposium on Computing for Development (ACM DEV)**, 2010, 2012.
- **IEEE Conference on Computer Communications (INFOCOM)**, 2004, 2005, 2006, 2007, 2008, 2011, 2012.
- **ACM Annual Symposium on Mobile Ad hoc Networking and Computing (MobiHoc)**, 2001, 2002, 2003, 2004, 2005, 2006, 2007.
- **ACM Workshop on Networked Systems for Developing Regions (NSDR)**, 2012.

Selected Conference Leadership

- **Steering Committee Member**, ACM Workshop on Networked Systems for Developing Regions (NSDR), 2009-present.
- **TPC Co-Chair and Co-founder**, ACM Wireless Networks and Systems for Developing Regions (WiNS-DR), San Francisco, CA, September 2008.
- **TPC Area Chair**, 27th IEEE Conference on Computer Communications (INFOCOM), Phoenix, AZ, April 2008.
- **Program Co-Chair**, 8th ACM Annual Symposium on Mobile Ad hoc Networking & Computing (MobiHoc), Montreal, Canada, September 2007.
- **Program Co-Chair**, 2nd Annual IEEE Communications Society Conference on Sensor and Ad hoc Communications and Networks (SECON), San Jose, CA, October 2005.
- **Program Co-Chair**, 11th ACM International Conference on Mobile Computing and Networking (Mobicom), Cologne, Germany, August-September 2005.

PROFESSIONAL AFFILIATIONS

Distinguished Scientist, Association for Computing Machinery (ACM)

Member, ACM SIGMOBILE

Member, ACM SIGCOMM

Senior Member, Institute of Electrical and Electronic Engineers (IEEE)