Elizabeth M. Belding

Professor, Department of Computer Science
Associate Dean of Diversity, Equity and Inclusion, College of Engineering
University of California
Santa Barbara, CA 93106

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RESEARCH INTERESTS

- Wireless and Mobile Networks
- Social Network Analytics
- Network Analytics
- ICT for Development
- Monitoring and Measurement
- Mobile Network Deployment
- White Spaces Networking
- Cellular Networks

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*

EMPLOYMENT

Associate Dean – Diversity, Equity and Inclusion   July 2019–present
College of Engineering, University of California, Santa Barbara

Graduate Vice Chair   July 2017–June 2019
Department of Computer Science, University of California, Santa Barbara

Vice Chair   July 2009–March 2015
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

PROFESSIONAL SOCIETY DISTINCTIONS

ACM Fellow, 2019.

AAAS Fellow, 2019.

IEEE Fellow, 2014.

HONORS AND AWARDS

Internet Research Task Force (IRTF) Applied Networking Research Prize, 2024, for ACM Sigcomm'24 paper titled "The Efficacy of the Connect America Fund in Addressing US Internet Access Inequities."

ACM SIGMOBILE Test of Time Award, 2018, for WMCSA'99 paper titled "Ad hoc On-Demand Distance Vector Routing."

N2Women: Stars in Computer Networking and Communications, 2017.

NCWIT Harrold and Notkin Research and Graduate Mentoring Award, 2015.

Distinguished Alumni Award, Florida State University Department of Computer Science, 2014.

Top 40 under 40, Pacific Coast Business Times, 2013.

UCSB Faculty Senate Outstanding Graduate Mentor Award, 2012.

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.

National Science Foundation Graduate Fellowship, 1997-2000.

University of California Doctoral Scholar Fellowship, 1996-2000.

Conference Distinctions

- **Best Paper Award and Impact Recognition Award**, ACM CSCW, 2024.
- **Best Paper Award**, ACM Internet Measurement Conference (IMC), 2022.
- **Best Paper Award**, 5th ACM Workshop on Micro Aerial Vehicle Networks, Systems and Applications (DroNet), 2019.
- **Best Paper Honorable Mention**, ACM CSCW 2017.
- **Keynote Speaker**, Florida State University Computer Science Expo, 2014.
- **Keynote Speaker**, ACoRN MultiHop Wireless Networking Workshop, Sydney, Australia, 2009.
- **Best Paper Award**, Proceedings of the Passive and Active Measurements (PAM) Conference, 2007.
- **Keynote Speaker**, 4th International IEEE Workshop on Wireless Local Networks, 2004.
- **Excellent Paper**, 5th International Symposium on Wireless Personal Multimedia Communications (WPMC), 2002.

PUBLICATIONS

2025

- **5G Performance: A Multidimensional Variability Analysis.**
  V. Srinivasavaradhan, J. Liu and E. Belding.
  Passive and Active Measurement (PAM) Conference, March 2025.

2024

- **Estimating Video Quality Using Coarse-Grained Features: Insights and Limitations from Gaussian Mixture Models.**
  J. Liu, M. Waz, J. Chung, K. Moslehpour, D. Lerner, and E. Belding.
  ACM CoNext, December 2024.

- **Mending the Fabric: the Contentious, Collaborative Work of Repairing Broadband Maps.**
  B. Palacios Abad, M. Vigil-Hayes, E. Belding and E. Zegura.
  Proceedings of the ACM CHI, November 2024.

- **Mapping Cellular Network Evolution and Infrastructure Criticality: A Nationwide Analysis.**
  V. Srinivasavaradhan, J. Liu, and E. Belding.
  The Research Conference on Communications, Information and Internet Policy (TPRC), Washington D.C., September 2024.

- **Assessing the Efficacy of the Connect America Fund in Addressing Internet Access Inequities in the US.**
  H. Manda, V. Srinivasavaradhan, L. Koduru, K. Zhang, Z. Zhou, U. Paul, E. Belding, A. Gupta and T. Narechania.
  ACM SIGCOMM, Sydney, Australia, August 2024.

- **Watching Stars in Pixels: The Interplay of Traffic Shaping and YouTube Streaming QoE over GEO Satellite Networks.**
  J. Liu, D. Lerner, J. Chung, U. Paul, A. Gupta and E. Belding.
  Passive and Active Measurement (PAM) Conference, online, February 2024.

2023

- **Decoding the Divide: Analyzing Disparities in Broadband Plans Offered by Major US ISPs.**
  U. Paul, V. Gunasekaran, J. Liu, T. Narechania, A. Gupta, and E. Belding.
  ACM SIGCOMM, New York, NY, September 2023.

2022

- **Pandemic-influenced human mobility on tribal lands in California: Data sparsity and analytical precision.**
  E. Showalter, M. Vigil-Hayes, E. Zegura, R. Sutton, E. Belding.
  PLOS ONE, December 2022.

- **The Importance of Contextualization of Crowdsourced Active Speed Test Measurements.**
  U. Paul, J. Liu, M. Gu, A. Gupta and E. Belding.
  ACM Internet Measurement Conference (IMC), October 2022.

- **LoRaX: Repurposing LoRa as a Low Data Rate Messaging System to Extend Internet Boundaries".**
  M. Vigil-Hayes, Md. N. Hossain, A. K. Elliot, E. M. Belding and E. Zegura.
  ACM COMPASS, June 2022.

- **Characterizing Internet Access and Quality Inequities in California M-Lab Measurements"**.
  U. Paul, J. Liu, D. Farias-Llerenas, V. Adarsh, A. Gupta and E. Belding.
  ACM COMPASS, June 2022.
- **Note: Towards Community-Empowered Network Data Action**.
  B. Palacios Abad, E. Belding, M. Vigil-Hayes and E. Zegura.
  ACM COMPASS, June 2022.
- **A Tale of Three Datasets: Towards Characterizing Mobile Broadband Access in the United States**.
  T. Mangla, E. Showalter, V. Adarsh, K. Jones, M. Vigil-Hayes, E. Belding and E. Zegura.
  Communications of the ACM, 65(3), March 2022.

2021

- **Tribal mobility and COVID-19 policies: quantifying the differing effects of social distancing orders across urban, rural, and tribal boundaries**.
  E. Showalter, M. Vigil-Hayes, E. Zegura, R. Sutton and E. Belding.
  Association for Public Policy Analysis and Management (APPAM), November 2021 (Extended Abstract).
- **Coverage is Not Binary: Quantifying Mobile Broadband Quality in Urban, Rural and Tribal Contexts.**
  V. Adarsh, M. Nekrasov, U. Paul, T. Mangla, A. Gupta, M. Vigil-Hayes, E. Zegura and E. Belding.
  IEEE ICCCN, July 2021.
- **Too Late for Playback: Estimation of Video Stream Quality in Rural and Urban Contexts.**
  V. Adarsh, M. Nekrasov, U. Paul, A. Ermakov, A. Gupta, M. Vigil-Hayes, E. Zegura, and E. Belding.
  Passive and Active Measurement (PAM) Conference, April 2021.
- **As a Squash Plant Grows: Social Textures of Sparse Internet Connectivity in Rural and Tribal Communities.**
  M. Duarte, M. Vigil-Hayes, E. Zegura, E. Belding, I. Masara, and J. Case Nevarez.
  ACM Transactions on Computer-Human Interaction, 2021.
- **Estimation of Congestion from Cellular Walled Gardens using Passive Measurement.**
  V. Adarsh, M. Nekrasov, U. Paul, and E. Belding.
  IEEE Transactions on Mobile Computing, 2021.
- **Tribal Mobility and COVID-19: An Urban-Rural Analysis in New Mexico.**
  E. Showalter, M. Vigil-Hayes, E. Zegura, R. Sutton and E. Belding.
  ACM HotMobile, February 2021.

2020

- **SafeRoute: Learning to Navigate Streets Safely in an Urban Environment.**
  S. Levy, W. Xiong, E. Belding and W. Y. Wang.
  ACM Transactions on Intelligent Systems and Technology (ACM TIST), 2020.
- **Impact of 802.15.4 Radio Antenna Orientation on UAS Aerial Data Collection.**
  M. Nekrasov, M. Ginier, R. Allen, I. Artamonova, E. Belding.
  ICCCN, August 2020.
- **Measuring and Characterizing Hate Speech on News Websites.**
  S. Zannettou, M. ElSherief, E. Belding, S. Nilizadeh and G. Stringhini.
  Web Science, July 2020.
- **Towards Understanding Gender Bias in Relation Extraction.**
  A. Gaut, T. Sun, S. Tang, Y. Huang, J. Qian, M. ElSherief, J. Zhao, D. Mirza, E. Belding, K.-W. Chang and W. Y. Wang.
  ACL, July 2020.
- **#Outage: Detecting Power and Communication Outages from Social Networks.**
  U. Paul, A. Ermakov, M. Nekrasov, V. Adarsh and E. Belding.
  The Web Conference (WWW), April 2020.

2019

- **Evaluating LTE Coverage and Quality from an Unmanned Aircraft System.**
  M. Nekrasov, V. Adarsh, U. Paul, E. Showalter, E. Zegura, M. Vigil-Hayes and E. Belding.
  16th International Conference on Mobile Ad-hoc and Smart Systems (IEEE MASS), Monterey, CA, November 2019.
- **A Benchmark Dataset for Learning to Intervene in Online Hate Speech.** J. Qian, A. Bethke, Y. Liu, E. Belding and W. Y. Wang.
  EMNLP, Hong Kong, China, November 2019.
- **Packet-level Congestion Estimation in LTE Networks using Passive Measurements.**
  V. Adarsh, M. Nekrasov, E. Zegura and E. Belding.
  ACM Internet Measurement Conference (IMC), Netherlands, October 2019.

- **Mitigating Gender Bias in Natural Language Processing: Literature Review.**
  T. Sun, A. Gaut, S. Tang, Y. Huang, M. ElSherief, J. Zhao, D. Mirza, E. Belding, K.-W. Chang, W. Y. Wang.
  ACL, Florence, Italy, July 2019.

- **MPTCP Performance over Heterogeneous Subpaths.**
  V. Adarsh, P. Schmitt and E. Belding.
  IEEE ICCCN, Valencia, Spain, July 2019.

- **Performance Analysis of Aerial Data Collection from Outdoor IoT Sensor Networks using 2.4GHz 802.15.4.**
  M. Nekrasov, R. Allen and E. Belding.
  ACM Workshop on Micro Aerial Vehicle Networks, Systems and Applications (DroNet), Seoul, South Korea, June 2019.

- **Learning to Decipher Hate Symbols.**
  J. Qian, M. ElSherief, E. Belding and W. Y. Wang.
  NAACL-HLT, Minneapolis, MN, June 2019.

- **Indigenous Internet: Nuances of Native American Internet Use.**
  E. Showalter, N. Moghaddas, M. Vigil-Hayes, E. Zegura and E. Belding.
  ICTD, Amenabad, India, January 2019.

2018

- **A User-Driven Free Speech Application for Anonymous and Verified Online, Public Group Discourse.**
  M. Nekrasov, D. Iland, M. Metzger, L. Parks and E. Belding.
  Journal of Interet Services and Applications, 9(21), November 2018.

- **Cellular and Internet Connectivity for Displaced Populations.**
  P. Schmitt, D. Iland, E. Belding and M. Zheleva.
  Chapter in ICTs for Refugees and Displaced Persons, C. Maitland, Ed., MIT Press, 2018

- **Hierarchical CVAE for Fine-Grained Hate Speech Classification.**
  J. Qian, M. ElSherief, E. Belding and W. Wang.
  EMNLP, Brussels, Belguim, November 2018.

- **Hate Lingo: A Target-based Linguistic Analysis of Hate Speech in Social Media.**
  M. ElSherief, V. Kulkarni, D. Nguyen, W. Wang and E. Belding.
  International AAAI Conference on Web and Social Media (ICWSM), Palo Alto, CA, June 2018.

- **Peer to Peer Hate: Hate Speech Instigators and Their Targets.**
  M. ElSherief, S. Nilizadeh, D. Nguyen, G. Vigna and E. Belding.
  International AAAI Conference on Web and Social Media (ICWSM), Palo Alto, CA, June 2018.

- **Leveraging Intra-User and Inter-User Representation Learning for Automated Hate Speech Detection.**
  J. Qian, M. ElSherief, E. Belding and W. Wang.
  NAACL HLT, New Orleans, LA, June 2018.

- **Third-Party Cellular Congestion Detection and Augmentation.**
  P. Schmitt, D. Iland, M. Zheleva and E. Belding.
  Transactions on Mobile Computing, April 2018.

2017

- **Whom to Query? Spatially-Blind Participatory Crowdsensing under Budget Constraints.**
  M. ElSherief, M. Vigil-Hayes, R. Raghavendra and E. Belding.
  ACM CrowdSenSys, Delft, The Netherlands, Nov. 2017.

- **FiDO: A Community-based Web Browsing Agent and CDN for Challenged Network Environments.**
  M. Vigil-Hayes, E. Belding and E. Zegura.
  Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), 1(3), Sept. 2017.

- **SecurePost: Verified Group-Anonymity on Social Media.**
  M. Nekrasov, D. Iland, M. Metzger, Y. Zhao and E. Belding.
  7th USENIX Workshop on Free and Open Communications on the Internet (FOCI) , Vancouver, Canada, August 2017.

- **Limits to Internet Freedoms.**
  M. Nekrasov, L. Parks and E. Belding.
  ACM LIMITS, Santa Barbara, CA, June 2017.

- **Low on Air: Inherent Wireless Channel Capacity Limitations.**
  P. Schmitt and E. Belding.
  ACM LIMITS, Santa Barbara, CA, June 2017.

- **#NotOkay: Understanding Gender-based Violence in Social Media.**
  M. ElSherief, E. Belding and D. Nguyen.
  AAAI ICWSM, Montreal, Canada, May 2017.

- **#Indigineous: Tracking the Connection Actions of Native American Advocates on Twitter.**
  M. Vigil-Hayes, M. Duarte, N. Parkhurst and E. Belding.
  ACM CSCW, Portland, OR, February 2017. Best Paper Award Honorable Mention.

2016

- **PhoneHome: Robust Extension of Cellular Coverage.**
  P. Schmitt, D. Iland, E. Belding and M. Zheleva.
  IEEE ICCCN, Waikoloa, HI, August 2016.

- **SmartCell: Small-Scale Mobile Congestion Awareness.**
  P. Schmitt, D. Iland and E. Belding.
  IEEE Communications Magazine special issue on Wireless Technologies for Development, 54(7), pp. 44-50, July 2016.

- **Navigating Connectivity in Reduced Infastructure Environments.**
  P. Schmitt and E. Belding.
  ACM LIMITS - Computing within Limits, Irvine, CA, June 2016.

- **Community-Level Access Divides: A Refugee Camp Case Study.**
  P. Schmitt, D. Iland, E. Belding, B. Tomaszewski, Y. Xu and C. Maitland.
  ICTD, Ann Arbor, MI, June 2016.

- **Dynamic, Data-Driven Optimization of Solar Powered Charging Kiosks for Crisis Response.**
  D. Iland and E. Belding.
  ISCRAM, Rio de Janiefo, Brazil, May 2016.

- **HybridCell: Cellular Connectivity on the Fringes with Demand-Driven Local Cells.**
  P. Schmitt, D. Iland, M. Zheleva and E. Belding.
  IEEE Infocom, San Francisco, CA, April 2016.

- **Examining MVNO Data Paths and Performance.**
  P. Schmitt, M. Vigil and E. Belding.
  PAM, Crete, Greece, March 2016.

- **Repurposing FM: Radio Nowhere to OSNs Everywhere.**
  M. Vigil, E. Belding and M. Rantanen.
  ACM CSCW, San Francisco, CA, February 2016.

2015

- **Internet Media Upload Caching for Poorly-Connected Regions.**
  P. Schmitt, R. Raghavendra and E. Belding.
  ACM DEV, London, England, December 2015.

- **The Urban Characteristics of Street Harassment: A First Look.**
  M. ElSherief and E. Belding.
  UrbanGIS, Seattle, WA, November 2015.

- **Internet Bandwidth Upgrade: Implications on Performance and Usage in Rural Zambia.**
  Mariya Zheleva, Paul Schmitt, Morgan Vigil and Elizabeth M. Belding.
  Information Technologies and International Development (ITID) Journal, 11(2), pp. 1-17, Summer 2015.

- **A Practical Framework for 802.11 MIMO Rate Adaptation.**
  L. Deek, E. Garcia-Villegas, E. Belding, S.-J. Lee, and K. Almeroth.
  Elsevier Computer Networks, 83, June 2015, pp. 332–348.

- **A First Look at Tribal Web Traffic..**
  M. Vigil, M. Rantanen and E. Belding.
  WWW, Florence, Italy, May 2015.

2014

- **EmergeNet: Robust, Rapidly Deployable Cellular Networks.**
  Daniel Iland and Elizabeth M. Belding.
  IEEE Communications Magazine, December 2014.

- **Intelligent Channel Bonding in 802.11n WLANs.**
  Lara Deek, Eduard Garcia-Villegas, Elizabeth M. Belding, Sung-Ju Lee and Kevin Almeroth.
  IEEE Transactions on Mobile Computing, 13(6), June 2014.

- **WhiteRate: A Context-aware Approach to Wireless Rate Adaptation.**
  Veljko Pejovic and Elizabeth Belding.
  IEEE Transactions on Mobile Computing, 13(4), April 2014.

- **VillageLink: Wide-Area Wireless Coverage.**
  Veljko Pejovic, David L. Johnson, Mariya Zheleva, Elizabeth M. Belding, and Albert Lysko.
  COMSNETS, Bangalore, India, January 2014.

2013

- **Kwaabana: File Sharing for Rural Networks.**
  David L. Johnson, Elizabeth M. Belding and Consider Mudenda.
  ACM DEV, Cape Town, South Africa, December 2013.

- **The Increased Bandwidth Fallacy: Performance and Usage in Rural Zambia.**
  Mariya Zheleva, Paul Schmitt, Morgan Vigil, and Elizabeth M. Belding.
  ACM DEV, Cape Town, South Africa, December 2013.

- **Community Detection in Cellular Network Traces.**
  Mariya Zheleva, Paul Schmitt, Morgan Vigil, and Elizabeth M. Belding.
  International Conference on Information and Communication Technologies and Development (ICTD), Cape Town, South Africa, December 2013.

- **Bringing Visibility to Rural Users in Cote d'Ivoire.**
  Mariya Zheleva, Paul Schmitt, Morgan Vigil, and Elizabeth M. Belding.
  International Conference on Information and Communication Technologies and Development (ICTD), Cape Town, South Africa, December 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.

DEVELOPED AND PUBLICLY RELEASED SOFTWARE TOOLS

- *Twitter hate speech dataset*: a collection of approximately 28K hate speech tweets from January 2016 to July 2017, categorized by type of hate, with insight into the nuanced linguistic characteristics of hate and actors involved in hate speech.

- *SecurePost*: A Twitter and Facebook based group anonymity and tweet verification tool. Available through the Google Play Store.

- *SCUBA: Focus and Context for Real-time Mesh Network Health Diagnosis*: Network visualization tool that visualizes multiple metrics representative of mesh network performance.

- *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.

- *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.

- *DAMON: A Distributed Architecture for Monitoring Multi-hop Mobile Networks*: Windows and Linux client software for monitoring the performance of multi-hop mobile networks.

- *AODV@IETF Peer Routing Software*: Windows and Linux client software for ad hoc networking of mobile nodes.

- *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.

- *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.

- *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.

INVITED TECHNICAL PRESENTATIONS

Selected Invited Talks (2010-present)

- "Internet Connectivity is Not Binary," *IEEE Global Humanitarian Technology Conference*, Keynote, October 2021.
- "Expanding the Focus of Digital Innovation," *Marconi Society Decade of Digital Inclusion 6G summit on Connecting the Unconnected*, September 2021.
- "Addressing LTE Coverage Inaccuracies in Indian Country," *Internet Society Indigenous Connectivity Conference*, October 202 (with E. Zegura and M. Vigil-Hayes).
- "Bridging the Digital Divide," *Federal Communications Commission (FCC)*, July 2020 (with E. Zegura).
- "Wireless Network Innovations to Address Internet Access Inequalities," *Grace Murray Hopper Celebration of Women in Computing*, September 2018.
- "Expanding the Focus of Digital Innovation," *InTouch Health*, April 2018.
- "Expanding the Focus of Digital Innovation," *Lawrence Berkeley National Labs Director's Annual Strategic Planning Meeting Keynote*, March 2018.
- "Digital Inequalities within our Borders," *Barnard/Columbia University*, February 2018.
- "A Rural Lens on Intelligent Infrastructure," *Computing Community Consortium Symposium on Computing Research: Addressing National Priorities and Societal Needs*, October 2017.
- "Internet for the next 3 billion: How engineering and computer science can (and will) bridge the digital divide," *Industry without Borders Keynote*, April 2017.
- "A First Look at Internet Usage Context of Indigenous U.S. Populations," *National Congress of American Indians*, November 2015.
- "Panel: Computing in the Developing World," *Microsoft Research Faculty Summit*, July 2015.
- "A First Look at Internet Usage Context of Indigenous U.S. Populations," *Universitat Politecnica de Catalyuna (UPC)*, May 2015.
- "A First Look at Tribal Web Traffic," *IRTF Globally Accessible Internet for All (GAIA) Working Group Meeting*, December 2014.
- "The Internet is Everything," *Florida State University Computer Science Expo Keynote*, November 2014.
- "Bridging the Digital Divide: A Case for Wireless Networks," *UCSB Dept. of Computer Science Array of Talks*, January 2014.
- "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.

PROFESSIONAL ACTIVITIES

Editorship

- **Editor at Large**, IEEE Transactions on Networking, 2014 - present.
- **Editorial Board Member**, IEEE Pervasive Computing Magazine, 2011 - 2015.
- **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.

Technical Program Committees

- **ACM Internet Measurement Conference (IMC)**, 2022, 2023, 2024, 2025.
- **ACM HotNets**, 2024.
- **ACM International Conference on Mobile Computing and Networking (MobiCom)**, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2011, 2012, 2013, 2017, 2022, 2024.
- **ACM CoNext**, 2024.
- **ACM International Conference on Mobile Systems, Applications and Services (MobiSys)**, 2005, 2007, 2010, 2013, 2017, 2019.
- **ACM Conference on Computing and Sustainable Societies (COMPASS)**, 2018, 2020, 2021, 2024.
- **ACM Symposium on Computing for Development (ACM DEV)**, 2010, 2012, 2014, 2016.
- **IEEE Conference on Computer Communications (INFOCOM)**, 2004, 2005, 2006, 2007, 2008, 2011, 2012, 2013, 2016, 2017, 2018.
- **ICTD**, 2013, 2016, 2017, 2019.
- **IEEE International Conference on Distributed Computing Systems (ICDCS)**, 2019.
- 3rd **Workshop on Abusive Language Online**, 2019.
- **Southern California Celebration of Women in Computing**, 2016.
- **ACM SIGCOMM**, 2013, 2023, 2024.
- **Annual IEEE Communications Society Conference on Sensor, Mesh and Ad hoc Communications and Networks (SECON)**, 2004, 2005, 2006, 2007, 2011.
- 8th **International Conference on Ubiquitous Computing (UbiComp)**, 2006.
- **IEEE Hot Topics in Mesh Networking (HotMESH)**, 2010, 2011, 2013, 2013.
- **High Performance Computing (HiPC)**, 2010.
- **ExtremecCom**, 2009, 2010.
- **IEEE International Conference on Broadband Communications, Networks, and Systems (BroadNets)**, 2007, 2008.
- **IEEE International Conference on Mobile Ad hoc and Sensor Systems (MASS)**, 2004, 2008.
- 3rd **IEEE SECON WiMesh Workshop**, 2008.
- **ICST WICON**, 2008.
- 1st **Workshop on Wireless Broadband Access for Communities and Rural Developing Regions (Wireless4D)**, 2008.
- 1st **ACM International Workshop on Wireless Network Testbeds, Experimental Evaluation and Characterization (WiNTECH)**, 2006.
- **International Workshop on Delay Tolerant Mobile Networks**, 2006.
- **IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM)**, 2006.
- **ICST Workshop on Wireless Network Measurements (WiNMee)**, 2005, 2006.
- 2nd **International IEEE/Create-Net Conference on Testbeds and Research Infrastructures for the Development of Networks and Communities (TridentCom)**, 2006.
- 6th **IEEE Workshop on Mobile Computing Systems and Applications (WMCSA)**, 2004.
- 1st **ACM Workshop on Vehicular Ad hoc Networks (VANET)**, 2004.
- 4th **Workshop on Applications and Services in Wireless Networks (ASWN)**, 2004.
- 1st **Annual International Conference on Mobile and Ubiquitous Systems (Mobiquitous)**, 2004.
- 5th **IEEE Conference on Mobile and Wireless Communications Networks (MWCN)**, 2003.
- 8th **IFIP International Conference on Personal Wireless Communications (PWC)**, 2003.
- **International Conference on Communications (ICC)**, 2003.
- **Next Generation Internet Symposium**, held in conjunction with ICC, 2002, 2003.
- **Workshop on Security and Assurance in Ad hoc Networks**, 2003.
- 4th **International Workshop on Networked Group Communication**, 2002.
- **The** 1st **Annual Mediterranean Ad hoc Networking Workshop (Med-hoc-net)**, 2002.
- **International Workshop on Ad hoc Networking (IWAHN)**, held in conjunction with the International Conference on Parallel Processing, 2002.
- **Hot Interconnects**, 2001, 2002.
- **Communication Networks and Distributed Systems Modeling and Simulation Conference (CNDS)**, held in conjunction with the SCS Western Multiconference on Computer Simulation, 2002.
- **Global Internet Symposium**, held in conjunction with Globecom, 2001.
- **Grace Murray Hopper Women in Computing Conference**, 2000.

Conference Leadership

- **TPC Chair**, IEEE Global Humanitarian Technology Conference (GHTC), September 2022.
- **Steering Committee Member**, IEEE MASS, 2021 - present.
- **TPC Co-Chair**, ACM MobiSys, July 2020.
- **Co-Chair and Organizer**, Dagstuhl Workshop on Internet of People, October 2017.
- **Steering Committee Member**, ACM HotMobile, 2017 - 2019.
- **General Chair**, ACM HotMobile, Sonoma, CA, February 2017.
- **Senior Technical Program Committee**, ICTD, Ann Arbor, Michigan, June 2016.
- **TPC Co-Chair**, ACM DEV, London, England, December 2015.
- **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.
- **Local Arrangements Chair**, 14th IEEE International Conference on Network Protocols (ICNP), Santa Barbara, CA, November 2006.
- **Workshops Chair**, 3rd IEEE International Conference on Mobile Ad hoc and Sensor Systems (MASS), Vancouver, Canada, October 2006.
- **Program Chair**, IFIP/IEEE Mobile and Wireless Communications Networks (MWCN) Conference, Paris, France, October 2004.
- **Demos Chair**, 10th ACM International Conference on Mobile Computing and Networking (MobiCom), Philadelphia, PA, September 2004.
- **Publicity Chair**, 5th Annual Symposium on Mobile Ad hoc Networking and Computing (MobiHoc), Tokyo, Japan, May 2004.
- **Co-Chair**, Internet Research Task Force (IRTF) Working Group on Ad hoc Network Scalability (ANS), 2003 - present.
- **Technical Posters Chair**, Grace Murray Hopper Women in Computing Conference, Vancouver, Canada, October 2002.
- **Technical Posters Chair**, The 8th ACM International Conference on Mobile Computing and Networking (MobiCom), Atlanta, GA, September 2002.
- **Co-Chair**, AODV Next Generation (AODVng) Workshop, Lausanne, Switzerland, June 2002.
- **Publicity Chair**, The 3rd Annual Symposium on Mobile Ad hoc Networking & Computing (MobiHoc), Lausanne, Switzerland, June 2002.
- **Publicity Chair**, SIGMETRICS 2002, Marina del Rey, CA, June 2002.
- **Technology Innovation Forum Leader**, Grace Murray Hopper Women in Computing Conference, Cape Cod, MA, September 2000.
- **Registration Chair**, 1st Annual Workshop on Mobile Ad hoc Networking and Computing (MobiHoc), held in conjunction with the 6th ACM/IEEE International Conference on Mobile Computing and Networking (MobiCom), Boston, MA, August 2000.

Other Selected Positions

- ACM Internet Measurement Conference (IMC) Test-of-Time committee, 2025.
- ACM Sigcomm Test-of-Time committee, 2023 and 2025.
- Marconi Society 2030 Digital Equity Project "Ensuring Effective Broadband Assessment, Measurement and Mapping" Working Group Co-Chair, 2022
- IEEE Connecting the Unconnected Challenge (CTUC) Competition Judge, 2021.
- National Center for Women in Technology (NCWIT) Harrold and Notkin Research and Graduate Mentoring Award selection committee member, 2016–18.
- ACM Lawler Award selection committee member, 2014–18.
- NSF/CISE Division Director for Computer and Network Systems (CNS) search committee member, 2019.

PROFESSIONAL AFFILIATIONS

Fellow, American Association for the Advancement of Science (AAAS)

Fellow, Association for Computing Machinery (ACM)

Fellow, Institute of Electrical and Electronic Engineers (IEEE)

Member, ACM SIGMOBILE

UNIVERSITY OF CALIFORNIA LEADERSHIP AND SERVICE

Computer Science (CS) Department Service

- 2017 – 2019, CS Graudate Program Vice Chair
- 2017 – 2019, CS Graduate Program Faculty Advisor
- 2017 – 2019, CS Graduate Advising and Affairs Committee (Co-Chair)
- 2017 – present, CS Diversity Committee (Member)
- 2017 – 2019, CS Graduate Admissions Committee (Ex-Officio Member)
- 2016 – 2017, CS Graduate Admissions Committee (Member)
- 2015 – 2017, CS Diversity Committee (Chair)
- 2011 – 2013, CS Advisory Board Committee (Member)
- 2011 – 2012, CS Strategic Vision Committee (Member)
- 2009 – 2015, CS Vice Chair
- 2009 – 2015, CS Graduate Advisor
- 2009 – 2015, CS Graduate Affairs Committee (Co-Chair)
- 2009 – 2015, CS Instructor/Class Assignments (Coordinator)
- 2007 – 2018, CS Women in Computer Science (WiCS) Graduate Student Group (Founding Faculty Advisor)
- 2005 – 2014, CS Graduate Admissions Committee (Chair or Co-Chair)
- 2005 – 2009, CS Diversity Committee (Chair or Co-Chair)
- 2004 – 2005, Undergraduate Affairs and Curriculum Committee (Member)
- 2003 – 2004, Faculty Recruitment Committee (Member)
- 2003 – 2004, CS Academic Honesty Committee (Chair)
- 2001 – 2002, CS Colloquium Committee (Chair)
- 2001 – 2005, CS Graduate Admissions Committee (Member)

University Service

- 2019 – present, Associate Dean and Faculty Equity Advisor, College of Engineering
- 2017, UCSB Child Care Center Director Search Committee (Member)
- 2016 – 2021, UCSB Graduate Division Advisory Board on Diversity (Member)
- 2014 – 2021, UCSB Chancellor's Advisory Committee on the Status of Women (Chair)
- 2014 – 2021, UC Office of the President (UCOP) Systemwide Advisory Committee on the Status of Women (Member)
- 2014, UCSB Graduate Division Task Force on Graduate Student Funding
- 2013 – 2015, UCSB Center for Information Technology and Society (CITS) (Associate Director)
- 2012 UCSB Dean of Graduate Division Search Committee (Member)
- 2008 – present, UCSB Institute for Energy Efficiency (Research Affiliate)
- 2008 – 2011, UCSB Graduate Recruitment and Outreach Committee (Chair)
- 2007, UCSB Fulbright Scholarship Selection Committee (Member)
- 2007 – 2009, UCSB Graduate Outreach and Advancement Committee (Chair)
- 2007 – 2009, College of Engineering Graduate Student Diversity Committee (Chair)
- 2006 – present, UCSB Center for Information Technology and Society (CITS) Faculty Steering Committee (Member)
- 2005 – 2006, UCSB Faculty Career Development Award Committee (Member)
- 2005 – 2006, UCSB Graduate Fellowship Committee (Member)
- 2004 – 2005, UCSB Committee on Diversity and Equity (Member)
- 2003 – 2010, CS Representative, UCSB Affirmative Action Committee (Member)
- 2003 – 2004, ABET Committee Representative for CE Program (Member)
- 2002 – 2003, UCSB Regents Scholarship Selection Committee (Member)
- 2001 – 2002, UCSB Faculty Legislature Committee for the Academic Senate (Member)
- 2000 – 2003, Computer Engineering Faculty (Member)

GRADUATE STUDENT ADVISING

Ph.D. Students

Jiayi Liu, started Fall 2025

Laasya Koduru, started Fall 2024

Haarika Manda, started Fall 2023

Varshika Srinivasavaradhan, started Fall 2022

Nawel Alioua, started Fall 2021

Esther Showalter, started Fall 2017

Jiamo Liu, Dissertation title: *Towards Understanding Quality of Service and Quality of Experience in Terrestrial and GEO-Satellite Communication*, Winter 2025.

Udit Paul, Dissertation title: *Towards Bridging the Divide: Enhancing Understanding of Digital Inequity*, Summer 2023.

Vivek Adarsh, Dissertation title: *Autonomous and Predictive Systems to Enhance the Performance of Resilient Networks*, Summer 2022.

Michael Nekrasov, Dissertation title: *Robust, Resilient Networked Communications*, Winter 2020.

Mai El-Sherif, Dissertation title: *Computational Methods for Next-Generation Online Media Ecosystems*, Fall 2019.

Paul Schmitt, Dissertation title: *Network Measurement and Systems for Resource-Constrained Environments*, Summer 2017.

Morgan Vigil-Hayes, Dissertation title: *Community-based Networks for Challenged Environments*, Summer 2017.

Lara Deek, Dissertation title: *Resource-Efficient Wireless Systems for Emerging Wireless Networks*, Summer 2014.

Mariya Zheleva, Dissertation title: *Modular Wireless Networks for Infrastructure-Challenged Environments*, Summer 2014.

David Johnson, Dissertation title: *Rearchitecting Internet Access and Wireless Networks for Rural Developing Regions*, Winter 2013.

Veljko Pejovic, Dissertation title: *Adaptive and Resource-Efficient Rural Area Wireless Networks*, Summer 2012.

Mike Wittie (co-advisee), Dissertation title: *Towards Sustained Scalability of Communication Networks*, Summer 2011.

Ramya Raghavendra, Dissertation title: *Architecting Adaptive Resource-Aware Protocols for Large Wireless Networks*, Fall 2010.

Ashish Sharma, Dissertation title: *Reconfigurable, Energy-Efficient, and Application-Aware Wireless Systems for Emerging Markets*, Fall 2010.

Sumit Singh (co-advisee), Dissertation title: *Medium Access Control and Bandwidth Allocation in Millimeter-Wave and WiFi Networks*, Fall 2009.

Prashanth Acharya, Dissertation title: *Towards Measurement-driven Application Support in Wireless Mesh Networks*, Summer 2009.

Irfan Sheriff, Dissertation title: *Resource Estimation and Control in Wireless Networks*, Summer 2008.

Amit Jardosh (co-advisee), Dissertation title: *Adaptive Large-scale Wireless Networks: Measurements, Protocol Designs and Simulation Studies*, Fall 2008.

Kimaya Mittal, Dissertation title: *Towards Ubiquitous Multihop Wireless Networks: Addressing Capacity and Security Challenges*, Fall 2006.

Krishna Ramachandran (co-advisee), Dissertation title: *Design, Deployment and Management of High-capacity Large-scale Wireless Networks*, Fall 2006.

Ian Chakeres, Dissertation title: *Multimedia Support in Wireless Multihop Networks*, Summer 2005.

Yuan Sun, Dissertation title: *Towards Adaptive, Robust and Self-organizing Multi-hop Wireless Networks*, Summer 2005.

Masters Students (with Thesis/Project Option)

Khalid Mihlar, Project title: *An Analysis of TikTok for Geosynchronous Satellies*, Spring 2024.

Zephyr Zhou, Project title: *Analyzing the Impact of Socioeconomic Factors on Broadband Pricing: Insights from the Broadband-plan Querying Tool*, Spring 2024.

Vinothini Gunasekaran, Project title: *Analyzing Internet Affordability in Santa Barbara County*, Winter 2023.

Gwenyth Allwright, Project title: *Determining a Suitable Geographical Resolution for Human Mobility Data*, Spring 2021.

Dana Nguyen, Project title: *A Linguistic Exploration of Online Hate Speech on Self-Directed Hate*, Spring 2020.

Daniel Means, Project title: *Domain Adaptation with Adversarial Training to Identify Actionable Information from Disaster Images*, Winter 2020.

Ryan Allen, Project title: *Performance Analysis of aerial Data Collection from Outdoor IoT Sensor Networks using 2.4GHz 802.15.4*, Sprng 2019.

Smruthi Manjunath, Project title: *VillageShare ownCloud: A Mobile Application for Data Sharing*, Fall 2013.

Sarah Jones, Project title: *VillageShare: A Delay and Fault Tolerant Approach to Rural Village File Sharing*, Spring 2013.

Abhinav Anand, Project title: *VillageCell: Cost Effective Cellular Connectivity in Rural Areas*, Winter 2012

Manasa Chandrashekar, Project title: *Vertical Handover using Device Perceived Network Performance*, Winter 2012

Michael Benny, Project title: *MeshMon: A Framework for Monitoring Wireless Mesh Networks*, Fall 2005

Sumit Gwalani, Thesis title: *Intrusion Detection in Wireless Ad hoc Networks*, Summer 2003

Andrew Hewatt, Project title: *MeshViz: A Dynamic Presentation Platform for Delivering Network Data in Real-Time*, Fall 2005

Amit Jardosh, Project title: *Realistic Environment Models for Mobile Network Evaluation*, Spring 2004

Anderson Lam, Project title: *Video Performance in Wireless Mesh Networks*, Spring 2006

Chris Shiflet, Thesis title: *Address Aggregation in Mobile Ad hoc Networks*, Summer 2004

Kavitha Srinivasan, Thesis title: *AODVSTAT: An Intrusion Detection tool for Ad hoc Networks*, Summer 2004

Swaminathan Sundaramurthy, Thesis title: *Discouraging Selfishness in Mobile Ad hoc Networks*, Summer 2003

Alex Touma, Project title: *MeshMan: A Mesh Network Development and Management Framework*, Summer 2005

Sean Tucker, Project title: *LiMA: Lightweight Multicast Authentication*, Spring 2004

Vrishali Wagle (co-advisee), Project title: *An Ontology-based Service Discovery Mechanism*, Winter 2004

Gustavo Zaera, Project title: *Quality of Service in Ad hoc Networks*, Spring 2003