

## Edward W. Knightly

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- Research Interests** Wireless networks, high-performance protocol design, security, and performance evaluation.
- Education** Ph.D., University of California at Berkeley, EECS, 1996.  
M.S., University of California at Berkeley, EECS, 1992.  
B.S., Auburn University, Electrical Engineering, 1991.
- Positions** Rice University, Houston, TX, 2006 – present. *Professor*.  
Rice University, Houston, TX, 2002 – 2006. *Associate Professor*.  
Rice University, Houston, TX, 1996 – 2002. *Assistant Professor*.
- Visiting Positions** École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland, 2003 – 2004. *Visiting Professor*.
- Honors and Awards** IEEE Fellow, 2009.  
ACM MobiCom Best Paper Award, 2008.  
IEEE ICCCN Best Paper Award finalist, 2008.  
ACM Recognition of Service Award, 2007.  
Sloan Fellow, 2001.  
NSF CAREER Award, 1997.  
Multiple papers selected for “fast track” publication in *IEEE/ACM Transactions on Networking*.  
Premium Paper Award, *Distributed Systems Engineering Journal*, 1997.  
Sandia National Laboratories Graduate Fellowship, 1993-1996.  
University Scholarship, University of California at Berkeley, 1991.  
Member of HKN, TBII, ΣΠΣ, ΠΙΜΕ, ΦΚΦ (electrical engineering, engineering, physics, mathematics, and interdisciplinary) honor societies.  
Outstanding Undergraduate in Physics, Auburn University, 1989.  
NSF Research Experience for Undergraduates Award, Columbia University, 1989.  
Amoco, Citizen’s, H.K. Porter, and A.H. Skinner scholarships, 1987-1991.

**Journal  
Articles**

- J. Camp and E. Knightly, "Modulation Rate Adaptation in Urban and Vehicular Environments: Cross-layer Implementation and Experimental Evaluation," *IEEE/ACM Transactions on Networking*, 18(6):1949-1962, December 2010.
- O. Gurewitz, V. Mancuso, J. Shi, and E. Knightly, "Measurement and Modeling of the Origins of Starvation of Congestion Controlled Flows in Wireless Mesh Networks," *IEEE/ACM Transactions on Networking*, 17(6):1832-1845, December 2009.
- S. Ranjan, R. Swaminathan, M. Uysal, A. Nucci, and E. Knightly, "DDoS-Shield: DDoS-Resilient Scheduling to Counter Application Layer Attacks," *IEEE/ACM Transactions on Networking*, 17(1):40-53, February 2009.
- S. Ranjan and E. Knightly, "High Performance Resource Allocation and Request Redirection Algorithms for Web Clusters," *IEEE Transactions on Parallel and Distributed Systems*, 19(9):1186-1200, September 2008.
- I. Aad, J-P. Hubaux, and E. Knightly, "Impact of Denial of Service Attacks on Ad Hoc Networks," *IEEE/ACM Transactions on Networking*, 16(4):791-802, August 2008.
- J. Camp and E. Knightly, "The IEEE 802.11s Extended Service Set Mesh Networking Standard," *IEEE Communications Magazine*, 46(8):120-126, August 2008.
- M. Garetto, T. Salonidis, and E. Knightly, "Modeling Per-flow Throughput and Capturing Starvation in CSMA Multi-hop Wireless Networks," *IEEE/ACM Transactions on Networking*, 16(4):864-877, August 2008.
- A. Khattab, J. Camp, C. Hunter, P. Murphy, A. Sabharwal, and E. Knightly, "WARP: a flexible platform for clean-slate wireless medium access protocol design," *ACM SIGMOBILE Mobile Computing and Communications Review*, 12(1):56-58, January 2008.
- O. Gurewitz, A. de Baynast, and E. Knightly, "Cooperative Strategies and Achievable Rate for Tree Networks with Optimal Spatial Reuse," *IEEE Transactions on Information Theory*, 53(10):3596-3614, October 2007.
- A. Sabharwal, A. Khoshnevis, and Edward Knightly, "Opportunistic Spectral Usage: Bounds and a Multi-band CSMA/CA Protocol," *IEEE/ACM Transactions on Networking*, 15(3):533-545, June 2007.
- J. Camp, E. Knightly, and W. Reed, "Developing and Deploying Multihop Wireless Networks for Low-Income Income Communities," *Journal of Urban Technology*, 13(3):129-137, December 2006.
- A. Kuzmanovic and E. Knightly, "Low-Rate TCP-Targeted Denial of Service Attacks and Counter Strategies," *IEEE/ACM Transactions on Networking*, 14(4):683-696, August 2006.
- A. Kuzmanovic and E. Knightly, "TCP-LP: Low-Priority Service via End-Point Congestion Control," *IEEE/ACM Transactions on Networking*, 14(4):739-752, August 2006.
- C. Li and E. Knightly, "Schedulability Criterion and Performance Analysis of Coordinated Schedulers," *IEEE/ACM Transactions on Networking*, 13(2):276-287, April 2005.
- B. Sadeghi, V. Kanodia, A. Sabharwal, and E. Knightly, "OAR: An Opportunistic MAC for Multirate Ad Hoc Networks," *ACM Wireless Networks Journal*, 11(1): 39-53, January 2005.
- V. Gambiroza, P. Yuan, and E. Knightly, "The IEEE 802.17 Media Access Protocol for High-Speed Metropolitan-Area Resilient Packet Rings," *IEEE Network*, 18(3):8-15, May 2004.

- V. Gambiroza, P. Yuan, L. Balzano, Y. Liu, S. Sheafor, and E. Knightly, "Design, Analysis, and Implementation of DVSR: A Fair, High Performance Protocol for Packet Rings," *IEEE/ACM Transactions on Networking*, 12(1):85-102, February 2004.
- Y. Liu, S. Gruhl, and E. Knightly, "WCFQ: an Opportunistic Wireless Scheduler with Statistical Fairness Bounds," *IEEE Transactions on Wireless Communications*, 2(5):1017-1028, September 2003.
- A. Kuzmanovic and E. Knightly, "Measurement Based Characterization and Classification of QoS-Enhanced Systems," *IEEE Transactions on Parallel and Distributed Systems*, 14(7):671-685, July 2003.
- H. Fu and E. Knightly, "A Simple Model of Real-Time Flow Aggregation," *IEEE/ACM Transactions on Networking*, 11(3):422-435, June 2003.
- V. Kanodia and E. Knightly, "Ensuring Latency Targets in Multi-Class Web Servers," *IEEE Transactions on Parallel and Distributed Systems* 14(1):84-93, January 2003.
- B. Sadeghi and E. Knightly, "Architecture and Algorithms for Scalable Mobile QoS," *ACM Wireless Networks Journal*, 9(1):7-20, January 2003.
- C. Li and E. Knightly, "Coordinated Multihop Scheduling: A Framework for End-to-End Services," *IEEE/ACM Transactions on Networking*, 10(6):776-789, December 2002.
- V. Kanodia, C. Li, A. Sabharwal, B. Sadeghi, and E. Knightly, "Distributed Priority Scheduling and Medium Access in Ad Hoc Networks," *ACM Wireless Networks Journal*, 8(5):455-466, September 2002.
- P. Yuan, J. Schlembach, A. Skoe, and E. Knightly, "Design and Implementation of Scalable Admission Control," in *Computer Networks Journal: Special Issue on Quality of Service in IP Networks*, 37(5):507-518, November 2001.
- J. Qiu and E. Knightly, "Measurement-Based Admission Control using Aggregate Traffic Envelopes," in *IEEE/ACM Transactions on Networking*, 9(2):199-210, April 2001.
- C. Cetinkaya, V. Kanodia, and Edward W. Knightly, "Scalable Services via Egress Admission Control," in *IEEE Transactions on Multimedia: Special Issue on Multimedia over IP*. 3(1):69-81, March 2001.
- T. Wu and E. Knightly, "Enforceable and Efficient Service Provisioning," *Computer Communications Journal, Special Issue on Multimedia Communications over the Internet*, 23:(14-15):1377-1388, August 2000.
- E. Knightly, "Resource Allocation for Multimedia Traffic Flows using Rate-Variance Envelopes," *ACM Multimedia Systems Journal*, 7(6):477-485, November 1999.
- E. Knightly and N. Shroff, "Admission Control for Statistical QoS: Theory and Practice," *IEEE Network*, 13(2):20-29, March 1999.
- H. Zhang and E. Knightly, "RED-VBR: A Renegotiation-Based Approach to Support Delay-Sensitive VBR Video," *ACM Multimedia Systems Journal*, 5(3):164-176, May 1997.
- E. Knightly and H. Zhang, "D-BIND: An Accurate Traffic Model for Providing QoS Guarantees to VBR Traffic," *IEEE/ACM Transactions on Networking*, 5(2):219-231, April 1997.
- E. Knightly and P. Rossaro, "On the Effects of Smoothing for Deterministic QoS," *Distributed Systems Engineering Journal: Special Issue on Quality of Service*, 4(1):3-15, March 1997.

H. Zhang and E. Knightly, "RCSP and Stop-and-Go: A Comparison of Two Non-Work-Conserving Disciplines For Supporting Multimedia Communication," *ACM Multimedia Systems Journal: Special Issue on Multimedia Networking*, 4(6):346-356, November 1996.

D. Wrege, E. Knightly, J. Liebeherr, and H. Zhang, "Deterministic Delay Bounds for VBR Video in Packet-Switching Networks: Fundamental Limits and Practical Tradeoffs," *IEEE/ACM Transactions on Networking*, 4(3):352-362, June 1996.

**Refereed  
Conference  
Publications**

N. Anand, S. J. Lee, and E. Knightly, "STROBE: Actively Securing Wireless Communications using Zero-Forcing Beamforming," *Proceedings of IEEE INFOCOM 2012*, Orlando, FL, March 2012.

E. Aryafar, M. (Amir) Khojastepour, K. Sundaresan, S. Rangarajan, and E. Knightly, "ADAM: An Adaptive Beamforming System for Multicasting in Wireless LANs," *Proceedings of IEEE INFOCOM 2012*, Orlando, FL, March 2012.

B. Nardelli and E. Knightly, "Closed-form Throughput Expressions for CSMA Networks with Collisions and Hidden Terminals," *Proceedings of IEEE INFOCOM 2012*, Orlando, FL, March 2012.

C. Dacso, E. Knightly, and M. Dacso, "Technology-enabled Chronic Disease Management in Under-resourced Environments," in *Proceedings of Proceedings of the International Conference on Wireless Technologies for Humanitarian Relief, ACWR 2011*, Amrita University, India, December 2011.

C. Liu, B. Sadeghi, and E. Knightly, "Enabling Vehicular Visible Light Communication (V<sup>2</sup>LC) Networks," in *Proceedings of ACM VANET 2011*, Las Vegas, NV, September 2011.

B. Nardelli, J. Lee, K. Lee, Y. Yi, S. Chong, E. Knightly, and M. Chiang, "Experimental Evaluation of Optimal CSMA," in *Proceedings of IEEE INFOCOM 2011*, Shanghai, China, April 2011.

E. Aryafar, N. Anand, T. Salonidis, and E. Knightly, "Design and Experimental Evaluation of Multi-User Beamforming in Wireless LANs", in *Proceedings of ACM MobiCom 2010*, Chicago, IL, September 2010.

E. Magistretti, O. Gurewitz, and E. Knightly, "Inferring and Mitigating a Link's Hindering Transmissions in Managed 802.11 Wireless Networks," in *Proceedings of ACM MobiCom 2010*, Chicago, IL, September 2010.

J. Camp, E. Aryafar, and E. Knightly, "Coupled 802.11 Flows in Urban Channels: Model and Experimental Evaluation," in *Proceedings of IEEE INFOCOM 2010*, San Diego, CA, March 2010.

V. Mancuso, O. Gurewitz, A. Khattab, and E. Knightly, "Elastic rate limiting for spatially biased wireless mesh networks," in *Proceedings of IEEE INFOCOM 2010*, San Diego, CA, March 2010.

S. Miskovic and E. Knightly, "Routing Primitives for Wireless Mesh Networks: Design, Analysis and Experiments," in *Proceedings of IEEE INFOCOM 2010*, San Diego, CA, March 2010.

J. Robinson, M. Singh, R. Swaminathan, and E. Knightly, "Deploying Mesh Nodes under Non-Uniform Propagation," in *Proceedings of IEEE INFOCOM 2010*, San Diego, CA, March 2010.

- J. Shi, E. Aryafar, T. Salonidis, and E. Knightly, "Synchronized CSMA Contention: Model, Implementation, and Evaluation," in *Proceedings of IEEE INFOCOM 2009*, Rio de Janeiro, Brazil, April 2009.
- J. Camp and E. Knightly, "Modulation Rate Adaptation in Urban and Vehicular Environments: Cross-layer Implementation and Experimental Evaluation," in *Proceedings of ACM MobiCom 2008*, San Francisco, CA, September 2008.
- J. Robinson, R. Swaminathan, and E. Knightly, "Assessment of Deployed, Urban-Scale Wireless Networks with a Small Number of Measurements," in *Proceedings of ACM MobiCom 2008*, San Francisco, CA, September 2008. **Best Paper Award Winner.**
- A. Khattab, A. Sabharwal, and E. Knightly, "Fair Randomized Antenna Allocation in Asynchronous MIMO Multi-hop Networks," in *Proceedings of IEEE ICCCN 2008*, St. Thomas, US, August 2008. **Best Paper Award Finalist.**
- A. Giannoulis, M. Fiore, and E. Knightly, "Supporting Vehicular Mobility in Urban Multi-hop Wireless Networks," in *Proceedings of ACM MobiSys 2008*, Breckenridge, CO, June 2008.
- A. Giannoulis, T. Salonidis, and E. Knightly, "Congestion Control and Channel Assignment in Multi-Radio Wireless Mesh Networks," in *Proceedings of IEEE SECON 2008*, San Francisco, CA, June 2008.
- E. Aryafar, O. Gurewitz and E. Knightly, "Distance-1 Constrained Channel Assignment in Single Radio Wireless Mesh Networks," in *Proceedings of IEEE INFOCOM 2008*, Phoenix, AZ, April 2008.
- J. Camp, V. Mancuso, O. Gurewitz, and E. Knightly, "A Measurement Study of Multiplicative Overhead Effects in Wireless Networks," in *Proceedings of IEEE INFOCOM 2008*, Phoenix, AZ, April 2008.
- J. Robinson, M. Uysal, R. Swaminathan, and E. Knightly, "Adding Capacity Points to a Wireless Mesh Network Using Local Search," in *Proceedings of IEEE INFOCOM 2008*, Phoenix, AZ, April 2008.
- J. Shi, O. Gurewitz, V. Mancuso, J. Camp, and E. Knightly, "Measurement and Modeling of the Origins of Starvation in Congestion Controlled Mesh Networks," in *Proceedings of IEEE INFOCOM 2008*, Phoenix, AZ, April 2008.
- T. Salonidis, M. Garetto, A. Saha, and E. Knightly, "Identifying High Throughput Paths in 802.11 Mesh Networks: a Model-based Approach," in *Proceedings of IEEE ICNP 2007*, Beijing, China, October 2007.
- A. de Baynast, O. Gurewitz, and E. Knightly, "Cooperative Strategies and Optimal Scheduling for Tree Networks," in *Proceedings of IEEE INFOCOM 2007*, Anchorage, AK, May 2007.
- A. Kabbani, T. Salonidis, and E. Knightly, "A Distributed Low-Complexity Maximum-Throughput Scheduler for Wireless Backhaul Networks," in *Proceedings of IEEE INFOCOM 2007*, Anchorage, AK, May 2007.
- J. Robinson and E. Knightly, "A Performance Study of Deployment Factors in Wireless Mesh Networks," in *Proceedings of IEEE INFOCOM 2007*, Anchorage, AK, May 2007.
- A. Leonardi, S. Palazzo, A. Kabbani, and E. Knightly, "Exploiting Physical Layer Detection Techniques to Mitigate Starvation in CSMA/CA Wireless Networks," in *Proceedings of WONS 2007*, Obergurgl, Austria, January 2007.

- J. Camp, J. Robinson, C. Steger, and E. Knightly, "Measurement Driven Deployment of a Two-Tier Urban Mesh Access Network," in *Proceedings of ACM MobiSys 2006*, Uppsala, Sweden, June 2006.
- J. Shi, T. Salonidis, and E. Knightly, "Starvation Mitigation Through Multi-Channel Coordination in CSMA-based Wireless Networks," in *Proceedings of ACM MobiHoc 2006*, Florence, Italy, May 2006.
- M. Garetto, T. Salonidis, and E. Knightly, "Modeling Per-flow Throughput And Capturing Starvation in CSMA Multi-hop Wireless Networks," in *Proceedings of IEEE INFOCOM 2006*, Barcelona, Spain, April 2006.
- S. Ranjan, R. Swaminathan, M. Uysal, and E. Knightly, "DDoS-Resilient Scheduling to Counter Application Layer Attacks under Imperfect Detection," in *Proceedings of IEEE INFOCOM 2006*, Barcelona, Spain, April 2006.
- R. Karrer and E. Knightly, "TCP-PARIS: a Parallel Download Protocol for Replicas," in *Proceedings of IEEE International Workshop on Web Content Caching and Distribution (WCW 2005)*, Sophia Antipolis, France, September, 2005.
- M. Garetto, J. Shi, and E. Knightly, "Modeling Media Access in Embedded Two-Flow Topologies of Multi-hop Wireless Networks," in *Proceedings of ACM MobiCom 2005*, Cologne, Germany, August 2005.
- D. Dumitriu, E. Knightly, A. Kuzmanovic, I. Stoica, and W. Zwaenepoel, "Denial-of-Service Resilience in Peer-to-Peer File-Sharing Systems," in *Proceedings of ACM SIGMETRICS 2005*, Banff, Canada, June 2005.
- A. Kuzmanovic and E. Knightly, "A Performance vs. Trust Perspective in the Design of End-Point Congestion Control Protocols," in *Proceedings of IEEE ICNP 2004*, Berlin, Germany, October 2004.
- I. Aad, J-P. Hubaux, and E. Knightly, "Denial of Service Resilience in Ad Hoc Networks," in *Proceedings of ACM MobiCom 2004*, Philadelphia, PA, September 2004.
- V. Gambiroza, B. Sadeghi, and E. Knightly, "End-to-End Performance and Fairness in Multihop Wireless Backhaul Networks," in *Proceedings of ACM MobiCom 2004*, Philadelphia, PA, September 2004.
- C. Cetinkaya and E. Knightly, "Opportunistic Traffic Scheduling Over Multiple Network Paths," in *Proceedings of IEEE INFOCOM 2004*, Hong Kong, China, March 2004.
- S. Ranjan, R. Karrer and E. Knightly, "Wide Area Redirection of Dynamic Content by Internet Data Centers," in *Proceedings of IEEE INFOCOM 2004*, Hong Kong, China, March 2004.
- R. Karrer, A. Sabharwal, and E. Knightly, "Enabling Large-scale Wireless Broadband: The Case for TAPs," in *Proceedings of HotNets 2003*, Cambridge, MA, November 2003.
- A. Kuzmanovic and E. Knightly, "Low-Rate TCP-Targeted Denial of Service Attacks (The Shrew vs. the Mice and Elephants)," in *Proceedings of ACM SIGCOMM 2003*, Karlsruhe, Germany, August 2003.
- A. Kuzmanovic and E. Knightly, "TCP-LP: A Distributed Algorithm for Low Priority Data Transfer," in *Proceedings of IEEE INFOCOM 2003*, San Francisco, CA, April 2003.
- Y. Liu and E. Knightly, "Opportunistic Fair Scheduling over Multiple Wireless Channels," in *Proceedings of IEEE INFOCOM 2003*, San Francisco, CA, April 2003.

- B. Sadeghi, V. Kanodia, A. Sabharwal, and E. Knightly, "Opportunistic Media Access for Multirate Ad Hoc Networks," in *Proceedings of ACM MobiCom 2002*, Atlanta, GA, September, 2002.
- V. Gambiroza, Y. Liu, P. Yuan, and E. Knightly, "High-Performance Fair Bandwidth Allocation for Resilient Packet Rings," in *Proceedings of the 15th ITC Specialist Seminar on Internet Traffic Engineering and Traffic Management*, Wurzburg, Germany, July 2002.
- V. Kanodia, C. Li, A. Sabharwal, B. Sadeghi, and E. Knightly, "Ordered Packet Scheduling in Wireless Ad Hoc Networks: Mechanisms and Performance Analysis," in *Proceedings of ACM MOBIHOC 2002*, Lausanne, Switzerland, June 2002.
- S. Ranjan, J. Rolia, H. Fu, and E. Knightly, "QoS-Driven Server Migration for Internet Data Centers," in *Proceedings of IWQoS 2002*, Miami, FL, May 2002.
- C. Li and E. Knightly, "Schedulability Criterion and Performance Analysis of Coordinated Schedulers," in *Proceedings of the 17th International Teletraffic Congress (ITC-17)*, Salvador da Bahia, Brazil, September 2001.
- V. Kanodia, C. Li, A. Sabharwal, B. Sadeghi, and E. Knightly, "Distributed Multi-Hop Scheduling and Medium Access with Delay and Throughput Constraints," in *Proceedings of ACM MobiCom 2001*, Rome, Italy, July 2001.
- H. Fu and E. Knightly, "Aggregation and Scalable QoS: A Performance Study," in *Proceedings of IWQoS 2001*, Karlsruhe, Germany, June 2001.
- A. Kuzmanovic and E. Knightly, "Measuring Service in Multi-Class Networks," in *Proceedings of IEEE INFOCOM 2001*, Anchorage, Alaska, April 2001.
- J. Schlembach, A. Skoe, P. Yuan, and E. Knightly, "Design and Implementation of Scalable Admission Control," in *Proceedings of the International Workshop on QoS in Multiservice IP Networks (MQoS 2001)*, Rome, Italy, January 2001.
- C. Li and E. Knightly, "Coordinated Network Scheduling: A Framework for End-to-End Services," in *Proceedings of IEEE International Conference on Network Protocols (ICNP 2000)*, Osaka, Japan, November 2000.
- L. Breslau, E. Knightly, S. Shenker, I. Stoica, and H. Zhang, "Endpoint Admission Control: Architectural Issues and Performance," in *Proceedings of ACM SIGCOMM 2000*, Stockholm, Sweden, August 2000.
- V. Kanodia and E. Knightly, "Multi-Class Latency-Bounded Web Services," in *Proceedings of IWQoS 2000*, Pittsburgh, PA, June 2000.
- C. Cetinkaya and E. Knightly, "Egress Admission Control," in *Proceedings of IEEE INFOCOM 2000*, Tel Aviv, Israel, March 2000.
- T. Wu and E. Knightly, "Buffering vs. Smoothing for End-to-End QoS: Fundamental Issues and Comparison," in *Proceedings of Performance 1999*, Istanbul, Turkey, October 1999.
- R. Jain, B. Sadeghi, and E. Knightly, "Towards Coarse-Grained Mobile QoS," in *Proceedings of the 1999 ACM International Workshop on Wireless Mobile Multimedia*, Seattle, WA, August 1999.
- J. Qiu and E. Knightly, "Inter-Class Resource Sharing using Statistical Service Envelopes," in *Proceedings of IEEE INFOCOM 1999*, New York, NY, March 1999.

- R. Jain and E. Knightly, "A Framework for Design and Evaluation of Admission Control Algorithms in Multi-Service Mobile Networks," in *Proceedings of IEEE INFOCOM 1999*, New York, NY, March 1999.
- J. Qiu and E. Knightly, "QoS Control via Robust Envelope-Based MBAC," in *Proceedings of IWQoS 1998*, Napa, CA, May 1998 (position paper).
- E. Knightly, "Enforceable Quality of Service Guarantees for Bursty Traffic Streams," in *Proceedings of IEEE INFOCOM 1998*, San Francisco, CA, March 1998.
- E. Knightly, "On the Accuracy of Admission Control Tests," in *Proceedings of IEEE International Conference on Network Protocols (ICNP 1997)*, Atlanta, GA, October 1997.
- E. Knightly, "Second Moment Resource Allocation in Multi-Service Networks," in *Proceedings of ACM SIGMETRICS 1997*, Seattle, WA, June 1997.
- E. Knightly and P. Rossaro, "Improving QoS through Traffic Smoothing," in *Proceedings of IWQoS 1996*, Paris, France, March 1996.
- E. Knightly and H. Zhang, "Connection Admission Control for RED-VBR, a Renegotiation-Based Service," in *Proceedings of IWQoS 1996*, Paris, France, March 1996.
- E. Knightly, "H-BIND: A New Approach to Providing Statistical Performance Guarantees to VBR Traffic," in *Proceedings of IEEE INFOCOM 1996*, San Francisco, CA, March 1996.
- E. Knightly, D. Wrege, J. Liebeherr, and H. Zhang, "Fundamental Limits and Tradeoffs of Providing Deterministic Guarantees to VBR Video Traffic," in *Proceedings of ACM SIGMETRICS 1995*, Ottawa, Ontario, May 1995.
- H. Zhang and E. Knightly, "A New Approach to Support VBR Video in Packet-Switching Networks," in *Proceedings of IEEE Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV 1995)*, Durham, NH, April 1995.
- E. Knightly and H. Zhang, "Traffic Characterization and Switch Utilization using a Deterministic Bounding Interval Dependent Traffic Model," in *Proceedings of IEEE INFOCOM 1995*, Boston, MA, April 1995.
- E. Knightly, A. Banerjea, F. Templin, H. Zhang, B. Mah, and D. Ferrari, "A Demonstration of the Tenet Protocol Suite," in *Video Program of ACM Multimedia '94*, San Francisco, CA, October 1994.
- A. Banerjea, E. Knightly, F. Templin, and H. Zhang, "Experiments with the Tenet Real-Time Protocol Suite on the Sequoia 2000 Wide Area Network," in *Proceedings of ACM Multimedia 1994*, San Francisco, CA, October 1994.
- H. Zhang and E. Knightly, "Providing End-to-End Statistical Performance Guarantees with Interval Dependent Stochastic Models," in *Proceedings of ACM SIGMETRICS 1994*, Nashville, TN, May 1994.
- E. Knightly and G. Ventre, "Galileo: a Tool for Simulation and Analysis of Real-Time Networks," in *Proceedings of the 1993 IEEE International Conference on Network Protocols (ICNP 1993)*, San Francisco, CA, October 1993.

**Keynotes**

- "UHF-Band Unlicensed Wireless: Global Opportunities from Rural to Urban Networks," *IEEE RuralComm*, Houston, TX, December 2011.
- "Wireless Prototypes, Testbeds, and Experiments: What Next?" *Ninth IEEE WiOpt*, Princeton, NJ, May 2011.

“Urban-Scale Wireless Access: Experiences and Future Challenges,” Consejo Federal de Inversiones (Federal Council of Investment), Buenos Aires, Argentina, September 2010.

“Urban-Scale Wireless Access from MHz to THz,” *22nd International Teletraffic Congress (ITC 22)*, Amsterdam, Netherlands, September 2010.

“Challenges in Deployment and Operation of Diverse Spectrum Access Networks,” *Fifth IEEE Workshop on Networking Technologies for Software-Defined Radio and White Space*, Boston, MA, June 2010.

“Future Directions in Urban-Scale Multi-hop Wireless Networks,” *Second International Workshop on Carrier-Grade Wireless Mesh Networks*, San Diego, CA, March 2010.

“Ultra-Low Cost Wireless Access: Lessons from the Field,” *IEEE Broadband Wireless Access Workshop*, New Orleans, LA, December 2008.

“Urban Mesh Networks and Protocol Behavior Under Diverse Operating Conditions,” *USC Invited Workshop on Theory and Practice in Wireless Networks*, Los Angeles, CA, May 2008.

“Multi-tier Multihop Wireless: the Road Ahead,” *WICON 2007*, Austin, TX, October 2007.

“Urban Mesh Networks: Coming Soon to a City Near You,” *IFIP Networking 2007*, Atlanta, GA, May 2007.

“Large-Scale Urban Mesh Networks: from Deployment to Applications,” *The 31st IEEE Conference on Local Computer Networks*, Tampa, FL, November 2006.

“Deployment of an Urban IEEE 802.11 Mesh Access Network: Lessons Learned and Challenges Ahead,” Keynote Presentation, *International Workshop On Wireless Network Measurement (WiNMee 2006)*, Boston, MA, April 2006.

“Broadband Access Networks: The Missing Link for Next Generation Interactive Applications,” Keynote Presentation, *MIPS 2003*, Napoli, Italy, November 2003.

## Plenary Panels

20th International Conference on Computer Communication Networks, *Mobile and Wireless Networking*, Maui, HI, July 2011.

IEEE Globecom 2010, *Advances in Urban Sensing*, Miami, FL, December 2010.

IEEE INFOCOM 2009, *Current Trends in Wireless Networks*, Rio de Janeiro, Brazil, April 2009.

ACM MobiHoc 2006, *Protocol Challenges for High-Performance Urban Mesh Networks*, Florence, Italy, June 2006.

IEEE ICPS Workshop on Multi-hop Ad hoc Networks: from Theory to Reality, *How to Make MANETs Scale and Provide Coverage for Real*, Santorini, Greece, July 2005.

IEEE INFOCOM 2005, *Paranoid Protocol Design for Wireless Networks*, Miami, FL, March 2005.

ACM MobiCom 2004, *Wireless Community Mesh Networks - Hype or the Next Big Frontier?*, Philadelphia, PA, September 2004.

NSF Workshop on Fundamental Research in Networking, Airlie House, VA, April 2003.

ACM MobiCom 2002, *Evolution of Mobile and Wireless Networks: Enablers and Inhibitors*, Atlanta, GA, September 2002.

IEEE INFOCOM 2002, *QoS Research in a Complicated World*, New York, NY, June 2002.

- Invited Presentations**
- “Urban-Scale Wireless Networks in Unlicensed UHF Bands,” *CoFeTel (Comisión Federal de Telecomunicaciones)*, Mexico City, Mexico, November 2011.
  - “Broadband Wireless for Underserved Urban Communities,” *FCC*, Washington, D.C., October 2009.
  - “Congestion Control and Medium Access in Mesh Networks: Model and Experimental Validation,” *Fields Institute Workshop on Mathematical Modeling and Analysis of Wireless Networks*, Toronto, Canada, May 2008.
  - “Ultra-Low Cost Wireless Networking for Under-served Communities,” *The Conference on Convergence and Connectivity 2008: Broadband, Wireless and Mobile*, Baker Institute, Houston, TX, March 2008.
  - “High-Performance Wireless Access Networks,” *American Association for the Advancement of Science Annual Meeting*, San Francisco, CA, February 2007.
  - “Technology For All Wireless: Deployment, Measurements, and New Applications,” *Greater Houston Partnership*, August 2006.
  - “New Foundations for a High Performance Wireless Internet,” *Rice Alliance Austin Plenary Presentation*, Austin, TX, January 2005.
  - “Challenges in Residential Broadband Wireless,” *NSF Workshop on Broadband to the Home*, Chicago, IL, October, 2003.
  - “Challenges in Multihop Wireless TAP Networks,” *COST (EU) - NSF (USA) Workshop on Exchanges and Trends in Networking (NeXtworking 2003)*, Chania, Crete, Greece, June 2003.
  - “Opportunistic Media Access for Multirate Ad Hoc Networks,” *17th IEEE Computer Communications Workshop*, Santa Fe, NM October 2002.
  - “Distributed Scheduling and Media Access in Ad Hoc Networks,” *16th IEEE Computer Communications Workshop*, Charlottesville, VA, October 2001.
  - “Priority Scheduling and Media Access in Ad Hoc Networks,” *ITCom 2001: Modeling and Design of Wireless Networks Conference*, Denver, CO, August 2001.
  - “Measuring Service in QoS Networks,” *15th IEEE Computer Communications Workshop*, Captiva Island, FL, October 2000.
  - “Design Issues for Edge Admission Control,” *ICC 2000 Special Session on QoS*, New Orleans, LA, June 2000.
  - “Edge-Based Network QoS,” *Dagstuhl Seminar on Quality of Service in Networks and Distributed Systems*, Wadern, Germany, May 2000.
  - “Scalable Admission Control,” *14th IEEE Computer Communications Workshop*, Estes Park, CO, October 1999.
  - “Resource Control for Mobile Multimedia: Issues and a Coarse Grained Approach,” *13th IEEE Computer Communications Workshop*, Oxford, MS, October 1998.
- Professional Activities**
- Organizing Committee Chairs*
    - Chair, SIGMOBILE Outstanding Contributions Award Committee, 2012-

- Co-chair, NSF Workshop on Future Wireless Communication Networks, 2009
- General chair, ACM MobiHoc 2009
- General chair, ACM MobiSys 2007
- Sponsor co-chair, IFIP Networking 2007
- TPC Chair, IFIP Conference on Wireless on Demand Network Systems and Services 2006
- TPC Co-chair, IEEE INFOCOM 2005
- TPC Co-chair, ACM SIGCOMM Workshop on Experimental Approaches to Wireless Network Design and Analysis 2005
- Finance chair, ACM MobiCom 2002, 2003
- Tutorial co-chair, ACM MobiHoc 2003, IEEE ICNP 2001
- TPC Co-chair, IEEE International Workshop on Quality of Service 1998

#### *Editorial Positions*

- Guest Editor, *Ad Hoc Networks Journal*, Special Issue on Mesh Networks, November 2007).
- Guest Editor, *IEEE Journal on Selected Areas of Communications*, Special Issue on Multi-hop Wireless Mesh Networks, November 2006.
- Associate Editor, *IEEE Transactions on Mobile Computing*, 2005 - present.
- Associate Editor, *Computer Networks Journal*, 2000 - present.
- Associate Editor, *IEEE/ACM Transactions on Networking*, 2000 - 2007.
- Associate Editor, *IEEE Transactions on Multimedia*, 2001 - 2003.
- Associate Editor, *IEEE Network*, 1999 - 2000.
- Guest Editor, *IEEE Network* Special Issue on Integrated and Differentiated Services for the Internet, September 1999.

#### *Steering Committees*

- ACM S<sup>3</sup> Workshop: Wireless Workshop of the Students, by the Students, and for the Students (co-founder)
- IEEE/IFIP WONS: Wireless On Demand Networked Systems and Services
- ACM WiNTECH: International Workshop on Wireless Network Testbeds
- IEEE/IFIP IWQOS: International Workshop on Quality of Service

#### *Boards*

- Scientific Council, IMDEA Networks (Madrid), 2010 - present.
- Advisory Board, Rice University Center for Civic Engagement, 2006 - present.
- Advisory Board, Technology For All, 2004 - present.

#### *Technical Program Committee Member*

- ACM MobiCom 2002 - present
- ACM MobiSys 2011
- ACM SIGMETRICS 2000, 2002, 2007
- IEEE INFOCOM 1998 - present
- IEEE International Conference on Network Protocols (ICNP) 2001 - 2003

- IEEE International Workshop on Quality of Service (IWQoS) 1999 - 2003

**Recent Grants**

“Development and Deployment of an Operational and Programmable Diverse-Spectrum Access Network,” NSF MRI, 2011-2014, (PI, with Will Reed, Ashutosh Sabharwal, and Lin Zhong).

“Robust High-Performance Enterprise Wireless: Inference, Management, and Cooperation,” Cisco Collaborative Research Initiative (CCRI), 2010-2011.

“Robust and Real-Time Urban-Scale Wireless Eco-Systems for Sensing, Communication, and Control,” HP Labs Innovation Research Program, 2010-2011,

“Human-Centered Assessment, Design, and Access of Large-Scale Wireless Networks,” NSF Network Science and Engineering (NetSE), 2010-2015 (PI, with L. Zhong and R. Stein, Rice University, W. Reed and J. Forrest, TFA)

“Foundations for Network Cooperation at Signal-scale”, NSF Networking Technology and Systems (NeTS), 2010-2015, (co-PI, with A. Sabharwal and B. Aazhang, Rice University, N. Shroff, Ohio State University, M. Chiang and R. Calderbank, Princeton University)

“Turbo-Charging Wireless Clients: From Clean Slate Protocol Design to Urban Field Trials”, Intel University Research Grants Program, 2009-2011,

“Cooperative Wireless Networks: From Theory to Urban-Scale Trials”, NSF Networking Technology and Systems (NeTS), 2008-2010 (co-PI, with B. Aazhang).

“Understanding and Optimizing Wireless Mobile Computing for Underserved Urban Communities,” NSF Information and Intelligent Systems (IIS), 2008-2011 (co-PI, with L. Zhong and P. Kortum, Rice University, J. Crowder, University of Houston, and W. Reed, Technology For All).

“Wireless Network Protocol Design and Evaluation,” Texas Instruments Leadership University Program, 2008-2010.

“Programmable and At-Scale Infrastructure for Wireless Access, Mobile Computing, and Health Sensing,” NSF Computing Research Infrastructure (CRI), 2008-2012 (PI, with C. Dacso, Methodist Hospital Research Institute, J. Forrest and W. Reed, Technology For All, and L. Zhong, Rice University).