

## Edward W. Knightly

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- Research Interests** Design and in-the-field demonstration of new mobile and wireless networks and systems, including mission-driven autonomous drone networks, wireless security, and networked spectrum access in UHF, 60 GHz, THz, and visible light.
- Education** Ph.D., University of California at Berkeley, EECS, 1996.  
M.S., University of California at Berkeley, EECS, 1992.  
B.E.E., Auburn University, Electrical Engineering, 1991.
- Positions** Rice University, Houston, TX, 2017 – present. *Sheafor-Lindsay Professor of Electrical and Computer Engineering and Computer Science.*  
Rice University, Houston, TX, 2014 – 2019. *Department Chair, Electrical and Computer Engineering.*  
Rice University, Houston, TX, 2006 – 2016. *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** Dynamic Spectrum Alliance Award for Research on New Opportunities for Dynamic Spectrum Access, 2018.  
ACM Fellow, 2017.  
Best Paper Award, IEEE CNS 2017.  
Runner Up, Best Paper Award, ACM WiNTECH 2017.  
Best Paper Award, ACM MobiHoc 2015.  
Best Paper Award, IEEE SECON 2015.  
Best Paper Award, IEEE Workshop on Cognitive Radio Architectures for Broadband, 2014.  
Best Paper Award, IEEE SECON 2014.  
IEEE Fellow, 2009.  
Best Paper Award, ACM MobiCom 2008.  
Finalist, Best Paper Award, IEEE ICCCN 2008.

ACM Recognition of Service Award, 2007.

Sloan Fellow, 2001.

NSF CAREER Award, 1997.

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, ΠΜΕ, ΦΚΦ (electrical engineering, engineering, physics, mathematics, and interdisciplinary) honor societies.

Outstanding Undergraduate in Physics, Auburn University, 1989.

NSF Research Experience for Undergraduates, Columbia University, 1989.

Amoco, Citizen's, H.K. Porter, and A.H. Skinner scholarships, 1987-1991.

**Conference  
Publications  
2010 - present**

P. Nayak, S. Pandey, and E. Knightly, "Virtual Speed Test: an AP Tool for Passive Analysis of Wireless LANs," in *Proceedings of IEEE INFOCOM 2019*, Paris, France, April 2019.

Y. Ghasempour, M.K. Haider, C. Cordeiro, D. Koutsonikolas, and E. Knightly, "Multi-Stream Beam-Training for mmWave MIMO Networks," in *Proceedings of ACM MobiCom 2018*, New Delhi, India, October 2018.

M.K. Haider, Y. Ghasempour, D. Koutsonikolas, and E. Knightly, "LiSteer: mmWave Beam Acquisition and Steering by Tracking Indicator LEDs on Wireless APs," in *Proceedings of ACM MobiCom 2018*, New Delhi, India, October 2018.

M.K. Haider, Y. Ghasempour, and E. Knightly, "SearchLight: Tracking Device Mobility using Indoor Luminaries to Adapt 60 GHz Beams," in *Proceedings of ACM MobiHoc 2018*, Los Angeles, CA, June 2018.

R. Petrolo, Y. Lin, and E. Knightly, "ASTRO: Autonomous, Sensing, and Tetherless networked drOnes," in *Proceedings of ACM DroNet 2018*, Munich, Germany, June 2018.

C.-Y. Yeh and E. Knightly, "Feasibility of Passive Eavesdropping in Massive MIMO: An Experimental Approach," in *Proceedings of IEEE CNS 2018*, Beijing, China, May 2018.

M.K. Haider and E. Knightly, "iTrack: Tracking Indicator LEDs on APs to Bootstrap mmWave Beam Acquisition and Steering," in *Proceedings of ACM HotMobile*, Tempe, AZ, February 2018.

X. Zhang and E. Knightly, "Massive MIMO Pilot Distortion Attack and Zero-Startup-Cost Detection: Analysis and Experiments," in *Proceedings of IEEE CNS 2017*, Las Vegas, NV, October 2017. **Best Paper Award.**

S. Saha, Y. Ghasempour, M.K. Haider, T. Siddiqui, P. De Melo, N. Somanchi, L. Zakrajsek, A. Singh, O. Torres, D. Uvaydov, J. Jornet, E. Knightly, D. Koutsonikolas, D. Pados, and Z. Sun, "X60: A Programmable Testbed for Wideband 60 GHz WLANs with Phased Arrays," in *Proceedings of WiNTECH 2017*, Snowbird, Utah, October 2017. **Runner Up, Best Paper Award.**

Y. Ghasempour and E. Knightly, "Decoupling Beam Steering and User Selection for Scaling Multi-User 60 GHz WLANs," in *Proceedings of ACM MobiHoc 2017*, Chennai, India, July 2017.

- X. Zhang and E. Knightly, "CSIsnoop: Attacker Inference of Channel State Information in Multi-User WLANs," in *Proceedings of ACM MobiHoc 2017*, Chennai, India, July 2017.
- S. Naribole, S. Chen, E. Heng, and E. Knightly, "LiRa: a WLAN Architecture for Visible Light Communication with a Wi-Fi Uplink," in *Proceedings of IEEE SECON 2017*, San Diego, CA, June 2017.
- P. Nayak, M. Garetto, and E. Knightly, "Multi-User Downlink with Single-User Uplink can Starve TCP," in *Proceedings of IEEE INFOCOM 2017*, Atlanta, GA, May 2017.
- J. Chen, D. Steinmetzer, J. Classen, E. Knightly, and M. Hollick, "Pseudo Lateralization: Millimeter-Wave Localization Using a Single RF Chain," in *Proceedings of IEEE WCNC 2017*, San Francisco, CA, March 2017.
- A. Flores and E. Knightly, "Spoofing Uplink Spatial Multiplexing with Diverse Spectrum," in *Proceedings of IEEE DySPAN 2017*, Baltimore, MD, March 2017.
- R. Guerra, N. Anand, C. Shepard, and E. Knightly, "Opportunistic Channel Estimation for Implicit 802.11af MU-MIMO," in *Proceedings of the 28th International Teletraffic Congress (ITC-28)*, Würzburg, Germany, September 2016.
- M. K. Haider and E. Knightly, "Mobility Resilience and Overhead Constrained Adaptation in Directional 60 GHz WLANs: Protocol Design and System Implementation," in *Proceedings of ACM MobiHoc 2016*, Paderborn, Germany, July 2016.
- S. Naribole and E. Knightly, "Scalable Multicast in Highly-Directional 60 GHz WLANs," in *Proceedings of IEEE SECON 2016*, London, UK, June 2016.
- O. Bejarano, R. Hoefel, and E. Knightly, "Resilient Multi-User Beamforming WLANs: Mobility, Interference, and Imperfect CSI," in *Proceedings of IEEE INFOCOM 2016*, San Francisco, CA, April 2016.
- A. Flores, S. Quadri, and E. Knightly, "A Scalable Multi-User Uplink for Wi-Fi," in *Proceedings of NSDI 2016*, Santa Clara, CA, March 2016.
- D. Steinmetzer, J. Chen, J. Classen, E. Knightly, and M. Hollick, "Eavesdropping with Periscopes: Experimental Security Analysis of Highly Directional Millimeter Waves," in *Proceedings of IEEE Conference on Communications and Network Security*, Florence, Italy, September 2015.
- J. Classen, J. Chen, D. Steinmetzer, M. Hollick, and E. Knightly, "The Spy Next Door: Eavesdropping on High Throughput Visible Light Communications," in *Proceedings of ACM Workshop on Visible Light Communication Systems*, Paris, France, September 2015.
- O. Bejarano, S. Quadri, O. Gurewitz, and E. Knightly, "Scaling Multi-User MIMO WLANs: the Case for Concurrent Uplink Control Messages," in *Proceedings of IEEE SECON 2015*, Seattle, WA, June 2015. **Best Paper Award.**
- B. Nardelli and E. Knightly, "Robust CSMA: Adapting to Channel and Traffic Asymmetry," in *Proceedings of IEEE SECON 2015*, Seattle, WA, June 2015.
- X. Zhang and E. Knightly, "WATCH: WiFi in Active TV Channels," in *Proceedings of ACM MobiHoc 2015*, Hangzhou, China, June 2015. **Best Paper Award.**
- N. Anand, J.K. Lee, S.J. Lee, and E. Knightly, "Mode and User Selection for Multi-User MIMO WLANs without CSI," in *Proceedings of IEEE INFOCOM 2015*, Hong Kong, China, April 2015.

- T. Nitsche, A. Flores, E. Knightly, and J. Widmer, "Steering with Eyes Closed: mm-Wave Beam Steering without In-Band Measurement," in *Proceedings of IEEE INFOCOM 2015*, Hong Kong, China, April 2015.
- A. Flores and E. Knightly, "Virtual Duplex: Scaling Dense WLANs and Eliminating Contention Asymmetry," in *Proceedings of IEEE Workshop on Cognitive Radio Architectures for Broadband*, Raleigh, NC, October 2014. **Best Paper Award.**
- J. Chen, S. Quadri, L. Pollonini, S. Naribole, J. Ding, Z. Zheng, E. Knightly, and C. Dacso, "Blue Scale: Early Detection of Impending Congestive Heart Failure Events via Wireless Daily Self-Monitoring," in *Proceedings of IEEE EMBS Special Topic Conference on Healthcare Innovation and Point-of-Care Technologies*, Seattle, WA, October 2014.
- N. Anand, R. Guerra, and E. Knightly, "The Case for UHF-Band MU-MIMO," in *Proceedings of ACM MobiCom 2014*, Maui, HI, September 2014.
- O. Bejarano, E. Magistretti, O. Gurewitz, and E. Knightly, "MUTE: Sounding Inhibition in MU-MIMO WLANs," in *Proceedings of IEEE SECON 2014*, Singapore, June 2014. **Best Paper Award.**
- O. Bejarano and E. Knightly, "Virtual MISO Triggers in WiFi-like Networks," in *Proceedings of IEEE INFOCOM 2013*, Turin, Italy, April 2013.
- A. Giannoulis, P. Patras, and E. Knightly, "Mobile Access of Wide-Spectrum Networks: Design, Deployment and Experimental Evaluation," in *Proceedings of IEEE INFOCOM 2013*, Turin, Italy, April 2013.
- E. Magistretti, O. Gurewitz, E. Knightly, "802.11ec: Collision Avoidance without Control Messages," in *Proceedings of ACM MobiCom 2012*, Istanbul, Turkey, August 2012.
- N. Anand, S. J. Lee, and E. Knightly, "STROBE: Actively Securing Wireless Communications using Zero-Forcing Beamforming," in *Proceedings of IEEE INFOCOM 2012*, Orlando, FL, March 2012.
- E. Aryafar, M. Khojastepour, K. Sundaresan, S. Rangarajan, and E. Knightly, "ADAM: An Adaptive Beamforming System for Multicasting in Wireless LANs," in *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," in *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 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.

**Conference  
Publications  
2000 - 2009**

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.**

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.
- V. Gambiroza and E. Knightly, "Congestion Control in CSMA-Based Networks with Inconsistent Channel State," invited paper in *Proceedings of ACM International Wireless Internet Conference (WICON) 2006*, Boston, MA, August 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.

- V. Kanodia, A. Sabharwal, and E. Knightly, "MOAR: A Multi-channel Opportunistic Auto-rate Media Access Protocol for Ad Hoc Networks," invited paper in *Proceedings of Broadnets 2004*, San Jose, CA, 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.
- S. Sargento, R. Valadas, and E. Knightly, "Resource Stealing in Endpoint Controlled Multi-class Networks," invited paper in *Proceedings of the 13th Tyrrhenian International Workshop on Digital Communications (Evolutionary Trends of the Internet)*, Taormina, Italy, 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.

**Conference  
Publications  
prior to 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 and J. Qiu, "Measurement-Based Admission Control with Aggregate Traffic Envelopes," invited paper in *Proceedings of the 10th Tyrrhenian International Workshop on Digital Communications (Multimedia Communications)*, Ischia, Italy, September 1998.

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.

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.

#### **Demos and Posters**

R. Guerra, N. Anand, and E. Knightly, "An Open-Source Development Platform for Long-Range UHF-Connected WiFi Hotspots," *ACM MobiCom 2014 Demonstration*, Maui, HI, September 2014.

Y. Qiu, H. Haas, and E. Knightly, "A Software-defined Visible Light Communications System with WARP," *ACM Workshop on Visible Light Communication Systems*, Maui, HI, September 2014.

L. Pollonini, S. Quadri, J. Chen, J. Ding, Z. Zheng, S. Naribole, K. McArthur, E. Knightly, and C. Dacso, "Blue Scale: a Multi-Sensing Device for Remote Management of Congestive Heart Failure," in *IEEE Engineering in Medicine and Biology Society (EMBC 2014), Late-Breaking Research Poster Presentation*, Chicago, IL, August 2014.

R. Guerra, N. Anand, and E. Knightly, "A Platform for At-Scale Wideband UHF MU-MIMO Systems," *NSDI 2014 Demonstration*, Seattle, WA, April 2014.

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.

#### **Journal Articles 2010 - present**

P. Nayak, M. Garetto, and E. Knightly, "Modeling Multi-User WLANs under Closed Loop Traffic," *IEEE/ACM Transactions on Networking*, 27(2):763 - 776, April 2019.

X. Zhang and E. Knightly, "CSIsnoop: Inferring Channel State Information in Multi-User MIMO WLANs," *IEEE/ACM Transactions on Networking*, 27(1):231 - 244, February 2019.

- S.K. Saha, Y. Ghasempour, M.K. Haider, T. Siddiqui, P. De Melo, N. Somanchi, L. Zakrajsek, A. Singh, R. Shyamsunder, O. Torres, D. Uvaydov, J.M. Jornet, E. Knightly, D. Koutsonikolas, D. Pados, Z. Sun, and N. Thawdar, "X60: A Programmable Testbed for Wideband 60 GHz WLANs with Phased Arrays," *Computer Communications*, volume 133:77-88, January 2019.
- J. Ma, R. Shrestha, J. Adelberg, C.-Y. Yeh, Z. Hossain, E. Knightly, J. Miquel Jornet, and D. Middleman, "Security and Eavesdropping in Terahertz Wireless Links," *Nature*, 563(7729):89-93 (2018).
- Y. Ghasempour, M.K. Haider, and E. Knightly, "Decoupling Beam Steering and User Selection for MU-MIMO 60 GHz WLANs," *IEEE/ACM Transactions on Networking*, 26(5):2390 - 2403, October 2018.
- X. Zhang and E. Knightly, "Pilot Distortion Attack and Zero-Startup-Cost Detection in Massive MIMO Network: from Analysis to Experiments," *IEEE Transactions on Information Forensics and Security*, 13(12):3094-3107, December 2018.
- Y. Ghasempour, C. da Silva, C. Cordeiro, and E. Knightly, "IEEE 802.11ay: Next-generation 60 GHz Communication for 100 Gbps Wi-Fi," *IEEE Communications Magazine*, 55(12):186-192, December 2017.
- S. Naribole and E. Knightly, "Scalable Multicast in Highly-Directional 60 GHz WLANs," *IEEE/ACM Transactions on Networking*, 25(5):2844-2857, October 2017.
- A. Flores and E. Knightly, "Spoofing Uplink Spatial Multiplexing with Diverse Spectrum," *IEEE Transactions on Cognitive Communications and Networking*, 3(3):464-477, September 2017.
- X. Zhang and E. Knightly, "WATCH: WiFi in Active TV Channels," *IEEE Transactions on Cognitive Communications and Networking*, 2(4):330-342, December 2016.
- J. Lee, H. Lee, Y. Yi, S. Chong, E. Knightly, and M. Chiang, "Making 802.11 DCF Near-Optimal: Design, Implementation, and Evaluation," *IEEE/ACM Transactions on Networking*, 24(3):1745-1758, June 2016.
- E. Magistretti, O. Gurewitz, E. Knightly, "802.11ec: Collision Avoidance without Control Messages," *IEEE/ACM Transactions on Networking*, 22(6):1845-1858, December 2014.
- T. Nitsche, C. Cordeiro, A. Flores, E. Knightly, E. Perahia and J. Widmer, "IEEE 802.11ad: Directional 60 GHz Communication for Multi-Gbps Wi-Fi," *IEEE Communications Magazine*, 52(12):132-141, December 2014.
- E. Aryafar, T. Salonidis, J. Shi, and E. Knightly, "Synchronized CSMA Contention: Model, Implementation, and Evaluation," *IEEE/ACM Transactions on Networking*, 21(5):1349-1362, October 2013.
- E. Aryafar, M. Khojastepour, K. Sundaresan, S. Rangarajan, and E. Knightly, "ADAM: An Adaptive Beamforming System for Multicasting in Wireless LANs," *IEEE/ACM Transactions on Networking*, 21(5):1595-1608, October 2013.
- O. Bejarano, M. Park, and E. Knightly, "IEEE 802.11ac: From Channelization to Multi-User MIMO," *IEEE Communications Magazine*, 51(10):84-90, October 2013.
- A. Flores, R. Guerra, E. Knightly, P. Ecclesine and S. Pandey, "IEEE 802.11af: A Standard for TV White Space Spectrum Sharing," *IEEE Communications Magazine*, 51(10):92-100, October 2013.

A. Leonardia, S. Palazzo, C. Rametta, and E. Knightly, "A New Adaptive Receiver-Initiated Scheme for Mitigating Starvation in Wireless Networks," *Ad Hoc Networks*, 11(2):625-638, March 2013.

E. Magistretti, O. Gurewitz, and E. Knightly, "Measurement-Driven Modeling of Transmission Coordination for 802.11 Online Throughput Prediction," *IEEE/ACM Transactions on Networking*, 20(5):1452-1465, October 2012.

J. Camp, E. Aryafar, and E. Knightly, "Coupled 802.11 Flows in Urban Channels: Model and Experimental Evaluation," *IEEE/ACM Transactions on Networking*, 20(5):1635-1648, October 2012.

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.

**Journal  
Articles  
2000 - 2009**

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 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.

## Plenary Keynotes

"Emerging WLAN Devices, Capabilities, Applications, and Control Plane Challenges," *ACM MobiHoc 2019*, Catania, Italy, July 2019.

"Off-Grid Sensing Missions with Networked UAVs," *IEEE SECON 2019*, Boston, MA, June 2019.

"Networked UAVs on a Mission," *IEEE Vehicular Networking Conference (VNC 2018)*, Taipei, Taiwan, December 2018.

"Scaling and Securing Spectrum Access up to THz," *IEEE DySPAN 2018*, Seoul, Korea, October 2018.

"Scaling Wireless for Next Generation Transformative Applications," *IEEE INFOCOM 2017*, Atlanta, GA, May 2017.

"Emerging Wireless Experimental Platforms and Capabilities," *Computer and Networking Experimental Research Using Testbeds (CNERT 2017)* Atlanta, GA, May 2017.

"Scaling Wi-Fi for Next Generation Applications," *IEEE/IFIP Wireless Days 2017*, Porto, Portugal, March 2017.

"Remember the Uplink: Hidden Costs and Solutions for Lagging Uplink WLAN Capabilities," *25th IEEE International Conference on Computer Communications and Networks (IEEE ICCCN 2016)*, Waikoloa, Hawaii, August 2016.

"Diverse Spectrum and the Next Wireless Internet," *XXIII CONEISC*, Arequipa, Peru, August 2015.

"WiFi in sub-GHz Bands: Research Advances and Global Trials," *IEEE LatinCom*, Cartagena, Colombia, November 2014.

"New Spectrum and Services for the Next Wireless Internet," *IEEE/ACM International Symposium on Quality of Service (IWQoS 2014)*, Hong Kong, China, May 2014.

"Spectrum Access for the Next Wireless Internet," *Global Future Internet Summit*, Seoul, Korea, November 2013.

“Spectrum Access from TV Bands to Millimeter Wave and Visible Light,” *ACM WiNTECH 2013*, Miami, FL, September 2013.

“Multi-User MIMO in Dense, Urban Wireless Networks,” *IEEE/IFIP WONS*, Banff, Canada, March 2013.

“Urban-Scale Wireless Networks in Unlicensed sub-GHz Bands,” *ACM MobiHoc*, Hilton Head, SC, June 2012.

“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 (translated),” 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.

## Panels

Experimentation Meets Platforms, *IEEE INFOCOM 2019*, Paris, FR, May 2019.

V2X Communication Requirements for Autonomous Vehicles, *IEEE Vehicular Networking Conference (VNC 2018)*, Taipei, Taiwan, December 2018.

What is the (Right) Road Ahead for mm-Wave Networked Systems Research? *mmSys: Millimeter-Wave Networked Systems*, Honolulu, HI, April 2018.

New Challenges for New Spectrum, *Visions for Future Communications Summit*, Lisbon, Portugal, October 2017.

Communications and the Internet of Things in Smart Cities, *MIT LIDS Smart Urban Infrastructure Workshop*, Cambridge, MA, May 2017.

Challenges and Future Directions of Wireless Spectrum Research, *IEEE INFOCOM 2016*, San Francisco, CA, April 2016.

Connectivity to IoT Devices, *ACM Mobile Cloud Computing and Services 2015*, Paris, France, September 2015.

Unbundling Mexico's Telecommunications Sector: Reform, Investment and Digital Democracy, Baker Institute, Houston, TX, November 2014.

Trends in Spectrum Regulation, *IEEE LatinCom*, Cartagena, Colombia, November 2014.

Distinguished Panel, *5th Annual Wireless of the Students, by the Students, for the Students Workshop (S3 2013)*, Miami, FL, September 2013.

Wireless Dense Networks: Simple Rescaling or Change of Paradigm? *IEEE WoWMoM 2013*, Madrid, Spain, June 2013.

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

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

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

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

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

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

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

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

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

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

**Invited  
Presentations**

EMPOWER/PAWR Workshop, Paris, France, April 2019.

"RENEW: Reconfigurable Eco-system for Next-generation End-to-end Wireless," *IEEE INFOCOM 2018*, Honolulu, HI, April 2018.

"Urban Sensing and Wireless Backhaul," *Net Futures 2017*, Brussels, Belgium, June 2017.

“New Spectrum for New WLAN Services and Architectures,” *Globecom Industry Program: Next Generation WLAN and WPAN Technologies*, San Diego, CA, December 2015.

“Re-thinking Spectrum Sharing,” *ACM HotWireless 2015*, Paris, France, September 2015.

“Diverse Spectrum Access from MHz to THz,” NSF CREST Center for Research on Complex Networks at Texas Southern University, Houston, TX, May 2015.

“Diverse Spectrum MU-MIMO WLANs,” Distinguished Lecture, *IEEE International Conference on Computing, Networking and Communications (ICNC 2015)*, Anaheim, CA, February 2015.

“New Spectrum and Spectrum Sharing Opportunities,” 6th Annual IMDEA Networks Institute International Workshop, Madrid, Spain, June 2014.

“Diverse Spectrum Access for the Next Wireless Internet,” Parque Tecnológico Itaipu, Itaipu, Brazil, April 2014.

“Spectrum Access, Interference Management, and High Spectral Efficiency in UHF Bands,” Ministerio de Transportes y Comunicaciones, Lima, Peru, October 2013.

“Tecnología Super WiFi Utilizando La Banda UHF (translated),” Consejo Nacional del Colegio de Ingenieros del Peru, Lima, Peru, October 2013.

“Robust Control and Management of Wireless Networks,” 5th Annual IMDEA Networks Institute International Workshop, Madrid, Spain, June 2013.

“If We Build It, Will They Come?” *4G World*, Chicago, IL, October 2012.

“Grand Challenges in Wireless Networking,” NITRD Workshop on Complex Engineered Networks, Washington, DC, September 2012.

“Multi-User and Diverse Spectrum Access in Next Generation WiFi: Early Experimental Lessons,” Cisco, San Jose, CA, February 2012.

“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.

## Recent Seminars

“Networked UAVs on a Mission,” National Chiao Tung University, Hsinchu, Taiwan, December 2018.

“Scaling Wi-Fi to High Rate and High Client Density,” Politecnico di Milano, Milan, Italy, June 2018.

“ASTRO: a System for Networked Drone Sensing Missions without Ground Control,” Politecnico di Torino, Turin, Italy, June 2018.

“Scaling Wi-Fi to High Rate and High Client Density,” RPI Mercer Lecture, Troy, NY, September 2017.

“Multi-User Uplink and Downlink: the Next Wave in WLANs,” Texas A&M University Leaders and Innovators Seminar, College Station, TX, January 2017.

“Diverse Spectrum Wi-Fi: Research Advances and Global Trials,” Northeastern University Distinguished Lecture, Boston, MA, January 2016.

“Diverse Spectrum WLANs: Efficiency, Scaling, and Sharing,” NYU Weber Lecture, Brooklyn, NY, May 2015.

“Diverse Spectrum Multi-User MIMO: from WLANs to Urban Access,” distinguished lecture, Technical University Darmstadt, June 2014.

“Spectrum Access for the Next Wireless Internet,” KAIST, Daejun, Korea, November 2013.

“Spectrum Access for the Next Wireless Internet,” Seoul National University, Seoul, Korea, November 2013.

“Urban-Scale Wireless Networks in Unlicensed sub-GHz Bands,” distinguished lecture, NSF Center for Complex Networks, Texas Southern University, December 2012.

**Standards Presentations** A. Flores and E. Knightly, “Dual Wi-Fi: Dual Channel Wi-Fi for Congested WLANs with Asymmetric Traffic Loads,” IEEE 802.11 High Efficiency WLAN (HEW) Study Group, Dallas, TX, November 2013.

C. Shepard, L. Zhong, N. Anand, H. Yu, O. Bejarano, E. Knightly, and L. E. Li, “Practical Massive MIMO,” IEEE 802.11 High Efficiency WLAN (HEW) Study Group, Dallas, TX, November 2013.

T. Salonidis, J. Shi, E. Knightly, and J. Camp, “Modeling Imperfect Clock Synchronization in CSMA Wireless Networks,” IEEE 802.11n Standard Meeting, March 2006.

V. Gamberoza, B. Sadeghi, and E. Knightly “End-to-End Performance and Fairness in Multihop Wireless Backhaul Networks,” IEEE 802.11s Standard Meeting, March 2005.

V. Gamberoza, P. Yuan and E. Knightly, “Unbalanced Traffic and the RPR Fairness Algorithm,” IEEE 802.17 Resilient Packet Ring Standard Meeting, Atlanta, GA January 2003.

P. Yuan and E. Knightly, “The Rice Packet Ring Simulator,” IEEE 802.17 Resilient Packet Ring Standard Meeting, New Orleans, LA September 2002.

E. Knightly, “The RIAS Fairness Reference Model for RPR,” IEEE 802.17 Resilient Packet Ring Standard Meeting, Ottawa, Canada, May 2002.

E. Knightly, “Achieving High Performance with Darwin’s Fairness Algorithm,” IEEE 802.17 Resilient Packet Ring Standard Meeting, St. Louis, MO, March 2002.

**Patents** “Method and System for Reducing Sounding Overhead in Wireless Communication,” U.S. Patent 10,050,693 (filed June 2016).

“Dual Channel Wi-Fi for Congested WLANs with Assymmetric Traffic Loads,” U.S. Patent 9,820,336 (filed October 2014).

“Method and System for Wirelessly Transmitting Data,” U.S. Patent 8,958,362 (filed August 2012).

“System and Method for Randomized Antenna Allocation in Asynchronous MIMO Multihop Networks,” U.S. Patent 9,768,992 (filed June 2008).

“Enforceable and Efficient Service Provisioning,” U.S. Patent 6,707,790 (filed June 2000).

“Method and Apparatus for Performing Measurement-Based Admission Control Using Peak Rate Envelopes,” U.S. Patent 6,801,501 (filed September 1999).

**Professional Activities**

*Organizing Committee Chairs*

- Founder and co-chair, ACM Workshop on Visible Light Communication Systems 2014
- General chair, IEEE SECON 2013
- Co-chair, 2012 IEEE Healthcare Innovation Conference
- Chair, SIGMOBILE Awards Committee, 2012-present

- 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*

- Editor-at-Large, *IEEE/ACM Transactions on Networking*, 2013-present
- 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 - 2013
- 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 Advisory Board, INESC TEC (Porto), 2019 - present.
- Advisory Board, NSF CREST Center at TSU, 2013 - 2017
- Scientific Council, IMDEA Networks (Madrid), 2010 - present
- Advisory Board, Rice University Center for Civic Engagement, 2006 - 2010
- Advisory Board, Technology For All, 2004 - present

#### *Technical Program Committee Member*

- IEEE INFOCOM ATPC chair 2018
- ACM MobiCom 2002 - 2014

- ACM MobiSys 2011
- ACM SIGMETRICS 2000, 2002, 2007
- IEEE INFOCOM 1998 - 2014
- IEEE International Conference on Network Protocols (ICNP) 2001 - 2003
- IEEE International Workshop on Quality of Service (IWQoS) 1999 - 2003
- IEEE SECON 2014 - 2015

**Active  
Grants**

“Next Generation 60 GHz WLANs,” Intel Corp., 2019-2020.

“WLAN Assessment and Virtual Speed Test,” Cisco, 2019-2020.

“DoS Resilience, Secrecy, and Throughput in Massive MIMO” NSF SpecEES, 2018-2021 (PI, with O. Gurewitz).

“ASTRO: A Platform for 3-D Data-Driven Mobile Sensing via Networked Drones,” NSF NeTS, 2018-2023 (PI, with Y. Lin, W. Reed (TFA), C. Dacso (Baylor College of Medicine), and R. Griffin).

“Scaling WLANs in Spectrum, User Density, and Robustness,” NSF NeTS, 2018-2021 (Rice PI, Collaborative Research with Dimitrios Koutsonikolas and Josep Miquel Jornet).

“RENEW: An Open-source, End-to-end Programmable Multi-site Urban Wireless Testbed,” NSF PAWR, 2018-2023 (co-PI, with A. Sabharwal).

“Terabit-per-second Scale Networking: Lab to Tower, Design and Field Trials,” NSF Enhancing Access to Radio Spectrum (EARS), 2016-2019 (PI, with A. Babakhani).

**Ph.D.  
Students**

Ryan Guerra, 2019

Muhammad Kumail Haider, 2018

Sharan Naribole, 2018

Xu Zhang, 2017

Adriana Flores, 2016

Oscar Bejarano, 2015

Naren Anand, 2015

Bruno Nardelli, 2013

Anastasios Giannoulis, 2012

Eugenio Magistretti, 2012

Stanislav Miskovic, 2012

Ehsan Aryafar, 2011

Joseph Camp, 2009

Joshua Robinson, 2009

Jingpu Shi, 2007

Violeta Gambiroza, 2006

Supranamaya Ranjan, 2005

Aleksandar Kuzmanovic, 2004

Vikram Kanodia, 2003

Bahar Sadeghi, 2003

Yonghe Liu, 2003

Coskun Cetinkaya, 2002

**Postdocs**

Riccardo Petrolo, 2017-2018

Vincenzo Mancuso, 2006-2007

Omer Gurewitz, 2005-2007

Theodoros Salonidis, 2004-2006

Michele Garetto, 2004-2005

Roger Karrer, 2002-2004

Ashu Sabharwal, 2002-2004

Mingbo Xiao, 2002-2003

Huirong Fu, 2000-2002

Chengzhi Li, 1999-2001