

## BIPLAB SIKDAR

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### EMPLOYMENT

**Assistant Professor**, Rensselaer Polytechnic Institute, Troy, NY, USA 08/2001 - Present.  
**Tan Chin Tuan Fellow**, Nanyang Technological University, Singapore 07/2005 - 09/2005.

### EDUCATION

**Ph.D**, Rensselaer Polytechnic Institute, Troy, NY, USA August 2001.  
**M. Tech**, Indian Institute of Technology, Kanpur, India May 1998.  
**B. Tech**, North Eastern Hill University, Shillong, India May 1996.

### EXPERIENCE

**Assistant Professor**, Rensselaer Polytechnic Institute, Troy, NY, USA 8/2001 - Present  
**Tan Chin Tuan Fellow**, Nanyang Technological University, Singapore 7/2005 - 9/2005  
**Étudiant Visitant (Visiting Student)**, INRIA, Rocquencourt, France 5/2000 - 8/2000  
**Research Associate**, Indian Institute of Technology, Kanpur, India 12/1997 - 6/1998  
**Summer Intern**, Department of Telecommunications, Calcutta, India 5/1995 - 7/1995

### PROFESSIONAL ACTIVITIES

**Panelist:** National Science Foundation.

**TPC member:** IEEE INFOCOM (2003, 2004), IEEE GLOBECOM (2002, 2005), IEEE ICC (2005), IEEE MASS (2005), ICMU (2004, 2005, 2006), IEEE WCNC (2005, 2006).

**Journal Reviews:** IEEE/ACM Transactions on Networking, IEEE Transactions on Signal Processing, IEEE Transactions on Multimedia, IEEE Transactions on Automatic Control, IEEE Transactions on Wireless Communications, IEEE Transactions on Communications, IEEE Transactions on Mobile Computing, IEEE Transactions on Computers, IEEE Journal on Selected Areas in Communications, IEEE Communication Letters, ACM Transactions on Sensor Networks, ACM Wireless Networks, Computer Networks, Performance Evaluation, IEEE Communications Magazine, IEEE Communication Letters, IEE Transaction on Communications, Wireless Personal Communications, Computer Communications Review

**Conference Reviews:** IEEE INFOCOM, IEEE ICC, IEEE GLOBECOM, IEEE/IFIP MMNS, SPECTS, IEEE TRIDENTCOM, IEEE VTC, IEEE HPSR, IEEE WCNC, International Conference on Networking

### HONORS AND AWARDS

RPI School of Engineering Teaching Award, RPI, Troy, NY, 2006.

Tan Chin Tuan Fellowship, Singapore, 2005.

National Science Foundation (NSF) CAREER Award, 2004.

Charles M. Close Doctoral Prize, RPI, Troy, NY

ECSE Departmental Service Award, RPI, Troy, NY

Founder's Award of Excellence, RPI, Troy, NY

Master Teaching Assistant, RPI, Troy, NY

Verifone Fellowship, IIT, Kanpur, India  
Eta Kappa Nu  
Tau Beta Pi

## PATENTS

**Network management and control using on-line collaborative simulations**, US Provisional Patent No. 66/170896 (with S. Kalyanaraman et al.).

## PUBLICATIONS

### Book Chapters

1. S.Kalyanaraman and B.Sikdar, "Protocol Design Concepts, TCP/IP, and the Network Layer," IP over WDM: Building the Next-Generation Optical Internet, Sudhir Dixit (Editor), Wiley, April 2003.

### Journals (under review)

1. J. Peng, B. Sikdar and L. Cheng, "Multicasting With Localized Control In Wireless Ad-Hoc Networks," submitted to *IEEE Transactions on Mobile Computing*, 2005.
2. F. Ye and B. Sikdar, "Improving Spatial Reuse of Wireless Ad-Hoc Networks Using Distance-Aware Virtual Carrier Sensing," submitted to *Wireless Networks*, 2005.
3. K. Ramachandran and B. Sikdar, "Dynamics of Malware Spread in Decentralized Peer to Peer Networks," submitted to *IEEE Journal on Selected Areas in Communications*, 2005.
4. O. Tickoo and B. Sikdar, "Modeling Queueing and Channel Access Delay in Unsaturated IEEE 802.11 Random Access MAC based Wireless Networks," submitted to *IEEE/ACM Transactions on Networking*, 2006.
5. B. Stephenson and B. Sikdar, "A Quasi-species Model for the Propagation and Containment of Polymorphic Worms," submitted to *IEEE Transactions on Dependable and Secure Computing*, 2006.
6. F. Ye, S. Yi and B. Sikdar, "Scaling of Spatial Reuse and Saturation Throughput in a Class of MAC Protocols," submitted to *IEEE Transactions on Wireless Communications*, 2006.
7. J. Peng, L. Cheng and B. Sikdar, "A Pulse Based Wireless MAC Protocol With Collision Detection," submitted to *IEEE Transactions on Mobile Computing*, 2006.

### Journals (accepted or published)

1. B. Sikdar, "An Analytic Model for the Delay in IEEE 802.11 PCF MAC based Wireless Networks," accepted for publication, *IEEE Transactions on Wireless Communications*.
2. K. Chandrayana, S. Ramakrishnan, B. Sikdar and S. Kalyanaraman, "On Randomizing the Sending Times in TCP and Other Window Based Algorithms," *Computer Networks*, vol. 50, no. 3, pp. 422-447, February 2006.
3. K. Ramachandran and B. Sikdar, "A Population Based Approach to Model Network Lifetime in Wireless Sensor Networks," *ACM Performance Evaluation Review*, vol. 33, no. 2, September 2005.
4. J. Peng and B. Sikdar, "An Efficient and Scalable Loss Recovery Scheme for Video Multicast," *IEEE Transactions on Multimedia*, vol. 7, no. 2, pp. 356-365, April 2005.
5. J. Peng and B. Sikdar, "Multi-layer Multicast Congestion Control in Satellite Environments," *IEEE Journal on Selected Areas in Communications*, vol. 22, no. 3, pp. 449-461, April 2004.

6. B. Sikdar, S. Kalyanaraman and K. S. Vastola, "Analytic Models for the Latency and Steady-State Throughput of TCP Tahoe, Reno and SACK," *IEEE/ACM Transactions on Networking*, vol. 11, no. 6, pp. 959-971, December 2003.
7. O. Tickoo and B. Sikdar, "On the impact of IEEE 802.11 MAC on traffic characteristics," *IEEE Journal on Selected Areas in Communications*, vol. 21, no. 2, pp. 189-203, February 2003.
8. D. Manjunath and B. Sikdar, "Variable length packet switches: Delay analysis of crossbar switches under Poisson and self-similar traffic," *Computer Communications*, vol. 26, no. 6, pp. 590-610, April, 2002.
9. B. Sikdar, S. Kalyanaraman and K. S. Vastola, "An integrated model for the latency and steady state throughput of TCP connections," *Performance Evaluation*, vol. 46, no. 2-3, pp. 139-154, September 2001.
10. D. Manjunath and B. Sikdar, "Integral expressions for the numerical evaluation of product form expressions over irregular multidimensional integer state spaces (extended version)," *Telecommunication Systems*, vol. 16, no. 1,2, pp. 195-215, January 2001.
11. B. Sikdar and D. Manjunath, "Queueing analysis of scheduling policies in copy networks of space based multicast packet switches," *IEEE/ACM Transactions on Networking*, vol. 8, no. 3, pp. 396-406, July 2000.

## Conferences

1. H. Yang, F. Ye and B. Sikdar, "Distributed Mobility Transparent Broadcast in Mobile Ad Hoc Networks," to appear in *Proceedings of IEEE GLOBECOM*, San Francisco, CA, November 2006.
2. J. Peng, L. Cheng and B. Sikdar, "A New MAC Protocol for Wireless Packet Networks," to appear in *Proceedings of IEEE GLOBECOM*, San Francisco, CA, November 2006.
3. S. Deshpande, M. Thottan, T. Ho and B. Sikdar, "A Statistical Approach to Anomaly Detection in Interdomain Routing," to appear in *Proceedings of IEEE BROADNETS*, San Jose, CA, October 2006.
4. R. Iyengar, V. Sharma, K. Kar and B. Sikdar, "Analysis of Contention Based Multichannel MAC for Point to Multipoint Networks," *Proceedings of IEEE WOWMOM*, Niagara Falls, NY, June 2006.
5. F. Ye, H. Yang and B. Sikdar, "Enhancing MAC Coordination to Boost Spatial Reuse in IEEE 802.11 Ad Hoc Networks," *Proceedings of IEEE ICC*, Istanbul, Turkey, June 2006.
6. H. Yang, F. Ye and B. Sikdar, "SIMPLE: using Swarm Intelligence Methodology to design data acquisition protocol in sensor networks with mobile sinks," *Proceedings of IEEE INFOCOM*, Barcelona, Spain, April 2006.
7. B. Stephenson and B. Sikdar, "A Quasi-species Approach for Modeling the Dynamics of Polymorphic Worms," *Proceedings of IEEE INFOCOM*, Barcelona, Spain, April 2006.
8. K. Ramachandran and B. Sikdar, "Modeling Malware Propagation in Gnutella Type Peer-to-Peer Networks," *Proceedings of IEEE IPDPS*, Rhodes Island, Greece, April 2006.
9. R. Iyengar, K. Kar and B. Sikdar, "Scheduling algorithms for point to multipoint operation in IEEE 802.16 networks," *Proceedings of IEEE RAWNET*, April 2006.
10. B. Sikdar "Delay Analysis of IEEE 802.11 PCF MAC based Wireless Networks," *Proceedings of IEEE GLOBECOM*, Saint Louis, MO, November 2005.

11. R. Iyengar, P. Iyer and B. Sikdar, "Delay Analysis of 802.16 based Last Mile Wireless Networks," *Proceedings of IEEE GLOBECOM*, Saint Louis, MO, November 2005.
12. B. Sikdar, "Queueing Analysis of IEEE 802.11 Point Coordination Function," *Proceedings of International Teletraffic Congress*, Beijing, China, August 2005.
13. H. Yang and B. Sikdar, "A Lightweight Target Tracing Protocol for Ad Hoc Sensor Networks," *Proceedings of IEEE VTC*, Stockholm, Sweden, May, 2005.
14. A. Muthukrishnan and B. Sikdar, "Power Efficiencies of Multi-hop paths for Routing in Wireless Networks," *Proceedings of IEEE VTC*, Stockholm, Sweden, May, 2005.
15. H. Yang, F. Ye and B. Sikdar, "Swarm Intelligence Based Surveillance Protocol in Ad Hoc Sensor Networks," *Proceedings of IEEE VTC*, Stockholm, Sweden, May, 2005.
16. K. Ramachandran and B. Sikdar, "An Analytic Framework for Modeling Peer to Peer Networks," *Proceedings of IEEE INFOCOM*, Miami, FL, March 2005.
17. F. Ye and B. Sikdar, "Distance-Aware Virtual Carrier Sensing for Improved Spatial Reuse in Wireless Networks," *Proceedings of IEEE GLOBECOM*, Dallas, TX, November 2004.
18. S. Deshpande, M. Thottan and B. Sikdar, "Early Detection of BGP Instabilities Resulting from Internet Worm Attacks," *Proceedings of IEEE GLOBECOM*, Dallas, TX, November 2004.
19. S. Deshpande and B. Sikdar, "On the Impact of Route Processing and MRAI Timers on BGP Convergence Times," *Proceedings of IEEE GLOBECOM*, Dallas, TX, November 2004.
20. F. Ye and B. Sikdar, "Evaluation of Spatial Reuse in Cooperative Multiple Access Networks," *Proceedings of IEEE VTC*, Los Angeles, CA, October 2004.
21. O. Tickoo and B. Sikdar, "A Queueing Model for Finite Load IEEE 802.11 Random Access MAC," *Proceedings of IEEE ICC*, Paris, France, June 2004.
22. H. Yang, F. Ye and B. Sikdar, "A Dynamic Query-tree Energy Balancing Protocol for Sensor Networks," *Proceedings of IEEE WCNC*, pp. 1715-1720, Atlanta, GA, March 2004.
23. O. Tickoo and B. Sikdar, "Queueing Analysis and Delay Mitigation in IEEE 802.11 Random Access MAC based Wireless Networks," *Proceedings of IEEE INFOCOM*, Hong Kong, China, March 2004.
24. J. Peng and B. Sikdar, "A Multicast Congestion Control Scheme for Mobile Ad Hoc Networks," *Proceedings of IEEE GLOBECOM*, pp. 2860-2864, San Francisco, CA, December 2003.
25. F. Ye, S. Yi and B. Sikdar, "Improving Spatial Reuse of IEEE 802.11 Based Ad Hoc Networks," *Proceedings of IEEE GLOBECOM*, pp. 1013-1017, San Francisco, CA, December 2003.
26. J. Peng and B. Sikdar, "Multicast Loss Recovery with Active Injection," *Proceedings of IEEE ICCCN*, pp. 81-86, Dallas, TX, October 2003.
27. H. Yang and B. Sikdar, "A Protocol for Tracking Mobile Targets using Sensor Networks," *Proceedings of IEEE Workshop on Sensor Network Protocols and Applications (In conjunction with IEEE ICC)*, Anchorage, AK, May 2003.
28. R. Iyengar and B. Sikdar, "Scalable and Distributed GPS Free Positioning for Sensor Networks," *Proceedings of IEEE ICC*, pp. 338-342, Anchorage, AK, May, 2003.
29. J. Peng and B. Sikdar, "Rate Control over Repair Traffic in Multicast," *Proceedings of the 37th Conference on Information Sciences and Systems*, Baltimore, MD, March 2003.

30. O. Tickoo and B. Sikdar, "Modeling and Analysis of Traffic Characteristics in IEEE 802.11 MAC Based Networks," *Proceedings of IEEE GLOBECOM*, pp. 67-71, Taipei, Taiwan, November, 2002.
31. B. Sikdar, K. Chandrayana, K. S. Vastola and S. Kalyanaraman, "On Reducing the Degree of Second-Order Scaling in Network Traffic," *Proceedings of IEEE GLOBECOM*, pp. 2594-2598, Taipei, Taiwan, November, 2002.
32. J. Peng and B. Sikdar, "Routing-based video multicast congestion control," *Proceedings of IFIP/IEEE MMNS*, pp. 328-340, Santa Barbara, CA, October 2002.
33. B. Sikdar, K. Chandrayana, K. S. Vastola and S. Kalyanaraman, "Queue management algorithms and network traffic self-similarity," *Proceedings of IEEE HPSR*, pp. 319-323, Kobe, Japan, May 2002.
34. K. Chandrayana, B. Sikdar and S. Kalyanaraman, "Comparative study of TCP compatible binomial congestion control schemes," *Proceedings of IEEE HPSR*, pp. 224-228, Kobe, Japan, May 2002.
35. D. Manjunath and B. Sikdar, "Input queued switches for variable length packets: Finite buffer analysis," *Proceedings of the 8th International Conference on High Performance Computing*, pp. 372-384, Hyderabad, India, December 2001.
36. B. Sikdar, S. Kalyanaraman and K. S. Vastola, "Analytic models for the latency and steady-state throughput of TCP Tahoe, Reno and SACK," *Proceedings of IEEE GLOBECOM*, pp. 1781-1787, San Antonio, TX, November 2001.
37. J. Lévy-Véhel and B. Sikdar, "A multiplicative multifractal model for TCP traffic," *Proceedings of IEEE ISCC*, pp. 714-719, Hammamet, Tunisia, July 2001.
38. Y. Tao, D. Harrison, B. Sikdar, H. Tahilramani, B. Mo, L. Jiang, S. Kalyanaraman, B. Szymanski, and K. S. Vastola, "Network management and control using collaborative on-line simulation," *Proceedings of IEEE ICC*, pp. 204-209, Helsinki, Finland, June 2001.
39. K. Chandrayana, B. Sikdar and S. Kalyanaraman, "Scalable configuration of RED queue parameters," *Proceedings of IEEE HPSR*, pp. 185-189, Dallas, TX, May 2001.
40. B. Sikdar, S. Kalyanaraman and K. S. Vastola, "TCP Reno with random losses: Latency, throughput and sensitivity analysis," *Proceedings of IEEE IPCCC*, pp. 188-195, Phoenix, AZ, April 2001.
41. B. Sikdar and K. S. Vastola, "The effect of TCP on the self-similarity of network traffic," *Proceedings of the 35th Conference on Information Sciences and Systems*, Baltimore, MD, March 2001.
42. B. Sikdar, S. Kalyanaraman and K. S. Vastola, "An integrated model for the latency and steady-state throughput of TCP connections," *Proceeding of IFIP Symposium on Advanced Performance Modeling*, Orlando, FL, November 2000.
43. D. Manjunath and B. Sikdar, "Variable length packet switches: Delay analysis of crossbar switches under Poisson and self-similar traffic," *Proceedings of IEEE INFOCOM*, pp. 1055-1064, Tel-Aviv, Israel, March 2000.
44. B. Sikdar and K. S. Vastola, "On the convergence of Markovian arrival and fractional ARIMA processes with long-range dependence to fractional Brownian motion," *Proceedings of the 34th Conference on Information Sciences and Systems*, pp. TP2(7-12), Princeton, NJ, March 2000.
45. M. Yuksel, B. Sikdar, K. S. Vastola and B. Szymanski, "Workload generation in ns simulations of wide area networks and the Internet," *Proceedings of Communication Networks and Distributed Systems Simulation Conference*, pp. 93-98, San Diego, CA, January 2000.

46. D. Manjunath and B. Sikdar, "Integral expressions for the numerical evaluation of product form expressions over irregular multidimensional integer state spaces," *Proceedings of the Symposium on Performance Evaluation of Computer and Telecommunication Systems*, pp. 326-332, Chicago, IL, July 1999.
47. B. Sikdar and D. Manjunath, "Queueing analysis of scheduling policies in copy networks of space based multicast ATM switches," *Proceedings of 3rd IEEE International Workshop on Broadband Switching Systems*, pp 3-7, Kingston, Canada, June 1999.
48. B. Sikdar and D. Manjunath, "Input queued packets for variable length packets: A continuous time analysis," *Proceedings of the 3rd IEEE International Workshop on Broadband Switching Systems*, pp. 65-69, Kingston, Canada, June 1999.
49. B. Sikdar and D. Manjunath, "Evaluation of the exact overflow probabilities in a space based multicast switch copy network," *Proceedings of the 33rd Conference on Information Sciences and Systems*, pp. 586-587, Baltimore, MD, March 1999.

### Invited Papers

1. B. Sikdar and K. S. Vastola, "On the contribution of TCP to the self-similarity of network traffic," *Proceedings of the International Workshop on Digital Communications*, pp. 596-613, Taormina, Italy, September 2001.

### RESEARCH GRANTS AND CONTRACTS

1. *Biologically Motivated Models for Spatio-Temporal Behavior of Computer Networks: Performance, Growth and Pathological Behavior*,  
PI,  
Time of award: August 1, 2004 – August 31, 2009,  
Funds: RPI Total funds \$ **402,000**,  
Program: NSF CAREER Program.
2. *Infrastructure Mesh Wireless Networks*,  
co-PI (co-PIs: Shivkumar Kalyanaraman),  
Time of award: December 1, 2004 – November 30, 2006,  
Funds: RPI Total funds \$ **200,000 + \$25,000 equipment**,  
Program: Intel Corp.
3. *Community Wireless Networks for Last-Mile Broadband Interconnectivity: An Experimental Research Program*,  
co-PI (co-PIs: Shivkumar Kalyanaraman),  
Time of award: September 1, 2003 – August 31, 2007,  
Funds: RPI Total funds \$ **350,000**,  
Program: NSF ITR Program.
4. *Scalable Online Network Modeling and Simulation*,  
co-PI (co-PIs: Boleslaw Szymanski, Shivkumar Kalyanaraman, Christopher Carothers),  
Time of award: September 1, 2001 – June 30, 2004,  
Funds: RPI Total funds \$ **950,000**,  
Program: Electronics Division, US Army Research Office (ARO).
5. *High Performance Robust Network Management: Theoretical Foundations and Practical Design Tools*,  
co-PI (co-PIs: S. Kalyanaraman, C. Carothers, M. Arcaç, B. Azimi-Sadjadi and J. Wen),  
Time of award: January 1, 2002 – December 31, 2002,

Funds: RPI Total funds \$ **50,000**

Program: RPI Seed Grant.