

Resume: Steven H. Low

Professor: Computer Science and Electrical Engineering, Caltech, Pasadena, CA 91125
netlab.caltech.edu, slow@caltech.edu, Tel: +1 626 395 6767

Education

PhD in EE: Berkeley, 1992
MSc in EE: Berkeley, 1989
BS in EE: Cornell, 1987

Appointments

Primary appointments:

- **Professor**, 5/2006 – present
Associate Professor, 8/2000 – 5/2006
CS Dept. and EE Dept., Caltech, Pasadena CA91125
- **Founder, CEO**, 4/2006 – 4/2008
FastSoft, Inc, Monrovia CA 91016
- **Senior Lecturer**, 5/1996 – 7/2000
Dept. of EEE, University of Melbourne, Australia
- **Member of Technical Staff**, 8/1992 – 2/1996
AT&T Bell Labs, Murray Hill, NJ
This series of work has resulted in
 - IEEE William R. Bennett Prize for Best Original Paper in IEEE/ACM Transactions on Networking in 1996 for the paper "Anonymous Credit Cards and Their Collusion Analysis" (with N. Maxemchuk and S. Paul, 1997)
 - 1996 R&D 100 Award (1996)
 - Three patents (1995, 1997, 2010)
 - * Anonymous credit card transactions (Low, Maxemchuk, Paul, 1995)
 - * Document copying deterrent method using line and word shift techniques (Brassil, Low, Maxemchuk, O’Gorman, 1997)
 - * Method and apparatus for network congestion control using queue control and one-way delay measurements (Jin, Low, Wei, Wydrowski, Tang, Choe, 2010)
 - 2 software prototypes, 8 journal and 30 conference papers

Other appointments:

- **Guest Professor**, 2010 – 2013
Shanghai Jiao Tong University, China
- **Adjunct Professor**, 11/2008 – 10/2013
Faculty of Information Communication Technologies, Swinburne University of Technology, Melbourne, Australia
- **Senior Fellow**, 8/2000 – 2004
Dept. of EEE, University of Melbourne, Australia

- **Visiting Assistant Professor**, 2/1996 – 4/1996
Dept. of EEE, University of Science and Technology, Hong Kong
- **Lecturer**, 9/1995 – 1/1996
Dept. of ECE, Rutgers University, Piscataway, NJ
- **Consultant**, 9/1991 – 1/1992
Transmission Development Division NEC, San Jose, CA
- **Research Engineer**, Summer 1991
Advanced Technology Group, Apple Computer, Cupertino, CA
- **Yield Engineer**, Summer 1987
Technology Development, Intel Corp., Santa Clara, CA
- **Engineering Co-op Intern**, Summer 1986
System Technology Development, Intel Corp., Hillsboro, OR
- **Engineering Co-op Intern**, Fall 1985
System Technology Development, Intel Corp., Hillsboro, OR

Activities

- **Editorial board:**
 - IEEE/ACM Transactions on Networking, 1997 – 2006
 - Computer Networks Journal, 2003 – 2005
 - IEEE Journal on Selected Areas in Communications (Senior Editor), 2004 – present
 - ACM Computing Surveys, 2004 – 2010
 - NOW, Foundations and Trends in Networking, 2004 – present
 - IEEE Transactions on Automatic Control, 2010
- **Editor** (with Mung Chiang, Princeton): Springer Book Series on Optimization and Control of Communication Systems: Theory and Applications
- **Advisory board:**
 - Southern California Edison Technology Advisory Board, April 2011 –
 - Networking and Information Technology Technical Advisory Group for the US President’s Council of Advisors on Science and Technology (PCAST), 2006 – 2007
 - National Light Rail (NLR) Network Research Committee, August 2004 – 2006
- **Guest editor:**
 - Series Mentor, IEEE Journal on Selected Areas in Communications, Annual Series on Smart Grid, first issue 2012
 - IEEE Journal on Selected Areas in Communications special issue on Copyright and Privacy Protection, May 1998
 - IEEE Journal on Selected Areas in Communications special issue on Nonlinear Optimization of Communication Systems, August 2006
- **Tutorial:** TCP Congestion Control: Algorithms and Models

1. **ACM Sigcomm**, San Diego, CA, August, 27-28, 2001
 2. **ACM Sigmetrics**, Cambridge, MA, June 16, 2001
 3. **IEEE Infocom**, Alaska, April 2001 (with Matthew Roughan, AT&T Labs - Research)
 4. **Grampians Workshop**, Australia, December 8, 2000
 5. **IEEE ICC** (International Conference on Communications), New Orleans, USA, June 23, 2000
- **Tutorial:** Control and optimization of communication networks
 1. **IEEE Globecom**, Dallas, TX, November 2004 (with Mung Chiang, Princeton)
 2. **IEEE Infocom**, Miami, FL, March 2005 (with Mung Chiang, Princeton)
 3. **IEEE ISIT (International Symposium on Information Theory)**, Seattle, WA, July 2006 (with Mung Chiang and Rob Calderbank, Princeton)
 - **Short course:** Internet congestion control
 1. PURSUIT Summer School, Cambridge, England, August 2011
 2. KTH Royal Institute of Technology, Stockholm, Sweden, August 2010
 3. Lund University, Lund, Sweden, August 2010
 - **Workshop and invited session organization**
 1. IEEE CDC Pre-conference Workshop on Smart Grids, December 2010 (with Nader Motee, Kishan Baheti)
 2. Princeton CISS Invited Session on control and optimization of networks, March 2006 (with Mung Chiang)
 3. IEEE CCW Invited Session on control and optimization of networks, October 2005
 4. International Conference on Complementarity, Duality, and Global Optimization, August 2005 (with Mung Chiang)
 5. ACM Sigmetrics Invited Session on control and optimization of networks, June 2005
 6. IEEE CDC Invited Session on control and optimization of networks, December 2004
 7. Princeton CISS Invited Session on optimization of communication systems, March 2004 (with Mung Chiang)
 8. IEEE CCW Invited Session on control and optimization of networks, October 2004
 - **Panel organization:**
 1. Entrepreneurship in Networking Research, IEEE Infocom, Phoenix, AZ, April 2008
 2. Sustainable Computing and Networking, IEEE Infocom, Shanghai, China, April 2011
 - **Technical program committee (partial list):**
 - IEEE Infocom (1999, 2001–12, (Area TPC Chair: 2008, 2010–12), Tutorial co-Chair, 2012))
 - ACM Sigcomm (2004, 2006, 2007)
 - ACM Sigcomm Asia (2005)
 - ACM Sigmetrics (2003, tutorial co-chair)
 - ACM CoNEXT (2010)

- INFORMS (2006)
 - IEEE Information Theory Workshop (2004)
 - IEEE ICNP (2002, 2003)
 - IEEE Computer Communications Workshop (2000, 2001, 2004, 2005)
 - International Telegraphic Congress (ITC) (2010)
 - IEEE ICC (2003, 2004)
 - Institute for Pure and Applied Mathematics (IPAM) Workshop on “Large Scale Communication Networks” (2002, 2003 (Reunion))
 - International Workshop on Protocols for Fast Long-Distance Networks (PFLDnet) (2003 (co-chair), 2004 (steering committee), 2005, 2006, 2008, 2009)
 - IWQoS (2000, 2002)
 - SPIE ITCOM Conference on performance and control of Network Systems (1997, 1998, 2001, 2002, 2003),
 - High Performance Switching and Routing (HPSR) conference (2003, 2005)
 - IEEE ICON (2000,2001,2003)
 - International Conference on Optical Internet (2003)
 - International Workshop on Digital Watermarking (2002)
 - International Workshop on Digital Communications (2001)
 - Workshop on Information Hiding (1996 - 2001)
 - IFIP Fifth International Conference on Broadband Communications (1999)
- **Program co-chair:**
 - Technical Program Co-chair, International Teletraffic Congress, San Francisco, CA, Sept 2011
 - First International Workshop on Protocols for Fast Long-Distance Networks (PFLDnet), CERN, Geneva, Switzerland, January 2003
 - IEEE Workshop on Computer Aided Modeling, Analysis and Design of Communication Networks, New York, NY, May 2002

Honors

- Keynote, IFIP WG7.3 Performance Conference, Amsterdam, Netherlands, October 2011
- Okawa Foundation Research Grant, 2011
- Guest Professor, 2010 – 2013
Shanghai Jiao Tong University, China
- Adjunct Professor, 11/2008 – 10/2013
Faculty of Information Communication Technologies, Swinburne University of Technology, Melbourne, Australia
- IEEE Fellow, 2008
- Best Paper Award, IEEE Mobile Ad-hoc and Sensor Systems (MASS), (with Tao Cui, Lijun Chen, Tracey Ho and Lachlan L. H. Andrew), 2007

- IEEE William R. Bennett Prize paper (with N. Maxemchuk and S. Paul), 1997
- 1996 R&D 100 Award (1996)
- 6 US Patent Awards (1995, 1997, 2000, 2010, 2010, 2011)
- AT&T Smartcard Contest Award for Most Innovative Application (1994)
- University Fellowships & Scholarships (UC-Berkeley, 1987-92)
- Rank First in Graduating Class of Cornell Engineering College (1987)
- Dean's Honor List (Cornell 1984-87)

Invited talks

- **Plenary/Keynote/Distinguished lectures:**
 1. Keynote, IEEE GLOBECOM Workshop on Smart Grid Communications and Networks, Houston, TX, December 2011
 2. Keynote, IFIP WG7.3 Performance Conference, Amsterdam, Netherlands, October 2011
 3. Distinguished Speaker Series in Information Technology, Rensselaer Polytechnic Institute, February 2005
 4. IEEE First Workshop on Provisioning & Transport for Hybrid Networks (PATHNets), San Jose, CA, October 2004
 5. The Second ARC-TCP Workshop: Models and algorithms for TCP/IP Networks, Ecole Normale Supérieure, Paris, France, November 2003
 6. European Union RTN Summer School on Multi-Agent Control, Hamilton Institute, National University of Ireland, Maynooth, Ireland, September 2003
 7. Disney Digital Network Roundtable, Burbank, CA, (broadcast to Disney World (FL), ABC (NY), ESPN (CT), Disney Internet Group (WA), Disneyland (LA)), August 2003
 8. Workshop on Networking games and resource allocation, Institute of Applied Mathematical Research, Petrozavodsk, Russia, July 2002
- **Invited talks:**
 1. May 2012: Center for Nonlinear Studies (CNLS) Annual Conference on "Optimization and Control for Smart Grids", Los Alamos National Laboratory, Santa Fe, NM
 2. May 2012: Santa Fe Institute Workshop on Network Theory and Power Systems, Santa Fe, NM
 3. March 2012: Annual Conference on Information Sciences and Systems (CISS), Princeton, NJ
 4. Feb 2012: The 7th Annual Information Theory and Application Workshop, San Diego, CA
 5. Jan 2012: Seventh Annual Coordinated Science Laboratory (CSL) Student Conference, University of Illinois, Urbana-Champaign, IL
 6. December 2011: IEEE GLOBECOM Workshop on Smart Grid Communications and Networks (Keynote), Houston, TX
 7. November 2011: Workshop on Energy Security and Resilient Control Systems, Marina del Rey, CA

8. October 2011: FIP WG7.3 Performance Conference (Keynote), Amsterdam, Netherlands
9. October 2011: IEEE Computer Communications Workshop (CCW), Hyannis, MA
10. Sept 2011: Alumni College 2010 “Practical Applications of Sustainable Resources”, Caltech, Pasadena, CA
11. August 2011: Hamilton Institute Workshop Network Science Workshop, Dublin, Ireland
12. August 2011: PURSUIT Summer School, Cambridge, England
13. June 2011: Santa Barbara Control Workshop on “Decision Dynamics and Control in MultiAgent Systems”, UC, Santa Barbara, CA
14. May 2011: “IEEE/ACM International Symposium on Cluster, Cloud and Grid Computing (CCGrid),” Panel, Newport Beach, CA
15. May 2011: “Dynamical Systems Approaches in Smart Power Grids” at SIAM conference on Application of Dynamical Systems, Snowbird, UT
16. May 2011: Workshop on Dynamics, Control and Pricing in Power Systems, Linnaeus Excellent Center, Lund University, Sweden
17. April 2011, EDGE Lab Open House, Princeton, NJ
18. March 2011: USC Rusch Honors Colloquium, University of Southern California, LA, CA
19. February 2011: Workshop on Cyber-Physical Applications in Smart Electric Power Systems, NCSU, Raleigh, NC
20. February 2011: The 6th Information Theory and Applications (ITA) Workshop, UCSD, San Diego, CA
21. January 2011: KACST Smart Grid Workshop, Riyadh, Saudi Arabia
22. November 2010: Southern California Symposium on Network Economics and Game Theory, Los Angeles, CA
23. November 2010: INFORMS Annual Meeting, Distributed Algorithm and Optimization, Austin, TX
24. November 2010: IEEE Workshop on “A Systems Approach Toward Green Energy Production and Adaptive Power Distribution”, CSULB, Long Beach, CA
25. October 2010: DIMACS Workshop on Algorithmic Decision Theory for the Smart Grid, Rutgers University, Piscataway, NJ
26. October 2010: Southern California Edison Smart Grid Research Symposium, USC, Los Angeles, CA
27. March 2010: Workshop on Distributed Decisions via Games and Price Mechanisms, Lund University, Sweden
28. February 2010: The 5th Information Theory and Applications (ITA) Workshop, UCSD, San Diego, CA
29. Oct 2009: Southern California Symposium on Network Economics and Game Theory, Los Angeles, CA (panelist)
30. October 2009: INFORMS Annual Meeting, San Diego, CA
31. February 2009: The 2009 Information Theory and Applications Workshop, UCSD, San Diego, CA
32. November 2008: IPAM Workshop on New Mathematical Frontiers in Network Multi-Resolution Analysis, Institute for Pure and Applied Mathematics, UCLA, CA
33. October 2008: Workshop on the Frontiers in Distributed Communication, Sensing and Control, Yale University, New Haven, CT

34. August 2008: US-Korea Conference on Science, Technology and Entrepreneurship, San Diego, CA
35. June 2008: JASON Summer Study on Large Data, San Diego, CA
36. May 2008: IEEE ICC (International Conference on Communications), Panel on Transport Protocols in Next Generation Communications
37. April 2008: Workshop on The future of TCP: Train-wreck or Evolution? Stanford University, Palo Alto, CA
38. March 2008: ACCESS Industrial Workshop, KTH, Stockholm, Sweden
39. Jan 2008: The 2008 Information Theory and Applications Workshop, UCSD, San Diego, CA
40. Sept 2007: The 45th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL
41. Feb 2007: The Fifth International Workshop on Protocols for FAST Long-Distance Networks, ISI, Marina Del Rey, CA
42. Feb 2007: The IEEE 21st Annual Computer Communications Workshop (CCW), Pittsburgh, PA
43. Jan 2007: The 2007 Information Theory and Applications Workshop, UCSD, San Diego, CA
44. October 2006: The 44th Annual Allerton Conference on Communication, Control, and Computing, Monticello, IL
45. August 2006: International Workshop on Complex Systems and Networks (IWCSN 2006), Vancouver, BC, Canada
46. March 2006: IEEE Information Theory Workshop (ITW'2006), Punta del Este, Uruguay
47. March 2006: IRTF End-to-end Task Force Meeting, ISI/USC, Marina Del Rey, CA
48. December 2005: Workshop on QoS and Traffic Control, Ecole Normale Suprieure, Paris, France
49. November 2005: INFORMS Annual Meeting (Optimization and Games in Communication Networks Session), New Orleans, LA
50. November 2005: INFORMS Annual Meeting (Network Optimization Session), New Orleans, LA
51. July 2005: Workshop on the Complex Behavior of Adaptive, Network-Centric Systems, University of Maryland, College Park, MD
52. June 2005: Institute for Mathematics and Applications (IMA), Wireless Communications Workshop, Minniapolis, MN
53. May 2005: International ICFA Workshop on HEP Networking, Grids, and Digital Divide Issues for Global e-Science, Daegu, Korea
54. May 2005: SCMJ IT Workshop, Caltech, LA
55. March 2005: RAND Workshop on Network Science, Arlington, VA
56. Feb 2005: Internet2 Joint Tech Workshop, Salt Lake City, UT
57. Jan 2005: Computational Science Workshop for Underrepresented Groups, USC, Los Angeles, CA
58. October 2004: IEEE Computer Communication Workshop (CCW), Bonita Springs, FL
59. October 2004: Internet 0: Past, Present, and Future, The Center for Bits and Atoms, MIT, Boston, MA

60. September 2004: Fall Internet2 Member Meeting, Austin, TX
61. July 2004: Optical Network Testbeds Workshop, NASA Ames, CA
62. July 2004: 16th International Symposium on Mathematical Theory of Networks and Systems(MTNS 2004), K.U.Leuven, Belgium
63. July 2004: Workshop on Economics of Communication Networks, Montreal, Canada (presenter: Ao Tang)
64. March 2004: Distinguished Panel on Hot Research Topics in Computer Networking, University of Science and Technology, Hong Kong
65. February 2004: Institute for Mathematics and Applications (IMA), Workshop on Robustness in Complex Systems, Minniapolis, MN
66. November 2003: INRIA Workshop on Congestion Control, Paris, France
67. October 2003: IEEE Computer Communication Workshop (CCW), Laguna Beach, CA (presenter: David Wei)
68. October 2003: Allerton Conference, Monticello, IL (presenter: Ao Tang)
69. October 2003: Institute for Pure and Applied Mathematics (IPAM), Reunion Workshop on "Large Scale Communication Networks", Lake Arrowhead, CA
70. August 2003: Internet2 Joint Technology Meeting, Lawrence, KS
71. August 2003: Army Research Office Symposium on Science and Complex Adaptive Systems, Research Triangle Park, NC
72. July 2003: Algorithmic Game Theory and the Internet, Saarbrücken, Germany
73. July 2003: IEEE Information Theory Workshop, Hong Kong, China (Workshop cancelled due to SARS)
74. May 2003: CENIC (Corporation for Education Network Initiative in California) 2003 - On the Road to a Gigabit, Santa Barbara, CA
75. March 2003: High Energy Physics Data Grid Workshop at KEK (High Energy Accelerator Research Organization), Japan
76. October 2002: IEEE Information Theory Workshop, Bangalore, India
77. October 2002: Allerton Conference, Monticello, IL
78. October 2002: IEEE Computer Communication Networks, Santa Fe, NM
79. June 2002: Workshop on High-speed Networking, New York, NY
80. March 2002: Institute for Pure and Applied Mathematics (IPAM), Workshop on "Large Scale Communication Networks", UCLA, CA
81. February 2002: Decision and Control Symposium (IDC 2002), Adelaide, Australia
82. January 2002: Winter School on "Nonlinear Phenomena in Communication Networks", UCSD, San Diego, CA
83. December 2001: Winter Simulation Conference, Arlington, VA
84. October 2001: Allerton Conference, Monticello, IL
85. August 2001: Institute for Mathematics and Applications (IMA), Minniapolis, MN
86. March 2001: Center for Discrete Mathematics and Theoretical Computer Science (DIMACS), Rutgers University, NJ
87. March 2001: National Institute of Statistical Science (NISS), Research Triangular Park, NC

88. December 2000: First IEEE Pacific-Rim Conference on Multimedia, University of Sydney, Australia
89. October 2000: IEEE Computer Communication Networks (CCW), Captiva Island, FL
90. November 1999: INFORMS Fall 1999 Meeting, Philadelphia, PA
91. October 1999: IEEE Computer Communication Networks (CCW), Estes Park, CO
92. June 1997: The 9th INFORMS Applied Probability Conference, Boston, MA
93. April 1995: IEEE Information Theory Workshop, St. Louis, MO
94. March 1993: Interdisciplinary Workshop on Coordination and Complexity, Berkeley, CA

• **Invited seminars:**

Berkeley (2/1998, 2/2001, 4/2002, 4/2006), **Boston University** (6/2001, 10/2003, 11/2011), **Caltech** (6/1999), **Cambridge (UK)** (6/1999), **Chinese University of Hong Kong** (3/2004) **Cornell** (11/1999, 10/2003, 2/2012), **Georgia Tech** (6/1998, 9/2010), **Hong Kong University of Science & Technology** (10/2005), **ISI/USC** (11/2001, 7/2003), **McGill** (4/2012), **Melbourne University, Australia** (7/2004, 12/2011), **MIT** (10/2003, 2/2007), **Polytechnic University** (11/1999), **Princeton** (11/1999, 10/2003), **Purdue** (10/2001), **RPI** (3/2002), **Shanghai Jiaotong University, China** (4/2011), **Stanford** (1/2002, 2/2004, 4/2012), **Swinburne University, Australia** (7/2004, 12/2011), **Tsinghua University, China** (5/2008), **UC Irvine** (10/1999, 4/2009), **UC LA** (8/1998, 10/1999, 2/2001, 1/2003), **UC Riverside** (11/2001, 11/2011), **UC San Diego** (3/2012), **UIUC** (1/2012), **UMaryland** (College Park, 12/1999, 4/2004), **UMass** (Amherst, 12/1999), **UPenn** (3/2003), **USC** (1/2002), **UTexas** (Austin, 12/1999), **UWashington** (Seattle, 5/2008), **UWisconsin** (Madison, 4/2012),

AT&T Labs (NJ, 2/1998), **Bell Labs** (NJ, 2/1998, 6/2001, 2/2012), **Cisco** (CA, 10/2000, 6/2003, 2/2005), **Google** (CA, 6/2004), **HP Labs** (CA, 8/2004), **IBM T. J. Watson Research** (Yorktown Heights, NY, 10/2003), **IBM Almaden Research** (Almaden, CA, 8/2004), **Los Alamos National Lab** (NM, 4/2011), **Nortel Labs** (UK, 6/1999), **QualComm** (CA, 10/2009), **SUN** (CA, 6/2003), **Symantec** (CA, 8/2004), **Telstra Research Lab** (Australia, 8/1999)

Visits

- Lund University, Lund, Sweden, 7-8/2010
- Melbourne University, Australia, 7-8/2004
- Melbourne University, Australia, 8-10/2000
- Lee Center for Advanced Networking, Caltech, CA, 10/1999
- Bell Labs, Murray Hill, 12/1998-1/1999
- Bell Labs, Holmdel, NJ, 12/1997-2/1998
- AT&T Labs, Shannon Lab, NJ, 12/1996-3/1997
- University of Science & Technology, Hong Kong, 2-4/1996

Mentoring/Service (seriously outdated)

- **PhD Graduates (Caltech after 2000):**

- Jiantao Wang (with Doyle), PhD 2005, Goldman Sachs (first job)
- Lijun Chen (with Doyle), PhD 2006, Postdoc, Caltech
- Lun Li (with Doyle), PhD 2006, Postdoc, Caltech
- Mortada Meyhar, PhD 2006, Yahoo! (first job)
- Kevin Tang, PhD 2006, Assistant Professor, Cornell ECE (first job)
- David Wei, PhD 2006, Google (first job)
- David Lapsley (PhD, 1999, Melbourne University), first position: Lucent, Massachusetts

- **MS Graduates:**

- Kevin Phan (MSc, EE, 2009, Caltech), then UCLA
- Cheng Hu (MSc, CS, 2006, Caltech), first position: Investment firm
- John Pongsajapan (MSc, CS, 2006, Caltech), first position: Google
- Craig Cameron (MSc, 2002, Caltech), first position: Melbourne University, Australia
- Sanjeeva Athuraliya (MSc, 2000, Caltech), first position: in New Zealand
- Youngmi Ohk (MSc, 1998, Melbourne University), first position: SCI Technology Lab, Australia

- **Current PhD students:** Subhonmesh Bose (EE), Masoud Farivar (EE), Zhenhua Liu (CS), Jayakrishnan Unnikrishnan (EE)

- **Postdocs:** Ki-Baek Kim (visiting from SNU, Korea, 10/2001 – 2/2003), Cheng Jin (7/2002 – 9/2005), Werner Almsberger (12/2002 – 6/2003), Bartek Wydrowski (1/2004 – 12/2005), Joon-Young Choi (visiting from SNU, Korea, 2/2004 – 2/2005), Lachlan Andrew (10/2005 – 9/2008), Chee-Wei Tan (11/2008 – 10/2009), Sachin Adlakha (9/2010 –), Libin Jiang (11/2010 –)

- **Teaching:**

- **Caltech:**

- Developed and taught networking courses CS/EE145ab and later cs/ee143.
 - Participated in CDS110 (2003, 2004) and CDS270

- **Melbourne:** introductory and advanced networking, digital communications, digital signal processing.

- **Service:** CS Department Steering Committee, 1/2002 – 10/2007

Grants and technology transfer

External grants

Only external grants on which I'm the Caltech PI are listed.

1. **ARPA-E**: Scalable Real-time Decentralized Volt/VAR Control, 2012-15
2. **Okawa Foundation** Research Grant, 2011
3. **DoE** (DE-EE0002890): Power Minimization Techniques for Networked Datacenters, with Tang (Cornell) 2010–11
4. **NSF NetSE Large** (CNS-0911041): A Theory of Network Architecture, with Candes, Chandy, Doyle and Murray, 2009–12
5. **ARO DURIP** (W911NF-08-1-0513): WAN-in-Lab at 10Gbps, with Andrew, 2008–09
6. **ARO MURI** (Berkeley Prime Award W911NF-08-1-0233): Tools for the Analysis and Design of Complex Multi-scale Networks, with Doyle, 2008–13
7. **NSF NeTS** (CNS-0520349): Collaborative Research: Optimization and Games in Interdomain Routing, with Doyle and Zhang (UCLA), 2006
8. **NSF NeTS** (CNS-0435520): Counter-Intuitive Behavior in General Networks, 2005–07
9. **ARO Network Science**: Networked control systems, with Doyle, Murray, 2005–06
10. **NSF CRCRD** (CNS-0417607): Control and Optimization of Communication Systems, with Chiang (Princeton), 2004–06
11. **ARO DURIP** (W911NF-04-1-0095): Hybrid WAN in Lab with Doyle, Newman, Psaltis, Yip, 2004–05
12. **NSF RI** (EIA-0303620): WAN in Lab with Doyle, Newman, Psaltis, Yip (Cisco), 2003–08
13. **NSF STI** (ANI-0230967): Multi-Gbps TCP: Data Intensive Networks for Science & Engineering, with Bunn, Doyle, Newman, 2002–05
14. **AFOSR** (F49620-03-1-0119): Large Scale Self-Organizing Information Distribution System, 2002–05
15. **ARO Networking Research**: Analytical Theory of Protocols, with Doyle, 2002–05
16. **NSF ITR** (ANI-0113425): Optimal and Robust TCP Congestion Control, with Doyle, 2001–04
17. **Cisco ARTI**:
 - University Research Program: 2002, 2003, 2011
 - WAN in Lab: 2005
18. **Bell Labs, Alcatel-Lucent**: Energy Efficient Networking, 2011–13
19. **Misc**: Intel (2001), Microsoft (2001), Sun (2002), Juniper (2003), Level(3) (2003), Corning (2003)

Technology transfer

FastSoft, Inc., Founder, CEO (2006–08), Chairman of the Board, (2006–)

Publications

Note: Only refereed and invited articles are included. Some of the conferences (e.g., IEEE Infocom) have acceptance rate lower than or comparable to leading networking journals, e.g. 15%–25%.

Journal/Book chapter/Magazine

1. Z. Liu, M. Lin, A. Wierman, S. H. Low and L. L. H. Andrew. *Geographical load balancing with renewables*, ACM Sigmetrics Performance Evaluation Review (PER), March 2012
2. L. Chen, N. Li, L. Jiang and S. H. Low. *Optimal demand response: problem formulation and deterministic case* (invited), In Control and Optimization Theory for Electric Smart Grids, Aranya Chakraborty and Marija Ilic, Editors, Springer 2011
3. J. Lavaei and S. H. Low. *Zero duality gap in optimal power flow problem*, IEEE Trans. Power Systems, 2011
4. C. W. Tan, S. Friedland, and S. H. Low, *Nonnegative matrix inequalities and their application to nonconvex power control optimization*, SIAM Matrix Analysis and Application, 2011
5. C. W. Tan, S. Friedland, and S. H. Low, *Spectrum management in multiuser cognitive wireless networks: optimality and algorithm*, IEEE Journal on Selected Areas in Communications, 29:2, February 2011
6. A. Tang, L. Andrew, K. Jacobsson, K. Johansson, H. Hjalmarsson and S. H. Low. *Queue dynamics with window flow control*, IEEE/ACM Transactions on Networking, 18(5): 1422–1435, October 2010
7. L. Chen, S. H. Low and J. C. Doyle, *Random access game and medium access control design*, IEEE/ACM Transactions on Networking, 18(4): 1303–1316, 2010
8. A. Tang, X. Wei, S. H. Low and M. Chiang. *Equilibrium of heterogeneous congestion control protocols: optimality and stability*, IEEE/ACM Transactions on Networking, 18(3): 844–857, 2010.
9. L. Chen, S. H. Low and J. C. Doyle. *Cross-layer design in multihop wireless networks* (Invited), Special Issue on Wireless for the Future Internet, Computer Networks Journal, 2010.
10. L.L.H. Andrew, S.H. Low and B. P. Wydrowski. *Understanding XCP: equilibrium and fairness*, IEEE/ACM Transactions on Networking, 17(6):1697–1710, 2009
11. K. Jacobsson, L.L.H. Andrew, A.K. Tang and S.H. Low. *An Improved Link Model for Window Flow Control and Its Application to FAST TCP*, IEEE Transactions on Automatic Control, 54(3):551–564, Mar 2009
12. Ao Tang, Lachlan L. H. Andrew, Mung Chiang and Steven H. Low. *Transport Layer*, in Encyclopedia of Computer Systems Engineering, Wiley, January 2009
13. X. Wang, K. Kar and S. H. Low. *End-to-end fair rate optimization in wire-cum-wireless networks*, Ad Hoc Networks, Elsevier, 7:473–485, 2009
14. T. Cui, L. Chen and S.H. Low. *A game-theoretic framework for medium access control*, IEEE Journal on Selected Areas in Communications, 26(7):1116–1127, September 2008
15. A. Tang, J. Wang, S. H. Low and M. Chiang. *Equilibrium of heterogeneous congestion control protocols: existence and uniqueness*, IEEE/ACM Transactions on Networking, 15(4):824–837, Aug 2007

16. M. Mehyar, D. Spanos, J. Pongsajapan, S. H. Low and R. M. Murray. *Asynchronous distributed averaging on communication networks*, IEEE/ACM Transactions on Networking, 15(3):512-520, Aug 2007
17. J. Y. Choi, K. Koo, J. S. Lee and S. H. Low. *Global finite-time convergence of TCP Vegas without feedback information delay*, International Journal of Control, Automation and Systems, February 2007
18. M. Chiang, S. H. Low, A. R. Calderbank and J. C. Doyle. *Layering as optimization decomposition*, Proceedings of the IEEE, vol.95 pp.255-312. Jan 2007
19. L. Chen, S. H. Low and J. C. Doyle. *Dual scheduling algorithm in a generalized switch: asymptotic optimality and throughput optimality*, in High-Performance Packet Switching Architectures, Itamar Elhanany and Mounir Hamdi (Eds.), Springer, 2007
20. D. X. Wei, C. Jin, S. H. Low and S. Hegde. *FAST TCP: motivation, architecture, algorithms, performance*, IEEE/ACM Transactions on Networking, 14(6):1246-1259, December 2006
21. W.-H. Wang, M. Palaniswami and S. H. Low. *Application-oriented flow control: fundamentals, algorithms and fairness*, IEEE/ACM Transactions on Networking, 14(6):1282-1291, December 2006
22. B. Wydrowski, S. Hegde, M. Suchara, R. Witt and S. H. Low. *Grid networks and TCP services, protocols, and technologies*, in Grid Networks: Enabling Grids with Advanced Communication Technology, F. Travostino, J. Mambretti, G. Karmous-Edwards (Eds.), John Wiley & Sons, May 2006
23. J. Wang, D. X. Wei, J.-Y. Choi and S. H. Low. *Modeling and stability of FAST TCP (invited)*, in IMA Volumes in Mathematics and its Applications, Prathima Agrawal M. Andrew, P. J. Fleming, G. Yin, L. Zhang (Eds.), Springer, NY, 2006
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