

Curriculum Vitae

Simon S. Lam

telephone: 512 471-9531

email: lam@cs.utexas.edu

<http://www.cs.utexas.edu/users/lam/>

Research Interests: Computer networks, Internet security services, network protocol design

Education

Washington State University, Pullman, Washington
B.S. in Electrical Engineering (with Distinction), 1969

University of California, Los Angeles
M.S. in Engineering, 1970
Ph.D. in Engineering, 1974

Employment

Department of Computer Sciences, University of Texas at Austin
Regents Chair in Computer Sciences, 2001 – present
Professor, 1983 – present
Department Chair, 1992 – 1994
Professorship No. 2 (anonymously endowed), 1992 – 2001
Professorship No. 1 (anonymously endowed), 1988 – 2001
David Bruton Jr. Centennial Professorship, 1985 – 1988
Associate Professor, 1979 – 1983
Assistant Professor, 1977 – 1979

IBM T. J. Watson Research Center, Yorktown Heights, New York
Research Staff Member, June 1974 – August 1977

UCLA, ARPA Network Measurement Center
Postgraduate Research Engineer, June 1971 – March 1974
Postdoctoral Scholar, March 1974 – June 1974

Honors and Awards

Member, National Academy of Engineering (elected 2007) with the citation, “For contributions to computer network protocols and network security services.”

Software System Award (2004), ACM, with the citation, “For inventing secure sockets and prototyping the first secure sockets layer (named SNP - Secure Network Programming) as a high-level abstraction suitable for securing Internet applications” (co-recipient)

SIGCOMM Award (2004), ACM, for lifetime contribution to the field of communication networks with the citation, “in recognition of his vision, breadth, and rigor in contributing to, among other areas: secure network communication, the analysis of network and multiaccess protocols, the analysis of queueing networks, and the design of mechanisms for quality of service”

W. Wallace McDowell Award (2004), IEEE Computer Society, with the citation, “For outstanding fundamental contributions in network protocols and security services”

William R. Bennett Prize (2001) in the field of Communications Networking, IEEE Communications Society (co-recipient)

ACM Fellow (elected 1998)

IEEE Fellow (elected 1985)

Leonard G. Abraham Prize (1975) in the field of Communications Systems, IEEE Communications Society (co-recipient)

Teaching Excellence Award (2007), College of Natural Sciences, UT-Austin

Editor of the Year Award (2002), *Computer Networks*

UCLA Chancellor’s Fellowship, 1969 – 1973

Phi Kappa Phi Fellowship, 1969 – 1970

Outstanding Senior, College of Engineering, Washington State University, 1969

Professional Activities

Editor-in-Chief, *IEEE/ACM Transactions on Networking*, 1995 – 1999;
Editorial Board, 1992 – 2001

Editorial Board, *Computer Networks*, 1999 – 2007.

Editorial Board, *IEEE Transactions on Software Engineering*, 1990 – 1994

Editorial Board, *Performance Evaluation*, 1981 – 1993

Editor for Network Protocols, *IEEE Transactions on Communications*, 1984 – 1990

Editorial Board, *Proceedings of the IEEE*, 1985 – 1989

Co-founder of IEEE International Conference on Network Protocols in 1993

Co-founder of ACM SIGCOMM Conference in 1983

Steering Committee member, IEEE International Conference on Network Protocols, 1993 – 2008;
Advisory Board, 2008 – present

General Chair, IEEE International Conference on Network Protocols, Boston, 1994

Program Chair, ACM SIGCOMM Symposium, Austin, Texas, 1983 (inaugural)

Vice Chair, 8th Texas Conference on Computing Systems, Dallas (1979)

Program Committees

ACM SIGCOMM (2000, 1997, 1996, 1989, 1988, 1984, 1983)

IEEE INFOCOM (1998, 1997, 1996, 1993, 1992, 1984, 1983)

ACM SIGMETRICS (2005, 2000, 1982, 1981)

IEEE International Conference on Network Protocols (2005, 1997)

Fourth IEEE Workshop on the Architecture and Implementation of High Performance Communication Systems, Chalkidiki, Greece (1997)

IEEE Computer Security Foundations Workshop (1994)

TriComm '91, Chapel Hill (1991)

Eleventh IFIP International Conference on Protocol Specification, Testing and Verification, Stockholm (1991)

IFIP International Workshop on Protocols for High-Speed Networks, Palo Alto (1990)

IEEE Region 10 Conference on Computers and Communications, Hong Kong (1990)

ACM Principles of Distributed Computing, Vancouver (1984)

Panelist and contributor, *Research Priorities in Networking and Communications*, Airlie House Workshop reports to NSF Division of Networking and Communications Research and Infrastructure (1994, 1992, 1989)

Advisory Panel, NSF Division of Networking and Communications Research and Infrastructure (1991 – 1992)

NSF Review Panels, chair (October 1997, June 1996), panelist (1999, 1990, 1988)

Advisory Board, Wiley Book Series: *Advanced Texts in Computer Networking and Communications*, 2008 – present

SIGCOMM Award Committee (2005, 2007)

IEEE Koji Kobayashi Award Committee (1991)

External Examiner, Computer Science Department, University of Hong Kong (1990 – 1993)

IEEE Fellows Committee (1987 – 1990)

Doctoral Dissertations Supervised

Dong-Young Lee,

“Protocol Design for Dynamic Delaunay Triangulation,” December 2008. (Current Position: Member of Technical Staff, LG Electronics, Seoul, Korea.)

Yi Li,

“Model-driven Optimization of Multihop Wireless Networks,” August 2008, co-supervised by Yin Zhang. (Current Position: Member of Technical Staff, VMware, California.)

- Feng Wang,
“Multi-hop Wireless Network Management: Measurement, Modeling, and Control,” August 2007, co-supervised by Lili Qiu. (Current position: Member of Technical Staff, Meraki Networks, Mountain View, CA.)
- Min Sik Kim,
“Building and Maintaining Overlay Networks for Bandwidth-Demanding Applications,” August 2005. (Current position: Assistant Professor of Computer Science, Washington State University.)
- X. Brian Zhang,
“Protocol Design for Scalable and Reliable Group Rekeying,” August 2005. (Current position: Software Engineer, Google, Santa Monica, CA.)
- Huaiyu Liu,
“A Resilient Routing Infrastructure for Peer-to-Peer Networks,” August 2005. (Current Position: Research Scientist, Wireless Networking Lab, Intel Research.)
- Y. Richard Yang,
“Network Congestion Control,” August 2001. (Current position: Associate Professor of Computer Science, Yale University.)
- Chung Kei Wong,
“Network Security Services for Flows and Multicasts,” December 1999. (Current position: Technical Staff Member, Google, Mountain View, CA.)
- David K. Y. Yau,
“End System Support for Networking with Quality of Service Guarantees,” July 1997. (Current position: Associate Professor of Computer Science, Purdue University.)
- Geoffrey G. Xie,
“Network Architecture and Algorithms for Multimedia Transport,” August 1996. (Current position: Professor of Computer Science, Naval Postgraduate School, Monterey, CA.)
- Thomas Y. C. Woo,
“Authentication and Authorization in Distributed Systems,” August 1994. (Current position: Director, Networking Research Laboratory, Bell Laboratories, Lucent Technologies.)
- Kenneth L. Calvert,
“Quotient Problems and Protocol Conversion,” May 1991. (Current position: Professor and Department Chair, Department of Computer Science, University of Kentucky, Lexington.)
- Pradeep Jain,
“Specification of Real-Time Broadcast Networks,” May 1991. (Last known position: Technical staff member, Qualcomm.)
- Ching-Tarng Hsieh,
“Models and Algorithms for the Design of Store-and-Forward Communication Networks,” December 1986. (Current position: Engineering Director, Information & Communications Laboratories at ITRI, Taiwan and Regional Director of WiMax Forum.)
- Edward Ching-Hua Chow,
“A Discipline for the Verification and Modular Construction of Communication Protocols,” December 1985. (Current position: Professor of Computer Science, University of Colorado at Colorado Springs.)

- A. Udaya Shankar,
“Analysis of Communication Protocols via Protocol Projections,” December 1982. (Current position: Professor of Computer Science, University of Maryland at College Park.)
- Ben L. DiVito,
“Verification of Communications Protocols and Abstract Process Models,” August 1982, co-supervised by Don Good. (Current position: Senior Research Engineer, NASA Langley Research Center, Hampton, Virginia.)
- Y. Luke Lien,
“Modeling and Analysis of Flow-controlled Computer Communication Networks,” December 1981. (Last known position: Senior Manager, IBM Research.)

M.A. Theses Supervised

- Nishanth Sastry,
“Application Specific Unicast Congestion Control,” December 2001.
- Raghuram Bindignavle,
“Secure Network Programming,” December 1994.
- Simon Chow,
“A Study of MPEG Compressed Video Traffic on Computer Networks,” August 1994.
- Yeu-Chen Hao,
“Simulation of Queueing Network Models and Analysis of Performance Measures,” December 1984.

Research Grants (PI/PD)

- Principal Investigator/Project Director, “NECO: Protocol Design for Distributed Delaunay Triangulation and Its Applications,” National Science Foundation CNS-0830939, \$400,000, 9/1/08 to 8/31/11.
- Principal Investigator/Project Director, “NeTS-NR: A Novel Technique to Detect Shared Congestion and Applications,” National Science Foundation CNS-0434515, \$350,000, 10/01/04 to 9/30/08.
- Principal Investigator/Project Director, “A Foundation for Designing Overlay Network Protocols,” National Science Foundation ANI-0319168, \$350,000, 9/01/03 to 8/31/07.
- Principal Investigator/Project Director, “Congestion Controlled Streaming Media for the Internet,” Texas Advanced Research Program 003658-0439-2001, \$200,000 (no overhead), 1/1/02 to 8/31/04
- Principal Investigator/Project Director, “Secure Multicast Services and Applications,” National Science Foundation ANI-9977267, \$536,504, 9/15/99 to 8/31/03.
- Principal Investigator/Project Director, “Keystone: A Group Key Management Service,” NSA University Research Program MDA904-98-C-A901, \$199,971, 9/10/98 to 9/10/00.
- Principal Investigator/Project Director, “Packet Network Architecture and Protocols for Video Services,” National Science Foundation NCR-9506048, \$449,910, 8/15/95 to 8/31/00.

Principal Investigator/Project Director, "Architecture and Protocols for Secure Group Communications," Texas Advanced Research Program 003658-063, \$100,069 (no overhead), 1/1/98 to 12/31/99

Principal Investigator/Project Director, "Packet Switch Design for Real-Time Delivery of Multimedia," Texas Advanced Research Program 003658-220, \$154,617 (no overhead), 1/1/96 to 8/31/98 (co-principal investigator: Roy Jenevein).

Principal Investigator/Project Director, "Designing a Distributed Authorization Service," NSA University Research Program MDA904-94-C-6106, \$199,806, 7/11/94 to 7/31/97.

Principal Investigator/Project Director, "Networking and OS Support for Multimedia," AT&T Foundation, \$23,000, 10/1/95 to 10/1/97.

Principal Investigator/Project Director, "A Theoretical Foundation for Communication Network Protocols," National Science Foundation NCR-9004464, \$338,509, 9/1/90 to 8/31/94.

Principal Investigator/Project Director, "A Proof Methodology for Authentication Protocols," NSA University Research Program MDA 904-93-C-4089, \$119,942, 6/13/93 to 6/30/96.

Principal Investigator/Project Director, "Multimedia Research in UNIX Environment," Lockheed unrestricted grant, \$23,000, 1993.

Principal Investigator/Project Director, "Authorization in Distributed Systems," NSA University Research Program MDA 904-92-C-5150, \$119,976, 8/1/92 to 7/31/95.

Principal Investigator/Project Director, "Fundamental Problems in Communication Network Protocols," National Science Foundation NCR-8613338, \$333,200, 4/1/87 to 3/31/91.

Principal Investigator/Project Director, "Applying a Theory of Modules and Interfaces to Security Verification," NSA University Research Program MDA 904-91-C-7046, \$99,981, 6/28/91 to 6/27/94.

Principal Investigator/Project Director, "Verification of Network Protocols for Secure Communication," Texas Advanced Research Program Project No. 003658-135, \$113,306 (no overhead), 1/1/90 to 8/31/92.

Principal Investigator/Project Director, "Specification and Design of Real-Time Systems and Communications," Lockheed unrestricted grant, \$20,000, 1990 (co-principal investigator: Al Mok).

Principal Investigator/Project Director, "Performance Analysis of Concurrent Programs," Texas Advanced Research Program Project No. 1643, \$165,933 (no overhead), 6/1/88 to 8/31/90 (co-principal investigator: Galen Sasaki).

Principal Investigator/Project Director, "Protocols for Communication and Network Resource Allocation," National Science Foundation ECS-8304734, \$221,701, 6/1/83 to 5/31/87.

Principal Investigator/Project Director, "Resource Allocation for Computer Communication Networks," National Science Foundation ECS-8004376, \$100,440, 12/1/80 to 5/31/83.

Principal Investigator/Project Director, "Resource Allocation for Computer Communication Networks," National Science Foundation ENG78-01803, \$84,959, 6/1/78 to 11/30/80.

Research Grants (co-PI)

Co-Principal Investigator (with Zhang and Qiu), “Collaborative Research: NeTS-NBD: Traffic Engineering in an Uncertain World,” National Science Foundation CNS-0627020, \$500,000, 9/1/06 to 8/31/09.

Co-Principal Investigator (with Mok and Lin), “Coordinated Research in Adaptive Network-Centric Computing,” Office of Naval Research N00014-99-1-0402, \$454,000, 3/01/99 to 2/28/02.

(Prior research grants for which I was co-PI are omitted.)

Infrastructure Grants

Co-Principal Investigator (with Fussell, Mok, Porter, and Vin), “CISE Research Infrastructure: System Support for a Hierarchy of Distributed Applications,” National Science Foundation CDA-9624082, \$1.5 million (including UT-Austin matching funds), 1996 – 2001.

Project Director, equipment grant of RS6000 workstations (\$900,000 value), IBM Corporation, 1993.

(Prior infrastructure grants for which I was co-PI are omitted.)

Software Systems Built

1. **ACE** (2008), protocols for a dynamic set of p2p nodes to construct and maintain a distributed Delaunay triangulation for greedy routing in a d-dimensional Euclidean space (with Dong-Young Lee)
2. **Silk** (2004), a resilient, scalable routing fabric for p2p networks that use hypercube routing (with Huaiyu Liu).
3. **Keystone** (1999), a scalable group key management service based upon the key tree idea (with Chung K. Wong).
4. **FlowSign** (1999), efficient digital signature service for packet flows and multicasts (with Chung K. Wong).
5. **SNP** (1993), the *first* secure sockets layer for Internet applications (with Thomas Woo, Raghuram Bindignavle, and Shaowen Su); winner of 2004 ACM Software System Award.
6. **PROSPEC** (1985), one of the earliest tools for interactive protocol specification and verification with a graphical user interface (with Ching-Hua Chow).

Publications

Dissertation

- *Packet Switching in a Multi-Access Broadcast Channel with Application to Satellite Communication in a Computer Network*, Computer Science Department, University of California at

Los Angeles, March 1974 (supervisor: Professor Leonard Kleinrock); published as Technical Report UCLA-ENG-7429 (ARPA), School of Engineering and Applied Science, UCLA, April 1974, 306 pages.

Book

- *Principles of Communication and Networking Protocols*, IEEE Computer Society Press, 1984. [Editor]

Articles in Books

1. (with Thomas Y. C. Woo) “Authentication for Distributed Systems,” in *Internet Besieged: Countering Cyberspace Scofflaws*, Dorothy Denning and Peter Denning (editors), ACM Press and Addison Wesley, 1998.
2. (with A. U. Shankar) “Refinement and Projection of Relational Specifications,” in *Stepwise Refinement of Distributed Systems*, J. W. de Bakker, W. P. de Roever and G. Rozenberg (editors), Lecture Notes in Computer Science 430, Springer-Verlag, May 1990.
3. (with A. U. Shankar) “Construction of Network Protocols by Stepwise Refinement,” in *Stepwise Refinement of Distributed Systems*, J. W. de Bakker, W. P. de Roever and G. Rozenberg (editors), Lecture Notes in Computer Science 430, Springer-Verlag, May 1990.
4. (with A. U. Shankar) “Time-Dependent Communication Protocols,” in *Principles of Communication and Networking Protocols*, S. S. Lam (ed.), IEEE Computer Society Press, 1984.
5. “Multiple Access Protocols,” chapter in *Computer Communications, Vol. 1: Principles*, W. Chou (ed.), Prentice-Hall, 1982.
6. “Data Link Control Procedures,” chapter in *Computer Communications, Vol. 1: Principles*, W. Chou (ed.), Prentice-Hall, 1982.
7. “Satellite Multi-Access Schemes for Data Traffic,” in *Satellite Communications*, H. L. Van Trees (ed.), IEEE Press, 1979.
8. (with M. Reiser) “Congestion Control of Store-and-Forward Networks by Input Buffer Limits—An Analysis,” in *Advances in Computer Communications and Networks*, W. W. Chu (ed.), Artech House, 1979.
9. (with L. Kleinrock) “Packet-Switching in a Slotted Satellite Channel,” in *Advances in Computer Communications*, W. W. Chu (ed.), Artech House, 1974 (1st ed.), 1976 (2nd ed.).

Journal Articles

1. (with Min Sik Kim, Taekhyun Kim, YongJune Shin, and Edward J. Powers) “A Wavelet-based Approach to Detect Shared Congestion,” *IEEE/ACM Transactions on Networking* Vol. 16, No. 4, pages 763-776, August 2008.
2. (with Feng Wang and Lili Qiu) “Probabilistic Region-based Localization for Wireless Networks,” *ACM SIGMOBILE Mobile Computing and Communications Review (MC2R)*, Special Issue on Localization, January 2007.

3. (with Huaiyu Liu) "Failure Recovery for Structured P2P Networks: Protocol Design and Performance under Churn," *Computer Networks*, Vol. 50, Issue 16, November 2006, pages 3083-3104.
4. (with Nishanth Sastry) "CYRF: A Theory of Window-based Unicast Congestion Control," *IEEE/ACM Transactions on Networking*, Vol. 13, No. 2, pages 330-342, April 2005.
5. (with X. Brian Zhang and Dong-Young Lee) "Group Rekeying with Limited Unicast Recovery," *Computer Networks*, Vol. 44, Issue 6, pages 855-870, April 2004.
6. (with X. Brian Zhang, Dong-Young Lee, and Y. Richard Yang) "Protocol Design for Scalable and Reliable Group Rekeying," *IEEE/ACM Transactions on Networking*, Vol. 11, No. 6, December 2003.
7. (with Y. Richard Yang and Min S. Kim) "Transient Behaviors of TCP-Friendly Congestion Control Protocols," *Computer Networks*, Vol. 41, Issue 2, pages 193-210, February 2003.
8. (with Chung Kei Wong and Mohamed G. Gouda) "Secure Group Communications Using Key Graphs," *IEEE/ACM Transactions on Networking*, Vol. 8, No. 1, Feb. 2000, pages 16-30.
9. (with Chung Kei Wong) "Digital Signatures for Flows and Multicasts," *IEEE/ACM Transactions on Networking*, Vol. 7, No. 4, August 1999, pages 502-513.
10. (with David K. Y. Yau) "Migrating Sockets—End System Support for Networking with Quality of Service Guarantees," *IEEE/ACM Transactions on Networking*, Vol. 6, No. 6, pp. 700-716 December 1998.
11. (with Geoffrey G. Xie) "Real-Time Block Transfer Under a Link Sharing Hierarchy," *IEEE/ACM Transactions on Networking*, Vol. 6, No. 1, pp. 30-41, February 1998.
12. (with Geoffrey G. Xie) "An efficient network architecture motivated by application-level QoS," *Journal of High Speed Networking*, Vol. 6, No. 3, pp. 165-179, January 1998.
13. (with David K. Y. Yau) "Operating System Techniques for Distributed Multimedia," *International Journal of Intelligent Systems*, Special Issue on multimedia computing systems, 1998.
14. (with Geoffrey G. Xie) "Burst Scheduling Networks," *Performance Evaluation*, Special Issue on ATM Traffic Management, Vol. 31, November 1997, pages 133-157.
15. (with David K. Y. Yau) "Adaptive Rate-Controlled Scheduling for Multimedia Applications," *IEEE/ACM Transactions on Networking*, Vol. 5, No. 4, August 1997.
16. (with Pawan Goyal and Harrick Vin) "Determining End-to-End Delay Bounds in Heterogeneous Networks," *ACM/Springer-Verlag Multimedia Systems*, Vol. 5, No. 3, May 1997.
17. (with Geoffrey G. Xie) "Group Priority Scheduling," *IEEE/ACM Transactions on Networking*, Vol. 5, No. 2, April 1997.
18. (with Simon Chow and David Yau) "A Lossless Smoothing Algorithm for Compressed Video," *IEEE/ACM Transactions on Networking*, Vol. 4, No. 5, October 1996.
19. (with Geoffrey G. Xie) "Delay Guarantee of Virtual Clock Server," *IEEE/ACM Transactions on Networking*, Vol. 3, No. 6, December 1995.
20. (with A. U. Shankar) "A Theory of Interfaces and Modules I—Composition Theorem," *IEEE Transactions on Software Engineering*, Vol. 20, No. 1, January 1994.

21. (with T. Y. C. Woo) "Authorization in Distributed Systems: A New Approach," *Journal of Computer Security*, 1994.
22. (with A. U. Shankar) "A Stepwise Refinement Heuristic for Protocol Construction," *ACM TOPLAS*, Vol. 14, No. 3, July 1992.
23. (with T. Y. C. Woo) "Authentication for Distributed Systems," *Computer*, Vol. 25, No. 1, January 1992, and "Authentication revisited," *Computer*, Vol. 25, No. 3, March 1992.
24. (with A. U. Shankar) "Specifying Modules to Satisfy Interfaces: A State Transition System Approach," *Distributed Computing*, Vol. 6, July 1992, pages 39-63.
25. (with P. Jain) "Specification of Real-Time Broadcast Networks," *IEEE Transactions on Computers*, Vol. 40, No. 4, April 1991.
26. (with A. U. Shankar) "A Relational Notation for State Transition Systems," *IEEE Transactions on Software Engineering*, Vol. 16, No. 7, July 1990.
27. (with K. L. Calvert) "Formal Methods for Protocol Conversion," *IEEE Journal on Selected Areas in Communications*, Vol. 8, No. 1, January 1990.
28. (with C. T. Hsieh) "PAM—A Noniterative Approximate Solution Method for Closed Multi-chain Queueing Networks," *Performance Evaluation*, Vol. 9, No. 2, April 1989.
29. "Protocol Conversion," *IEEE Transactions on Software Engineering*, Vol. 14, No. 3, March 1988; correction in *IEEE Transactions on Software Engineering*, Vol. 14, No. 9, Sept. 1988, page 1376.
30. (with C. H. Chow) "PROSPEC: An Interactive Programming Environment for Designing and Verifying Communication Protocols," *IEEE Transactions on Software Engineering*, Vol. 14, No. 3, March 1988.
31. (with C. T. Hsieh) "Two Classes of Performance Bounds for Closed Queueing Networks," *Performance Evaluation*, Vol. 7, No. 1, February 1987.
32. (with P. Jain) "Modeling and Verification of Real-Time Protocols for Broadcast Networks," *IEEE Transactions on Software Engineering*, Vol. SE-13, No. 8, August 1987.
33. (with A. U. Shankar) "Time-Dependent Distributed Systems: Proving Safety, Liveness, and Real-Time Properties," *Distributed Computing*, Vol. 2, 1987.
34. (with C. H. Chow, M. G. Gouda) "A Discipline for Constructing Multiphase Communication Protocols," *ACM Transactions on Computer Systems*, Vol. 3, No. 4, November 1985.
35. (with A. U. Shankar) "Protocol Verification via Projections," *IEEE Transactions on Software Engineering*, Vol. SE-10, No. 4, July 1984.
36. (with A. U. Shankar) "An HDLC Protocol Specification and its Verification Using Image Protocols," *ACM Transactions on Computer Systems*, Vol. 1, No. 4, pp. 331–368, November 1983.
37. "A Simple Derivation of the MVA and LBANC Algorithms from the Convolution Algorithm," *IEEE Trans. on Computers*, Vol. C-32, No. 11, November 1983.
38. (with Y. L. Lien) "A Tree Convolution Algorithm for the Solution of Queueing Networks," *Comm. ACM*, Vol. 26, No. 3, March 1983.

39. (with J. W. Wong) "Queueing Network Models of Packet Switching Networks, Part 2: Networks with Population Size Constraints," *Performance Evaluation*, Vol. 2, No. 3, 1982.
40. (with J. W. Wong) "Queueing Network Models of Packet Switching Networks, Part 1: Open Networks," *Performance Evaluation*, Vol. 2, No. 1, 1982.
41. "Dynamic Scaling and Growth Behavior of Queueing Network Normalization Constants," *Journal of the ACM*, Vol. 29, No. 2, April 1982.
42. (with Y. L. Lien) "Congestion Control of Packet Communication Networks by Input Buffer Limits—A Simulation Study," *IEEE Trans. on Computers*, Vol. C-30, No. 10, October 1981.
43. (with A. U. Shankar) "A Derivation of Response Time Distributions for a Multi-Class Feedback Queueing System," *Performance Evaluation*, Vol. 1, No. 1, 1981.
44. "Packet Broadcast Networks—A Performance Analysis of the R-ALOHA Protocol," *IEEE Trans. on Computers*, Vol. C-29, July 1980.
45. "A Carrier Sense Multiple Access Protocol for Local Networks," *Computer Networks*, Vol. 4, No. 1, January 1980.
46. "Satellite Packet Communication—Multiple Access Protocols and Performance," *IEEE Trans. on Commun.*, Vol. COM-27, October 1979.
47. (with M. Reiser) "Congestion Control of Store-and-Forward Networks by Input Buffer Limits—An Analysis," *IEEE Trans. on Commun.*, Vol. COM-27, January 1979.
48. "A New Measure for Characterizing Data Traffic," *IEEE Trans. on Commun.*, Vol. COM-26, January 1978.
49. "Delay Analysis of a Time Division Multiple Access (TDMA) Channel," *IEEE Trans. on Commun.*, Vol. COM-25, December 1977.
50. "An Extension of Moore's Result for Closed Queueing Networks," *IBM Journal of Research and Development*, Vol. 21, July 1977.
51. "Queueing Networks with Population Size Constraints," *IBM Journal of Research and Development*, Vol. 21, July 1977.
52. (with P. J. Schweitzer) "Buffer Overflow in a Store-and-Forward Network Node," *IBM Journal of Research and Development*, Vol. 20, November 1976.
53. "Store-and-Forward Buffer Requirements in a Packet Switching Network," *IEEE Trans. on Commun.*, Vol. COM-24, April 1976.
54. (with L. Kleinrock) "Packet-Switching in a Multi-Access Broadcast Channel: Dynamic Control Procedures," *IEEE Trans. on Commun.*, Vol. COM-23, September 1975.
55. (with L. Kleinrock) "Packet-Switching in a Multi-Access Broadcast Channel: Performance Evaluation," *IEEE Trans. on Commun.*, Vol. COM-23, April 1975.

Conference Articles

1. (with Dong-Young Lee) “Efficient and Accurate Protocols for Distributed Delaunay Triangulation under Churn,” *Proceedings IEEE ICNP 2008*, Orlando, Florida, October 2008.
2. (with Dong-Young Lee and Eui Kyung Chung) “A Radius Geocast Routing Protocol,” *Proceedings IEEE International Conference on High Performance Computing and Communications*, Dalian, China, September 2008.
3. (with Dong-Young Lee) “Protocol Design for Dynamic Delaunay Triangulation,” *Proceedings of 27th IEEE ICDCS*, Toronto, June 2007.
4. (with Yi Li, Yin Zhang, and Lili Qiu) “SmartTunnel: Achieving Reliability in the Internet,” *Proceedings of IEEE INFOCOM 2007*, Anchorage, Alaska, May 2007.
5. (with Yun Mao, Feng Wang, Lili Qiu, and Jonathan Smith) “S4: Small State and Small Stretch Routing Protocol for Large Wireless Sensor Networks,” *Proceedings of the 4th USENIX Symposium on Networked System Design and Implementation (NSDI 2007)*, Cambridge, Massachusetts, April 2007.
6. (with Min Sik Kim, Taekhyun Kim, YongJune Shin, and Edward J. Powers) “Scalable Clustering of Internet Paths by Shared Congestion,” *Proceedings IEEE INFOCOM 2006*, Barcelona, Spain, April 2006.
7. (with X. Brian Zhang and Huaiyu Liu) “Efficient Group Rekeying Using Application Layer Multicast,” *Proceedings of 25th IEEE ICDCS*, Columbus, Ohio, June 2005.
8. (with Min Sik Kim and Yi Li) “Eliminating Bottlenecks in Overlay Multicast,” *Proceedings of IFIP Networking 2005*, Waterloo, Canada, May 2005.
9. (with Min Sik Kim, Taekhyun Kim, Yongjune Shin, and Edward J. Powers) “A Wavelet-based Approach to Detect Shared Congestion,” *Proceedings ACM SIGCOMM 2004*, Portland, Oregon, Aug. 30-Sept.3, 2004.
10. (with Huaiyu Liu) “Failure Recovery for Structured P2P Networks: Protocol Design and Performance Evaluation,” *Proceedings ACM SIGMETRICS 2004*, New York City, June 2004.
11. (with Huaiyu Liu) “Consistency-preserving Neighbor Table Optimization for P2P Networks,” *Proceedings ICPADS 2004*, Newport Beach, CA, July 2004.
12. (with Huaiyu Liu) “Neighbor Table Construction and Update in a Dynamic Peer-to-Peer Network,” *Proceedings IEEE ICDCS 2003*, Providence, RI, May 2003.
13. (with Min Sik Kim and Dong-Young Lee) “Optimal Distribution Tree for Internet Streaming Media,” *Proceedings IEEE ICDCS 2003*, Providence, RI, May 2003.
14. (with X. Brian Zhang and Dong-Young Lee) “Group Rekeying with Limited Unicast Recovery,” *Proceedings IEEE ICC 2003*, Anchorage, Alaska, May 2003.
15. (with Nishanth Sastry) “A Theory of Window-Based Unicast Congestion Control,” *Proceedings IEEE ICNP 2002*, Paris, November 2002.
16. (with Y. R. Yang, X. S. Li, and X. B. Zhang) “Reliable Group Rekeying: A Performance Analysis,” *Proceedings ACM SIGCOMM 2001*, San Diego, August 2001.
17. (with X. B. Zhang, D.-Y. Lee, and Y. R. Yang) “Protocol Design for Scalable and Reliable Group Rekeying,” *Proceedings SPIE Conference on Scalability and Traffic Control in IP Networks*, Denver, CO, August 2001.

18. (with X. S. Li, Y. R. Yang, and M. Gouda) "Batch Rekeying for Secure Group Communications," *Tenth International World Wide Web Conference*, Hong Kong, China, May 2001.
19. (with Y. Richard Yang and Min S. Kim) "Transient Behaviors of TCP-Friendly Congestion Control Protocols," *Proceedings IEEE INFOCOM 2001*, Anchorage, April 2001.
20. (with Y. Richard Yang and Min S. Kim) "Optimal Partitioning of Multicast Receivers," *Proceedings ICNP 2000*, Osaka, Japan, November 2000.
21. (with Y. Richard Yang) "General AIMD Congestion Control," *Proceedings ICNP 2000*, Osaka, Japan, November 2000.
22. (with Chung Kei Wong) "Keystone: A Group Key Management Service," *Proceedings International Conference on Telecommunications*, Acapulco, Mexico, May 2000.
23. (with C. K. Wong and M. Gouda) "Secure Group Communications using Key Graphs," *Proceedings ACM SIGCOMM '98*, Vancouver, B.C., September 1998.
24. (with C. K. Wong) "Digital Signatures for Flows and Multicasts," *Proceedings IEEE ICNP '98*, Austin, October 1998.
25. (with Thomas Y. C. Woo) "Designing a Distributed Authorization Service," *Proceedings IEEE INFOCOM '98*, San Francisco, March 1998.
26. (with Geoffrey G. Xie) "Admission Control and Loss Management for an Application-Level Statistical Service," *Proceedings IEEE ICNP '97*, Atlanta, October 1997.
27. (with David K. Y. Yau) "Migrating Sockets for Networking with Quality of Service Guarantees," *Proceedings IEEE ICNP '97*, Atlanta, October 1997.
28. (with David K. Y. Yau) "End System Support for Networking with Quality of Service Guarantees," *Proceedings of 4th IEEE Workshop on the Architecture and Implementation of High Performance Communication Systems*, Chalkidiki, Greece, July 1997.
29. (with Geoffrey G. Xie) "Real-Time Block Transfer Under a Link Sharing Hierarchy," *Proceedings of IEEE INFOCOM '97*, Japan, March 1997.
30. (with David K. Y. Yau) "Adaptive Rate-Controlled Scheduling for Multimedia Applications," *Proceedings ACM Multimedia '96*, Boston, November 1996.
31. (with Geoffrey G. Xie) "An Efficient Adaptive Search Algorithm for Scheduling Real-Time Traffic," *Proceedings of International Conference on Network Protocols*, Columbus, Ohio, October 1996.
32. (with Geoffrey G. Xie) "Group Priority Scheduling," *Proceedings of IEEE INFOCOM '96*, San Francisco, March 1996.
33. (with David K. Y. Yau) "An Architecture Towards Efficient OS Support for Distributed Multimedia," *IS&T/SPIE Proceedings Multimedia Computing and Networking*, San Jose, January 1996.
34. (with Geoffrey G. Xie) "Burst Scheduling Networks: Flow Specification and Performance Guarantees," *Proceedings NOSSDAV '95 Workshop*, Durham, New Hampshire, April 1995.
35. (with Pawan Goyal and Harrick Vin) "Determining End-to-End Delay Bounds in Heterogeneous Networks," *Proceedings NOSSDAV '95 Workshop*, Durham, New Hampshire, April 1995.

36. (with Geoffrey G. Xie) “Burst Scheduling: Architecture and Algorithm for Switching Packet Video,” *Proceedings IEEE INFOCOM '95*, Boston, April 1995.
37. (with Thomas Y. C. Woo), “Design, Verification and Implementation of an Authentication Protocol,” *Proc. Int. Conference on Network Protocols*, Boston, October 1994.
38. (with Simon Chow and David Yau) “An Algorithm for Lossless Smoothing of MPEG Video,” *Proceedings ACM SIGCOMM '94*, London, August 1994.
39. (with Thomas Woo, Raghuram Bindignavle, and Shaowen Su) “SNP: An Interface for Secure Network Programming,” *Proc. USENIX '94 Summer Technical Conference*, Boston, June 1994.
40. (with T. Y. C. Woo) “A Framework for Distributed Authorization,” *Proceedings ACM Conference on Computer and Communications Security*, Fairfax, VA, November 1993.
41. (with T. Y. C. Woo) “Verifying Authentication Protocols: Methodology and Example,” *Proceedings International Conference on Network Protocols*, San Francisco, October 1993.
42. (with T. Y. C. Woo) “A Semantic Model for Authentication Protocols,” *Proceedings IEEE Symposium on Research in Security and Privacy*, Oakland, May 1993.
43. (with T. Y. C. Woo) “Authorization in Distributed System: A Formal Approach,” *Proceedings IEEE Symposium on Research in Security and Privacy*, Oakland, May 1992.
44. (with A. U. Shankar) “Understanding Interfaces,” *Proceedings Fourth International Conference on Formal Description Techniques*, Sydney, Australia, November 1991 (**Conference Keynote Address**).
45. (with A. U. Shankar) “A Composition Theorem for Layered Systems,” *Proceedings 11th IFIP International Symposium on Protocol Specification, Testing and Verification*, Stockholm, June 1991.
46. (with A. U. Shankar and T. Y. C. Woo) “Applying a Theory of Modules and Interfaces to Security Verification,” *Proceedings IEEE Symposium on Research in Security and Privacy*, Oakland, May 1991.
47. (with K. L. Calvert) “Adaptors for Protocol Conversion,” *Proceedings INFOCOM '90*, San Francisco, June 1990.
48. (with K. L. Calvert) “The Protocol Conversion Problem—Finding a Quotient of Specifications,” *Proceedings 27th Allerton Conference*, Urbana-Champaign, September 1989.
49. (with K. L. Calvert) “Deriving a Protocol Converter: A Top-Down Method,” *Proceedings ACM SIGCOMM Symposium*, Austin, Texas, September 1989.
50. (with C. T. Hsieh) “PAM—A Noniterative Approximation Solution Method for Closed Multichain Queueing Networks,” *Proceedings ACM SIGMETRICS Conference*, Santa Fe, New Mexico, May 1988.
51. (with P. Jain) “Specification and Verification of Collision-Free Broadcast Networks,” *Proceedings ACM SIGCOMM Symposium*, Stanford University, August 1988.
52. “Protocol Conversion via Projections,” *Proceedings Int. Computer Science Conference*, Hong Kong, December 1988.
53. (with A. U. Shankar) “A Relational Notation for State Transition Systems,” *Proceedings Eighth International Symposium on Protocol Specification, Testing, and Verification*, North-Holland, 1988.

54. (with K. L. Calvert) "An Exercise in Deriving a Protocol Conversion," *Proceedings ACM SIGCOMM*, Stowe, VT, August 1987.
55. (with C. T. Hsieh) "Modeling, Analysis and Optimal Routing of Flow-Controlled Communication Networks," *Proceedings ACM SIGCOMM*, Stowe, VT, August 1987.
56. "Protocol Conversion—Correctness Problems," *Proceedings ACM SIGCOMM*, Stowe, VT, August 1986.
57. (with C. H. Chow, M. G. Gouda, A. U. Shankar) "Interactive Verification and Construction of Communication Protocols in PROSPEC," *Proceedings of INFOCOM '86*, Miami, FL, April 1986.
58. (with C. T. Hsieh) "Models and Algorithms for the Design of Store-and-Forward Communication Networks," *Proceedings International Conference on Communications*, Chicago, IL, June 1985.
59. (with M. G. Gouda and C. H. Chow) "On the Undecidability of Detecting Livelocks in Networks of Communicating Finite State Machines," *Proceedings Fourth International Workshop on Protocol Specification, Testing and Verification*, Mt. Pocono, PA, June 1984.
60. (with C. H. Chow and M. G. Gouda) "An Exercise in Constructing Multi-Phase Communication Protocols," *Proceedings ACM SIGCOMM '84 Symposium*, Montreal, June 1984.
61. (with A. U. Shankar) "Specification and Verification of Time-Dependent Communication Protocols," *Proceedings Fourth International Workshop on Protocol Specification, Testing and Verification*, Mt. Pocono, PA, June 1984.
62. (with C. H. Chow and M. G. Gouda) "On Constructing Multiphase Communication Protocols," *Proceedings Fourth International Workshop on Protocol Specification, Testing and Verification*, Mt. Pocono, PA, pp. 47–56, North-Holland, 1984.
63. "Communication Network Protocols: Formal Models and Analytic Methods," *NSF Workshop on Large-Scale Computer Communication Networks and Information Theory*, Washington, D.C., April 1984.
64. "Some Research Problems and Directions in Computer Communications," *NSF Workshop on Large-Scale Computer Communication Networks and Information Theory*, Washington, D.C., April 1984.
65. (with A. U. Shankar) "Verification of an HDLC Protocol with ARM Connection Management and Full-Duplex Data Transfer," *Proceedings ACM SIGCOMM '83 Symposium*, March 1983; also in *Computer Communication Review*, Vol. 13, No. 2, 1983.
66. (with A. U. Shankar) "On Time-Dependent Communication Protocols and their Projections," *Protocol Specification, Testing and Verification*, (ed. C. Sunshine), North-Holland Publishing Co., Amsterdam, 1982.
67. (with A. U. Shankar) "An Illustration of Protocol Projections," *Protocol Specification, Testing and Verification*, (ed. C. Sunshine), North-Holland Publishing Co., Amsterdam, 1982.
68. (with Y. L. Lien) "Optimal Routing in Networks with Flow-Controlled Virtual Channels," Computer Network Performance Symposium, University of Maryland, April 1982, published in *Performance Evaluation Review*, Vol. 11, No. 1, 1982.

69. "On the Performance of Multiple Access Protocols for Local Networks," *Proceedings 10th IMACS World Congress on Systems Simulation and Scientific Computation*, Montreal, August 1982.
70. (with A. U. Shankar) "Verification of Communication Protocols via Protocol Projections," *Proceedings INFOCOM 82*, Las Vegas, NV, March 1982, IEEE Computer Society Press.
71. (with A. U. Shankar) "Protocol Projections: A Method for Analyzing Communication Protocols," *Conference Rec. National Telecommunications Conference*, New Orleans, LA, November 1981.
72. (with Y. L. Lien) "Modeling and Analysis of Flow Controlled Packet Switching Networks," *Proceedings Seventh Data Communications Symposium*, Mexico City, October 1981, IEEE Computer Society Press.
73. "Design Considerations for Large Mobile Packet Radio Networks," *Local Networks and Distributed Office Systems*, Online Publications Ltd., Northwood, UK, 1981.
74. (with Y. L. Lien) "An Experimental Study of the Congestion Control of Packet Communications Networks," *Proceedings International Conference on Computer Communications*, Atlanta, GA, October 1980.
75. "A Packet Network Architecture for Local Interconnection," *Conference Rec. International Conference on Communications*, Seattle, WA, June 1980.
76. (with A. U. Shankar) "Response Time Distributions for a Multi-Class Queue with Feedback," International Symposium on Computer Performance Modeling, Measurement and Evaluation, Toronto, May 1980, published in *Performance Evaluation Review*, Vol. 9, No. 2, pp. 225–234, 1980.
77. "Congestion Control Techniques for Packet Networks," Second International Conference on Information Sciences and Systems, Patras, Greece, July 1979, *Advances in Communications*, (ed. D. Lainiotis and N. Tzannes), D. Reidel, Holland, 1980.
78. "A Packet Communication System Architecture for Local Networking," Workshop on Large Scale Systems, *Proceedings International Symposium on Circuits and Systems*, Houston, TX, April 1980.
79. "A Study of the CSMA Protocol in Local Networks," *Proceedings Fourth Berkeley Conference on Distributed Data Management and Computer Networks*, San Francisco, CA, August 1979.
80. "On Protocols for Satellite Packet Switching," *Conference Rec. International Conference on Communications*, Boston, MA, June 1979.
81. "An Analysis of the Reservation-ALOHA Protocol for Satellite Packet Switching," *Conference Rec. International Conference on Communications*, Toronto, June 1978.
82. "Packet Broadcasting Networks," *Proceedings Workshop on Pattern Database Systems*, Tokyo, Japan, December 1977.
83. (with M. Reiser) "Congestion Control of Store-and-Forward Networks by Input Buffer Limits," *Conference Rec. National Telecommunications Conference*, Los Angeles, CA, December 1977.
84. "Satellite Multiaccess Schemes for Data Traffic," *Proceedings International Conference on Communications*, Chicago, June 1977.

85. "Delay Analysis of a Packet-Switched TDMA System," *Conference Rec. National Telecommunication Conference*, Dallas, TX, November 1976.
86. (with L. Kleinrock) "Dynamic Control Schemes for a Packet Switched Multi-Access Broadcast Channel," National Computer Conference, Anaheim, CA, May 1975, *AFIPS Conference Proceedings*, Vol. 44, AFIPS Press, 1975.
87. (with L. Kleinrock) "On Stability of Packet Switching in a Random Multi-Access Broadcast Channel," *Proceedings Subconf. on Computer Nets*, Seventh Hawaii International Conference on System Sciences, Honolulu, January 1974.
88. (with L. Kleinrock) "Packet-Switching in a Slotted Satellite Channel," National Computer Conference, New York, NY, June 1973; in *AFIPS Conference Proceedings*, Vol. 42, 1973, pp. 703-710.

Other Publications

1. "Back to the Future, Part 4: The Internet," *ACM SIGCOMM Computer Communication Review*, Vol. 35, Issue 1, Pages 3-12, January 2005 (2004 SIGCOMM Award presentation and **Conference Keynote Address**).
2. (with Thomas Y. C. Woo) "A Lesson in Authentication Protocol Design," *ACM Operating Systems Review*, Vol. 28, No. 3, 1994.
3. (with L. Kleinrock) "Dynamics of the ALOHA Channel," ARPA Network Information Center, Stanford Research Institute, Menlo Park, California, ASS Note 50 (NIC 18435), August 1973.
4. "Some Satellite Simulation Results," ARPA Network Information Center, Stanford Research Institute, Menlo Park, California, ASS Note 48 (NIC 17655), July 1973 (*first experimental demonstration of ALOHA channel instability*).
5. (with L. Kleinrock) "Analytic Results with the Addition of One Large User," ARPA Network Information Center, Stanford Research Institute, Menlo Park, California, ASS Note 27 (NIC 12736), October 1972.
6. (with L. Kleinrock) "Correction for ASS Note 12," ARPA Network Information Center, Stanford Research Institute, Menlo Park, California, ASS Note 25 (NIC 12734), November 1972.
7. (with L. Kleinrock) "Approximations in the Infinite Population Model of the ARPANET Satellite System," ARPA Network Information Center, Stanford Research Institute, Menlo Park, California, ASS Note 17 (NIC 11862), October 1972.
8. (with L. Kleinrock) "Analytic Results for the ARPANET Satellite System Model Including the Effects of the Retransmission Delay Distribution," ARPA Network Information Center, Stanford Research Institute, Menlo Park, California, ASS Note 12 (NIC 11294), August 1972.

August 20, 2009