

Paul S. Min, Ph.D.
Washington University in Saint Louis
(Webpage : <https://ese.wustl.edu/faculty/Pages/Paul-Min.aspx>)

psm@wustl.edu
+1 (314) 853-6200 (phone)

Campus Box 1223
Academy Building Room 218A
St. Louis, MO 63130

Education

<u>Year</u>	<u>College or University</u>	<u>Degree</u>
1987	The University of Michigan	Ph.D. in Electrical Engineering
1984	The University of Michigan	M.S. in Electrical Engineering
1982	The University of Michigan	B.S. in Electrical Engineering

Professional Experience

From: 1990
To: Present
Organization: Washington University, St. Louis

Summary:

2015 - Senior Professor - Department of Electrical Systems Engineering

2011 – 2014 Chair – Undergraduate Curriculum, Department of Electrical and Systems Engineering

2000 – 2002 Chair – Graduate Curriculum, Department of Electrical and Systems Engineering

2002 - 2014 Associate Professor - Department of Electrical and Systems Engineering

1997 - 2008 On leave from full-time duty at Washington University – as Presidents of MinMax Technologies and Erlang Technology.)

1996 - 2002 Associate Professor - Department of Electrical Engineering

1996 Promoted with Tenure

1990 - 1996 Assistant Professor - Department of Electrical Engineering

- Teaching Experience
- “Transmission System and Multiplexing,” Washington University, ESE 571
 - “Electrical Laboratory I,” Washington University, EE 250.
 - “Communication Theory,” Washington University, ESE 471.
 - “Reliability and Quality Control,” Washington University, ESE 405/505
 - “Signaling and Control of Communications Networks,” Washington University, ESE 572.
 - “Introduction to Electronic Circuits,” Washington University, ESE232
 - “Queueing Systems and Discrete Stochastic Processes,” Washington University, EE 536 / CS 567.
 - “Digital Computer,” Washington University, EE 260M / CS 260.
 - “Data Networks,” Washington University, EE 530.
 - “Electrical Circuit Analysis,” Washington University, ESE 230.
 - “Computer/Communications System Analysis I,” Washington University, EE 557/ CS 557.
 - “Computer/Communications System Analysis II,” Washington University, EE558 / CS 558.
 - “Digital Systems Laboratory,” Washington University, EE 455 / CS 455.

From: 1999
To: 2008
Organization: Erlang Technology, Inc., St. Louis, Missouri
Title: Founder and President
Summary: Up to 70 employees, \$40M in total capital raised from 5 VCs and 3 Corporations
Received “Product of Year” Award from Analog Zone Magazine in 2004

From: 1997
To: 1999
Organization: MinMax Technologies, Inc., St. Louis, Missouri
Title: Founder and President
Summary: Fabless semiconductor company, designing high performance switching ASICs

From: September 1987
To: August 1990
Organization: Bellcore, New Jersey
Title: Member of Technical Staff
Summary: Member of New Network Architecture Development Group

From: 1983
To: 1987

Organization: Department of Electrical Engineering, The University of Michigan
Title: Graduate Instructor
Summary: Instructor for senior level Electrical Engineering Laboratory Class. Received a Best “Best Graduate Instructor Award” from the Department of Electrical Engineering

Professional Affiliations, Achievements & Awards

- Technical Program Committee, COMCAS 2015, Tel Aviv, November 2017.
- Technical Program Committee, COMCAS 2015, Tel Aviv, October 2015.
- Past-Chair, Saint Louis Section of the Institute of Electrical and Electronics Engineers (IEEE), 2015
- Member of Executive Committee, Saint Louis Section of the IEEE, 2010-2015
- Chair, Saint Louis Section of the IEEE, 2014
- Technical Program Committee, COMCAS 2013, Tel Aviv, October 2013.
- Vice Chair, Saint Louis Section of the IEEE, 2013
- Treasurer, Saint Louis Section of the IEEE, 2012
- The Best Paper Award at MOBILITY 2011, October 2011, Barcelona, Spain
- Counselor, Student Chapter of the Year, the Institute of Electrical and Electronics Engineers, 2011
- Award of Appreciation, Saint Louis Section of the Institute of Electrical and Electronics Engineers, 2011, for contribution to various activities of the Saint Louis Section the Institute of Electrical and Electronics Engineers
- Secretary, Saint Louis Section of the IEEE, 2010
- Counselor, Student Chapter of the Year, the Institute of Electrical and Electronics Engineers, 2010
- Wall Street Journal Businessmen of Year, 2003.
- American Men and Women of Science, listed in 1997.
- Outstanding Achievement Award, Bellcore, 1990.
- 18th ISATA Award of Technical Excellence, the best paper award at ISATA 1988.
- Rockwell Fellow, Rockwell International, 1985, 1986.
- Outstanding Graduate Student Award, the University of Michigan, 1985.
- Outstanding Teaching Award, the University of Michigan, 1984, 1986.
- Member of Honor's College, the University of Michigan, 1979, 1980.
- Honor's Convocation, the University of Michigan, 1979.
- Outstanding Freshman Award, the University of Michigan, 1979.
- Woodhaven Rotary Club Scholarship, Woodhaven Rotary Club, 1978.

- Second Place Winner, the State of Michigan Mathematics Prize Competition, 1977.
- International Program Committee, *IASTED International Conference on Communications, Internet and Information Technology (CIIT 2005)*, Cambridge, Massachusetts from October 31-November 2, 2005
- International Program Committee, *IASTED International Conference on Communications 2003*, Scottsdale, Arizona, 2003
- International Program Committee, *Wireless and Optical Communications 2003*, Banff, Canada, 2003.
- International Program Committee, Session Chair, *Wireless and Optical Communications 2002*, Banff, Canada, 2002.
- Invited participant, *NSF Workshop on Enhancing International Cooperation in CS/CE Research and Education*, Portland, 1997.
- Session Chair, *the 1993 Conference on Information Sciences and Systems*, Baltimore, March 1997.
- Member, Board of Editors, *Journal of Network and Systems Management*, 1996-1998.
- Program Committee, *International Symposium on Integrated Network Management*, San Diego, 1997.
- Guest Editor, *Journal of Network and Systems Management, Special Issue on Routing in Broadband Networks*, December 1995 and June 1996.
- Invited participant, *ARPA Workshop on Survivability of Large Scale Systems*, Washington D.C., 1996.
- Special Event Organizer, *International Symposium on Integrated Network Management*, Santa Barbara, 1995.
- Organizing Committee, *International Symposium on Integrated Network Management*, Santa Barbara, 1995.
- Local Arrangements Chair, *IEEE Information Theory Workshop on Information Theory Multiple Access and Queueing*, St. Louis, 1995.
- Chair, *Communications Chapter, St. Louis Section of the IEEE*, 1995.
- Participant, *IEEE Information Theory Workshop on Information Theory, Multiple Access and Queueing*, St. Louis, 1995.
- Participant, *ARPA/AFOSR Non-Linear Optics and Communication Workshop*, Denver, 1994.
- Participant, *CNRI Giga Bit Network Workshop*, Washington D.C., 1993.
- Participant, *IFIP/IEEE International Workshop on Distributed Systems*, New Jersey, 1993.
- Program Committee, *International Conference on Computer Communications and Networks*, San Diego, 1992.
- Session Chair, *ISMM International Conference*, New Orleans, 1990.
- Senior Member, *IEEE*.
- Member, *IEEE Committee on Network Operations and Management*.
- Member, *IEEE Committee on Computer Communications*.
- Registered Specialist, *Hong Kong Research Grant Council*.

- Reviewer, *IEEE Transactions on Communications*.
- Reviewer, *IEEE Transactions on Networking*.
- Reviewer, *IEEE Journal on Selected Areas in Communications*.
- Reviewer, *Journal of Network and Systems Management*.
- Reviewer, *Telecommunication Systems*.
- Reviewer, Computers and Electrical Engineering.
- Reviewer, *ETRI Journal*.
- Reviewer, *IEEE Transactions on Automatic Control*.
- Reviewer, *IEEE Communications*.
- Book Reviewer, *Prentice Hall*.
- Book Reviewer, *Morgan Kaufmann Publishers, Inc.*
- Book Reviewer, *Irwin Publishing Co.*

University Activities:

- Undergraduate Studies Committee, School of Engineering and Applied Science (2012 – Present)
- Faculty Advisor for IEEE Student Chapter (2009 – Present)
- Ambassador for McDonnell International Scholar Academy (2007 – 2013)
- Web Development Committee (2006 – 2008)
- University Judicial Board (1998 - 2000)
- Resource Generation Committee (1994 - 1995)
- Top 20 Committee (1992 - 1995)
- Telecommunications Committee, Chair (1991 - 1997)
- Library Planning Committee (1991 - 1992)
- Computer Engineering Committee (1990 - 1996)
- Communications Curriculum Committee (1990 - 1992)
- Resources Committee (1990 - 1992)

Patents

<u>Patent No.</u>	<u>Date</u>	<u>Title</u>
7,110,411	09/19/06	Method of and Apparatus for WFQ Scheduling Using a Plurality of Scheduling Queues to Provide Fairness, High Scalability, and Low Computational Complexity
7,106,738	09/12/06	Method of and Apparatus for High Speed Packet Switching Using Train Packet Queuing and Providing High Scalability
6,859,455	02/22/05	Method of and Apparatus for Building and Using Multi-Dimensional

		Index Trees for Multi-Dimensional Data Objects
6,614,789	09/02/03	Method of and Apparatus for Matching Strings of Different Lengths
6,359,885	3/19/02	Multi-Channel Packet Switching Apparatus Having Traffic Flow Controlling and Checking Functions
6,128,292	10/03/00	Packet Switching Apparatus with Multi-Channel and Multi-Cast Switching Functions and Packet Switching System Using the Same
5,788,161	12/13/98	Network Designer for Communication Networks
5,526,352	06/11/95	Integrable Low Complexity Multi-Channel Switch
5,440,549	08/08/95	Nonblocking Multi-Channel Switching with Multicasting Capability

Publications

- Yu, Qixiang, Luo, Z., and Min, P.S., “Intrusion Detection in Wireless Sensor Networks for Destructive Intruders.” Proceedings of the APSIPA 2015 conference. December 16-19, 2015.
- Hung, C.P., and Min, P.S., “Simple Web Application Framework.” Submitted for publication in the IEEE Transactions on Cloud Computing.
- Luo, Z., and Min, P.S., “Parallel Implementation of Energy-Based Target Localization Methods in Wireless Sensor Networks.” Proceeding of the 2014 IEEE SOUTHEASTCON.
- Yu, Q., Luo, Z., and Min, P.S., “Intrusion Detection in Wireless Sensor Networks for Destructive Intruder.” Proceeding of 2014 International Conference on Smart Computing (SMARTCOMP 2014).
- Luo, Z., and Min, P.S., “Survey of Target Localization Methods in Wireless Sensor Networks,” 19th IEEE International Conference on Networks (ICON 2013), Singapore, December 11-13, 2013.
- Hung, C.P., and Min, P.S., “Deriving and Visualizing the Lower Bounds of Information Gain for Prefetch Systems,” 19th IEEE International Conference On Networks (ICON 2013), Singapore, December 11-13, 2013.
- Hung, C.P., and Min, P.S., “Access LUT without CAM - Improved Pearson Hashing for Collision Reduction,” 19th IEEE International Conference On Networks (ICON 2013), Singapore, December 11-13, 2013.
- Luo, Z and Min, P.S., “Target Localization in Wireless Sensor Networks for Industrial Control with Selected Sensors.” International Journal of Distributed Sensor Networks, Volume 2013 (2013), Article ID 304631.
- Hung, C.P., and Min, P.S. “Performance Evaluation of Distributed Mobile Application Virtualization Services,” International Journal on Advances in Internet Technology, Vol. 5, no. 3&4, 2012, pp. 65-83.
- Hung, C.P. and Min, P.S., “Performance evaluation of distributed application virtualization services using the UMTS mobility model,” MOBILITY 2011 The First International Conference on Mobile Services, Resources, and Users, 23-29 Oct. 2011.

- Hung, C.P. and Min, P.S., "Service Area Optimization For Application Virtualization Using UMTS Mobility Model," International Conference on Internet Computing, pp. 128-134, Las Vegas, July 18-21, 2011.
- Hung, C.P. and Min, P.S., "Application Virtualization Using UMTS Mobility Model," ICOMP'11, September, 2011.
- Hung, C.P. and Min, P.S., "Infrastructure Arrangement for Application Virtualization Service," the 9th International Information and Telecommunication Technologies Symposium, Vol.1, pp. 78-85, Rio de Janeiro, December 2010.
- Hung, C.P. and Min, P.S., "Probabilistic Approach to Network-Based Virtual Computing," the 9th International Information and Telecommunication Technologies Symposium, Vol.1, pp. 117-124, Rio de Janeiro, December 2010.
- Shiravi, A. and Min, P. S., "On the Latency Bound of Proportional Nested-DRR with Credit Adjusting," *2007 Workshop on High Performance Switching and Routing HPSR 2007*, July 2007.
- Shiravi, A. and Min, P. S., "LOOFA-PB: A Modified LOOFA Scheduler for Variable-Length Packet Switching." *2007 IEEE International Conference on Communications (ICC 2007)*, Glasgow, June 2007.
- Shiravi, A., Kim, Y. G., and Min, P. S., "Congestion Prediction of Self-Similar Network through Parameter Estimation," *Proceedings of 2006 IEEE/IFIP Network Operations & Management Symposium*, April 2006, Vancouver.
- Shiravi, A., Kim, Y. G., and Min, P. S., "Traffic Dispatching Algorithm in Three-Stage Switch," *Proceedings of 5th International Conference on Networking*, April 2006, Mauritius.
- Shiravi, A., Kim, Y. G., and Min, P. S., "Proportional Nested Deficit Round Robin with Credit Adjusting," *Proceedings of 2nd Int'l Conf. on Quality of Service in Heterogeneous Wired/Wireless Networks (QShine 2005)*, Orlando, August 2005.
- Shiravi, A., Kim, Y. G., and Min, P. S., "Proportional Nested Deficit Round Robin: Improving the Latency of Packet Scheduler with an $O(1)$ Complexity," *Proceedings of International Workshop on Advanced Architectures and Algorithms for Internet Delivery and Applications (AAA-IDEA 2005)*, Orlando, June 2005
- Kim, Y. G., Shiravi, A., and Min, P. S., "Prediction-Based Routing through Least Cost Delay Constraint," *Proceedings of IEEE IPDPS 2004*, Santa Fe, April 2004.
- Kim, Y. G. and Min, P. S., "On the Prediction of Average Queuing Delay with Self-Similar Traffic," *Proceedings of IEEE GLOBECOM 2003*, San Francisco, December 2003.
- Hu, C., Saidi, H., Yan, P. Y., and Min, P.S., "A Protocol Independent Policier And Shaper Using Virtual Scheduling Algorithm," *Proceedings of ICCAS 2002*.
- Hu, C., Saidi, H., and Min, P.S., "DB_WFQ: An Efficient Fair Queueing Using Binary Counter," *Proceeding of Coins 2002*.
- Yoon, U. and Min, P.S., "Performance Analysis of Radio Link Control Mechanism in W-CDMA System", *IEEE VTC'01 Fall*, October 2001, New Jersey

- Akl, B., Hegde, M.V., Naraghi-Pour, M., and Min, P.S., "Multi-Cell CDMA Network Design," *IEEE Transaction on Vehicular Technology*, Volume 50, No. 3, pp. 711-722, May 2001.
- Yoon, U., Park, S., Min, P.S., "Performance Analysis of Multiple Rejects ARQ at RLC (Radio Link Control) for Packet Data Service in W-CDMA System," *IEEE Globecom*, November 2000, San Francisco.
- Yoon, U., Park, S., Min, P.S., "Performance Analysis of Multiple Rejects ARQ for RLC (Radio Link Control) in the Third Generation Wireless Communication," *WCNC*, September 2000, Chicago.
- Yoon, U., Park, S., Min, P.S., "Network Architecture and Wireless Data Service Protocol based on Mobile IP toward the Third Generation Wireless Communication," *3G Wireless*, June 2000, San Francisco, pp. 211-215
- R.G. Akl, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Multi-Cell CDMA Network Design," *IEEE International Conference on Communications*, June 2000.
- R.G. Akl, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "CDMA Network Design to Meet Non-uniform User Demand," *International Teletraffic Congress*, March 2000.
- R.G. Akl, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "CDMA Network Design," *IEEE Transactions on Vehicular Technology*.
- R.G. Akl, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Cell Placement in a CDMA Network," *IEEE Wireless Communications and Networking Conference*, September 1999, Volume 2, pp. 903-907.
- R.G. Akl, M.V. Hegde, P.S. Min, "Effects of Call Arrival Rate and Mobility on Network Throughput in Multi-Cell CDMA," *IEEE International Conference on Communications*, June 1999, Volume 3, pp. 1763-1767.
- Hegde, M.V., Schmid, O.A., Saidi, H., and Min, P.S., "Real-Time Adaptive Bandwidth Allocation for High-Speed ATM Switches," accepted, *International Conference on Communications*, June 1999.
- Akl, B.G., Hegde, M.V., and Min, P.S., "Effects of Mobility on Network Throughput in Multicell CDMA Networks," accepted, *International Conference on Communications*, June 1999.
- Akl, B.G., Hegde, M.V., Min, P.S., and Naraghi-Pour, M., "Flexible Allocation of Capacity in Multi-Cell CDMA Networks," accepted, *Vehicular Technology Conference*, June 1999.
- R.G. Akl, M.V. Hegde, M. Naraghi-Pour, P.S. Min, "Flexible Allocation of Capacity in Multi-Cell CDMA Networks," *IEEE Vehicular Technology Conference*, May 1999, Volume 2, pp. 1643-1647.
- Oh, M.S., and Min, P.S., "Reliability Analysis for One-Turn and Deflection Crossbar Architectures and Distributed Fault Recovery Scheme," *Proceedings of GLOBECOM 97*, Phoenix, November 1997.

- Kim, K.B., Yan, P.Y., Kim, K.S., Schmid, O., and Min, P.S., "A Growable ATM Switch with Embedded Multi-Channel Multicasting Property," *Proceedings of GLOBECOM 97*, pp. 222-226, Phoenix, November 1997.
- Kim, K.B., Yan, P.Y., Kim, K.S., Schmid, O., and Min, P.S., "MASCON: A Single IC Solution to ATM Multi-Channel Switching with Embedded Multicasting," *Proceedings of ISS 97*, pp. 451-458, Toronto, September 1997.
- Maunder, A.S., and Min, P.S., "Investigation of Rate Control in Routing Policies for B-ISDN Networks," *Proceedings of the 15th International Teletraffic Congress*, Washington D.C., June 1997.
- Yan, P.Y., Kim, K.B., Kim, K.S., and Min, P.S., "A Large Scale ATM Switch System Using Multi-Channel Switching Paradigm," *Proceedings of ATM Workshop*, Lisbon, Portugal, May 1997.
- Yan, P.Y., Kim, K.S., Min, P.S., and Hegde, M.V., "Multi-Channel Deflection Crossbar (MCDC): A VLSI Optimized Architecture for Multi-Channel ATM Switching," *Proceedings of IEEE INFOCOM 97*, Kobe, Japan, April 1997.
- Maunder, A., Rayes, A., and Min, P.S., "Analysis and Rate Controlling Link: Leaky Bucket with Finite Servers," *Proceedings of the 1997 Conference on Information Sciences and Systems*, Baltimore, March 1997.
- Shin, S.W., Min, P.S., and Kim, J.H., "Real Time Traffic Management System at Korean Mobile Telecom," *Proceedings of 19th Annual Pacific Telecommunications Conference*, pp. 113-121, Honolulu, Hawaii, January 1997.
- Min, P.S., Hegde, M.V., Chandra, A., and Maunder, A.S., "Analysis of Banyan Based Copy Networks with Internal Buffering," *Journal of High Speed Networks*, Volume 5, No. 3, pp. 259-275 November 1996.
- Vargas, C., Hegde, M.V., Naraghi-Pour, M., and Min, P.S., "Shadow Prices for Least Loaded Routing and Aggregated Least Busy Alternate Routing," *IEEE Transactions on Networking*, Volume 4, No. 5, pp. 796-807, October 1996.
- Shin, S.W., Kwon, S.M., and Min, P.S., "Capacity Analysis of CDMA with Nonuniform Cell Loading and Sizes," *Proceedings of the 34th Annual Allerton Conference*, October 1996.
- Hegde, M.V., Min, P.S., and Sohraby, K., "Note from Guest Editors," *Journal of Network and Systems Management*, Volume 4, No. 2, pp. 101-102, June 1996.
- Rayes, A. and Min, P.S., "Application of Shadow Price in Capacity Expansion of State Dependent Routing," *Journal of Network Systems Management*, Volume 4, No. 1, pp. 71-93, March 1996.
- Min, P.S., "PCS Revolution in the United States," *Electronics News*, No. 2277, January 22, 1996. Translated and published in Korean.
- Hegde, M.V., Min, P.S., and Sohraby, K., "Guest Editorial," *Journal of Network and Systems Management*, Volume 3, No. 4, pp. 347-349, December 1995.

- Min, P.S., Hegde, M.V., Saidi, H., and Chandra, A., "Nonblocking Copy Networks in Multi-Channel Switching," *IEEE Transactions on Networking*, Volume 3, No. 6, pp. 857-871, December 1995.
- Rayes, A. and Min, P.S., "Capacity Expansion of Least Busy Alternate Routing with Shadow Price," *Proceedings of GLOBECOM 95*, Singapore, November 1995.
- Min, P.S., Hegde, M.V., Chandra, A., and Maunder, A., "Throughput and Delay for Copy Networks with Internal Buffers," *Proceedings of the 33rd Annual Allerton Conference*, October 1995.
- Min, P.S., Hegde, M.V., Saidi, H., and Chandra, A., "Fanout Splitting in Nonblocking Copy Networks with Shared Buffering," *Proceedings of the 33rd Annual Allerton Conference*, October 1995.
- Min, P.S., Hegde, M.V., and Rayes, A., "Estimation of Exogenous Traffic Based on Link Measurements in Circuit-Switched Networks," *IEEE Transactions on Communications*, Volume 43, No. 8, pp. 2381-2390, August 1995.
- Maunder, A., Rayes, A., and Min, P.S., "Analysis of Routing Policies in Broadband Networks." Invited paper. *Canadian Journal of Electrical and Computer Engineering*, Special Issue on Planning and Designing of Broadband Networks, Volume 20, No. 3, pp. 125-136, July 1995.
- Min, P.S., Hegde, M.V., Saidi, H., and Chandra, A., "Architecture and Performance of Nonblocking Copy Networks with Multi-Channel Switching," *Proceedings of APCC 95*, pp. 531-535, Osaka, Japan, June 1995.
- Saidi, H., Min, P.S., and Hegde, M.V., "A New Structural Property of Statistical Data Fork," *IEEE Transactions on Networking*, Volume 3, No. 3, pp. 289-298, June 1995.
- Min, P.S., Saidi, H., and Hegde, M.V., "A Nonblocking Architecture for Broadband Multi-Channel Switching," *IEEE Transactions on Networking*, Volume 3, No. 2, pp. 181-198, April 1995.
- Min, P.S., Hegde, M.V., Saidi, H., and Chandra, A., "Multi-Channel Copy Networks: Architecture, Performance Model, Fairness, and Cell Sequencing," *Proceedings of IEEE INFOCOM 95*, pp. 931-938, Boston, April 1995.
- Min, P.S., Hegde, M.V., and Chandra, A., "Analysis of Packet Movements in Internally Buffered Copy Networks," *Third ORSA Telecommunications Conference*, p. 141, Boca Raton, Florida, March 1995.
- Maunder, A. and Min, P.S., "Routing for Multi-Rate Traffic with Multiple Qualities of Service," *Proceedings of the Third International Conference on Computer Communications and Networks*, pp. 104-108, San Francisco, September 1994.
- Saidi, H. and Min, P.S., "Performance Benefits of Multi-Channel Switching," *Proceedings of the 32nd Annual Allerton Conference*, pp. 583-592, September 1994.
- Min, P.S., "Book Review: 'Telecommunications Network Management into the 21st Century'," *IEEE Communications*, Volume 32, No. 7, pp. 5-8, July 1994.

- Saidi, H., Min, P.S., and Hegde, M.V., "Guaranteed Cell Sequence in Nonblocking Multi-Channel Switching," *Proceedings of IEEE INFOCOM 94*, Toronto, pp. 1420-1427, June 1994.
- Min, P.S., Hegde, M.V., Saidi, H., and Chandra, A., "Shared Buffering in Nonblocking Copy Networks," *Proceedings of the 1994 IEEE International Symposium on Information Theory*, Norway, p. 406, June 1994.
- Min, P.S., Hegde, M.V., and Rayes, A., "Real Time Traffic Estimation in Circuit-Switched Networks," *Proceedings of the 14th International Teletraffic Congress*, France, pp. 1175-1184, June 1994.
- Hegde, M.V., Min, P.S., and Rayes, A., "State Dependent Routing: Traffic Dynamics and Performance Benefits," *Journal of Network and Systems Management*, Volume 2, No. 2, pp. 125-149, June 1994.
- Saidi, H., Min, P.S., and Hegde, M.V., "Control of Packet Flow in Statistical Data Forks," *Proceedings of the 1994 International Conference on Communications*, New Orleans, pp. 415-419, May 1994.
- Saidi, H., Min, P.S., and Hegde, M.V., "Nonblocking Multi-Channel Switching in ATM Networks," *Proceedings of the 1994 International Conference on Communications*, New Orleans, pp. 701-705, May 1994.
- Maunder, A. and Min, P.S., "Analysis and Development of Routing Schemes for Multi-Rate, Multi-Point Traffic," *Proceedings of the 1994 Conference on Information Sciences and Systems*, Princeton, pp. 1041-1046, March 1994.
- Min, P.S., Hegde, M.V., and Chandra A., "Internal Buffering in Banyan-Based Copy Networks," *Proceedings of the 1994 Conference on Information Sciences and Systems*, Princeton, pp. 209-214, March 1994.
- Rayes, A. and Min, P.S., "Capacity Expansion in State Dependent Routing Schemes," *Proceedings of the 1994 Conference on Information Sciences and Systems*, Princeton, pp. 237-241, March 1994.
- Vargas, C., Hegde, M.V., Naraghi-Pour, M., and Min, P.S., "Shadow Prices for State Dependent Routing," *Proceedings of the 1994 Conference on Information Sciences and Systems*, Princeton, pp. 243-248, March 1994.
- Saidi, H., Min, P.S., and Hegde, M.V., "Non-Blocking Multi-Channel Switching." Invited paper. *Proceedings of the 31st Annual Allerton Conference*, pp. 335-344, September 1993.
- Min, P.S., Hegde, M.V., and Rayes, A., "Model Based Estimation of Exogenous Traffic," *Proceedings of the 1993 Conference on Information Sciences and Systems*, Baltimore, pp. 126-131, March 1993.
- Hegde, M.V., Min, P.S., and Rayes, A., "Performance Analysis of State Dependent Routing," *Proceedings of the 1993 Conference on Information Sciences and Systems*, pp. 695-700, Baltimore, March 1993.
- Hegde, M.V. and Min, P.S., "Telephone Networks," Magill Survey of Science Applied Science, Salem Press, pp. 2624-2630, 1992.

- Saidi, H., Min, P.S., and Hegde, M.V., "Assignment of 2^k Trunk Groups in Multi-Channel Switches Using Generalized Binary Addresses," *Proceedings of the 30th Annual Allerton Conference*, pp. 652-661, September 1992.
- Hegde, M.V. and Min, P.S., "Performance Analysis of State Dependent Routing." Invited paper. *Second ORSA Telecommunications Conference*, Boca Raton, Florida, February 1992.
- Rizzoni, R. and Min, P.S., "Detection of Sensor Failures in Automotive Engines," *IEEE Transactions on Vehicular Technology*, Volume 40, No. 2, pp. 487-500, May 1991.
- Min, P.S. and Hegde, M.V., "End-to-End Planning Models for Optimal Evolution of Telecommunications Network," *Proceedings of IEEE INFOCOM 90*, San Francisco, pp. 200-206, June 1990.
- Min, P.S., "Validation of Controller Inputs in Electronically Controlled Engines." Invited paper. *Proceedings of the 1990 American Control Conference*, pp.2887-2890, San Diego, May 1990.
- Min, P.S. and Youn, C., "Generic Equipment Models (GEM) for Consistent Planning of Telecommunications Networks," *Proceedings of the 1990 ISMM International Conference*, New Orleans, pp. 190-194, March 1990.
- Min, P.S., "Robust Application of Beard-Jones Detection Filter," *Advances in Computing and Control*, Springer-Verlag, Volume 130, pp. 162-173, 1989.
- Min, P.S. and Ribbens, W.B., "A Vector Space Solution to Incipient Sensor Failure Detection," *IEEE Transactions on Vehicular Technology*, Volume 38, No.3, pp. 148-158, August 1989.
- Min, P.S., "Robust Application of Beard-Jones Detection Filter," *Proceedings of the 1989 American Control Conference*, Pittsburgh, pp. 859-864, June 1989.
- Rizzoni, G. and Min, P.S., "Real Time Detection Filters for the On-board Diagnosis of Incipient Failures," *Proceedings of the 1989 International Symposium on Allied Technology and Automation*, pp. 1445-1466, Paper No. 89131, Florence, Italy, June 1989.
- Min, P.S., "Diagnosis of On-Board Sensors in Internal Combustion (IC) Engines," *Proceedings of the 1989 American Control Conference*, Pittsburgh, pp. 1065-1070, June 1989.
- Min, P.S., "Detection of Incipient Sensor Failures in Internal Combustion Engines," *Proceedings of the 1988 International Symposium on Allied Technology and Automation*, Paper No. 88038, Florence, Italy, June 1988.

Testimony Provided or Expected to Provide as Expert Witness

Matter: Arbitration for Licensing
Law Firm: Alston Bird

Case Name: Nokia v. LG Electronics, International Chamber of Commerce Arb. No. 21326
Testifying Expert for Nokia.
Completed in October 2016.
(Expert reports submitted.)

Matter: Patent Infringement for Mobile Devices

Law Firm: Paul Hastings

Case Name: Odyssey Wireless, Inc., v. Samsung Electronics Co., Ltd., et al, Case No. 3:15-cv-1738-H-RBB (U.S.D.C.S.D. Cal.)
Testifying Expert for Samsung.
Completed in October 2016.
(Expert reports submitted.)

Matter: Patent Infringement for Mobile Devices

Law Firm: Greenberg Traurig

Case Name: Mobile Telecommunications Technologies LLC v. Amazon.com, Inc., 2:13-cv-883-JRG-RSP (U.S.D.C. E.D. Texas)
Testifying Expert for Amazon.
Completed in April 2015.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Mobile Devices

Law Firm: Mayer Brown

Case Name: Mobile Telecommunications Technologies LLC v. LG Electronics Mobilecomm U.S.A., Inc., 2:13-cv-947-JRG-RSP (U.S.D.C. E.D. Texas)
Testifying Expert for LG Electronics Mobilecomm.
Completed in February 2016.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Semiconductor Devices

Law Firm: Mayer Brown

Case Name: Inter Parte Reexamination for U.S. Patent Nos. 6,895,520 and 6,899,332
Expert for LG Electronics.
Completed in February 2016.
(Expert declaration submitted, and deposed.)

Matter: Patent Infringement in Vehicular Electronics

Law Firm: Gardner, Linn, Burkhardt & Flory, L.L.P

Case Name: *Magna Electronics Inc. v. TRW Automotive Holdings Corp. et al.*, Civil Action No. 1:12-cv-00654 (Western District of Michigan), and relating to the action styled *Magna Electronics Inc. v. TRW Automotive Holdings Corp. et al.*, Civil Action No. 1:13-cv-00324 (Western District of Michigan).

Testifying Expert for Magna Electronics
Completed in February 2016.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement in Electronic Circuits
Law Firm: Ropes and Gray
Case Name: Certain Devices Containing Non-Volatile Memory and Products Containing the Same (USITC Inv. Nos. 337-TA-922)
Testifying Expert for Spansion Inc.
Completed in February 2015.
(Expert reports submitted.)

Matter: Trade Secret Misappropriation in Software Method for Cable Television Advertisement
Law Firm: Brownstein Hyatt Farber Schreck
Case Name: Cross MediaWorks v. EMT Holdings, USDC Southern District of New York, Case No. 1:14-cv-00561-VSB
Testifying Expert for Cross MediaWorks.
Completed in April 2015.
(Testified during injunction hearing.)

Matter: Patent Infringement in Vehicular Electronics
Law Firm: Steptoe and Johnson
Case Name: Certain Vision-Based Driver Assistance System Cameras and Components Thereof (USITC Inv. Nos. 337-TA-899 and 907)
Testifying Expert for Magna Electronics
Completed in February 2015.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Vehicular System
Law Firm: Susman Godfrey
Case Name: Eagle Harbor Holdings, LLC, and Mediustech, LLC, v. Ford Motor Company, 3:11-cv-05503-BHS (U.S.D.C. Western District of Washington at Tacoma)
Testifying Expert for Mediustech.
Completed in March 2015.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Communication Networks
Law Firm: Davis Polk & Wardwell LLP
Case Name: Sprint Communications Company L.P., v. Comcast Cable Communications, LLC, Comcast IP Phone, LLC, and Comcast Phone of Kansas, LLC. 2:11-cv-02684-KHV-DJW (U.S.D.C. Kansas)
Testifying Expert for Comcast.
Retained in March 2012.

(Expert reports submitted, and deposited.)

Matter: Patent Infringement for Communication Networks
Law Firm: Quinn Emanuel
Case Name: France Telecom S.A. v. Marvell Semiconductor, Inc., 12-Civ-4986 (S.D.N.Y.)
Testifying Expert for Marvell.
Completed in September 2014.
(Expert reports submitted, deposited, and testified during trial.)

Matter: Wireless Image Distribution
Law Firm: Jones Day
Case Name: *Inter Partes* Review of U.S. Patent No. 8,437,797
Expert for Google Inc.
Completed in November 2014.
(Expert declaration submitted.)

Matter: Nonvolatile Semiconductor Memories
Law Firm: Jones Day
Case Name: *Inter Partes* Review of U.S. Patent Nos. 8,301,833 and 8,516,187
Expert for SanDisk.
Completed in May 2014.
(Expert declaration submitted.)

Matter: Communication Protocols for Wireless Device
Law Firm: Dorsey & Whitney, LLP
Case Name: Certain Point-To-Point Network Communication Devices and Products
Containing Same (USITC Inv. No. 337-TA-892)
Testifying Expert for Toshiba
Completed in May 2014.
(Expert reports submitted, and deposited.)

Matter: Patent Infringement for Wireless Networks
Law Firm: Ropes and Gray
Case Name: In the Matter of Certain Wireless Devices With 3G and/or 4G Capabilities and
Components Thereof (USITC Inv. No. 337-TA-868) InterDigital Comms., Inc. v.
Huawei Techs. Co., Ltd., No. 13-00008 (D. Del., filed January 2, 2013),
InterDigital Comms., Inc. v. ZTE Corp., No. 13-00009 (D. Del., filed January 2,
2013), InterDigital Comms., Inc. v. Nokia Corp., No. 1:13-cv-00010 (D. Del.,
filed January 2, 2013), InterDigital Comms., Inc. v. Samsung Elec. Co., Ltd., No.
13-00011 (D. Del., filed January 2, 2013)
Testifying Expert for Joint Defense Group.
Completed in February 2014.
(Expert reports submitted, deposited, and testified during trials.)

Matter: Patent Infringement for Mobile Communication
Law Firm: Finnegan, Henderson, Farabow, Garrett & Dunner, L.L.P.

Case Name: Certain Digital Media Devices, Including Televisions, Blu-Ray Disc Players, Home Theater Systems, Tablets and Mobile Phones, Components Thereof and Associated Software (USITC Inv. No. 337-TA-882)
Testifying Expert for LG Electronics, Inc.
Completed in February 2014.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Wireless Networks
Law Firm: Vinson & Elkins LLP
Case Name: Wi-LAN USA, Inc. and Wi-LAN, Inc. v. Telefonaktiebolaget LM Ericsson and Ericsson, Inc. (USDC: Southern District of FL - Case #1: 12-cv-23569), Wi-LAN USA, Inc. and Wi-LAN, Inc. v. Alcatel-Lucent USA, Inc. (USDC: Southern District of FL - Case #1: 12-cv-23568-Altonaga/Simonton)
Testifying Expert for Wi-LAN.
Completed in May 2015.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Data Storage
Law Firm: Ropes and Gray, Weil Gotshal
Case Name: Summit Data Systems, LLC v. EMC Corporation., et al. 1:10-cv-00749-GMS (U.S.D.C. Delaware)
Testifying Expert for EMC Corporation and Netapp, Inc.
Completed in December 2012.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Wireless Mobile Device
Law Firm: Ashurst Australia
Case Name: Samsung v. Apple, Australian Federal Court Proceeding No. NSD 1243 of 2011
Testifying Expert for Samsung Electronics.
Completed in December 2012.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Wireless Mobile Devices
Law Firm: Quinn Emanuel
Case Name: Apple Inc. v. Samsung Electronics Co., Ltd., et al., 4:11-cv-01846-LHK (N.D. Cal.) and Samsung Electronics Co., Ltd., et al. v. Apple Inc., 4:11-cv-02079 (N.D. Cal.)
Testifying Expert for Samsung Electronics.
Completed in July 2012.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Wireless Mobile Device
Law Firm: Quinn Emanuel
Case Name: Certain Electronic Devices, Including Wireless Communication Devices, Portable Music And Data Processing Devices, And Tablet Computer, U.S.I.T.C. Inv. No. 337-TA-794

Testifying Expert for Samsung Electronics.
Completed in June 2012.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Portable Storage Device
Law Firm: White and Case
Case Name: CERTAIN UNIVERSAL SERIAL BUS (“USB”) PORTABLE STORAGE
DEVICES, INCLUDING USB FLASH DRIVES AND COMPONENTS
THEREOF, US International Trade Commission Investigation No. 337-TA-788
Testifying Expert Witness for Trek
Completed in May 2012.
(Expert reports submitted, and deposed.)

Matter: Copyright Infringement for Petroleum Processing Software
Law Firm: Osha Liang LLP
Case Name: Aspen Technology, Inc. v. Tekin A. Kunt and M3 Technology, Inc., Case
Number: H-10-1127, US District Court, Texas, Houston Division.
Testifying Expert for M3 Technology, Inc.
Completed in May 2012.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Trade Secret Misappropriation for DC-DC converter
Law Firm: Covington & Burling, Haynes Boone
Case Name: Certain DC—DC Controllers and Products Containing Same, US International
Trade Commission Investigation No. 337-TA-698
Testifying Expert for UPI.
Completed in March 2012.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Parallel Processor
Law Firm: Orrick, Herrington, & Sutcliffe. Kirkland and Ellis.
Case Name: BIAx Corporation v. Nvidia and Sony Civil Action No. 09-cv-01257-PAB-MEH
Testifying Expert for Nvidia and Sony
Completed in March 2012.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Call Center Technology
Law Firms: Duffy, Sweeney, and Scott. Foley Lardner.
Case Name: Ronald Katz Technology Licensing v. Citizens Financial Group 7-ML-1816-C
RGK (FFM)
Testifying Expert Witness for Citizens Financial Group.
Completed in 2011.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Storage Area Network
Law Firm: DLA Piper

Case Name: Network Appliance, Inc., v. Sun Microsystems, Inc., Case Number: C-07-06053
EDL, US District Court, Northern District of California, San Francisco Division.
Testifying Expert for Sun Microsystems, Inc.
Completed in 2010.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Flat Panel Display Controller
Law Firm: Jones Day
Case Name: Certain Video Displays, Components Thereof, and Products Containing Same, US
International Trade Commission Investigation No. 337-TA-687
Testifying Expert for Vizio, Inc.
Completed in 2010.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Call Center Technology
Law Firms: Foley Lardner
Case Name: Ronald Katz Technology Licensing v. US Bank 7-ML-1816-C RGK (FFM)
Testifying Expert Witness for US Bank
Completed in May 2009.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for USB to VGA Converter
Law Firm: Wang Hartmann, Gibbs, & Cauley, P.C.
Case Name: Displaylink Corporation v. Magic Control Technology Corporation, Case No.
5:07-CV-01998-RMW, US District Court, Northern District of California, San
Francisco Division.
Testifying Expert for Magic Control Technology Corporation
Completed in 2009.
(Expert reports submitted, and deposed.)

Matter: Patent Infringement for Flash Memory
Law Firm: Jones Day and Wilson Sansini
Case Name: Certain Flash Memory Controllers, Drives, Memory Card, and Media Players and
Products Containing Same. US International Trade Commission Investigation
No. 337-TA-619
Testifying Expert for SanDisk Corporation.
Completed in 2008.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Semiconductor Packaging
Law Firm: Jones Day
Case Name: Certain Semiconductor Chips with Minimized Chip Package Size and Products
Containing the Same. US International Trade Commission Investigation No. 337-
TA-605
Testifying Expert for Freescale Semiconductor
Completed in 2008.

(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Automatic Switching System
Law Firms: Jones Day, and Heller Ehrman, LLP.
Case Name: ATEN International Co., Ltd and ATEN Technology, Inc. v. Belkin Corporation, Belkin Logistics, Inc. and Emine Technology Co., Ltd. US International Trade Commission Investigation No. Ltd 337-TA-589
Testifying Expert for Belkin Corporation, Belkin Logistics, Inc., and Emine Technology Co., Ltd.
Completed in 2007.
(Expert reports submitted, deposed, and testified during trial.)

Matter: Patent Infringement for Dual Mode Communication
Law Firm: Wilmer Cutler Pickering Hale and Dorr, LLP
Case Name: Broadcom Corporation v. Qualcomm Incorporated SACV05-467-JVS (RNBx)
Testifying Expert Witness for Broadcom Corporation
Completed in 2007.
(Expert reports submitted, deposed, and testified during trial.)