

Suresh Subramaniam

Professor and Chair of Electrical and Computer Engineering, IEEE Fellow
Director, Lab for Intelligent Networking and Computing
The George Washington University
5000B Science and Engineering Hall, 800 22nd St. N.W., Washington, DC 20052.
suresh@gwu.edu • +1 (202) 994-4743 • <http://www.seas.gwu.edu/~suresh>

EDUCATION

University of Washington, Seattle, Washington, USA

- Ph.D. in Electrical Engineering Jun 1993 – Sep 1997
 - Dissertation: All-optical networks with sparse wavelength conversion. Dissertation research on the quantitative effects of wavelength conversion on the performance of all-optical networks.
 - Adviser: Prof. Arun Somani
 - Coursework: Data networks, optical networking, probability theory, and network optimization.
 - Cumulative GPA: 3.99 / 4.0

Tulane University, New Orleans, Louisiana, USA

- M.S. in Electrical Engineering Aug 1991 – May 1993
 - Thesis: Texture analysis for ocean bottom classification.
 - Coursework: Signal and image processing, control theory, and statistical analysis.
 - Cumulative GPA: 4.0 / 4.0

Anna University, Chennai, India

- B.E. in Electronics and Communications Engineering Sep 1984 – May 1988
 - Graduated with honors (first class, 80%).
 - Project title: A microprocessor-based blood-pressure monitor.

APPOINTMENTS

George Washington University, Washington DC

- Chair, Department of Electrical and Computer Engineering Oct 2016 – date
- Interim Associate Dean, School of Engineering and Applied Science Jul 2015 – Aug 2016
- Interim Chair, Department of Electrical and Computer Engineering Aug 2014 – Jul 2015
- Full Professor, Department of Electrical and Computer Engineering Sep 2008 – date
- Associate Professor, Department of Electrical and Computer Engineering Sep 2003 – Aug 2008
- Assistant Professor, Department of Electrical and Computer Engineering Sep 1997 – Aug 2003

Massachusetts Institute of Technology, Cambridge, MA

- Visiting Faculty, Department of Electrical Engineering and Computer Science Jan 2014 – Aug 2014

University of Maryland, College Park, MD

- Visiting Faculty, Department of Electrical and Computer Engineering Sep 2003 – Jun 2004

University of Washington, Seattle, WA

- Research Assistant, Department of Electrical and Computer Engineering Jun 1993 – Aug 1997
- Teaching Assistant, Department of Electrical and Computer Engineering Apr 1996 – Jun 1996

MIT Lincoln Laboratory, Lexington, MA

- Summer Staff Member, Optical Communications Technology group Jun 1996 – Sep 1996

Tulane University, New Orleans, LA

- Teaching Assistant, Department of Electrical Engineering Aug 1991 – May 1993

Indian Institute of Science, Bengaluru, India

- Research Assistant, Department of Electrical Communication Engineering Aug 1990 – May 1991

HCL Technologies, Chennai, India

- R & D Hardware Engineer, Computer Division Jul 1988 – Aug 1990

GRANTS

- [G1] “NeTS: Small: Design and provisioning for inter-datacenter multigranular flexible optical networks,” National Science Foundation, \$299,795, PI. Oct 2018 – Sep 2021
- [G2] “NeTS: JUNO2: Resilience in next-generation intelligent optical networks,” National Science Foundation, \$368,056, PI. Sep 2018 – Aug 2021

- [G3] “CSR: Small: A server-network cooperative approach for data center energy optimization,” National Science Foundation, \$499,172, co-PI. Sep 2017 – Aug 2020
- [G4] “NeTS: Small: WDM-based ultra-scale data center networks: architectures and control algorithms,” National Science Foundation, \$250,000, PI. Oct 2016 – Sep 2020
- [G5] “NeTS: JUNO: Cost-effective and scalable architectures for multi-granular optical networks,” National Science Foundation, \$282,284, PI. Apr 2014 – Mar 2018
- [G6] “CSR: Small: Reliability as a Service (RaaS) in cloud computing,” National Science Foundation, Sep. 2013 - Aug. 2017, \$407,968, co-PI. Sep 2013 – Aug 2017
- [G7] “Integrating mesh networking into the design of a smart healthcare logistics system,” LMI, \$50,000, co-PI. Sep 2015 – Aug 2016
- [G8] “WIDER: Planning: GW Reform and Advancement of STEM-education Practices (GRASP),” National Science Foundation, \$229, 886, co-PI. Sep 2013 – Aug 2015
- [G9] “Holistic and integrated design of layered optical networks,” National Science Foundation, \$169,960, PI. Sep 2009 – Aug 2013
- [G10] “Cross-layer design and management of translucent optical networks,” National Science Foundation, \$264, 988, PI. Sep 2005 – Aug 2019
- [G11] “Evolutionary architectures for ultra-broadband access networks,” National Science Foundation, \$147, 984, PI. Sep 2004 – Aug 2009
- [G12] “Hybrid system approach to network congestion control,” Defense Advanced Research Projects Agency & National Security Agency, \$1, 000, 000 (approx. \$380,000 to S. Subramaniam), Co-PI. Jul 2001 – Aug 2004
- [G13] “Secure WDM networks,” National Security Agency/Defense Information Systems Agency, \$125,000 (approx. \$59,000 to S. Subramaniam), Co-PI. Sep 2002 – Aug 2003
- [G14] “BITPIPE: A synthesis tool for QoS in ad-hoc networks,” National Security Agency, \$197, 000, Co-PI. Feb 2002 – Feb 2004
- [G15] “Fault and attack management in optical networks,” Defense Advanced Research Projects Agency, \$2,400,000, (approx. \$420,000 to S. Subramaniam), Co-PI. Jun 2000 – May 2003
- [G16] “Improving the cost-effectiveness of WDM optical networks,” National Science Foundation, \$229,284, PI. Sep 1999 – Aug 2003
- [G17] “Exploring architectures and algorithms for optical networks,” National Science Foundation, \$171,590, PI. Sep 1999 – Aug 2003
- [G18] “Advanced telecommunication protocol and network security – secure WDM networks and second line IDS based on user styles,” National Security Agency / Defense Information Systems Agency, \$225, 000 (approx. \$60,000 to S. Subramaniam), Co-PI. Jan 2001 – Dec 2001
- [G19] “Modeling optical components for network survivability,” National Security Agency, \$199, 994, PI. Apr 1999 – Mar 2000
- [G20] “Optimal converter placement in WDM optical networks,” University Facilitating Fund, GWU, \$10, 830, PI. Jul 1998 – Jun 1999

PATENTS

- [P1] “Method for establishing connections by allocating links and channels,” U.S. Patent # 6538777 (with R.A. Barry). Mar 2003

PUBLICATIONS BOOKS

- [B1] “Cross-Layer Design in Optical Networks”, eds. **S. Subramaniam**, M. Brandt-Pearce, P. Demeester, and C. V. Saradhi, Springer. 2013
- [B2] “Optical Networking Technologies: Architectures, Protocols, and Performance,” eds. K. M. Sivalingam and **S. Subramaniam**, Springer. 2005
- [B3] “Optical Networks: Principles and Practice,” eds. K. M. Sivalingam and **S. Subramaniam**, Kluwer Academic Publishers. 2000

BOOK CHAPTERS

- [BC1] **S. Subramaniam** and M. Brandt-Pearce, “QoT-aware survivable network design,” in *Cross-Layer Design in Optical Networks*, pp. 175–197. Mar 2013

- [BC2] G. Sahin and **S. Subramaniam**, “Facilitating service level agreements with restoration speed requirements,” in *Optical Networking Technologies: Architectures, Protocols, and Performance*, pp. 357–377. Mar 2005
- [BC3] **S. Subramaniam**, “Blocking performance of wavelength-routing networks,” in *Optical WDM Networks: Principles and Practice*, pp. 229–245. Mar 2000

JOURNAL PAPERS

- [J1] S. Alamro, M. Xu, T. Lan, and **S. Subramaniam**, “Shed+: Optimal dynamic speculation to meet application deadlines in cloud,” to appear in *IEEE Transactions on Network and Service Management*, 2020.
- [J2] R. Zou, H. Hasegawa, M. Jinno, and **S. Subramaniam**, “Link-protection and FIPP P-cycle designs in translucent elastic optical networks,” *IEEE/OSA Journal of Optical Communications and Networking*, vol. 12, no. 7, pp. 163–176, Jul 2020.
- [J3] P. Zou, O. Ozel, and **S. Subramaniam**, “Waiting before serving: A companion to packet management in status update systems,” *IEEE Transactions on Information Theory*, vol. 66, no. 6, pp. 3864–3877, Jun 2020.
- [J4] J. Fan, X. Wei, T. Wang, T. Lan, and **S. Subramaniam**, “Churn-resilient task scheduling in a tiered IoT infrastructure,” *China Communications*, vol. 16, no. 8, pp. 162–175, Aug 2019.
- [J5] J. Wu, **S. Subramaniam**, and H. Hasegawa, “Efficient dynamic routing and spectrum assignment for multifiber elastic optical networks,” *IEEE/OSA Journal of Optical Communications and Networking*, vol. 11, no. 5, pp. 190–201, May 2019.
- [J6] X. Wei, C. Tang, J. Fan, and **S. Subramaniam**, “Joint optimization of energy consumption and delay in cloud-to-thing continuum,” *IEEE Internet of Things Journal*, vol. 6, no. 2, pp. 2325–2337, Apr 2019.
- [J7] F. Yao, J. Wu, G. Venkataramani, and **S. Subramaniam**, “TS-BatPro: Improving energy efficiency in data centers by leveraging temporal–spatial batching,” *IEEE Transactions on Green Communications and Networking*, vol. 3, no. 1, pp. 236–249, Mar 2019.
- [J8] J. Wu, M. Xu, **S. Subramaniam**, and H. Hasegawa, “Joint banding-node placement and resource allocation for multi-granular elastic optical networks,” *IEEE/OSA Journal of Optical Communications and Networking*, vol. 10, no. 8, pp. C27–C38, Aug 2018.
- [J9] M. Xu, C. Liu, and **S. Subramaniam**, “PODCA: A passive optical data center network architecture,” *IEEE/OSA Journal of Optical Communications and Networking*, vol. 10, no. 4, pp. 409–420, Apr 2018.
- [J10] M. Xu, S. Alamro, T. Lian, and **S. Subramaniam**, “CRED: Cloud right-sizing with execution deadlines and data locality,” *IEEE Transactions on Parallel and Distributed Systems*, vol. 28, no. 12, pp. 3389–3400, Dec 2017.
- [J11] T. Ishikawa, Y. Mori, H. Hasegawa, **S. Subramaniam**, K. i. Sato, and O. Moriwaki, “A compact OXC architecture, design and prototype development for flexible waveband routing optical networks,” *Optics Express*, vol. 25, no. 14, pp. 15 838–15 853, Jul 2017.
- [J12] J. Zhao, Y. Xiang, H. Liu, T. Lan, H. Huang, and **S. Subramaniam**, “Elastic reliability optimization through peer-to-peer checkpointing in cloud computing,” *IEEE Transactions on Parallel and Distributed Systems*, vol. 28, no. 2, pp. 491–502, Feb 2017.
- [J13] H. Hasegawa, **S. Subramaniam**, and K. i. Sato, “Node architecture and design of flexible waveband routing optical networks,” *IEEE/OSA Journal of Optical Communications and Networking*, vol. 8, no. 10, pp. 734–744, Oct 2016.
- [J14] F. Ahdi and **S. Subramaniam**, “Capacity enhancement of RF wireless mesh networks through FSO links,” *IEEE/OSA Journal of Optical Communications and Networking*, vol. 8, no. 7, pp. 495–506, Jul 2016.
- [J15] J. Tapolcai, L. Ronyai, E. Hosszu, L. Gyimothi, P.-H. Ho, and **S. Subramaniam**, “Signaling free localization of node failures in all-optical networks,” *IEEE Transactions on Communications*, vol. 64, no. 6, pp. 2527–2538, Jun 2016.
- [J16] J. Wu, **S. Subramaniam**, and H. Hasegawa, “Optimal nonuniform wavebanding in WDM mesh networks,” *Photonic Network Communications*, vol. 31, no. 3, pp. 376–385, Jun 2016.
- [J17] X. Wang, M. Brandt-Pearce, and **S. Subramaniam**, “Impact of wavelength and modulation conversion on translucent elastic optical networks using MILP,” *IEEE/OSA Journal of Optical Communications and Networks*, vol. 7, no. 7, pp. 644–655, July 2015. Jul 2015.

- [J18] J. Zhao, **S. Subramaniam**, and M. Brandt-Pearce, “Efficient and accurate analytical performance models for translucent optical networks,” *IEEE/OSA Journal of Optical Communications and Networks*, vol. 6, no. 12, pp. 1128–1142, Dec 2014.
- [J19] M. Ali, P.-H. Ho, J. Tapolcai, and **S. Subramaniam**, “Multi-link failure localization via monitoring bursts,” *IEEE/OSA Journal of Optical Communications and Networks*, vol. 6, no. 11, pp. 952–964, Nov 2014.
- [J20] X. Wang, M. Brandt-Pearce, and **S. Subramaniam**, “Distributed grooming, routing, and wavelength assignment for dynamic optical networks using ant colony optimization,” *IEEE/OSA Journal of Optical Communications and Networks*, vol. 6, no. 6, pp. 578–589, Jun 2014.
- [J21] J. Zhao, **S. Subramaniam**, and M. Brandt-Pearce, “Intra- and inter-domain QoT-aware routing and wavelength assignment (RWA) for translucent optical networks,” *IEEE/OSA Journal of Optical Communications and Networks*, vol. 6, no. 6, pp. 536–548, Jun 2014.
- [J22] O. Turkcu and **S. Subramaniam**, “Optimal wavebanding in WDM ring networks,” *IEEE/ACM Transactions on Networking*, vol. 22, no. 1, pp. 179–190, Feb 2014.
- [J23] J. He, R. A. Norwood, M. Brandt-Pearce, I. Djordjevic, M. Cvijetic, **S. Subramaniam**, R. Himmelhuber, C. Reynolds, P. Blanche, B. Lynn, and N. Peyghambarian, “A survey on recent advances in optical communications,” *Computers and Electrical Engineering*, vol. 40, no. 1, pp. 216–240, Jan 2014.
- [J24] J. Zhao, **S. Subramaniam**, and M. Brandt-Pearce, “QoT-aware grooming, routing, and wavelength assignment (GRWA) for mixed-line-rate translucent optical networks,” *China Communications (Selected Papers from ICC '12)*, vol. 10, no. 1, pp. 17–30, Jan 2013.
- [J25] J. Sole-Pareta, **S. Subramaniam**, D. Careglio, and S. Spadaro, “Cross-layer approaches for planning and operating impairment-aware optical networks,” *Proceedings of the IEEE*, vol. 100, no. 5, pp. 1118–1129, May 2012.
- [J26] S. Cho, S. Ramasubramanian, O. Turkcu, and **S. Subramaniam**, “Throughput and delay analysis of multi-channel wireless infrastructure networks,” *Ad Hoc Networks*, vol. 10, no. 3, pp. 373–387, May 2012.
- [J27] M. Al-Naimi, O. Turkcu, and **S. Subramaniam**, “ROADM optimization in WDM ring networks,” *Optical Switching and Networking Journal*, vol. 9, no. 1, pp. 25–38, Jan 2012.
- [J28] —, “Uniform waveband assignment in optical mesh networks,” *Photonic Network Communications*, vol. 22, no. 3, pp. 266–275, Jul 2011.
- [J29] J. He, M. Brandt-Pearce, and **S. Subramaniam**, “Analysis of blocking probability for first-fit wavelength assignment in transmission-impaired optical networks,” *IEEE/OSA Journal of Optical Communications and Networks*, vol. 3, no. 5, pp. 411–425, Apr 2011.
- [J30] A. Gadkar and **S. Subramaniam**, “Wavelength reuse in optical time-slotted networks,” *Optical Switching and Networking Journal*, vol. 7, no. 4, pp. 153–164, Dec 2010.
- [J31] S. Stanic, **S. Subramaniam**, G. Sahin, H. Choi, and H.-A. Choi, “Active monitoring and alarm management for fault localization in transparent all-optical networks,” *IEEE Transactions on Network and Service Management*, vol. 7, no. 2, pp. 118–131, Jun 2010.
- [J32] A. Askarian, Y. Zhai, **S. Subramaniam**, Y. Pointurier, and M. Brandt-Pearce, “Cross-layer approach to survivable DWDM network design,” *IEEE/OSA Journal of Optical Communications and Networks*, vol. 2, no. 6, pp. 319–331, Jun 2010.
- [J33] C. V. Saradhi and **S. Subramaniam**, “Physical layer impairment aware routing (PLIAR) in WDM optical networks: Issues and challenges,” *IEEE Communications Surveys and Tutorials*, vol. 11, no. 4, pp. 109–130, 4th Quarter 2009.
- [J34] O. Turkcu and **S. Subramaniam**, “Performance of optical networks with limited reconfigurability,” *IEEE/ACM Trans. Networking*, vol. 17, no. 6, pp. 2002–2013, Dec 2009.
- [J35] A. Gadkar and **S. Subramaniam**, “Buffered time-wavelength cross-connects: architectures and performance evaluation,” *Optical Switching and Networking Journal*, vol. 6, no. 4, pp. 276–288, Dec 2009.
- [J36] Y. Pointurier, M. Brandt-Pearce, and **S. Subramaniam**, “Analysis of blocking probability in noise- and crosstalk-impaired all-optical networks,” *IEEE/OSA Journal of Optical Communications and Networks*, vol. 1, no. 6, pp. 543–554, Nov 2009.

- [J37] J. He, M. Brandt-Pearce, and **S. Subramaniam**, “QoS-aware wavelength assignment with BER and latency constraints for all-optical networks,” *IEEE/OSA J. Lightwave Technology*, vol. 27, no. 5, pp. 462–474, Mar 2009.
- [J38] —, “Optimal RWA for static traffic in transmission-impaired wavelength-routed networks,” *IEEE Communications Letters*, vol. 12, no. 9, pp. 693–695, Sep 2008.
- [J39] Y. Pointurier, M. Brandt-Pearce, **S. Subramaniam**, and B. Xu, “Cross-layer adaptive routing and wavelength assignment in all-optical networks,” *IEEE J. Selected Areas in Communications*, vol. 26, no. 6, pp. 32–44, Aug 2008.
- [J40] S. Sankaranarayanan, **S. Subramaniam**, H. Choi, and H.-A. Choi, “Survivable traffic grooming in WDM optical networks,” *KICS Journal of Communications and Networks*, vol. 9, no. 1, pp. 93–104, Mar 2007.
- [J41] S. Koo, G. Sahin, and **S. Subramaniam**, “Dynamic LSP routing in IP/MPLS over WDM networks,” *IEEE J. Selected Areas in Communications Supplement on Optical Communications and Networking*, vol. 24, no. 12, pp. 45–55, Dec 2006.
- [J42] M. Sivakumar, K. M. Sivalingam, and **S. Subramaniam**, “On factors affecting the performance of dynamically groomed optical WDM mesh networks,” *Photonic Network Communications*, vol. 12, no. 1, pp. 100–112, Jul 2006.
- [J43] F. Alizadeh-Shabdiz and **S. Subramaniam**, “Analytical models for single-hop and multi-hop ad hoc networks,” *Mobile Networks and Applications*, vol. 11, no. 1, pp. 75–90, Feb 2006.
- [J44] T. Deng and **S. Subramaniam**, “Virtual loops in power-equalized transparent DWDM networks,” *Optical Switching and Networking*, vol. 2, no. 4, pp. 209–216, Dec 2005.
- [J45] M. Sivakumar and **S. Subramaniam**, “Blocking performance of time switching in TDM wavelength routing networks,” *Optical Switching and Networking*, vol. 2, no. 2, pp. 100–112, Sep 2005.
- [J46] T. Deng and **S. Subramaniam**, “QoS-friendly wavelength assignment in dynamic wavelength-routed optical networks,” *Photonic Network Communications*, vol. 10, no. 1, pp. 5–22, Jul 2005.
- [J47] V. Tamilraj, **S. Subramaniam**, and H.-A. Choi, “Performance models for multi-rate circuits in switched multi-channel optical networks,” *Photonic Network Communications*, vol. 9, no. 2, pp. 235–47, Mar 2005.
- [J48] H. Choi, **S. Subramaniam**, and H.-A. Choi, “Loopback recovery from double-link failures in optical mesh networks,” *IEEE/ACM Transactions on Networking*, vol. 12, no. 6, pp. 1119–30, Dec 2004.
- [J49] G. Sahin and **S. Subramaniam**, “Providing quality of protection classes through control-message scheduling in DWDM mesh networks with capacity sharing,” *IEEE Journal on Selected Areas in Communications*, vol. 22, no. 9, pp. 1846–58, Nov 2004.
- [J50] S. Sankaranarayanan and **S. Subramaniam**, “Comprehensive performance modeling and analysis of multicasting in optical networks,” *IEEE J. Selected Areas in Communications*, vol. 21, no. 9, pp. 1399–1413, Nov 2003.
- [J51] S. Koo and **S. Subramaniam**, “Performance evaluation of optical mesh restoration schemes,” *Information Sciences Journal*, vol. 149, no. 1, pp. 183–95, Jan 2003.
- [J52] H. Choi, **S. Subramaniam**, and H.-A. Choi, “Loopback recovery from neighboring double-link failures in WDM mesh networks,” *Information Sciences Journal*, vol. 149, no. 1, pp. 197–209, Jan 2003.
- [J53] H. Lee, H. Choi, **S. Subramaniam**, and H.-A. Choi, “Survivable embedding of logical topologies in WDM ring networks,” *Information Sciences Journal*, vol. 149, no. 1, pp. 151–60, Jan 2003.
- [J54] M. Sivakumar and **S. Subramaniam**, “On the performance impact of wavelength assignment, wavelength conversion architecture and placement algorithms,” *Optical Networks Magazine*, vol. 3, no. 2, pp. 44–53, May 2002.
- [J55] A. S. Arora and **S. Subramaniam**, “Wavelength conversion placement in WDM mesh optical networks,” *Photonic Network Communications*, vol. 4, no. 2, pp. 167–77, May 2002.
- [J56] G. Sahin, **S. Subramaniam**, and M. Azizoglu, “Signaling and capacity assignment for restoration in optical networks,” *OSA Journal of Optical Networking*, vol. 1, no. 5, pp. 188–206, May 2002.

- [J57] A. S. Arora, **S. Subramaniam**, and H.-A. Choi, “Logical topology design for linear and ring optical networks,” *IEEE Journal on Selected Areas in Communications*, vol. 20, no. 1, pp. 62–74, Jan 2002.
- [J58] H. Choi, **S. Subramaniam**, and H.-A. Choi, “Optimal wavelength assignment algorithms for permutation traffic in multi-fiber WDM ring networks,” *Photonic Network Communications*, vol. 4, no. 1, pp. 37–46, Jan 2002.
- [J59] **S. Subramaniam** and A. Somani, “Design and architectural considerations in WDM optical networks,” *World Markets Series Business Briefing on Global Optical Communications*, pp. 64–68, 2001.
- [J60] D. Zhou and **S. Subramaniam**, “Survivability in optical networks,” *IEEE Network*, vol. 14, no. 6, pp. 16–23, Nov/Dec 2000.
- [J61] **S. Subramaniam**, E. J. Harder, and H. A. Choi, “Scheduling multirate sessions in time division multiplexed wavelength-routing networks,” *IEEE Journal on Selected Areas in Communications*, vol. 18, no. 10, pp. 2105–2110, Oct 2000.
- [J62] **S. Subramaniam**, M. Azizoglu, and A. K. Somani, “On optimal converter placement in wavelength-routed networks,” *IEEE/ACM Transactions on Networking*, vol. 7, no. 5, pp. 754–766, Oct 1999.
- [J63] **S. Subramaniam**, A. K. Somani, M. Azizoğlu, and R. A. Barry, “The benefits of wavelength conversion in WDM networks with non-Poisson traffic,” *IEEE Communications Letters*, vol. 3, no. 3, pp. 81–83, Mar 1999.
- [J64] **S. Subramaniam**, M. Azizoğlu, and A. K. Somani, “All-optical networks with sparse wavelength conversion,” *IEEE/ACM Transactions on Networking*, vol. 4, no. 4, pp. 544–557, Aug 1996.
- [J65] **S. Subramaniam** and A. K. Somani, “Multicasting in ATM networks using MINs,” *Computer Communications*, vol. 19, no. 8, pp. 712–22, Jul 1996.

CONFERENCE PAPERS

- [C1] P. Rafiee, P. Zou, O. Ozel, and **S. Subramaniam**, “Maintaining information freshness in power-efficient status update systems,” in *Proc. Infocom Workshop on Age of Information*, Jul 2020.
- [C2] M. Tian, A. Vishwanath, G. Venkataramani, and **S. Subramaniam**, “SpinSmart: Exploring optimal server fan speeds to improve overall system energy consumption,” in *Proc. Workshop on Energy-Efficient Data Centers*, Jun 2020.
- [C3] J. Zhao and **S. Subramaniam**, “Virtual network mapping in elastic optical networks with advance reservation,” in *Proc. ICC*, Jun 2020.
- [C4] T. Kuno, Y. Mori, **S. Subramaniam**, M. Jinno, and H. Hasegawa, “High-throughput and high-port-count optical cross-connections using flexible waveband routing,” in *Proc. ONDM*, May 2020. **Best Student Paper Award.**
- [C5] R. Zou, **S. Subramaniam**, H. Hasegawa, and M. Jinno, “P-cycle design for translucent elastic optical networks,” in *Proc. Globecom*, Dec 2019.
- [C6] Y. Azuma, T. Kodama, M. Jinno, H. Hasegawa, and **S. Subramaniam**, “Effect of geographical distribution of failed links on survivability improvement in translucent elastic optical network employing shared protection with fallback,” in *Proc. Asia Communications and Photonics Conference (ACPC)*, Nov 2019.
- [C7] F. Yao, K. Nguyen, S. Dayupule, B. Lu, J. Wu, **S. Subramaniam**, and G. Venkataramani, “HolDCSim: A joint server-network simulator for data centers,” in *IEEE International Symposium on Workload Characterization (IISWC)*, Oct 2019.
- [C8] P. Zou, O. Ozel, and **S. Subramaniam**, “Trading off computation with transmission in status update systems,” in *Proc. IEEE Intl. Symposium on Personal, Indoor and Mobile Radio Communications (PIMRC)*, Sep 2019.
- [C9] —, “Relative age of information: a new metric for status update systems,” in *Proc. IEEE Information Theory Workshop (ITW)*, Aug 2019.
- [C10] M. Xu, J. Diakonikolas, **S. Subramaniam**, and E. Modiano, “A hierarchical WDM-based scalable data center network architecture,” in *Proc. ICC*, May 2019.
- [C11] M. Xu, M. Tian, E. Modiano, and **S. Subramaniam**, “RHODA topology configuration using Bayesian optimization,” in *Proc. ONDM*, May 2019. **Invited paper.**

- [C12] R. Zou and **S. Subramaniam**, “Novel p-cycle selection algorithms for elastic optical networks,” in *Proc. ONDM*, May 2019. **Best Paper Award.**
- [C13] J. Zhao and **S. Subramaniam**, “Embedding virtual networks in flexible optical networks with sliceable transponders,” in *Proc. ONDM*, May 2019.
- [C14] P. Zou, O. Ozel, and **S. Subramaniam**, “On the benefits of waiting in status update systems,” in *Proc. Infocom Workshop on Age of Information*, Apr 2019.
- [C15] B. Lu, S. S. Dayupule, F. Yao, J. Wu, G. Venkataramani, and **S. Subramaniam**, “PopCorns: Power optimization using a cooperative network-server approach for data centers,” in *Proc. ICCCN*, Aug 2018. **Invited paper.**
- [C16] M. Xu, S. Alamro, T. Lan, and **S. Subramaniam**, “Chronos: A unifying optimization framework for speculative execution of deadline-critical MapReduce jobs,” in *Proc. IEEE Intl. Conference on Distributed Computing Systems (ICDCS)*, Jul 2018.
- [C17] J. Wu, **S. Subramaniam**, and H. Hasegawa, “Dynamic routing and spectrum assignment for multi-fiber elastic optical networks,” in *Proc. Advanced Photonics Congress*, Jul 2018.
- [C18] S. Alamro, M. Xu, T. Lan, and **S. Subramaniam**, “Shed: Optimal dynamic cloning to meet application deadlines in cloud,” in *Proc. ICC*, May 2018.
- [C19] J. Fan, X. Wei, T. Wang, T. Lan, and **S. Subramaniam**, “Deadline-aware task scheduling in a tiered IoT infrastructure,” in *Proc. Globecom*, Dec 2017.
- [C20] F. Yao, J. Wu, G. Venkataramani, and **S. Subramaniam**, “TS-Bat: Leveraging temporal-spatial batching for data center energy optimization,” in *Proc. Globecom*, Dec 2017.
- [C21] J. Wu, M. Xu, **S. Subramaniam**, and H. Hasegawa, “Joint banding-node placement and resource allocation for multi-granular elastic optical networks,” in *Proc. Globecom*, Dec 2017.
- [C22] M. Xu, S. Alamro, T. Lan, and **S. Subramaniam**, “LASER: A deep learning approach for speculative execution and replication of deadline-critical jobs in cloud,” in *Proc. ICCCN*, Aug 2017. **Invited paper.**
- [C23] F. Yao, J. Wu, G. Venkataramani, and **S. Subramaniam**, “WASP: Workload-adaptive energy-latency optimization in server farms using server low-power states,” in *Proc. CLOUD*, Jun 2017.
- [C24] M. Xu, S. Alamro, T. Lan, and **S. Subramaniam**, “Optimizing speculative execution of deadline-sensitive jobs in cloud,” in *Proc. SIGMETRICS*, Jun 2017.
- [C25] J. Wu, M. Xu, and **S. Subramaniam**, “Routing, fiber, band, and spectrum assignment (RFBSA) for multi-granular elastic optical networks,” in *Proc. ICC*, May 2017.
- [C26] C. Liu, M. Xu, and **S. Subramaniam**, “A reconfigurable high-performance optical data center architecture,” in *Proc. Globecom*, Dec 2016.
- [C27] J. Wu, M. Xu, **S. Subramaniam**, and H. Hasegawa, “Evaluation and performance modeling of two OXC architectures (invited),” in *Proc. IEEE Sarnoff Symposium*, Sep 2016. **Invited paper.**
- [C28] T. Ishikawa, M. Niwa, K. Ueda, Y. Mori, H. Hasegawa, **S. Subramaniam**, K. Sato, and O. Moriwaki, “Hardware scale analysis and prototype development of flexible waveband routing OXCs,” in *Proc. OECC*, Jul 2016.
- [C29] S. Alamro, M. Xu, T. Lan, and **S. Subramaniam**, “CRED: Cloud right-sizing to meet execution deadlines and data locality,” in *Proc. IEEE CLOUD*, Jul 2016.
- [C30] M. Xu, C. Liu, and **S. Subramaniam**, “PODCA: A passive optical data center architecture,” in *Proc. ICC*, May 2016.
- [C31] T. Ishikawa, H. Hasegawa, **S. Subramaniam**, and K. Sato, “A compact OXC node architecture that exploits dynamic path bundling and routing,” in *Proc. ONDM*, May 2016.
- [C32] J. Zhao and **S. Subramaniam**, “QoT- and SLA-aware resource allocation in translucent optical networks,” in *Proc. GLOBECOM*, Dec 2015.
- [C33] F. Yao, J. Wu, G. Venkataramani, and **S. Subramaniam**, “A dual delay timer strategy for optimizing server farm energy,” in *Proc. CloudCom*, Dec 2015.
- [C34] J. Wu, **S. Subramaniam**, and H. Hasegawa, “Comparison of OXC node architectures for WDM and flex-grid optical networks,” in *Proc. Intl. Conf. Computer Comm. Networks (ICCCN)*, Dec 2015. **Invited paper.**
- [C35] F. Ahdi and **S. Subramaniam**, “Using unmanned aerial vehicles as relays in wireless balloon networks,” in *Proc. ICC*, Jun 2015.

- [C36] H. Hasegawa, **S. Subramaniam**, and K. Sato, “Flexible waveband routing optical networks,” in *Proc. ICC*, Jun 2015.
- [C37] J. Wu, **S. Subramaniam**, and H. Hasegawa, “Optimal non-uniform wavebanding in WDM mesh networks,” in *Proc. Intl. Conf. on Optical Networks Design and Modeling (ONDM)*, May 2015.
- [C38] Y. Xiang, H. Liu, T. Lan, H. Huang, and **S. Subramaniam**, “Optimizing job reliability via contention-free, distributed scheduling of VM checkpointing,” in *Proc. ACM SIGCOMM Workshop on Distributed Cloud Computing (DCC)*, Aug 2014.
- [C39] J. Wu, J. Zhao, and **S. Subramaniam**, “Co-scheduling computational and networking resources in elastic optical networks,” in *Proc. ICC*, Jun 2014.
- [C40] F. Yao, J. Wu, G. Venkataramani, and **S. Subramaniam**, “A comparative analysis of data center network architectures,” in *Proc. ICC*, Jun 2014.
- [C41] J. Tapolcai, L. Ronyai, E. Hosszu, P.-H. Ho, and **S. Subramaniam**, “Signaling free localization of node failures in all-optical networks,” in *Proc. Infocom*, Apr 2014.
- [C42] X. Wang, M. Brandt-Pearce, and **S. Subramaniam**, “Dynamic grooming, routing, and wavelength assignment for real-time optical networks,” in *Proc. Globecom*, Dec 2013.
- [C43] F. Ahdi and **S. Subramaniam**, “Optimal placement of FSO relays for network disaster recovery,” in *Proc. ICC*, Jun 2013.
- [C44] J. Zhao, **S. Subramaniam**, and M. Brandt-Pearce, “Virtual topology mapping in elastic optical networks,” in *Proc. ICC*, Jun 2013.
- [C45] —, “Inter-domain QoT-aware RWA for translucent optical networks,” in *Proc. Intl. Conference on Computing, Networking, and Communications (ICNC)*, Jan 2013. **Invited paper.**
- [C46] F. Ahdi and **S. Subramaniam**, “Improving hybrid FSO/RF network reliability through transceiver reconfiguration,” in *Proc. Globecom*, Dec 2012.
- [C47] X. Wang, M. Brandt-Pearce, and **S. Subramaniam**, “Dynamic grooming and RWA in translucent optical networks using a time-slotted ILP,” in *Proc. Globecom*, Dec 2012.
- [C48] J. Zhao, **S. Subramaniam**, and M. Brandt-Pearce, “QoT-aware grooming, routing, and wavelength assignment (GRWA) for Mixed-Line-Rate translucent optical networks,” in *Proc. IEEE Intl. Conf. on Communications in China (ICCC)*, Aug 2012.
- [C49] —, “Cross-layer RWA in translucent optical networks,” in *Proc. ICC*, Jun 2012.
- [C50] N. Limrungrasi, J. Zhao, Y. Xiang, T. Lan, H. Huang, and **S. Subramaniam**, “Providing reliability as an elastic service in cloud computing,” in *Proc. ICC*, Jun 2012.
- [C51] X. Wang, M. Brandt-Pearce, and **S. Subramaniam**, “Grooming and RWA in translucent dynamic mixed-line-rate WDM networks with impairments,” in *Proc. Optical Fiber Communications (OFC)*, Mar 2012.
- [C52] F. Ahdi and **S. Subramaniam**, “Optimal placement of FSO links in hybrid wireless optical networks,” in *Proc. Globecom*, Dec 2011.
- [C53] —, “Capacity enhancement of hybrid wireless optical networks using MIMO links,” in *Proc. Globecom*, Dec 2011.
- [C54] S. Stanic and **S. Subramaniam**, “Fault localization in all-optical networks with user and supervisory lightpaths,” in *Proc. ICC*, Jun 2011.
- [C55] A. Pingley, N. Zhang, X. Fu, H.-A. Choi, **S. Subramaniam**, and W. Zhao, “Protection of query privacy for continuous location based services,” in *Proc. Infocom*, Mar 2011.
- [C56] O. Turkcu, A. Somani, and **S. Subramaniam**, “Multicast routing in hierarchical optical networks using collection-distribution networks,” in *Proc. Broadnets*, Oct 2010.
- [C57] A. Askarian, **S. Subramaniam**, and M. Brandt-Pearce, “Implementing protection classes through p-cycles in impairment-constrained optical networks,” in *Proc. ICC*, May 2010.
- [C58] A. Gadkar and **S. Subramaniam**, “Connection scheduling in wavelength-constrained optical time-slotted networks,” in *Proc. ICC*, May 2010.
- [C59] S. Cho, S. Ramasubramanian, O. Turkcu, and **S. Subramaniam**, “Performance analysis of multi-channel wireless infrastructure networks,” in *Proc. LANMAN*, May 2010.
- [C60] M. Alnaimi, O. Turkcu, and **S. Subramaniam**, “Uniform waveband switching in WDM mesh networks,” in *Intl. Conference on Telecommunications*, Apr 2010.
- [C61] O. Turkcu and **S. Subramaniam**, “Optimal waveband switching in optical ring networks,” in *Proc. Infocom*, Mar 2010.

- [C62] A. Gadkar and **S. Subramaniam**, “Design and performance evaluation of wavelength-constrained optical time-slotted networks,” in *Proc. OFC*, Mar 2010.
- [C63] A. Askarian, **S. Subramaniam**, and M. Brandt-Pearce, “A cross-layer ILP formulation for finding p-cycles in all-optical networks,” in *Proc. Globecom*, Dec 2009.
- [C64] A. Askarian, **S. Subramaniam**, and M. Brandt-Pearce, “Evaluation of link protection schemes in physically impaired optical networks,” in *Proc. ICC*, Jun 2009.
- [C65] A. Gadkar and **S. Subramaniam**, “Optimal FDL design for time-wavelength crossconnects and optical packet switches,” in *Proc. ICC*, Jun 2009.
- [C66] O. Turkcu and **S. Subramaniam**, “Alternate multihop routing in limited reconfigurable optical networks,” in *Proc. High Speed Networks (HSN) Workshop (in conjunction with Infocom)*, Apr 2009.
- [C67] J. He, M. Brandt-Pearce, and **S. Subramaniam**, “Analysis of blocking probability for first-fit RWA in transmission impaired optical networks,” in *Proc. Infocom*, Apr 2009.
- [C68] O. Turkcu and **S. Subramaniam**, “Multihopping and waveband assignment in limited reconfigurable WDM networks,” in *Proc. OFC*, Mar 2009.
- [C69] A. Gadkar and **S. Subramaniam**, “Performance of an optical packet switch with an optimal FDL bank,” in *Proc. OFC*, Mar 2009.
- [C70] M. Al-Naimi and **S. Subramaniam**, “Wavebanding in bi-directional WDM ring networks with limited reconfigurability,” in *Proc. ICCCN*, Aug 2008.
- [C71] A. Askarian, Y. Zhai, **S. Subramaniam**, Y. Pointurier, and M. Brandt-Pearce, “Protection and restoration from link failures in DWDM networks: A cross-layer study,” in *Proc. ICC*, May 2008.
- [C72] A. Gadkar and **S. Subramaniam**, “FDL design in time-wavelength switched optical networks,” in *Proc. ICC*, May 2008.
- [C73] S. Stanic and **S. Subramaniam**, “Distributed hierarchical monitoring and alarm management in transparent optical networks,” in *Proc. ICC*, May 2008.
- [C74] A. Gadkar and **S. Subramaniam**, “Design and evaluation of a buffered time-wavelength crossconnect,” in *Proc. OFC*, Feb 2008.
- [C75] A. Askarian, Y. Zhai, **S. Subramaniam**, Y. Pointurier, and M. Brandt-Pearce, “QoT-aware RWA algorithms for fast failure recovery in all-optical networks,” in *Proc. OFC*, Feb 2008.
- [C76] O. Turkcu and **S. Subramaniam**, “Transponder wavelength assignment in WDM networks,” in *Proc. OFC*, Feb 2008.
- [C77] S. Stanic and **S. Subramaniam**, “A comparison of flat and hierarchical fault-localization in transparent optical networks,” in *Proc. OFC*, Feb 2008.
- [C78] M. Al-Naimi and **S. Subramaniam**, “Waveband assignment in bi-directional ring networks,” in *Proc. OFC*, Feb 2008.
- [C79] O. Turkcu, M. Alnaimi, and **S. Subramaniam**, “Reconfigurability issues in metro DWDM networks,” in *Proc. Advanced Networks and Telecommunication Systems (ANTS)*, Dec 2007. **Invited paper.**
- [C80] —, “On minimizing band size in limited reconfigurable optical networks,” in *Proc. Intl. Conf. Signal Proc. and Comm.*, Nov 2007.
- [C81] —, “Wavelength assignment in optical networks with limited reconfigurability,” in *Proc. Globecom*, Nov 2007.
- [C82] J. He, M. Brandt-Pearce, Y. Pointurier, and **S. Subramaniam**, “QoT-aware routing in impairment-constrained optical networks,” in *Proc. Globecom*, Nov 2007.
- [C83] S. Stanic, G. Sahin, H. Choi, **S. Subramaniam**, and H.-A. Choi, “Monitoring and alarm management in transparent optical networks,” in *Proc. Broadnets*, Sep 2007.
- [C84] J. He, M. Brandt-Pearce, and **S. Subramaniam**, “Connection provisioning in QoT-guaranteed distributed all-optical networks,” in *Proc. Broadnets*, Sep 2007.
- [C85] O. Turkcu and **S. Subramaniam**, “Blocking analysis of limited-reconfigurable optical networks,” in *Proc. Intl. Conf. Computer Comm. Networks (ICCCN)*, Aug 2007. **Invited paper.**
- [C86] —, “BER and latency constrained QoS-aware distributed routing for all-optical networks,” in *Proc. Chinacom*, Aug 2007.
- [C87] J. He, M. Brandt-Pearce, and **S. Subramaniam**, “QoS-aware wavelength assignment with BER and latency guarantees for crosstalk limited networks,” in *Proc. ICC*, Jun 2007.

- [C88] J. He, M. Brandt-Pearce, Y. Pointurier, and **S. Subramaniam**, “Adaptive wavelength assignment using wavelength spectrum separation for distributed optical networks,” in *Proc. ICC*, Jun 2007.
- [C89] Y. Zhai, Y. Pointurier, **S. Subramaniam**, and M. Brandt-Pearce, “Performance of dedicated path protection in transmission-impaired DWDM networks,” in *Proc. ICC*, Jun 2007.
- [C90] Y. Pointurier, M. Brandt-Pearce, and **S. Subramaniam**, “Analysis of blocking probability in noise and crosstalk impaired all-optical networks,” in *Proc. Infocom Mini-symposium*, May 2007.
- [C91] O. Turkcu and **S. Subramaniam**, “Blocking in reconfigurable optical networks,” in *Proc. Infocom*, May 2007, May 2007.
- [C92] Y. Zhai, Y. Pointurier, **S. Subramaniam**, and M. Brandt-Pearce, “QoS-aware RWA algorithms for path-protected DWDM networks,” in *Proc. OFC*, Mar 2007.
- [C93] O. Turkcu and **S. Subramaniam**, “Blocking and waveband assignment in WDM networks with limited reconfigurability,” in *Proc. OFC*, Mar 2007.
- [C94] Y. Pointurier, M. Brandt-Pearce, T. Deng, and **S. Subramaniam**, “Fair QoS-aware adaptive routing and wavelength assignment in all-optical networks,” in *Proc. ICC*, June 2006, Jun 2006. **Best Paper Award.**
- [C95] —, “Fair routing and wavelength assignment in all-optical networks,” in *Proc. OFC*, Mar 2006.
- [C96] T. Deng and **S. Subramaniam**, “Adaptive QoS routing in dynamic wavelength-route optical networks,” in *Proc. Broadnets*, Oct 2005.
- [C97] M. Sivakumar, K. Sivalingam, and **S. Subramaniam**, “On factors affecting the performance of dynamically groomed optical WDM mesh networks,” in *Proc. High Perf. Switching and Routing (HPSR)*, May 2005.
- [C98] T. Deng and **S. Subramaniam**, “Evaluation of optical amplifier robustness against covert QoS attacks in a point-to-point DWDM link,” in *Proc. OFC*, Mar 2005.
- [C99] V. Tamilraj, **S. Subramaniam**, K. Sivalingam, and H. Krishnamurthy, “Performance evaluation of optical cross-connect architectures with tunable transceivers,” in *Proc. ONDM*, Feb 2005.
- [C100] T. Deng and **S. Subramaniam**, “Virtual loop effects in DWDM networks with dynamic power equalization,” in *Proc. ONDM*, Feb 2005.
- [C101] F. Alizadeh-Shabdiz and **S. Subramaniam**, “MAC layer performance analysis of multi-hop ad hoc networks,” in *Proc. Globecom*, Dec 2004.
- [C102] T. Deng and **S. Subramaniam**, “Covert low-power QoS attack in all-optical wavelength routed networks,” in *Proc. Globecom*, Dec 2004.
- [C103] F. Alizadeh-Shabdiz and **S. Subramaniam**, “Analytical models for single-hop and multi-hop ad hoc networks,” in *Proc. Broadnets*, Oct 2004.
- [C104] T. Deng, **S. Subramaniam**, and J. Xu, “Crosstalk-aware wavelength assignment in dynamic wavelength-routed optical networks,” in *Proc. Broadnets*, Oct 2004.
- [C105] M. Sivakumar and **S. Subramaniam**, “Performance evaluation of time switching in TDM wavelength routing networks,” in *Proc. Broadnets*, Oct 2004.
- [C106] T. Deng and **S. Subramaniam**, “Source power management in transparent wavelength-routed mesh networks,” in *Proc. ICC*, Jun 2004.
- [C107] S. Koo, G. Sahin, and **S. Subramaniam**, “Dynamic LSP provisioning in overlay, augmented, and peer architectures for IP/MPLS over WDM networks,” in *Proc. Infocom*, Mar 2004.
- [C108] T. Deng and **S. Subramaniam**, “Amplifier placement and source power management in transparent DWDM networks,” in *Proc. ONDM*, Feb 2004.
- [C109] —, “Amplifier placement in transparent DWDM ring networks,” in *Proc. Opticomm*, Oct 2003.
- [C110] S. Sankaranarayanan, **S. Subramaniam**, H. Choi, and H.-A. Choi, “Survivable traffic grooming in WDM ring networks,” in *Proc. Opticomm*, Oct 2003.
- [C111] V. Tamilraj and **S. Subramaniam**, “A comparison of optical network topologies,” in *Proc. Allerton Conf. on Communications, Control, and Computing*, Oct 2003. **Invited paper.**
- [C112] S. Stanic, **S. Subramaniam**, H. Choi, G. Sahin, and H.-A. Choi, “Efficient alarm management in optical networks,” in *DARPA Information Survivability Conference and Exposition*, May 2003.
- [C113] S. Koo, G. Sahin, and **S. Subramaniam**, “Cost efficient LSP protection in IP/MPLS-over-WDM overlay networks,” in *Proc. ICC*, May 2003.
- [C114] G. Sahin and **S. Subramaniam**, “Online control-message scheduling for Quality of Protection (QoP) in DWDM mesh networks,” in *Proc. OFC*, Mar 2003.

- [C115] F. Alizadeh-Shabdiz and **S. Subramaniam**, “On the performance of a new 802.11-based low latency power control MAC protocol for ad-hoc networks,” in *Proc. WCNC*, Mar 2003.
- [C116] ———, “A finite load analytical model for the IEEE 802.11 Distributed Coordinated Function MAC,” in *Proc. WiOpt*, Mar 2003.
- [C117] G. Sahin and **S. Subramaniam**, “Control-message scheduling for improving restoration times in optical mesh networks,” in *IASTED Intl. Conf. on Parallel and Distributed Computing Systems*, Nov 2002. **Invited paper.**
- [C118] H.-A. Choi, H. Choi, and **S. Subramaniam**, “Fast restoration in WDM mesh networks,” in *Proc. Allerton Conf. on Communications, Control, and Computing*, Nov 2002. **Invited paper.**
- [C119] S. Sankaranarayanan and **S. Subramaniam**, “Performance evaluation of multicasting in optical networks,” in *Proc. Allerton Conf. on Communications, Control, and Computing*, Nov 2002. **Invited paper.**
- [C120] S. Stanic, **S. Subramaniam**, H. Choi, G. Sahin, and H.-A. Choi, “On monitoring transparent optical networks,” in *Workshop on Optical Networks (in conjunction with ICPP '02)*, Aug 2002.
- [C121] H. Lee, H. Choi, **S. Subramaniam**, and H.-A. Choi, “Preserving survivability during logical topology reconfiguration in WDM ring networks,” in *Workshop on Optical Networks (in conjunction with ICPP '02)*, Aug 2002.
- [C122] V. Tamilraj and **S. Subramaniam**, “Blocking of multirate circuits in multichannel optical networks,” in *Proc. Opticomm*, Jul 2002.
- [C123] T. Deng and **S. Subramaniam**, “Analysis of optical amplifier gain competition attack in a point-to-point WDM link,” in *Proc. Opticomm*, Jul 2002.
- [C124] S. Sankaranarayanan, **S. Subramaniam**, H. Choi, and H.-A. Choi, “Survivable traffic grooming in WDM optical networks,” in *Workshop on High Speed Networks (in conjunction with Infocom)*, Jun 2002.
- [C125] H. Choi, **S. Subramaniam**, and H.-A. Choi, “On double-link failure recovery in WDM optical networks,” in *Proc. Infocom*, Jun 2002.
- [C126] S. Koo and **S. Subramaniam**, “Trade-offs between speed, capacity, and restorability in optical mesh network restoration,” in *Proc. OFC*, Mar 2002.
- [C127] H. Choi, **S. Subramaniam**, and H.-A. Choi, “Loopback recovery from neighboring double-link failures in WDM mesh networks,” in *Proc. Joint Conf. on Information Sciences*, Mar 2002.
- [C128] H. J. Lee, H. Choi, **S. Subramaniam**, and H.-A. Choi, “Survivable embedding of logical topology in WDM ring networks,” in *Proc. Joint Conf. on Information Sciences*, Mar 2002.
- [C129] S. Koo and **S. Subramaniam**, “Performance evaluation of optical mesh restoration schemes,” in *Proc. Joint Conf. on Information Sciences*, Mar 2002.
- [C130] M. Sivakumar and **S. Subramaniam**, “Wavelength conversion placement and wavelength assignment in WDM optical networks,” in *Proc. High Performace Computing*, Dec 2001.
- [C131] V. Tamilraj and **S. Subramaniam**, “An analytical blocking model for dual-rate sessions in multichannel optical networks,” in *Proc. Globecom*, Nov 2001.
- [C132] H. Lee, H. Choi, **S. Subramaniam**, and H.-A. Choi, “Survivable logical topology design in WDM ring optical networks,” in *Proc. Allerton Conf. on Communications, Control, and Computing*, Oct 2001. **Invited paper.**
- [C133] H. Choi, **S. Subramaniam**, and H.-A. Choi, “Loopback methods for double-link failure recovery in optical networks,” in *Proc. Allerton Conf. on Communications, Control, and Computing*, Oct 2001. **Invited paper.**
- [C134] **S. Subramaniam** and G. Krishnamurthi, “Load-balancing location management,” in *Proc. ICC*, Jun 2001.
- [C135] J. K. Patel, S. U. Kim and D. Su, **S. Subramaniam**, and H.-A. Choi, “A framework for managing faults and attacks in all-optical transport networks,” in *DARPA Information Survivability Conference and Exposition*, Jun 2001.
- [C136] V. Tamilraj and **S. Subramaniam**, “Analytical blocking models for multirate sessions in TDM wavelength-routing networks,” in *Proc. CISS*, Mar 2001.
- [C137] H. Choi, **S. Subramaniam**, and H.-A. Choi, “Optimal off-line wavelength assignment for permutation traffic in multi-fiber WDM rings,” in *Terabit Optical Networking: Architecture, Control, and Management Issues, Proc. of SPIE*, Nov 2000.

- [C138] A. S. Arora, **S. Subramaniam**, and H.-A. Choi, "A pre-designed protection scheme for WDM ring networks," in *Terabit Optical Networking: Architecture, Control, and Management Issues, Proc. of SPIE*, Nov 2000.
- [C139] **S. Subramaniam**, H. Choi, and H.-A. Choi, "On the effects of switching in multi-fiber WDM networks," in *Proc. Allerton Conf. on Communications, Control, and Computing*, Oct 2000. **Invited paper.**
- [C140] A. S. Arora and **S. Subramaniam**, "Converter placement in wavelength-routing mesh topologies," in *Proc. ICC*, Jun 2000.
- [C141] A. S. Arora, H.-A. Choi, and **S. Subramaniam**, "Logical topology design in optical networks," in *Conference on Graph Theory, Combinatorics, Algorithms and Applications*, Jun 2000.
- [C142] **S. Subramaniam**, E. J. Harder, and H.-A. Choi, "Scheduling multi-rate sessions in TDM wavelength-routing networks," in *Proc. Globecom*, Dec 1999.
- [C143] **S. Subramaniam**, E. J. Harder, and H.-A. Choi, "Resource allocation for multirate sessions in WDM/TDM rings," in *All-Optical Networking 1999: Architecture, Control, and Management Issues, Proc. SPIE*, Sep 1999.
- [C144] **S. Subramaniam**, M. Azizoğlu, and A. K. Somani, "On the optimal placement of wavelength converters in wavelength-routed networks," in *Proc. Infocom*, Apr 1998.
- [C145] M. Azizoğlu, **S. Subramaniam**, and A. K. Somani, "Converter placement on wavelength-routed network paths," in *All-Optical Communication Systems: Architecture, Control, and Network Issues III, Proc. SPIE*, Nov 1997. **Best Paper Award.**
- [C146] **S. Subramaniam** and R. A. Barry, "Wavelength assignment in fixed routing WDM networks," in *Proc. ICC*, June 1997, pp. 406–410. Jun 1997.
- [C147] R. A. Barry and **S. Subramaniam**, "The MAX_SUM wavelength assignment algorithm for WDM ring networks," in *Proc. OFC*, Jun 1997.
- [C148] **S. Subramaniam**, A. K. Somani, M. Azizoğlu, and R. A. Barry, "A performance model for wavelength conversion with non-Poisson traffic," in *Proc. Infocom*, Apr 1997.
- [C149] **S. Subramaniam**, M. Azizoğlu, and A. K. Somani, "Connectivity and sparse wavelength conversion in wavelength-routing networks," in *Proc. Infocom*, Mar 1996. **Top 10 Paper.**
- [C150] **S. Subramaniam**, M. Azizoğlu, and A. K. Somani, "Effect of wavelength converter density on the blocking performance of all-optical networks," in *Proc. LEOS Meeting*, Oct 1995.
- [C151] **S. Subramaniam** and A. K. Somani, "Multicasting in ATM networks using MINs," in *Proc. Intl. Conf. Computer Comm. and Networks (ICCCN)*, Sep 1995.
- [C152] S. Ramaswamy, I. T. Phillips, **S. Subramaniam**, and R. M. Haralick, "Zone classification in a document using the method of feature vector generation," in *Proc. International Conference on Document Analysis and Recognition (ICDAR)*, Aug 1995.
- [C153] **S. Subramaniam** and A. K. Somani, "Connectionless traffic service in ATM networks," in *Proc. LANMAN*, Mar 1995.
- [C154] S. Chen, **S. Subramaniam**, I. T. Phillips, and R. M. Haralick, "Performance evaluation of two OCR systems," in *Proc. Symposium on Document Analysis and Information Retrieval*, Apr 1994.
- [C155] **S. Subramaniam**, H. Barad, A. B. Martinez, and B. Bourgeois, "Seafloor characterization using texture," in *Proc. IEEE Southeastcon*, Apr 1993.

**INVITED
PRESENTATIONS**

- [I1] "Disaster recovery in optical networks," *Design of Reliable Communication Networks (DRCN)*, Milan, Italy. Conference conducted online. Mar 2020
- [I2] "The evolution of data center network architectures," *Intl. Conf. Contemporary Computing and Applications (IC3A)*, Lucknow, India. **Keynote address.** Feb 2020
- [I3] "The evolution of data center network architectures," *IEEE ComSoc Distinguished Lecture* at Sapporo, Yokohama, and Osaka (Japan), Seoul (South Korea). Nov 2019
- [I4] "RHODA topology configuration using Bayesian optimization," *Intl. Conference on Optical Network Design and Modeling (ONDM)*, Athens, Greece. May 2019
- [I5] "The evolution of data center network architectures," *IEEE ComSoc Distinguished Lecture* at Wollongong, Sydney, Adelaide, and Melbourne; Australia. Mar 2019
- [I6] "PopCorns: Power optimization using a cooperative network-server approach for data centers," *Intl. Conf. Computer Communications and Networks (ICCCN)*, Hangzhou, China. Aug 2018

- [I7] "Data center networking," *IEEE ComSoc Distinguished Lecture* at Kolkata, Hyderabad, Kozhikode, and Bengaluru; India. Jul 2018
- [I8] "Multi-granular optical networks," *TELNET*, Noida, India. **Keynote address.** Aug 2017
- [I9] "LASER: A deep learning approach for speculative execution and replication of deadline-critical jobs in cloud," *Intl. Conf. Computer Communications and Networks (ICCCN)*, Vancouver, Canada. Jul 2017
- [I10] "Optics in data center networks," *OSA Advanced Photonics Congress*, New Orleans, LA. Jul 2017
- [I11] "Reliability in optical networks," *Design of Reliable Communication Networks (DRCN)*, Munich, Germany. **Keynote address.** Mar 2017
- [I12] "Recent advances in optical data center networking," *Intl. Conf. Computing, Networking, and Communications (ICNC)*, Santa Clara, CA. Jan 2017
- [I13] "Comparison of OXC node architectures for WDM and flex-grid optical networks," *Intl. Conf. Computer Comm. Networks (ICCCN)*, Las Vegas, NV. Aug 2015
- [I14] "Towards providing reliability as a service in cloud computing," School of Electrical Engineering and Telecommunications, University of New South Wales, Sydney, Australia. Jun 2014
- [I15] "Impairment-aware RWA for translucent optical networks," ECE Department, University of Massachusetts, Lowell, MA. Mar 2014
- [I16] "Towards providing reliability as a service in cloud computing," Virginia Tech Northern Virginia Center, Falls Church, VA. Nov 2013
- [I17] "Towards providing reliability as a service in cloud computing," AT&T Labs, Florham Park, NJ. Sep 2013
- [I18] "Inter-domain QoT-aware RWA for translucent optical networks", *Intl. Conf. Computing, Networking, and Communications (ICNC)*, San Diego, CA. Jan 2013
- [I19] "Optical networking research," *Third US-Japan Future Network Collaboration Workshop on Advanced Research Issues*, Tokyo, Japan. Nov 2012
- [I20] "Design and optimization of limited-reconfigurable optical networks," *Nokia Siemens Networks*, Munich, Germany, June 2009. Jun 2009
- [I21] "On the design and optimization of limited-reconfigurable optical networks," *Peking University*, Beijing, China. May 2008
- [I22] "Overview of optical networking research at GWU," *Ciena Corp.*, Linthicum, MD. May 2008
- [I23] "On the design and optimization of reconfigurable optical networks," *Optimization of Optical Networks Workshop*, Montreal, Canada. May 2008
- [I24] "Reconfigurability issues in metro DWDM networks," *Advanced Networks and Telecommunication Systems (ANTS) Conference*, Mumbai, India. Dec 2007
- [I25] "Blocking analysis of limited-reconfigurable optical networks," *Intl. Conf. Computer Comm. Networks (ICCCN)*, Honolulu, HI. Aug 2007
- [I26] "Reconfigurable optical networks," *Computer Communications Workshop (CCW)*, Pittsburgh, PA. Feb 2007
- [I27] "Planning for dual-link failures in optical networks," ECE Department Colloquium, Univ. of Arizona, Tucson, AZ. Oct 2003
- [I28] "A comparison of optical network topologies," *41st Annual Allerton Conference on Communications, Control, and Computing*, Monticello, IL. Oct 2003
- [I29] "Performance evaluation of multicasting in optical networks," *40th Annual Allerton Conference on Communications, Control, and Computing*, Monticello, IL. Oct 2002
- [I30] "Loopback methods for double-link failure recovery in optical networks," *39th Annual Allerton Conference on Communications, Control, and Computing*, Monticello, IL. Oct 2001
- [I31] "Wavelength conversion in optical networks," LIDS Colloquium, Dept. of EECS, MIT, Cambridge, MA. May 2001
- [I32] "Wavelength conversion and survivability issues in optical networks," Nokia Research Center, Burlington, MA. May 2001
- [I33] "Pre-designed protection for WDM optical ring networks," *IP over DWDM Conference*, Paris, France. Nov 2000
- [I34] "On the effects of switching in multi-fiber WDM networks," *38th Annual Allerton Conference on Communications, Control, and Computing*, Monticello, IL. Oct 2000

- [I35] "Performance models and algorithms for all-optical networks," Dept. of EECS, University of Maryland, Baltimore County, MD. Feb 1999
- [I36] "Models and algorithms for all-optical networks," Dept. of Electrical and Computer Engineering, Iowa State University, Ames, IA. Apr 1998
- [I37] "Routing and wavelength assignment in optical networks," *MIT Lincoln Laboratory*, Lexington, MA. Sep 1996

CONFERENCE PRESENTATIONS

- [P1] "P-cycle design for translucent elastic optical networks," *IEEE Globecom*, Waikoloa, HI. Dec 2019
- [P2] "A hierarchical WDM-based scalable data center network architecture," *IEEE ICC*, Shanghai, China. May 2019
- [P3] "Novel p-cycle selection algorithms for elastic optical networks," *Optical Network Design and Modeling (ONDM)*, Athens, Greece. May 2019
- [P4] "Embedding virtual networks in flexible optical networks with sliceable transponders," *Optical Network Design and Modeling (ONDM)*, Athens, Greece. May 2019
- [P5] "Chronos: A unifying optimization framework for speculative execution of deadline-critical MapReduce jobs," *IEEE Intl. Conference on Distributed Computing Systems (ICDCS)*, Vienna, Austria. Jul 2018
- [P6] "Dynamic routing and spectrum assignment for multi-fiber elastic optical networks," *OSA Advanced Photonics Congress*, Zurich, Switzerland. Jul 2018
- [P7] "Joint banding-node placement and resource allocation for multi-granular elastic optical networks," *IEEE Globecom*, Singapore. Dec 2017
- [P8] "Routing, fiber, band, and spectrum assignment (RFBSA) for multi-granular elastic optical networks," *IEEE ICC*, Paris, France. May 2017
- [P9] "PODCA: A passive optical data center architecture," *IEEE ICC*, Kuala Lumpur, Malaysia. May 2016
- [P10] "Using unmanned aerial vehicles as relays in wireless balloon networks," *IEEE ICC*, London, UK. Jun 2015
- [P11] "Co-scheduling computational and networking resources in elastic optical networks," *IEEE ICC*, Sydney, Australia. Jun 2014
- [P12] "Optimal placement of FSO relays for network disaster recovery," *IEEE ICC*, Budapest, Hungary. Jun 2013
- [P13] "Implementing protection classes through p-cycles in impairment-constrained optical networks", *IEEE ICC*, Cape Town, South Africa. May 2010
- [P14] "Optimal waveband switching in optical ring networks," *IEEE Infocom*, San Diego, CA. Mar 2010
- [P15] "Evaluation of link protection schemes in physically impaired optical networks," *IEEE ICC*, Dresden. Germany. Jun 2009
- [P16] "Alternate multihop routing in limited reconfigurable optical networks," *IEEE High Speed Networks Workshop* (in conjunction with Infocom), Rio de Janeiro, Brazil. Apr 2009
- [P17] "Analysis of blocking probability for first-fit RWA in transmission impaired optical networks", *IEEE Infocom*, Rio de Janeiro, Brazil. Apr 2009
- [P18] "Wavebanding in bi-directional WDM ring networks with limited reconfigurability", *IEEE ICCCN*, St. Thomas, VI. Aug 2008
- [P19] "Distributed hierarchical monitoring and alarm management in transparent optical networks," *IEEE ICC*, Beijing, China. May 2008
- [P20] "Protection and restoration from link failures in DWDM networks: A cross-layer study," *IEEE ICC*, Beijing, China. May 2008
- [P21] "Performance of dedicated path protection in transmission-impaired DWDM networks," *IEEE ICC*, Glasgow, Scotland. Jun 2007
- [P22] "QoS-aware RWA algorithms for path-protected DWDM networks," *IEEE/OSA Optical Fiber Communications (OFC)*, Anaheim, CA. Mar 2007
- [P23] "Performance evaluation of optical cross-connect architectures with tunable transceivers," *Optical Network Design and Modeling (ONDM)*, Milan, Italy. Feb 2005
- [P24] "Virtual loop effects in DWDM networks with dynamic power equalization," *ONDM*, Milan, Italy. Feb 2005

- [P25] “Analytical models for single-hop and multi-hop ad hoc networks,” *IEEE Broadnets*, San Jose, CA. Oct 2004
- [P26] “Source power management in transparent wavelength-routed mesh networks,” *IEEE ICC*, Paris, France. Jun 2004
- [P27] “Amplifier placement and source power management in transparent DWDM networks,” *ONDM*, Ghent, Belgium. Feb 2004
- [P28] “Survivable traffic grooming in WDM ring networks,” *Opticomm*, Dallas, TX. Oct 2003
- [P29] “Blocking of multirate circuits in multichannel optical networks,” *Opticomm*, Boston, MA. Jul 2002
- [P30] “On double-link failure recovery in WDM optical networks,” *IEEE Infocom*, New York, NY. Jun 2002
- [P31] “Wavelength conversion placement and wavelength assignment in WDM optical networks,” *High Performance Computing*, Hyderabad, India. Dec 2001
- [P32] “Load balancing location management,” *IEEE ICC*, Helsinki, Finland. Jun 2001
- [P33] “Converter placement in wavelength-routing mesh topologies,” *IEEE ICC*, New Orleans, LA. Jun 2000
- [P34] “Scheduling multi-rate sessions in TDM wavelength-routing networks,” *IEEE Globecom*, Rio de Janeiro, Brazil. Dec 1999
- [P35] “Resource allocation for multi-rate sessions in WDM/TDM rings,” *SPIE Conference on All-Optical Networking*, Boston, MA. Sep 1999
- [P36] “On the optimal placement of wavelength converters in wavelength-routed networks,” *IEEE Infocom*, San Francisco, CA. Apr 1998
- [P37] “An optimal algorithm for maximizing the number of connections in WDM rings,” *DIMACS Workshop on Multichannel Optical Networks*, Rutgers University, New Brunswick, NJ. Mar 1998
- [P38] “A performance model for wavelength conversion with non-Poisson traffic,” *IEEE Infocom*, Kobe, Japan. Apr 1997
- [P39] “Connectivity and sparse wavelength conversion in wavelength-routing networks,” *IEEE Infocom*, San Francisco, CA. Mar 1996
- [P40] “Connectionless traffic service in ATM networks,” *IEEE LANMAN*, Marathon, FL. Mar 1995
- [P41] “Seafloor characterization using texture,” *IEEE Southeastcon*, Charlotte, NC. Apr 1993

PROFESSIONAL ACTIVITIES

EDITORIAL ACTIVITIES

- Associate Editor, *IEEE/ACM Transactions on Networking* Jan 2008 – 2013; Jul 2017 – present
- Associate Editor, *IEEE/OSA J. Optical Communications and Networks* Apr 2015 – present
- Associate Editor, *Photonic Network Communications* Jan 2013 – present
- Associate Editor, *Optical Switching and Networking* Dec 2006 – present
- Associate Editor, *Journal of Communications and Networks* Jun 2002 – Jan 2018
- Guest Editor, Special Issue on “Energy Efficiency in Optical Networks,” *IEEE J. Selected Areas in Communications*, 2014
- Associate Editor, “*IEEE Communications Surveys and Tutorials*,” Jun 2002 – May 2008
- Associate Editor, “*Optical Networks Magazine*,” Sep 2001 – Aug 2003
- Book Review Editor, “*Optical Networks Magazine*,” Sep 2001 – Aug 2003
- Guest Editor, “*Optical Networks Magazine*,” 2002, 2003
- Guest Editor, “*Journal of High Speed Networks*,” 2002

PANEL ACTIVITIES

- NSF Workshop on Free Space Optical Networks, Arlington, VA. Jul 2017.
I was **one of about 50** researchers invited by NSF to participate in this workshop on FSO networks. Participation by invitation only.
- Japan-US Trustworthy Networking Workshop, San Francisco, CA. Mar 2016.
I was **one of 15** U.S. researchers invited by NSF to participate in this special workshop, along with 17 researchers from Japan. Participation by invitation only.
- Visionary Panel - Cloud technology of the future, Advanced Technology Academic Research Center (ATARC). Jan 2016.

- Third US-Japan Future Network Collaboration Workshop on Advanced Research Issues, Tokyo, Japan. Nov 2012.
I was **one of 15** U.S. researchers invited by NSF to participate in this special workshop, along with 15 researchers from Japan. Participation by invitation only.
- NSF Workshop on Ultra-High Capacity Optical Communications and Networking. Oct 2002.
I was one of about 30 panelists invited to participate in this workshop. Participation by invitation only.
- “Broadband Access and Fiber Networks,” *Netcom 21*, Ashburn, VA. Mar 2001.
- Regular review panelist at NSF. I have served on panels for CISE, ENG, CAREER, IGERT, SBIR, GRFP, GENI, and other special programs at NSF. I have also served on review panels for DoE, DoD, and DTRA research programs. 1999 – present

PROFESSIONAL AFFILIATIONS AND LEADERSHIP

- **Fellow of IEEE** (Class of 2015)
- **Distinguished Lecturer**, IEEE Communications Society, 2018-2021.
- **textbfChair**, IEEE ComSoc Optical Networking Technical Committee, Jan 2012 – Dec 2013. Elected as Secretary in Nov 2007 and served in that position Jan 2008 – Dec 2009, and as Vice-Chair Jan 2010 – Dec 2011.
- Member of OSA, ACM, IEEE Communications Society (ComSoc) and IEEE Computer Society
- Member, IEEE ComSoc Technical Committee on Transmission, Access, and Optical Systems
- Member, Eta Kappa Nu Honors Society

CONFERENCE ACTIVITIES

- **Steering Committee Member**, *IEEE LANMAN* May 2015 – present
- **General Chair**
 - *IEEE LANMAN Workshop*, Beijing, China Apr 2015
 - *IEEE High Speed Networks Workshop (in conjunction with Infocom)*, Shanghai, China Apr 2011
 - *IEEE ANTS*, New Delhi, India Dec 2009
 - *IEEE Broadnets*, San Jose, CA Oct 2006
 - *Trusted Internet Workshop (in conjunction with High Performance Computing)*, Bangalore, India Dec 2005
- **Technical Program Chair**
 - *IEEE Globecom Optical Networks and Systems Symposium*, Washington, DC Dec 2016
 - *IEEE LANMAN*, Reno, NV May 2014
 - *IEEE Infocom*, Turin, Italy Mar 2013
 - *IEEE ANTS*, Mumbai, India Dec 2008
 - *IEEE ICC Optical Networks and Systems Symposium*, Glasgow, Scotland Jun 2007
 - *IEEE Broadnets: Broadband Optical Networking Symposium*, San Jose, CA Oct 2004
 - *Trusted Internet Workshop (in conjunction with High Performance Computing)*, Hyderabad, India Dec 2004
- **Technical Program Vice-Chair**
 - *IEEE Intl. Conf. Computer Comm. Networks (ICCCN)*, St. Thomas, Virgin Islands Aug 2008
 - *IEEE Globecom Advanced Technologies and Protocols for Optical Networks Symposium*, San Francisco, CA Nov 2006
- **Publications Chair**
 - *ACM International Conference on Network Protocols (ICNP)*, Madrid, Spain Oct 2020
 - *ACM SIGCOMM*, Budapest, Hungary Aug 2018
- **Award Committees**
 - Best Paper Award Committee, *IEEE ICC* May 2016
- **Technical Program Committee Meeting Chair**
 - *Infocom TPC Meeting*, Washington, DC Oct 2007
- **Tutorials Chair**
 - *High Performance Switching and Routing (HPSR) Conference*, Phoenix, AZ Apr 2004
 - *Opticomm*, Dallas, TX Oct 2003
- **Session Organizer**
 - Invited session on Optical Cross-layer Design at *IEEE Broadnets*, Raleigh, NC Sep 2007
- **Technical Session Chair**

- Several sessions in Infocom, ICC, Globecom, Broadnets, ONDM, and OFC
- **Technical Program Committee Member**
 - *IEEE Infocom*: 2003, 2004, 2007 – 2018. Served as Area Chair in 2008, 2011, 2012, 2014-2019
 - *IEEE ICC*: 2003, 2004, 2006-2020
 - *IEEE Globecom*: 2003-2016
 - *IEEE/OSA OFC*: 2007-2009
 - *Reliable Networks Design and Modeling (RNDM) Workshop*: 2010-2018
 - *IEEE Broadnets/Opticomm*: 2000-2005, 2007
 - *IEEE Intl. Performance Computing and Communications Conference (IPCCC)*: 2007-2008
 - *Optical Network Design and Modeling (ONDM)*: 2005, 2007-2020
 - *Intl. Conf. on Signal Proc. and Comm. (ICSPC)*: 2007
 - *High Performance Switching and Routing (HPSR) Conference*: 2004
 - *Design of Reliable Communication Networks (DRCN)*: 2003, 2009-2018
 - *Trusted Internet Workshop (in conjunction with High Performance Computing Conference)*: 2003-2004
 - *Workshop on Optical Networks (in conjunction with Intl. Conf. Parallel Processing)*: 2002
 - *SPIE Conf. on Optical Networking*: 2000
 - *Intl. Conf. Computer Communication Networks (ICCCN)*: 1999-2001, 2008-2009

TUTORIALS AND SHORT COURSES

- “The evolution of data center network architectures,” *IEEE ComSoc Distinguished Lecture* at Sapporo, Yokohama, and Osaka (Japan), Seoul (South Korea). Nov 2019
- “The evolution of data center network architectures,” *IEEE ComSoc Distinguished Lecture* at Wollongong, Sydney, Adelaide, and Melbourne; Australia. Mar 2019
- “Data center networking,” *IEEE ComSoc Distinguished Lecture* at Kolkata, Hyderabad, Kozhikode, and Bengaluru; India. Jul 2018
- “Data center networking,” *IEEE Communications Society Summer School*, Trento, Italy Jun 2016
- “Introduction to transport network technologies,” *OPNETWORK*, Washington, DC Aug 2008
- “Optical network survivability – fundamentals, challenges, solutions,” *Broadnets*, Boston, MA Oct 2005
- “Wavelength-routing networks: architectures and performance,” *Opticomm*, Dallas, TX Oct 2000

EXTERNAL REFERENCE

- Reference for P&T candidates and IEEE Fellow candidates at the following institutions:
 - Tsinghua University
 - National University of Singapore
 - TU Braunschweig
 - City University of New York
 - Nanyang Technological University, Singapore
 - University of Ottawa
 - Stony Brook University
 - University of Cyprus
 - University of Virginia
 - University of Texas at Dallas
 - University of Massachusetts, Lowell
 - Arizona State University West
 - KAUST, Saudi Arabia
 - Virginia Commonwealth University
 - Howard University
 - University of Alberta
 - Iowa State University
 - University of North Texas
 - Georgia State University
 - University of New South Wales, Australia
 - Washington State University

REVIEWER

- Reviewer for the journals: *IEEE/ACM Transactions on Networking*, *IEEE Transactions on Communications*, *IEEE Journal on Selected Areas in Communications*, *IEEE Transactions on Computers*, *IEEE Transactions on Parallel and Distributed Computing*, *IEEE Sensors Journal*, *IEEE/OSA Journal of Lightwave Technology*, *IEEE Communications Magazine*, *IEEE Network*, *Elsevier Journal on Optical Switching and Networking*, *Elsevier Journal on Computer Networks*, *European Transactions on Telecommunications*, *J. High Speed Networks (IOS Press)*, *Mobile Networks and Applications (Springer)*, *Operations Research*
- Reviewer of the books:
 - “WDM Optical Networks: Concepts, Design, and Algorithms,” by C. Siva Ram Murthy and G. Mohan, 1st edition, Prentice Hall, 2002.
 - “Optical Networks: A Practical Perspective,” by R. Ramaswami and K. N. Sivarajan, 2nd edition, Morgan Kaufmann, 2001
 - “Multiwavelength Optical Networks: A Layered Approach,” by T. Stern and K. Bala, 1st edition, Addison-Wesley Longman, 1999

CONSULTING

- Consultant for Oblon, Spivak, McClelland, Maier & Neustadt, L.L.P., 2014.
- Consultant for Infinera Corporation, 2011.
- Consultant for Fish and Richardson, PC in WDM patent infringement case, 2001-2002.

VOLUNTARY SERVICE

- Mentor for middle-school students preparing for American Computer Science League (ACSL) and American Mathematics Competition (AMC) contests, 2010 – 2020.
- Mentor/coach for a First Lego League robotics team of elementary/middle school students, 2007 – 2010, 2012 – 2016. Team qualified for state-level competition several years and won several awards.
- Served as a judge for Mathematics in the Thomas Jefferson High School for Science and Technology’s Science Fair, February 2014.
- “What does a professor do and how do you become one?”, invited talk at Thomas Jefferson High School for Science and Technology’s Symposium to Advance Research, May 2012.
- Served as a judge for Mathematics in the Virginia State Science and Engineering Fair held at George Mason University, 2007 and 2008.
- Teacher of Tamil language in Indian Sunday School (Chinmaya Mission), 2005 – 2008.

HONORS & AWARDS

- **IEEE ComSoc Distinguished Lecturer**, Jan. 2018 - Dec. 2021.
- **Fellow of the IEEE**, Class of 2015.
- **2017 Distinguished Researcher Award**, School of Engineering and Applied Science, GWU, May 2017.
- **Best Paper Award** for the paper “Novel p-cycle selection algorithms for elastic optical networks” (with R. Zou) in *Conference on Optical Network Design and Modeling (ONDM)*, Athens, Greece, May 2019.
- **Best Paper Award** for the paper “Fair QoS-aware adaptive routing and wavelength assignment in all-optical networks” (with Y. Pointurier, M. Brandt-Pearce, and T. Deng) in *IEEE Intl. Conf. on Comm. (ICC)*, Istanbul, Turkey, June 2006.
- **Best Paper Award** for the paper “Converter placement on wavelength-routed network paths” (with M. Azizoglu and A. K. Somani) in *All-Optical Communication Systems: Architecture, Control, and Network Issues*, SPIE, Nov. 1997.
- **“Top Ten”** paper citation in *IEEE Infocom’96*. My paper was nominated for the Best Paper Award, and invited for publication in the *IEEE/ACM Transactions on Networking*.
- Elected to Secretary position (one of 3 officers) of the IEEE ComSoc Optical Networking Technical Committee (ONTC) starting Jan. 2008. Served as Vice-Chair from Jan. 2010 – Dec. 2011, and as Chair from Jan. 2012 – Dec. 2013.
- Listed in *Marquis Who’s Who in America*, *Marquis Who’s Who in Science and Engineering*, and *ASEE Who’s Who in Engineering Education*.
- Awarded U.S. Patent # 6538777 for the invention (with R. A. Barry) “Method for establishing connections by allocating links and channels,” March 2003.
- NSF travel grant to present paper at *IEEE Infocom*, San Francisco, CA, April 1998.
- NSF graduate student travel grant to present paper at *IEEE Infocom*, Kobe, Japan, April 1997.
- J. Watamull Scholarship, University of Washington, Seattle, 1994–1996.
- Eta Kappa Nu, Electrical Engineering Honors Society, 1992.

**COURSE
DEVELOPMENT &
TEACHING**

GRADUATE

- ECE 6575 – Optical Communication Networks. This course was fully developed by me. Topics include signal propagation in fiber, dispersion, polarization, optical networking components, WDM transmission systems design, wavelength-routing networks, network survivability, performance analysis, and network control and management.
- ECE 6560 – Network Performance Analysis. This course was completely revamped by me, and I have taught it almost every year since 1997.
- ECE 6015 – Stochastic Processes in Engineering
- ECE 6555 – Network Protocols
- ECE 6035 – Introduction to Computer Networks

UNDERGRADUATE

- ECE 4415 – Introduction to Computer Networks
- ECE 3515 / CSCI 3462 – Computer Organization
- ECE 3410 – Communications Engineering
- CSCI 1121: Introduction to C Programming

**STUDENT
MENTORSHIP**

POST-DOCTORAL FELLOWS AND VISITORS

- [PV1] Khulan Batbayar, Visiting Student Researcher, Jan. 2020 - May 2020. Visiting PhD student from UPC (Spain) and UCLouvain (Belgium) on a US-EU collaboration project on Next Generation Internet.
- [PV2] Dr. Xianglin Wei, Visiting Researcher, March 2018 - March 2019. Visiting from Nanjing Institute of Telecommunications Technology, China.
- [PV3] Dr. Jianhua Fan, Visiting Researcher, Jan. - July 2017. Visiting from Nanjing Institute of Telecommunications Technology, China.
- [PV4] Pedro Javier de Carracedo, Visiting Researcher, Aug./Sep. 2009. Visiting from University of Alcala, Spain.
- [PV5] Gokhan Sahin, Post-Doctoral Fellow, April 2002 – March 2004. Currently a faculty member in the ECE Department at Miami University, Oxford, Ohio.

CURRENT DOCTORAL STUDENTS

- [CD1] Peng Zou. Status: Started program in Fall '18. Passed preliminary exam in Spring '19.
- [CD2] Rujia Zou. Status: Started program in Fall '19. Passed preliminary exam in Fall '19.
- [CD3] Min Tian. Status: Started program in Fall '19. Passed preliminary exam in Fall '19.
- [CD4] Shrinivas Petale. Status: Started program in Fall '19. Passed preliminary exam in Spring '20.

GRADUATED DOCTORAL STUDENTS

- [D1] Sultan Alamro, Ph.D., Spring 2020. Dissertation title: Optimal dynamic resource provisioning to meet QoS requirements in cloud.
- [D2] Maotong Xu, Ph.D., Spring 2019. Dissertation title: Deadline-aware job and task scheduling in cloud environment. **ECE Best Dissertation Award.**
- [D3] Jingxin Wu, Ph.D., Summer 2018. Dissertation title: Resource allocation in multigranular optical networks.
- [D4] Farshad Ahdi, Ph.D., Spring 2016. Dissertation title: Reliability and capacity planning in hybrid optical networks.
- [D5] Juzi Zhao, Ph.D., Spring 2014. Dissertation title: Impairment-aware resource allocation in translucent optical networks. **ECE Best Dissertation Award.**
- [D6] Majid Al-Naimi, Ph.D., Summer 2011. Dissertation title: Waveband optimization in ROADM-based optical networks.
- [D7] Sava Stanic, Ph.D., Fall 2010. Dissertation title: Fault monitoring and localization in transparent optical networks.
- [D8] Arush Gadkar, Ph.D., Fall 2010. Dissertation title: Time-slotted optical networks: architectures and performance evaluation.
- [D9] Amir Askarian, Ph.D., Spring 2010. Dissertation title: Cross-layer approach to resilient all-optical network design.
- [D10] Onur Turkcu, Ph.D., Summer 2009. Dissertation title: Transponder tunability and waveband switching in reconfigurable optical networks.

- [D11] Tao Deng, D.Sc., Fall 2005. Dissertation title: Physical-layer aware design and service provisioning in transparent wavelength-routed networks.
- [D12] Farshid Alizadeh-Shabdiz, D.Sc., Spring 2004. Dissertation title: Single and multi-hop ad hoc networks: Performance analysis and a new MAC protocol.
- [D13] Sunggy Koo, D.Sc., Spring 2004. Dissertation title: Provisioning and restoration in IP/MPLS over WDM networks.

GRADUATED MASTERS STUDENTS

- [M1] Hao Xie, M.S., Summer 2019. Thesis title: Virtual optical network embedding with node and link splitting in elastic optical networks.
- [M2] Min Tian, M.S., Summer 2019. Thesis title: Energy optimization by fan speed control for data centers.
- [M3] Rujia Zou, M.S., Spring 2019. Thesis title: P-cycle design in elastic optical networks.
- [M4] Peyman Keyvan Saeid, M.S., Summer 2012. Thesis title: Energy-efficient QoS-guaranteed routing in translucent optical networks.
- [M5] Lee Swingen, M.S., Thesis title: A comparison study of CRZ-DPSK and RZ-DPSK modulation formats versus four common impairments of an optically pre-amplified DPSK receiver.
- [M6] Somak Halder, M.S., Summer 2003. Thesis title: EXPRED: A new active queue management algorithm.
- [M7] Cansu Altinbuken, M.S., Summer 2003. Thesis title: Comparison of fair queueing algorithms.
- [M8] Srivatsan Sankaranarayanan, M.S., Fall 2002. Thesis title: Performance evaluation of multicasting in optical networks.
- [M9] Venkatraman Tamilraj, M.S., Summer 2002. Thesis title: Analytical blocking models for multi-rate circuits in multichannel optical networks.
- [M10] Ritabrata Roy, M.S., Summer 2002 (co-advisor with Profs. C. Korman and S. Ahmadi). Thesis title: Minimum energy transmission schemes for mobile ad-hoc networks.
- [M11] Mahesh Sivakumar, M.S., Summer 2001. Thesis title: Wavelength conversion and time switching in wavelength-routing networks: a performance study.
- [M12] Amrinder S. Arora, M.S., Fall 2000 (co-advisor with Prof. H.-A. Choi). Thesis title: Design of logical topologies for optical network survivability.

UNDERGRADUATE RESEARCH STUDENTS

- [U1] Will Haftel, Spring 2020. Disaster recovery in optical networks.
- [U2] Greg Kahl, Spring 2019. Data center energy simulation.

**DISSERTATION
COMMITTEES**

- [DC1] Engin Kayraklioglu, "Productive machine learning support for data locality optimizations in distributed memory systems," Dept. of ECE, GWU, Oct. 2019.
- [DC2] Fan Yao, "Low-cost techniques for enhancing energy efficiency and information security in next generation multi-core server system designs," Dept. of ECE, GWU, June 2018.
- [DC3] Yongbo Li, "Pushing the envelope of mobile computing: Improving security, energy, and latency by bridging the gap between analytical modeling and system design," Dept. of ECE, GWU, Feb. 2018.
- [DC4] Yang Hu, "Triangle counting on large graphs," Dept. of ECE, GWU, Nov. 2017.
- [DC5] Hang Liu, "High performance systems for graph analytics," Dept. of ECE, GWU, Aug. 2017.
- [DC6] Ahmed Anbar, "Exploiting hierarchical locality in extreme scale architectures," Dept. of ECE, GWU, Aug. 2016.
- [DC7] David Newsom, "Locality-driven power optimization techniques for high-performance parallel systems," Dept. of ECE, GWU, Dec. 2015.
- [DC8] Olivier Serres, "Hardware support for productive Partitioned Global Address Space (PGAS) programming," Dec. 2015.
- [DC9] Yu Xiang, "Enhancing performance of cloud computing services through improving reliability and taming latency," July 2015.
- [DC10] Thilo Schondienst, "Modeling and reducing the environmental impact of communication networks," Dept. of ECE, University of Massachusetts, Lowell, Dec. 2014.

- [DC11] Xu Wang, "Resource assignment for fiber optic networks," Dept. of ECE, University of Virginia, Nov. 2014.
- [DC12] Jie Chen, "Next generation hardware monitoring infrastructure for multi-core resource auditing," Dept. of ECE, GWU, Oct. 2014.
- [DC13] Luca Zappaterra, "Improving resource management in dynamic cognitive radio networks through low-complexity channel selection algorithms," Dept. of Computer Science, GWU, March 2014.
- [DC14] Ron Chiang, "Understanding and optimizing I/O virtualization in data centers," Dept. of ECE, GWU, Aug. 2013.
- [DC15] Akhtar Nawaz Khan, "Design Based Routing with Waveband and Wavelength Assignments in WDM Networks Using Multi-granular Optical Crossconnects," School of Engineering and Technology, Asian Institute of Technology, Thailand, January 2013.
- [DC16] Ahmad Dhaini, "Design and Analysis of Green Mission-Critical Fiber-Wireless Broadband Access Networks," Dept. of ECE, University of Waterloo, Canada, Sep. 2011.
- [DC17] Shahram Shiri, "Analysis and design of an occulter for exoplanet missions," Dept. of ECE, GWU, March 2011.
- [DC18] Mira Yun, "Performance enhancement in heterogeneous wireless networks," Dept. of Computer Science, GWU, March 2011.
- [DC19] Yu Zhou, "Resource management in wireless networks: queue management and scheduling in mesh networks and multi-access control in internetworking systems," Dept. of Computer Science, GWU, July 2010.
- [DC20] Jinhong Wu, "Convergence and algorithm design for iterative receivers," Dept. of ECE, GWU, April 2010.
- [DC21] Wei Cheng, "Cross-layer study for multipath communication in multi-radio multi-channel wireless networks: Topology control and channel scheduling," Dept. of Computer Science, GWU, January 2010.
- [DC22] Kai Xing, "Exploiting neighborhood information in wireless networks: channel assignment and replica detection," Dept. of Computer Science, GWU, September 2009.
- [DC23] Yanxia Rong, "Misbehavior detection and rate adaptation in IEEE 802.11 networks: modeling and SPRT algorithms," Dept. of Computer Science, GWU, August 2008.
- [DC24] Liran Ma, "Thwarting malicious and selfish behavior in commodity Wi-Fi networks," Dept. of Computer Science, GWU, July 2008.
- [DC25] Jun He, "RWA algorithm design and performance analysis for all-optical networks subject to physical impairments," University of Virginia, April 2008.
- [DC26] Krishanthmohan Ratnam, "Multi-layer survivability in IP-over-WDM networks," National University of Singapore, Feb. 2008.
- [DC27] Jinghao Xu, "Performance of wireless ad hoc networks with multiuser detection and energy conservation," Dept. of ECE, GWU, Dec. 2007.
- [DC28] Fanchun Jin, "Utility-based radio resource management in mobile wireless networks," Dept. of Computer Science, GWU, July 2007.
- [DC29] Joseph Gomes, "Optimizing multi-join queries over dynamic data streams," Dept. of Computer Science, GWU, July 2007.
- [DC30] Fang Liu, "Security provisioning in wireless sensor networks," Dept. of Computer Science, GWU, May 2007.
- [DC31] Nan Zhang, "Multiuser diversity and interference cancellation for wireless communication systems," Dept. of ECE, GWU, 2006.
- [DC32] Yang Cao, "Cooperative diversity transmission in wireless networks," Dept. of ECE, GWU, 2006.
- [DC33] Amrinder Arora, "Theoretical foundations of channel scheduling in wireless networks," Dept. of Computer Science, GWU, Feb. 2006.
- [DC34] Yen-Hung Hu, "Flood-based DDoS attacks and windows-based filtering approach," Dept. of Computer Science, GWU, 2003.
- [DC35] Michael Souryal, "Channel-adaptive techniques for ad hoc wireless networks," Dept. of ECE, GWU, March 2003.
- [DC36] Hyunju Kim, "Error recovery in binary image transmission," Dept. of Computer Science, GWU, Dec. 2002.

- [DC37] Lei Yao, "Queueing analysis and control of long range dependent traffic: Applications to Internet traffic engineering," Dept. of ECE, GWU, Nov. 2002.
- [DC38] Jelena Damnjanovic, "Diversity techniques in multiuser communications," Dept. of ECE, GWU, May 2001.
- [DC39] Li-Chuan Chen, "Algorithms for efficient Web system performance," Dept. of Computer Science, GWU, March 2001.
- [DC40] Amina Al Rustamani, "Greedy detection," Dept. of ECE, GWU, Jan. 2001.
- [DC41] Sang Kim, "On the use of antenna arrays and multiuser detection for DS/CDMA systems," Dept. of ECE, GWU, April 2000.
- [DC42] Jose Gallardo, "Fractional stable noise processes and their application to traffic modeling and fast simulation of broadband telecommunications networks," Dept. of EECS, GWU, May, 2000.
- [DC43] William Shvodian, "A new MAC protocol for broadband satellites," Dept. of EECS, GWU, Nov. 1999.
- [DC44] Fatih Alagoz, "Adaptive transmission and rate control in one-to-many link wireless networks: Algorithms, strategies, and performance analysis," Dept. of EECS, GWU, Nov. 1999.
- [DC45] Siamak Dastango, "A family of multicode spread Aloha protocols supporting voice and data," Dept. of EECS, GWU, Nov. 1999.
- [DC46] Byung K. Yi, "On the implementation of iterative decoding schemes," Dept. of EECS, GWU, March 1999.
- [DC47] Eric J. Harder, "Routing and wavelength assignment in all-optical WDM wavelength-routing networks," Dept. of EECS, GWU, March 1998.
- [DC48] Yaacov Shama, "Detection/decoding in multiuser communications," Dept. of EECS, GWU, Jan. 1998.

**COMMITTEE
SERVICE**

FACULTY SENATE

- SEAS Representative on the Faculty Senate Steering Committee on Undergraduate Curriculum Reform, Fall '07 – Summer '09.
- Member, Senate Committee on Research, Fall '04 and Spring '05. Reviewed patent policy, conflict of interest disclosures, and VA campus research activities.

UNIVERSITY SERVICE

- Member, Self-Study Committee on Ethics and Integrity for Middle States Accreditation, Spring 2016 - Summer 2017. The committee met monthly to document issues concerning ethics and integrity in the Middle States Accreditation report.
- Member, School Rules and Procedures Board Working Group, Fall '14 and Spring '15. The working group looked into modifying the relevant sections of the GWU Faculty Code.
- Member, University Honors Program Advisory Committee, Fall '09 – Spring '12. This committee met monthly and discussed issues related to the Honors Program.

SCHOOL SERVICE

- Chair, Graduate Education Strategic Planning Task Force, Spring '16. I led a group of various stakeholders including students, alumni, faculty, and industry leaders on graduate education strategic planning.
- Member, CS Chair Search Committee, Spring and Fall '14, Spring '15. I am one of 7 members of this school-wide committee.
- Chair, ECE Task Force, Spring '13. I chaired this ad hoc task force of 7 members that examined the impact on the ECE department of the creation of a separate BME department.
- Member, SEAS Personnel Sub-Committee, Spring '12. I was one of 10 members reviewing 5 promotion/tenure cases within SEAS.
- Member, SEAS Personnel Sub-Committee, Spring '10. I was one of 5 members of the sub-committee that reviewed 3 promotion/tenure cases within SEAS.
- Chair, Promotion and Tenure Task Force, Spring '10. Developed procedures for forming the SEAS Personnel Sub-Committee and templates and formats for the various documents that are to be used by promotion/tenure candidates, departments, and by the sub-committee.
- Chair, Evaluation Task Force of the Academic Program Review Report of the Department of Computer Science, Spring 2010.

- Member, SEAS Retention Task Force, Fall '05. Participated in a series of meetings to look at the retention issue within SEAS and contributed to the final report written by Dr. Craig Linebaugh.

DEPARTMENT SERVICE

- Director, Lab For Intelligent Networking and Computing (LINC), 2015-now.
- Member, Recruitment committee to hire faculty, 2002, 2006 - 2013, 2016. Responsible for reviewing applications and making recommendations for inviting candidates to interview.
- Member, ECE Chair Search Committee, Spring and Fall '14. I was one of 6 members of this committee to recruit an external Chair for the department.
- Member, ECE Personnel Sub-committee for the promotion and tenure of Prof. Howie Huang, Fall '13.
- Coordinator, ABET report preparation team, 2012-13.
- Member, Staff Recruitment Committee, Spring 2013.
- Lead Writer, Academic and Doctoral Program Review Report, 2007-08.
- Course Director for:
 - ECE 4415/6035 – Introduction to Computer Networks
 - ECE 6560 – Network Performance Analysis
 - ECE 6575 – Optical Communication Networks
- Chair, Graduate Admissions and Support Committee, 1999 – 2012, Acting Chair, Spring 2013, Member, 2014 – now. As chair of the committee, I came up with a process to streamline the processing of graduate student applications (particularly doctoral). This process continues to be improved. I also personally did a detailed screening of all doctoral applications and summarized the applicants' strengths and weaknesses before the applications were discussed at the committee meeting. Along with the Department Chair, I was also responsible for making GTA course assignments.
- Member, Graduate Curriculum Committee, 1998-99, 2002 – present. I have been an active member of this committee and the various ad hoc subcommittees of the GCC. Accomplishments include overhauling the graduate curriculum in 2005-2006, leading the Communications and Networks group in the curriculum revamping, and examining core courses and preliminary exam structure.
- Co-wrote proposals to charter the Institute of High-speed Telecommunications and the GW Center for Networking Research, Summer 2002.
- Prepared lecture on Telecommunications for ECE 1 students, Fall 2001.
- Jointly developed a proposal for selective academic excellence, "Critical infrastructure and information technologies."
- Called admitted undergraduate students to encourage them to attend GW, 1999 – present.
- Member, Ad hoc Committee on Undergraduate Telecommunications Degree, 2001 – 2002.
- Member, Outreach and New Initiatives Committee, 2001 – 2002.
- Member, Academic Standards Committee, 1999 – 2002.
- Coordinator, Doctoral Qualifying Examination in Communications and Networking, Spring 1998, 2001, 2003.
- Member, Doctoral Preliminary Examination Committee, Fall 2002.
- Library Representative, 1999-2004.
- Member, Undergraduate Curriculum Committee, 1998 – 2002. Jointly redesigned the undergraduate curriculum taking into account new ABET 2000 accreditation criteria.
- Member, UCC subcommittee for designing a new undergraduate course called "Computational techniques for Electrical and Computer Engineers," 1999-2000.
- Member, GCC Computer Engineering Subcommittee. Responsible for determining areas of focus and courses in those areas, 2001.
- Undergraduate advisor, Summer 2000, 2001, 2002.

PERSONAL

- U.S. Citizen.
- Interests: Books, movies, music, tennis and cricket, puzzles.
- Fluent in English and Tamil.

[CV compiled on 2020-05-30]