

TILMAN WOLF

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Tilman Wolf is Professor of Electrical and Computer Engineering and Senior Vice Provost for Academic Affairs at the University of Massachusetts Amherst. As Associate Dean of Engineering, he led major initiatives in the College of Engineering, including the establishment of a new Department of Biomedical Engineering and its degree programs, implementation of a new cohort-based distance education M.S. program, and development of a training program for graduate students who teach the college-wide freshman seminar. He is engaged in research and teaching in the areas of computer networks, cybersecurity, and embedded systems. He is a co-author of the book “Architecture of Network Systems” and has published extensively in peer-reviewed journals and conferences. His research has been supported by grants from NSF, DARPA, and industry. He has taught numerous courses on computer networks, embedded systems, programming, and digital design.

PROFESSIONAL APPOINTMENTS

University of Massachusetts Amherst, MA

- **Senior Vice Provost** for Academic Affairs, September 2017 – present.
- **Professor** of Electrical and Computer Engineering, September 2012 – present.
- **Senior Associate Dean** of Engineering, January 2017 – August 2017.
- **Associate Dean** of Engineering, January 2014 – December 2016.
- **Associate Professor** of Electrical and Computer Engineering, September 2007 – August 2012.
- **Assistant Professor** of Electrical and Computer Engineering, August 2002 – August 2007.

Institute IMDEA Networks, Madrid, Spain

- **Visiting Researcher**, July 2012 – December 2012.

IBM T. J. Watson Research Center, NY

- **Research Intern**, Pervasive and Embedded Networking Department, Summers 2000 and 2001.

Washington University in St. Louis, MO

- **Graduate Research Assistant**, Applied Research Laboratory, September 1998 – August 2002.
- **Research Intern**, Electronic Radiology Laboratory, School of Medicine, Summer 1997.

EDUCATION

Degrees

Washington University in St. Louis, MO

- **D.Sc. in Computer Science**, August 2002, Advisor: Jonathan S. Turner, Dissertation: “Design and Performance of Scalable High-Performance Programmable Routers.”
- **M.S. in Computer Engineering**, August 2000.
- **M.S. in Computer Science**, December 1998, Advisor: Guru M. Parulkar, Project: “Design of a Medical-Video-on-Demand System over ATM Networks,” Certificate in Networking and Communications.

Universität Stuttgart, Germany

- **Diplom in Informatik**, July 1998, Advisor: Kurt Rothermel, Thesis: “User Generated Annotations for WWW Documents.”

Professional Development

Harvard Institutes for Higher Education, Harvard Graduate School of Education, Cambridge, MA

- **Management Development Program (MDP)**, Summer 2016.

National Science Foundation

- **Innovation Corps (I-Corps)**, Summer 2016.

AWARDS AND HONORS

- **Distinguished Graduate Mentor Award**, University of Massachusetts, 2017.
- **IEEE Distinguished Lecturer**, IEEE Communications Society, 2014 – 2017 (renewed 2016).
- **Best Paper Award**, First IEEE Conference on Communications and Network Security, 2013.
- **Notable Article in Computing**, ACM Computing Reviews' Best of 2013.
- **Best Paper Award**, 12th IEEE International Conference on High Performance Switching and Routing, 2011.
- **Outstanding Faculty Award**, IEEE/HKN Student Chapter, University of Massachusetts, 2010.
- **Outstanding Teacher Award**, College of Engineering, University of Massachusetts, 2008.
- Barbara H. and Joseph I. Goldstein **Outstanding Junior Faculty Award**, College of Engineering, University of Massachusetts, 2006.
- **CAREER Award**, National Science Foundation, 2005.
- **Lilly Teaching Fellowship**, University of Massachusetts, 2004 – 2005.
- **IBM Research Fellowship**, 2001 – 2002.
- **Outstanding Thesis Award**, Universität Stuttgart, 1998.
- **Fulbright Scholarship**, 1996 – 1997.

RESEARCH FUNDING

G-26 **TWC: Small: Hardware Security for Embedded Computing Systems**

PI: **Tilman Wolf**, Co-PI: Russell Tessier

Sponsor: National Science Foundation, Secure & Trustworthy Cyberspace, #1617458

Amount: \$512,523, August 2016 – July 2019.

G-25 **I-Corps: Commercialization of Fault Detection and Traceback for Software-Defined Networks**

Sole-PI: **Tilman Wolf**

Sponsor: National Science Foundation, I-Corps Program, #1644434

Amount: \$50,000, August 2016 – January 2017.

G-24 **EAGER: Collaborative Research: Enabling Economic Policies in Software-Defined Internet Exchange Points**

Lead-PI: **Tilman Wolf**, Co-PI: Anna Nagurney

Collaborating institutions: University of Kentucky

Sponsor: National Science Foundation, Networking Technology and Systems Program, #1551444

Amount: \$149,992, October 2015 – September 2017.

G-23 **NeTS: Small: Abstractions and Algorithms for Control of Network Services**

PI: **Tilman Wolf**, Co-PI: Sriram Natarajan

Sponsor: National Science Foundation, Networking Technology and Systems Program, #1421448

Amount: \$499,581, October 2014 – September 2017.

G-22 **An Embedded System Laboratory for a General Education Computer Engineering Course**

Sole-PI: **Tilman Wolf**

Sponsor: Intel Research Council

Amount: \$10,000, May 2014.

G-21 **Toward Self-Directed Learning in an Embedded Computing Systems Course**

Sole-PI: **Tilman Wolf**

Sponsor: Intel Research Council

Amount: \$25,000, July 2013.

G-20 **Embedded Systems Projects for M5**

Sole-PI: **Tilman Wolf**

Sponsor: Intel Research Council

Amount: \$25,000, May 2012.

G-19 **NeTS: Large: Collaborative Research: Network Innovation through Choice**

Lead-PI: **Tilman Wolf**, Co-PI: Anna Nagurney

Collaborating institutions: University of Kentucky, North Carolina State University, University of North Carolina

- Sponsor: National Science Foundation, Special Projects – CISE, #1111276
Amount: \$1,021,441 (\$2,844,483 total), September 2011 – August 2015.
- G-18 **TC: Small: Securing the Router Infrastructure of the Internet**
PI: **Tilman Wolf**, Co-PI: Russell Tessier
Sponsor: National Science Foundation, Trustworthy Computing Program, #1115999
Amount: \$512,000, September 2011 – August 2015.
- G-17 **Curriculum Development: Intel Atom in a First-Year Course**
Sole-PI: **Tilman Wolf**
Sponsor: Intel Research Council
Amount: \$30,000, April 2011.
- G-16 **Curriculum Development: Intel Atom in Embedded Systems Courses**
Sole-PI: **Tilman Wolf**
Sponsor: Intel Research Council
Amount: \$27,000, May 2010.
- G-15 **EAGER: Exploring Security Issues in Next-Generation Networking Infrastructure**
Sole-PI: **Tilman Wolf**
Sponsor: National Science Foundation, Exploratory Research Program, #0952524
Amount: \$100,000, January 2010 – December 2011.
- G-14 **Reconfigurable Next Generation Network Monitoring**
PI: Russell Tessier, Co-PI: **Tilman Wolf**
Sponsor: Altera University Program
Amount: \$25,000, July 2009.
- G-13 **Runtime System Support for Packet Processing on Converged Architectures**
Sole-PI: **Tilman Wolf**
Sponsor: Intel Research Council
Amount: \$25,000, May 2008.
- G-12 **Principles for Intrinsically Assurable Network Operation (PIANO)**
Main contract: BAE Systems: PI: Brian DeCleene
Subcontract: University of Massachusetts: PI: **Tilman Wolf**, Co-PIs: James F. Kurose, Donald F. Towsley
Sponsor: DARPA, Space and Naval Warfare Systems Center San Diego, N66001-08-C-2013
Amount: \$471,523 UMass portion (\$8,496,201 total), December 2007 – June 2009.
- G-11 **NeTS-NBD: Packet Spacing in Small-Buffer Networks**
PI: **Tilman Wolf**, Co-PI: Weibo Gong
Sponsor: National Science Foundation, Networking Technology and Systems Program, #0721790
Amount: \$458,000, August 2007 – July 2010.
- G-10 **FIND: Service-Centric End-to-End Abstractions in Network Architectures**
Sole-PI: **Tilman Wolf**
Sponsor: National Science Foundation, Networking Technology and Systems Program, #0626690
Amount: \$357,881, September 2006 – August 2010.
- G-9 **Collaborative Proposal: Technologies for Improving Laboratory Experiences in Advanced Technical Education**
PI: **Tilman Wolf**
Collaborating institution: Washington University in St. Louis (Lead-PI: Jonathan Turner)
Sponsor: National Science Foundation, Research and Evaluation on Education in Science and Engineering Program, #0632586
Amount: \$161,234 (\$600,854 total), September 2006 – August 2010.
- G-8 **Analysis of Partitioning and Interface Abstractions on Converged IA/IXA Platforms**
Sole-PI: **Tilman Wolf**
Sponsor: Intel Research Council
Amount: \$25,000, May 2006.
- G-7 **TabletPCs in a Freshman Engineering Course: Lectures, Discussions, and Labs**
Sole-PI: **Tilman Wolf**
Sponsor: Hewlett-Packard
Amount: \$69,000, May 2006.
- G-6 **NER: WISP: Wire-Streaming Processors in 2-D Nanoscale Fabrics**
PI: Csaba A. Moritz, Co-PI: **Tilman Wolf**

Sponsor: National Science Foundation, Nanoscale: Exploratory Research Program, #0508382
Amount: \$99,991, August 2005 – November 2006.

G-5 CAREER: The Dynamics of Network Processing

Sole-PI: **Tilman Wolf**

Sponsor: National Science Foundation, Faculty Early Career Development Program, #0447873
Amount: \$409,600, June 2005 – May 2010.

G-4 Edge Services on the IXP2350: Transparent TCP Acceleration

Sole-PI: **Tilman Wolf**

Sponsor: Intel Research Council
Amount: \$28,000, May 2005.

G-3 Composable Online Network Measurement on IXP-Based Network Systems

Sole-PI: **Tilman Wolf**

Sponsor: Intel Research Council
Amount: \$22,500, December 2004.

G-2 ITR: Hyperion–Next Generation Measurement Infrastructure and Application Use

PI: James F. Kurose, Co-PIs: Lixin Gao, **Tilman Wolf**, Donald F. Towsley, Prashant Shenoy

Sponsor: National Science Foundation, Information Technology Research Program, #0325868
Amount: \$2,711,486, September 2003 – August 2009.

G-1 An IXP-based Measurement Node for Data-Center Traffic Analysis

PI: **Tilman Wolf**, Co-PIs: James F. Kurose, Prashant Shenoy

Sponsor: Intel Research Council
Amount: \$75,000, July 2003.

PUBLICATIONS

Books

- B-1 Dimitrios Serpanos and **Tilman Wolf**. *Architecture of Network Systems*. Morgan Kaufmann Publishers, February 2011.

Book Chapters

- C-6 Russell Tessier, **Tilman Wolf**, Kekai Hu, and Harikrishnan Chandrikakutty. Reconfigurable network router security. In Pierre-Emmanuel Gaillardon, editor, *Reconfigurable Logic: Architecture, Tools, and Applications*, chapter 13, pages 375–395. CRC Press, October 2015.
- C-5 Anna Nagurney, Dong Li, Sara Saberi, and **Tilman Wolf**. A dynamic network economic model of a service-oriented internet with price and quality competition. In Valery A. Kalyagin, Panos M. Pardalos, and Themistocles M. Rassias, editors, *Network Models in Economics and Finance*, chapter 12, pages 239–264. Springer International Publishing, September 2014.
- C-4 **Tilman Wolf**. Customizable in-network services. In Byrav Ramamurthy, George Rouskas, and Krishna Sivalingam, editors, *Next-Generation Internet – Architectures and Protocols*, chapter 9. Cambridge University Press, February 2011.
- C-3 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. Application analysis and resource mapping for heterogeneous network processor architectures. In Mark A. Franklin, Patrick Crowley, Haldun Hadimioglu, and Peter Z. Onufryk, editors, *Network Processor Design: Issues and Practices, Volume 3*, chapter 13, pages 279–308. Morgan Kaufmann Publishers, February 2005.
- C-2 Mark A. Franklin and **Tilman Wolf**. Power considerations in network processor design. In Mark A. Franklin, Patrick Crowley, Haldun Hadimioglu, and Peter Z. Onufryk, editors, *Network Processor Design: Issues and Practices, Volume 2*, chapter 3, pages 29–50. Morgan Kaufmann Publishers, November 2003.
- C-1 Mark A. Franklin and **Tilman Wolf**. A network processor performance and design model with benchmark parameterization. In Patrick Crowley, Mark A. Franklin, Haldun Hadimioglu, and Peter Z. Onufryk, editors, *Network Processor Design: Issues and Practices, Volume 1*, chapter 6, pages 117–138. Morgan Kaufmann Publishers, October 2002.

Articles in Journals

- J-38 Xinming Chen, Brandon Jones, Michela Becchi, and **Tilman Wolf**. Picking pesky parameters: Optimizing regular expression matching in practice. *IEEE Transactions on Parallel and Distributed Systems*, 27(5):1430–1442, May 2016.
- J-37 Kekai Hu, Hari Krishnan Chandrikakutty, Zachary Goodman, Russell Tessier, and **Tilman Wolf**. Dynamic hardware monitors for network processor protection. *IEEE Transactions on Computers*, 65(3):860–872, March 2016.
- J-36 Luis Andres Marentes, **Tilman Wolf**, Anna Nagurney, and Yezid Donoso. Towards pricing mechanisms for delay tolerant services. *International Journal of Computers, Communications and Control*, 11(1):77–89, February 2016.
- J-35 **Tilman Wolf**, Hari Krishnan Kumarapillai Chandrikakutty, Kekai Hu, Deepak Unnikrishnan, and Russell Tessier. Securing network processors with high-performance hardware monitors. *IEEE Transactions on Dependable and Secure Computing*, 12(6):652–664, November 2015.
- J-34 Shashank Shanbhag, Arun Reddy Kandoor, Cong Wang, Ramgopal Mettu, and **Tilman Wolf**. VHub: Single-stage virtual network mapping through hub location. *Computer Networks*, 77:169–180, February 2015.
- J-33 Nauman Javed, Eric Lyons, Michael Zink, and **Tilman Wolf**. Adaptive wireless mesh networks: Surviving weather without sensing it. *Computer Communications*, 54:120–130, December 2014
- J-32 Sara Saberi, Anna Nagurney, and **Tilman Wolf**. A network economic game theory model of a service-oriented internet with price and quality competition in both content and network provision. *Service Science*, 6(4):229–250, December 2014.
- J-31 Luis Marentes, **Tilman Wolf**, Anna Nagurney, Yezid Donoso, and Harold Castro. Overcoming economic challenges of internet operators in low income regions through a delay tolerant architecture with mechanic backhauls. *NETNOMICS: Economic Research and Electronic Networking*, 15(3):183–213, November 2014.
- J-30 Anna Nagurney and **Tilman Wolf**. A Cournot-Nash-Bertrand game theory model of a service-oriented internet with price and quality competition among network transport providers. *Computational Management Science*, 11(4):475–502, October 2014.
- J-29 **Tilman Wolf**, James Griffioen, Kenneth L. Calvert, Rudra Dutta, George N. Rouskas, Ilia Baldine, and Anna Nagurney. ChoiceNet: toward an economy plane for the Internet. *ACM SIGCOMM Computer Communication Review*, 44(3):58–65, July 2014.
- J-28 **Tilman Wolf**, Sriram Natarajan, and Kamlesh Vasudevan. High-performance capabilities for 1-hop containment of network attacks. *IEEE/ACM Transactions on Networking*, 21(6):1931–1946, December 2013.
- J-27 Anna Nagurney, Dong Li, **Tilman Wolf**, and Sara Saberi. A network economic game theory model of a service-oriented internet with choices and quality competition. *NETNOMICS: Economic Research and Electronic Networking*, 14(1–2):1–25, November 2013. (**Notable Article in Computing in 2013 by ACM Computing Reviews**)
- J-26 Anna Nagurney and **Tilman Wolf**. A Cournot-Nash-Bertrand game theory model of a service-oriented internet with price and quality competition among network transport providers. *Computational Management Science*, pages 1–28, August 2013.
- J-25 Y. Sinan Hanay, Abhishek Dwaraki, Kekai Hu, and **Tilman Wolf**. High-performance implementation of in-network traffic pacing for small-buffer networks. *Computer Communications*, 36(13):1450–1459, July 2013.
- J-24 Danai Chasaki and **Tilman Wolf**. Attacks and defenses in the data plane of networks. *IEEE Transactions on Dependable and Secure Computing*, 9(6):798–810, November 2012.
- J-23 Qiang Wu and **Tilman Wolf**. Runtime Task Allocation in Multi-Core Packet Processing Systems. *IEEE Transactions on Parallel and Distributed Systems*, 23(10):1934–43, October 2012.
- J-22 Shashank Shanbhag and **Tilman Wolf**. Automated composition of data-path functionality in the future internet. *IEEE Network*, 25(6):8–14, November 2011.
- J-21 Yan Cai, **Tilman Wolf**, and Weibo Gong. Delaying Transmissions in data communication networks to improve transport-layer performance. *IEEE Journal on Selected Areas in Communications*, 29(5):916–927, May 2011.
- J-20 **Tilman Wolf**, Russell Tessier, and Gayatri Prabhu. Securing the data path of next-generation router systems. *Computer Communications*, 34(4):598–606, April 2011.
- J-19 **Tilman Wolf**. In-network services for customization in next-generation networks. *IEEE Network*,

- 24(4):6–12, July 2010.
- J-18 Shufu Mao and **Tilman Wolf**. Hardware support for secure processing in embedded systems. *IEEE Transactions on Computers*, 59(6):847–854, June 2010.
- J-17 **Tilman Wolf**. Assessing student learning in a virtual laboratory environment. *IEEE Transactions on Education*, 53(2):216–222, May 2010.
- J-16 Ramaswamy Ramaswamy, Ning Weng and **Tilman Wolf**. Analysis of network processing workloads. *Journal of Systems Architecture*, 55(10):421–433, October 2009.
- J-15 Ning Weng and **Tilman Wolf**. Analytic modeling of heterogeneous network processors for parallel workload mapping. *ACM Transactions on Embedded Computing Systems*, 8(3):1–29, April 2009.
- J-14 Sameer Ladiwala, Ramaswamy Ramaswamy, and **Tilman Wolf**. Transparent TCP acceleration. *Computer Communication*, 32:691–702, March 2009.
- J-13 Shashank Shanbhag and **Tilman Wolf**. Accurate anomaly detection through parallelism. *IEEE Network*, 23(1):22–28, January 2009.
- J-12 Sri Parameswaran and **Tilman Wolf**. Embedded systems security – an overview. *Design Automation for Embedded Systems*, 12(3):173–183, September 2008.
- J-11 Xin Huang and **Tilman Wolf**. Evaluating dynamic task mapping in network processor runtime systems. *IEEE Transactions on Parallel and Distributed Systems*, 19(8):1086–1098, August 2008.
- J-10 Guy Gogniat, **Tilman Wolf**, Wayne Burleson, Jean-Philippe Diguët, Lilian Bossuet, and Romain Vaslin. Reconfigurable hardware for high-security/high-performance embedded systems: the SAFES perspective. *IEEE Transactions on Very Large Scale Integration (VLSI) Systems*, 16(2):144–155, February 2008.
- J-9 **Tilman Wolf**, Ning Weng, and Chia-Hui Tai. Runtime support for multicore packet processing systems. *IEEE Network*, 21(4):29–37, July 2007.
- J-8 Ramaswamy Ramaswamy and **Tilman Wolf**. High-speed prefix-preserving IP address anonymization for passive measurement systems. *IEEE/ACM Transactions on Networking*, 15(1):26–39, February 2007.
- J-7 **Tilman Wolf** and Mark A. Franklin. Performance models for network processor design. *IEEE Transaction on Parallel and Distributed Systems*, 17(6):548–561, June 2006.
- J-6 **Tilman Wolf** and Sumi Y. Choi. Aggregated hierarchical multicast – a many-to-many communication paradigm using programmable networks. *IEEE Transactions on Systems, Man, and Cybernetics – Part C: Applications and Reviews*, 33(3):358–369, August 2003.
- J-5 **Tilman Wolf**, Prashanth Pappu, and Mark A. Franklin. Predictive scheduling of network processors. *Computer Networks*, 41(5):601–621, April 2003.
- J-4 Sumi Y. Choi, Jonathan S. Turner, and **Tilman Wolf**. Configuring sessions in programmable networks. *Computer Networks*, 41(2):269–284, February 2003.
- J-3 **Tilman Wolf**. Network processors: flexibility and performance for next-generation networks. *ACM SIGCOMM Computer Communication Review*, 32(1):65, January 2002.
- J-2 **Tilman Wolf** and Jonathan S. Turner. Design issues for high performance active routers. *IEEE Journal on Selected Areas of Communication*, 19(3):404–409, March 2001.
- J-1 Dan Decasper, Guru Parulkar, Sumi Y. Choi, John DeHart, **Tilman Wolf**, and Bernhard Plattner. A scalable, high performance active network node. *IEEE Network*, 13(1):8–19, January 1999.

Articles in Conference and Workshop Proceedings

- P-127 Arman Pouraghily, **Tilman Wolf** and Russell Tessier. Hardware support for embedded operating system security. In *Proc. of 28th IEEE International Conference on Application-specific Systems, Architectures and Processors (ASAP)*, Seattle, WA, July 2017.
- P-126 Thiago Teixeira, Andres Marentes, and **Tilman Wolf**. Economic incentives in virtualized access networks. In *Proc. of IEEE International Conference on Communications (ICC)*, Paris, France, May 2017.
- P-125 Qiongwen Xu, Xu Zhang, Jin Zhao, Xin Wang, and **Tilman Wolf**. Fast shortest path queries on large-scale graphs. In *Proc. of 23rd IEEE International Conference on Network Protocols (ICNP)*, Singapore, November 2016.
- P-124 Abhishek Dwaraki and **Tilman Wolf**. Adaptive service-chain routing for virtual network functions in software-defined networks. In *Proc. of the ACM SIGCOMM Workshop on Hot topics in Middleboxes and Network Function Virtualization (HotMiddlebox)*, pages 32–37, Florianopolis, Brazil, August 2016.
- P-123 Hao Cai and **Tilman Wolf**. Source authentication and path validation in networks using orthogonal sequences. In *Proc. of the 25th IEEE International Conference on Computer Communications and*

Networks (ICCCN), Waikoloa, HI, August 2016. **(Best Student Paper Runner-Up Award)**

- P-122 James Griffioen, **Tilman Wolf**, and Kenneth L. Calvert. A coin-operated software-defined exchange. In *Proc. of the 25th IEEE International Conference on Computer Communications and Networks (ICCCN)*, Waikoloa, HI, August 2016.
- P-121 Jingrui Li and **Tilman Wolf**. Denial-of-service prevention for software-defined network controllers. In *Proc. of the 25th IEEE International Conference on Computer Communications and Networks (ICCCN)*, Waikoloa, HI, August 2016.
- P-120 **Tilman Wolf** and Anna Nagurney. A layered protocol architecture for scalable innovation and identification of network economic synergies in the internet of things. In *Proc. of the First IEEE International Conference on Internet-of-Things Design and Implementation (IoTDI)*, pages 141–151, Berlin, Germany, April 2016. (Invited)
- P-119 Jingrui Li and **Tilman Wolf**. A one-way proof-of-work protocol to protect controllers in software-defined networks. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 123–124, Santa Clara, CA, March 2016.
- P-118 Xinming Chen, Hao Cai, and **Tilman Wolf**. Multi-criteria routing in networks with path choices. In *Proc. of 23rd IEEE International Conference on Network Protocols (ICNP)*, pages 334–344, San Francisco, CA, November 2015.
- P-117 Tedy Thomas, Arman Pouraghily, Kekai Hu, Russell Tessier, and **Tilman Wolf**. Multi-task support for security-enabled embedded processors. In *Proc. of 26th IEEE International Conference on Application-specific Systems, Architectures and Processors (ASAP)*, pages 136–143, Toronto, ON, July 2015.
- P-116 Andres Marentes, Thiago Teixeira, and **Tilman Wolf**. Exploring economic dynamics in an internet with service choices. In *Proc. of IEEE International Conference on Communications (ICC)*, pages 5272–5277, London, UK, June 2015.
- P-115 Xinming Chen, **Tilman Wolf**, Jim Griffioen, Onur Ascigil, Rudra Dutta, George Rouskas, Shireesh Bhat, Ilya Baldin, and Ken Calvert. Design of a protocol to enable economic transactions for network services. In *Proc. of IEEE International Conference on Communications (ICC)*, pages 5354–5359, London, UK, June 2015.
- P-114 Abhishek Dwaraki, Srinu Seetharaman, Sriram Natarajan, and **Tilman Wolf**. State abstraction and management in software-defined networks. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 189–190, Oakland, CA, May 2015.
- P-113 Hao Cai and **Tilman Wolf**. On 2-way neighbor discovery in wireless networks with directional antennas. In *Proc. of the 34th IEEE Conference on Computer Communications (INFOCOM)*, pages 702–710, Hong Kong, China, April 2015.
- P-112 Renlong Tu, Xin Wang, Jin Zhao, Yue Yang, Lei Shi, and **Tilman Wolf**. Design of a load-balancing middlebox based on SDN for data centers. In *Proc. of the 34th IEEE Conference on Computer Communications (INFOCOM) Workshops*, pages 480–485, Hong Kong, China, April 2015.
- P-111 Pengcheng Wang, Xue Yu, Shuai Chen, Padmaja Duggisetty, Shuo Guo, and **Tilman Wolf**. CryptoPaper: Digital information security for physical documents. In *Proc. of The 30th Annual ACM Symposium on Applied Computing (SAC)*, pages 2157–2164, Salamanca, Spain, April 2015.
- P-110 Abhishek Dwaraki, Srinu Seetharaman, Sriram Natarajan, and **Tilman Wolf**. GitFlow: Flow revision management for software-defined networks. In *Proc. of the 1st ACM SIGCOMM Symposium on Software Defined Networking Research (SOSR)*, pages 6:1–6:6, March 2015.
- P-109 Anna Nagurney, Sara Saberi, **Tilman Wolf**, and Ladimer S. Nagurney. A game theory model for a differentiated service-oriented Internet with duration-based contracts. In *Proc. of 14th INFORMS Computing Society Conference (ICS)*, Richmond, VA, January 2015.
- P-108 Sriram Natarajan and **Tilman Wolf**. Network-level privacy for hosted cloud services. In *Proc. of the Workshop on Smart Cloud Networks and Systems (SCNS)*, Paris, France, December 2014.
- P-107 Hao Cai, Xinming Chen, and **Tilman Wolf**. OrthCredential: A new network capability design for high-performance access control. In *Proc. of 22nd IEEE International Conference on Network Protocols (ICNP)*, pages 233–244, Raleigh, NC, October 2014.
- P-106 Kekai Hu, **Tilman Wolf**, Thiago Teixeira, and Russell Tessier. System-level security for network processors with hardware monitors. In *Proc. of 51st Design Automation Conference (DAC)*, pages 211:1–211:6, San Francisco, CA, June 2014.
- P-105 Karthikeswar Ivaturi and **Tilman Wolf**. Mapping of delay-sensitive virtual networks. In *Proc. of the International Conference on Computing, Networking and Communications (ICNC)*, pages 341–347, Honolulu, HI, February 2014.
- P-104 Peng Wu and **Tilman Wolf**. Stack protection in packet processing systems. In *Proc. of the Inter-*

- national Conference on Computing, Networking and Communications (ICNC)*, pages 53–57, Honolulu, HI, February 2014.
- P-103 Xinming Chen, Brandon Jones, Michela Becchi, and **Tilman Wolf**. Picking pesky parameters: Optimizing regular expression matching in practice. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 203–213, San Jose, CA, October 2013.
- P-102 Kekai Hu, Harikrishnan Chandrikakutty, Russell Tessier, and **Tilman Wolf**. Scalable hardware monitors to protect network processors from data plane attacks. In *Proc. of First IEEE Conference on Communications and Network Security (CNS)*, pages 314–322, Washington, DC, October 2013. (**Best Paper Award**)
- P-101 Abhishek Dwaraki and **Tilman Wolf**. Service instantiation in an Internet with choices. In *Proc. of the 22nd IEEE International Conference on Computer Communications and Networks (ICCCN)*, Nassau, Bahamas, August 2013.
- P-100 Nauman Javed, Eric Lyons, Michael Zink, and **Tilman Wolf**. Adaptive wireless mesh networks: Surviving weather without sensing it. In *Proc. of the Seventh Workshop on Wireless Mesh and Ad Hoc Networks (WiMAN) co-located with the 22nd IEEE International Conference on Computer Communications and Networks (ICCCN)*, Nassau, Bahamas, July 2013.
- P-99 Xinming Chen, Danai Chasaki, and **Tilman Wolf**. External monitoring of highly parallel network processors. In *Proc. of 14th IEEE International Conference on High Performance Switching and Routing (HPSR)*, pages 197–204, Taipei, Taiwan, July 2013.
- P-98 **Tilman Wolf**, Michael Zink, and Anna Nagurney. The cyber-physical marketplace: A framework for large-scale horizontal integration in distributed cyber-physical systems. In *Proc. of the Third International Workshop on Cyber-Physical Networking Systems (CPNS) held in conjunction with the IEEE 33rd International Conference on Distributed Computing Systems (ICDCS)*, pages 296–302, Philadelphia, PA, July 2013.
- P-97 Harikrishnan Kumarapillai Chandrikakutty, Deepak Unnikrishnan, Russell Tessier, and **Tilman Wolf**. High-performance hardware monitors to protect network processors from data plane attacks. In *Proc. of 50th Design Automation Conference (DAC)*, pages 80:1–80:6, Austin, TX, June 2013.
- P-96 George N. Rouskas, Ilia Baldine, Ken Calvert, Rudra Dutta, Jim Griffioen, Anna Nagurney, and **Tilman Wolf**. ChoiceNet: Network innovation through choice. In *Proc. of 17th International Conference on Optical Networking Design and Modeling (ONDM)*, Brest, France, April 2013. (Invited)
- P-95 Nauman Javed and **Tilman Wolf**. Multiple object tracking in sensor networks using distributed clique finding. In *Proc. of the International Conference on Computing, Networking and Communications (ICNC)*, pages 1139–1145, San Diego, CA, January 2013.
- P-94 Xinming Chen and **Tilman Wolf**. Extensible hierarchical simulation of network systems. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 141–142, Austin, TX, October 2012.
- P-93 **Tilman Wolf**, James Griffioen, Kenneth L. Calvert, Rudra Dutta, George N. Rouskas, Ilia Baldine, and Anna Nagurney. Choice as a principle in network architecture. In *Proc. of ACM Annual Conference of the Special Interest Group on Data Communication (SIGCOMM)*, pages 105–106, Helsinki, Finland, August 2012.
- P-92 Jin Zhu and **Tilman Wolf**. VNMBench: A benchmark for virtual network mapping algorithms. In *Proc. of 21st IEEE International Conference on Computer Communications and Networks (ICCCN)*, Munich, Germany, July 2012. (8 pages)
- P-91 Nauman Javed and **Tilman Wolf**. Automated sensor verification using outlier detection in the internet of things. In *Proc. of The Second International Workshop on Cyber-Physical Networking Systems (CPNS) held in conjunction with The IEEE 32nd International Conference on Distributed Computing Systems (ICDCS)*, pages 291–296, Macau, China, June 2012.
- P-90 Y. Sinan Hanay, Wei Li, Russell Tessier, and **Tilman Wolf**. Saving energy and improving TCP throughput with rate adaptation in Ethernet. In *Proc. of IEEE International Conference on Communications (ICC)*, pages 1249–1254, Ottawa, Canada, June 2012.
- P-89 Vikram Desai, Sriram Natarajan, and **Tilman Wolf**. Packet forwarding misbehavior detection in next-generation networks. In *Proc. of IEEE International Conference on Communications (ICC)*, pages 846–851, Ottawa, Canada, June 2012.
- P-88 Cong Wang, Shashank Shanbhag, and **Tilman Wolf**. Virtual network mapping with traffic matrices. In *Proc. of IEEE International Conference on Communications (ICC)*, pages 2717–2722, Ottawa, Canada, June 2012.
- P-87 Sriram Natarajan, Xin Huang, and **Tilman Wolf**. Efficient conflict detection in flow-based virtualized

- networks. In *Proc. of the International Conference on Computing, Networking and Communications (ICNC)*, Maui, HI, February 2012. (7 pages)
- P-86 Sriram Natarajan and **Tilman Wolf**. Security issues in network virtualization for the future internet. In *Proc. of the International Conference on Computing, Networking and Communications (ICNC)*, Maui, HI, February 2012. (Invited, 7 pages)
- P-85 Danai Chasaki, Qiang Wu, and **Tilman Wolf**. Inferring packet processing behavior using input/output monitors. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 91–92, Brooklyn, NY, October 2011.
- P-84 Sriram Natarajan and **Tilman Wolf**. Encrypted packet forwarding in virtualized networks. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 213–214, Brooklyn, NY, October 2011.
- P-83 Cong Wang and **Tilman Wolf**. Virtual network mapping with traffic matrices. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 225–226, Brooklyn, NY, October 2011.
- P-82 Danai Chasaki, Qiang Wu, and **Tilman Wolf**. Attacks on network infrastructure. In *Proc. of Twentieth IEEE International Conference on Computer Communications and Networks (ICCCN)*, Maui, HI, August 2011. (8 pages)
- P-81 Yan Cai, Y. Sinan Hanay, and **Tilman Wolf**. A study of the impact of network traffic pacing from network and end-user perspectives. In *Proc. of Twentieth IEEE International Conference on Computer Communications and Networks (ICCCN)*, Maui, HI, August 2011. (6 pages)
- P-80 Y. Sinan Hanay, Abhishek Dwaraki, and **Tilman Wolf**. High-performance implementation of in-network traffic pacing. In *Proc. of Twelfth IEEE International Conference on High Performance Switching and Routing (HPSR)*, pages 9–15, Cartagena, Spain, July 2011. (**Best Paper Award**)
- P-79 Qiang Wu, Dilip Joy Mampilli, and **Tilman Wolf**. Distributed runtime load-balancing for software routers on homogeneous many-core processors. In *Proc. of The ACM CoNEXT Workshop on Programmable Routers for Extensible Services of TOMorrow (PRESTO)*, Philadelphia, PA, November 2010. (6 pages)
- P-78 Danai Chasaki and **Tilman Wolf**. Design of a secure packet processor. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, San Diego, CA, October 2010. (10 pages)
- P-77 Qiang Wu, Shashank Shanbhag, and **Tilman Wolf**. Fair multithreading on packet processors for scalable network virtualization. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, San Diego, CA, October 2010. (11 pages)
- P-76 Danai Chasaki and **Tilman Wolf**. Fast regular expression matching in hardware using NFA-BDD combination. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, San Diego, CA, October 2010. (2 pages)
- P-75 Xin Huang, Shashank Shanbhag, and **Tilman Wolf**. Automated service composition and routing in networks with data-path services. In *Proc. of Nineteenth IEEE International Conference on Computer Communications and Networks (ICCCN)*, Zurich, Switzerland, August 2010. (8 pages)
- P-74 Shashank Shanbhag, Yu Gu, and **Tilman Wolf**. A taxonomy and comparative evaluation of algorithms for parallel anomaly detection. In *Proc. of Nineteenth IEEE International Conference on Computer Communications and Networks (ICCCN)*, Zurich, Switzerland, August 2010. (8 pages)
- P-73 Shashank Shanbhag and **Tilman Wolf**. Enforcement of data-plane policies in next-generation networks. In *Proc. of IEEE International Symposium on Policies for Distributed Systems and Networks (POLICY)*, pages 137–140, Fairfax, VA, July 2010.
- P-72 Qiang Wu, Danai Chasaki, and **Tilman Wolf**. Implementation of a Simplified Network Processor. In *Proc. of IEEE International Conference on High Performance Switching and Routing (HPSR)*, pages 7–13, Richardson, TX, June 2010.
- P-71 Qiang Wu and **Tilman Wolf**. Data path management in mesh-based programmable routers. In *Proc. of IEEE International Conference on Communications (ICC)*, Cape Town, South Africa, May 2010. (6 pages)
- P-70 Soumya Mahadevan and **Tilman Wolf**. Convergence of communication and processing in next-generation networks. In *Proc. of IEEE International Conference on Communications (ICC)*, Cape Town, South Africa, May 2010. (6 pages)
- P-69 Yan Cai, Bo Jiang, **Tilman Wolf**, and Weibo Gong. A practical on-line pacing scheme at edges of small buffer networks. In *Proc. of the 29th IEEE Conference on Computer Communications (INFOCOM)*, San Diego, CA, March 2010. (9 pages)

- P-68 Yan Cai, Yong Liu, Weibo Gong, and **Tilman Wolf**. Impact of arrival burstiness to queue length: An infinitesimal perturbation analysis. In *Proc. of 48th IEEE Conferences on Decision and Control (CDC)*, pages 7068–7073, Shanghai, China, December 2009.
- P-67 Shashank Shanbhag and **Tilman Wolf**. AnomBench: A benchmark for volume-based internet anomaly detection. In *Proc. of IEEE Global Communications Conference (GLOBECOM)*, Honolulu, HI, December 2009. (6 pages)
- P-66 Qiang Wu, Danai Chasaki, and **Tilman Wolf**. Simplifying data path processing in next-generation routers. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 11–19, Princeton, NJ, October 2009.
- P-65 Xin Huang, Shashank Shanbhag, and **Tilman Wolf**. Interfacing to a virtualized network infrastructure through network service abstractions. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 169–170, Princeton, NJ, October 2009.
- P-64 Danai Chasaki and **Tilman Wolf**. Evaluation of path recording techniques in secure MANET. In *Proc. of the 2009 IEEE Conference on Military Communications (MILCOM)*, Boston, MA, October 2009. (6 pages)
- P-63 Y. Sinan Hanay and **Tilman Wolf**. Techniques for policy enforcement on encrypted network traffic. In *Proc. of the 2009 IEEE Conference on Military Communications (MILCOM)*, Boston, MA, October 2009. (7 pages)
- P-62 **Tilman Wolf** and Russell Tessier. Design of a secure router system for next-generation networks. In *Proc. of Third International Conference on Network and System Security (NSS)*, pages 52–59, Gold Coast, Australia, October 2009.
- P-61 **Tilman Wolf** and Kamlesh T. Vasudevan. A high-performance capabilities-based network protocol. In *Proc. of Fifth Workshop on Secure Network Protocols (NPSec) held in conjunction with Seventeenth IEEE International Conference on Network Protocols (ICNP)*, Princeton, NJ, October 2009. (6 pages)
- P-60 Qiang Wu and **Tilman Wolf**. Design of a network service processing platform for data path customization. In *Proc. of The Second ACM SIGCOMM Workshop on Programmable Routers for Extensible Services of TOMorrow (PRESTO)*, pages 31–36, Barcelona, Spain, August 2009.
- P-59 **Tilman Wolf**, Weibo Gong, and Yan Cai. Burstiness as traffic metric in next-generation optical core networks. In *Proc. of IEEE Photonics Society Summer Topicals*, pages 129–130, Newport Beach, CA, July 2009.
- P-58 Qiang Wu and **Tilman Wolf**. Runtime resource allocation in multi-core packet processing systems. In *Proc. of IEEE Workshop on High Performance Switching and Routing (HPSR)*, Paris, France, June 2009. (8 pages)
- P-57 Shashank Shanbhag, Xin Huang, Santosh Proddatoori, and **Tilman Wolf**. Automated service composition in next-generation networks. In *Proc. of The International Workshop on Next Generation Network Architecture (NGNA) held in conjunction with The IEEE 29th International Conference on Distributed Computing Systems (ICDCS)*, pages 245–250, Montreal, Canada, June 2009.
- P-56 Qiang Wu and **Tilman Wolf**. Support for dynamic adaptation in next generation packet processing systems. In *Proc. of IEEE International Conference on Communications (ICC)*, Dresden, Germany, June 2009. (6 pages)
- P-55 Xin Huang, Sivakumar Ganapathy, and **Tilman Wolf**. Evaluating algorithms for composable service placement in computer networks. In *Proc. of IEEE International Conference on Communications (ICC)*, Dresden, Germany, June 2009. (6 pages)
- P-54 Yan Cai, Y. Sinan Hanay, and **Tilman Wolf**. Practical packet pacing in small-buffer networks. In *Proc. of IEEE International Conference on Communications (ICC)*, Dresden, Germany, June 2009. (6 pages)
- P-53 **Tilman Wolf** and Rui Yang. Design of a system to track student progress in virtual laboratories. In *Proc. of Northeast American Society of Engineering Education (ASEE) Conference*, Bridgeport, CT, April 2009. (7 pages)
- P-52 **Tilman Wolf**, Ellen Zegura, and Santosh Vempala. Workload generation and instrumentation for reproducible networking experiments. In *Proc. of Workload Generation and Instrumentation for Reproducible Networking Experiments (NetEval) held in conjunction with IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, pages 28–33, Boston, MA, April 2009.
- P-51 Shashank Shanbhag and **Tilman Wolf**. Implementation of end-to-end abstractions in a network service architecture. In *Fourth Conference on emerging Networking Experiments and Technologies (CoNEXT)*, Madrid, Spain, December 2008. (12 pages)
- P-50 Shashank Shanbhag and **Tilman Wolf**. Evaluation of an online parallel anomaly detection system. In *Proc. of IEEE Global Communications Conference (GLOBECOM)*, New Orleans, LA, December 2008.

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- P-49 Xin Huang, Sivakumar Ganapathy and **Tilman Wolf**. A framework for network state management in the next-generation internet architecture. In *Proc. of IEEE Global Communications Conference (GLOBECOM)*, New Orleans, LA, December 2008. (5 pages)
- P-48 Danai Chasaki, Y. Sinan Hanay, and **Tilman Wolf**. Topology reconstruction via path recording in secure MANET. In *Proc. of the 2008 IEEE Conference on Military Communications (MILCOM)*, San Diego, CA, November 2008. (7 pages)
- P-47 Qiang Wu and **Tilman Wolf**. On runtime management in multi-core packet processing systems. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 69–78, San Jose, CA, November 2008.
- P-46 **Tilman Wolf**. Data path credentials for high-performance capabilities-based networks. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 129–130, San Jose, CA, November 2008.
- P-45 Xin Huang, Sivakumar Ganapathy, and **Tilman Wolf**. A scalable distributed routing protocol for networks with data-path services. In *Proc. of 16th IEEE International Conference on Network Protocols (ICNP)*, pages 318–327, Orlando, FL, October 2008.
- P-44 Xin Huang, Sivakumar Ganapathy, and **Tilman Wolf**. A distributed algorithm for network service placement. In *Proc. of Seventeenth IEEE International Conference on Computer Communications and Networks (ICCCN)*, St. Thomas, USVI, August 2008. (7 pages)
- P-43 Shashank Shanbhag and **Tilman Wolf**. Massively parallel anomaly detection in online network measurement. In *Proc. of Seventeenth IEEE International Conference on Computer Communications and Networks (ICCCN)*, St. Thomas, USVI, August 2008. (6 pages)
- P-42 Qiang Wu and **Tilman Wolf**. Dynamic workload profiling and task allocation in packet processing systems. In *Proc. of IEEE Workshop on High Performance Switching and Routing (HPSR)*, pages 123–130, Shanghai, China, May 2008.
- P-41 Charlie Wiseman, Ken Wong, **Tilman Wolf**, and Sergey Gorinsky. Operational experience with a virtual networking laboratory. In *Proc. of the 39th SIGCSE Technical Symposium on Computer Science Education*, pages 427–431, Portland, OR, March 2008.
- P-40 **Tilman Wolf**. Design of a network architecture with inherent data path security. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 39–40, Orlando, FL, December 2007.
- P-39 **Tilman Wolf**. A credential-based data path architecture for assurable global networking. In *Proc. of the 2007 IEEE Conference on Military Communications (MILCOM)*, Orlando, FL, October 2007. (7 pages)
- P-38 Qiang Wu, Yong Liao, **Tilman Wolf**, and Lixin Gao. Benchmarking BGP routers. In *Proc. of IEEE International Symposium on Workload Characterization (IISWC)*, pages 79–88, Boston, MA, September 2007.
- P-37 Sivakumar Ganapathy and **Tilman Wolf**. Design of a network service architecture. In *Proc. of Sixteenth IEEE International Conference on Computer Communications and Networks (ICCCN)*, pages 754–759, Honolulu, HI, August 2007.
- P-36 Shufu Mao and **Tilman Wolf**. Hardware support for secure processing in embedded systems. In *Proc. of 44th Design Automation Conference (DAC)*, pages 483–488, San Diego, CA, June 2007.
- P-35 **Tilman Wolf**, Yan Cai, Patrick A. Kelly, and Weibo Gong. Stochastic sampling for internet traffic measurement. In *Proc. of 10th IEEE Global Internet Symposium*, Anchorage, AK, May 2007. (6 pages)
- P-34 Siddhartha Bunga and **Tilman Wolf**. A characterization of high-performance network monitoring systems and workloads. In *Proc. of IEEE Workshop on High Performance Switching and Routing (HPSR)*, Brooklyn, NY, May 2007. (8 pages)
- P-33 **Tilman Wolf**. Assessing the impact of inking technology in a large digital design course. In *Proc. of the 38th SIGCSE Technical Symposium on Computer Science Education*, pages 79–83, Covington, KY, March 2007.
- P-32 Ken Wong, **Tilman Wolf**, Sergey Gorinsky, and Jonathan Turner. Teaching experiences with a virtual network laboratory. In *Proc. of the 38th SIGCSE Technical Symposium on Computer Science Education*, pages 481–485, Covington, KY, March 2007.
- P-31 Xin Huang and **Tilman Wolf**. A methodology for evaluating runtime support in network processors. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 113–122, San Jose, CA, December 2006.
- P-30 **Tilman Wolf**, Shufu Mao, Dhruv Kumar, Basab Datta, Wayne Bursleson, and Guy Gogniat. Collabo-

- rative monitors for embedded system security. In *Proc. of First International Workshop on Embedded Systems Security in conjunction with 6th Annual ACM International Conference on Embedded Software (EMSOFT)*, Seoul, Korea, October 2006. (6 pages)
- P-29 Lukas Ruf, **Tilman Wolf**, Karoly Farkas, and Bernhard Plattner. Specification of network services and mapping algorithms. In *Proc. of the 2006 IEEE Conference on Military Communications (MILCOM)*, Washington, DC, October 2006. (7 pages)
- P-28 **Tilman Wolf**. Service-centric end-to-end abstractions in next-generation networks. In *Proc. of Fifteenth IEEE International Conference on Computer Communications and Networks (ICCCN)*, pages 79–86, Arlington, VA, October 2006.
- P-27 **Tilman Wolf**, Ramaswamy Ramaswamy, Siddhartha Bunga, and Ning Yang. An architecture for distributed real-time passive network measurement. In *Proc. of 14th Annual Meeting of the IEEE/ACM International Symposium on Modeling, Analysis, and Simulation of Computer and Telecommunication Systems (MASCOTS)*, pages 335–344, Monterey, CA, September 2006.
- P-26 **Tilman Wolf**. Challenges and applications for network-processor-based programmable routers. In *Proc. of IEEE Sarnoff Symposium*, Princeton, NJ, March 2006. (Invited, 4 pages)
- P-25 Guy Gogniat, **Tilman Wolf**, and Wayne Burlinson. Reconfigurable security support for embedded systems. In *Proc. of 39th Hawaii International Conference on System Science (HICSS-39)*, Poipu, HI, January 2006. (8 pages)
- P-24 **Tilman Wolf**, Shulin You, and Ramaswamy Ramaswamy. Transparent TCP acceleration through network processing. In *Proc. of IEEE Global Communications Conference (GLOBECOM)*, volume 2, pages 750–754, St. Louis, MO, November 2005.
- P-23 Guy Gogniat, **Tilman Wolf**, and Wayne Burlinson. Reconfigurable security primitive for embedded systems. In *Proc. of International Symposium on System-on-Chip (SOC)*, Tampere, Finland, November 2005. (6 pages)
- P-22 **Tilman Wolf**, Ning Weng, and Chia-Hui Tai. Design considerations for network processor operating systems. In *Proc. of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)*, pages 71–80, Princeton, NJ, October 2005.
- P-21 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. Analysis of network processing workloads. In *Proc. of IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, pages 226–235, Austin, TX, March 2005.
- P-20 Ning Weng and **Tilman Wolf**. Profiling and mapping of parallel workloads on network processors. In *Proc. of The 20th Annual ACM Symposium on Applied Computing (SAC)*, pages 890–896, Santa Fe, NM, March 2005.
- P-19 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. A network processor based passive measurement node. In *Proc. of Passive and Active Measurement Workshop (PAM)*, pages 337–340, Boston, MA, March 2005.
- P-18 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. Characterizing network processing delay. In *Proc. of IEEE Global Communications Conference (GLOBECOM)*, pages 1629–1634, Dallas, TX, November 2004.
- P-17 Ning Weng and **Tilman Wolf**. Pipelining vs. multiprocessors – choosing the right network processor system topology. In *Proc. of Advanced Networking and Communications Hardware Workshop (ANCHOR 2004) in conjunction The 31st ACM/IEEE Annual International Symposium on Computer Architecture (ISCA 2004)*, Munich, Germany, June 2004. (12 pages)
- P-16 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. Application analysis and resource mapping for heterogeneous network processor architectures. In *Proc. of Network Processor Workshop in conjunction with Tenth IEEE International Symposium on High Performance Computer Architecture (HPCA-10)*, pages 103–119, Madrid, Spain, February 2004.
- P-15 Ramaswamy Ramaswamy and **Tilman Wolf**. PacketBench: A tool for workload characterization of network processing. In *Proc. of IEEE 6th Annual Workshop on Workload Characterization (WWC-6)*, pages 42–50, Austin, TX, October 2003.
- P-14 Ramaswamy Ramaswamy, Ning Weng, and **Tilman Wolf**. Considering processing cost in network simulations. In *Proc. of Workshop on Models, Methods and Tools for Reproducible Network Research (MoMeTools) in conjunction with ACM SIGCOMM*, Karlsruhe, pages 47–56, Germany, August 2003.
- P-13 Mark A. Franklin and **Tilman Wolf**. Power considerations in network processor design. In *Proc. of Network Processor Workshop in conjunction with Ninth IEEE International Symposium on High Performance Computer Architecture (HPCA-9)*, pages 10–22, Anaheim, CA, February 2003.
- P-12 Prashanth Pappu and **Tilman Wolf**. Scheduling processing resources in programmable routers. In

- Proc. of the Twenty-First IEEE Conference on Computer Communications (INFOCOM)*, pages 104–112, New York, NY, June 2002.
- P-11 **Tilman Wolf** and Mark A. Franklin. Design tradeoffs for embedded network processors. In *Proc. of International Conference on Architecture of Computing Systems (ARCS) (Lecture Notes in Computer Science)*, volume 2299, pages 149–164, Karlsruhe, Germany, April 2002. Springer Verlag.
- P-10 Mark A. Franklin and **Tilman Wolf**. A network processor performance and design model with benchmark parameterization. In *Proc. of Network Processor Workshop in conjunction with Eighth IEEE International Symposium on High Performance Computer Architecture (HPCA-8)*, pages 63–74, Cambridge, MA, February 2002.
- P-9 **Tilman Wolf** and Mark A. Franklin. Locality-aware predictive scheduling for network processors. In *Proc. of IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, pages 152–159, Tucson, AZ, November 2001.
- P-8 **Tilman Wolf** and Sumi Y. Choi. Aggregated hierarchical multicast for active networks. In *Proc. of the 2001 IEEE Conference on Military Communications (MILCOM)*, pages 899–904, McLean, VA, October 2001.
- P-7 Ralph Keller, Jeyashankher Ramamirtham, and **Tilman Wolf**. Active pipes: Program composition for programmable networks. In *Proc. of the 2001 IEEE Conference on Military Communications (MILCOM)*, pages 962–966, McLean, VA, October 2001.
- P-6 Sumi Y. Choi, Jonathan S. Turner, and **Tilman Wolf**. Configuring sessions in programmable networks. In *Proc. of the Twentieth IEEE Conference on Computer Communications (INFOCOM)*, pages 60–66, Anchorage, AK, April 2001.
- P-5 **Tilman Wolf** and Mark A. Franklin. CommBench – a telecommunications benchmark for network processors. In *Proc. of IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)*, pages 154–162, Austin, TX, April 2000.
- P-4 **Tilman Wolf**, Dan Decasper, and Christian Tschudin. Tags for high performance active networks. In *Proc. of the Third IEEE Conference on Open Architectures and Network Programming (OPENARCH)*, pages 37–44, Tel Aviv, Israel, March 2000.
- P-3 **Tilman Wolf** and Jonathan S. Turner. Design issues for high performance active routers. In *Proc. of the International Zurich Seminar on Broadband Communications*, pages 199–205, Zurich, Switzerland, February 2000.
- P-2 **Tilman Wolf** and Dan Decasper. CPU scheduling for active processing using feedback deficit round robin. In *Proc. of the 37th Allerton Conference on Communication, Control, and Computing*, pages 768–769, Monticello, IL, September 1999.
- P-1 Sumi Y. Choi, Dan Decasper, John DeHart, Ralph Keller, John Lockwood, Jonathan S. Turner, and **Tilman Wolf**. Design of a flexible open platform for high performance active networks. In *Proc. of the 37th Allerton Conference on Communication, Control, and Computing*, pages 157–165, Monticello, IL, September 1999.

INVITED PRESENTATIONS

Keynote Speeches

- **The Eighth IEEE Latin-American Conference on Communications (LATINCOM)**, Medellin, Colombia, November 2016.
- **Comunicaciones, Computación, Tecnologías de Información, Electrónica y Electricidad (COM²TIEE)**, IEEE Section Guatemala, Antigua, Guatemala, November 2015.
- **International Workshop on Computer and Networking Experimental Research using Testbeds (CNERT)**, Raleigh, NC, October 2014.
- **The Third Future Network Development and Innovation Forum**, Nanjing, China, December 2013.

Invited Courses

- **Indian Institute of Science**, Bangalore, India
4-Day Course “Design of Next-Generation Network Processors and Networking Gear,” August 2015.
- **University of Konstanz**, Konstanz, Germany
3-Day Course “Computer Networks,” April 2015.

Invited Seminars

- **La Universidad Politécnica Salesiana**, Cuenca, Ecuador, November 2016.
- **Universidad Técnica del Norte**, Ibarra, Ecuador, November 2016.
- **Universidad Católica Santo Domingo**, Santo Domingo, Dominican Republic, November 2016.
- **IEEE Comsoc Puerto Rico and Caribbean Chapter**, San Juan, PR, November 2016.
- **University of Connecticut**, Comcast Center of Excellence for Security Innovation, October 2016.
- **Memorial University of Newfoundland**, Department of Electrical and Computer Engineering, St. John's, NL, April 2016.
- **Dalhousie University**, Faculty of Computer Science, Halifax, NS, April 2016.
- **University of New Brunswick**, Department of Electrical and Computer Engineering, Fredericton, NB, April 2016.
- **University of Maine**, Department of Electrical and Computer Engineering, Orono, ME, April 2016.
- **IEEE Comsoc New Hampshire Chapter**, Manchester, NH, April 2016.
- **IEEE Panama Section**, Panama City, Panama, November 2015.
- **University of El Salvador**, San Salvador, El Salvador, November 2015.
- **IEEE El Salvador Section**, San Salvador, El Salvador, November 2015.
- **Federal Communications Commission**, Washington, DC, June 2015.
- **IEEE Washington Section**, Columbia, MD, May 2015.
- **IEEE Eastern North Carolina Section**, North Carolina State University, Raleigh, NC, May 2015.
- **IEEE Central North Carolina Section**, North Carolina A&T State University, Greensboro, NC, May 2015.
- **IEEE Charlotte Section**, University of North Carolina, Charlotte, NC, May 2015.
- **IEEE Jamaica Section**, University of Technology Jamaica, Kingston, Jamaica, May 2015.
- **Huawei R&D Center**, Santa Clara, CA, Huawei Strategy & Technology Workshop, March 2014.
- **Tsinghua University**, Beijing, China, Institute for Network Sciences and Cyberspace, December 2013.
- **Chinese Academy of Sciences**, Beijing, China, Institute of Computing Technology, December 2013.
- **Universidad de los Andes**, Departamento de Ingeniería de Sistemas y Computación, Bogotá, Colombia, April 2013.
- **Telefónica Research Lab**, Barcelona, Spain, November 2012.
- **Universidad Carlos III de Madrid**, Science Week, Leganes, Spain, November 2012.
- **Karlsruhe Institute of Technology**, Institute for Telematics, Karlsruhe, Germany, October 2012.
- **Bell Labs Research**, Stuttgart, Germany, July 2012.
- **Rochester Institute of Technology**, Department of Computer Engineering, October 2011.
- **IBM T.J. Watson Research Center**, Yorktown, NY, August 2011.
- **Cisco Systems, Inc.**, Technical Speaker Series, July 2011.
- **Worcester Polytechnic Institute**, Department of Electrical and Computer Engineering, February 2011.
- **Georg-August-Universität Göttingen**, Germany, Institute for Informatik, November 2010.
- **University of Arkansas**, Department of Computer Science and Computer Engineering, April 2010.
- **Technische Universität Berlin**, Germany, School of Electrical Engineering and Computer Sciences, June 2009.
- **Stanford University**, Department of Computer Science, November 2008.
- **University of Connecticut**, Department of Electrical and Computer Engineering, October 2008.
- **Universität Konstanz**, Germany, Department of Computer and Information Science, July 2008.
- **Huawei Technologies Corporation**, China, Beijing Research Center, May 2008.
- **Tsinghua University**, Beijing, China, Department of Computer Science and Technology, May 2008.
- **Fudan University**, Shanghai, China, School of Software, May 2008.
- **University of Patras**, Greece, Department of Electrical and Computer Engineering, March 2008.
- **University of Edinburgh**, United Kingdom, School of Informatics, March 2008.
- **University of Massachusetts Lowell**, Department of Computer Science, September 2007.
- **University of Kentucky**, Department of Computer Science, January 2006.
- **Polytechnic University**, Brooklyn, NY, Department of Computer and Information Sciences, December 2005.
- **Eidgenössische Technische Hochschule (ETH)**, Zurich, Switzerland, Department of Information Technology and Electrical Engineering, November 2005.
- **IBM Research**, Zurich, Switzerland, April 2002.

- **University of British Columbia**, Vancouver, BC, Department of Electrical and Computer Engineering, March 2002.
- **University of Massachusetts Amherst**, Department of Electrical and Computer Engineering, March 2002.
- **IBM T.J. Watson Research Center**, Hawthorne, NY, March 2002.
- **Lucent Technologies**, Holmdel, NJ, March 2002.

Panels and Invited Presentations

- **National Academy of Engineering**, Irvine, CA
Invited Participant, Frontiers of Engineering Education (FOEE) Symposium, October 2014.
- **ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)**, San Jose, CA
Panelist “Future Trends in Networking,” October 2013.
- **International Conference on Computer Communications and Networks (ICCCN)**, Nassau, Bahamas
Panel Moderator “Trends in Network Architecture,” August 2013.
- **Workshop on Optimization of Computing at the Edge of Network (EON)**, Tampere, Finland
Invited Speaker “Hardware Support for Security and Virtualization in High-Performance Network Processors,” October 2012.
- **IEEE Annual International Conference on Computer Communications (INFOCOM)**, Orlando, FL
Panelist “Future Internet Design,” March 2012.
- **Data Center and Cloud Computing Technologies Workshop**, New York University Abu Dhabi
Invited Speaker “Security Issues in Software-Defined Networking,” March 2012.
- **International Conference on emerging Networking EXperiments and Technologies (CoNEXT)**, Tokyo, Japan
Panelist “Interdisciplinary opportunities for networking researchers,” December 2011.
- **Intel Embedded & Communications Education Summit**, Chandler, AZ
Invited Speaker “Application-Layer Offloading using the IXP2850,” February 2008.
- **Internet 2 Meeting**, Arlington, VA
Invited Speaker “Firewalls: Can’t Live With or Without Them,” April 2007.
- **Intel IXA University Summit**, Hudson, MA
Invited Speaker “Online Anomaly Detection using the IXP2400,” October 2006,
Panelist “Intel IXA Curriculum Development,” October 2005,
Invited Speaker “An IXA-Based Network Measurement Node,” October 2004.
- **Intel Network Measurement and Security Workshop**, Portland, OR
Invited Speaker “Real-time Network Measurement using the IXP2400 Network Processor,” November 2005.
- **International Conference on Computer Communications and Networks (ICCCN)**, Miami, FL
Panelist “Network Processor Benchmarking: Benchmarking a Diverse and Evolving Industry,” October 2002.

TEACHING EXPERIENCE

Undergraduate Teaching

- **ENGIN 112 – Introduction to Electrical and Computer Engineering**
First year introduction course on digital logic
Instructor Fall 2004 (lectures, 136 students), Fall 2005 (lectures, 115 students), Fall 2006 (discussions, 110 students), Fall 2007 (discussions, 95 students), Fall 2015 (lectures, 177 students), Fall 2016 (lectures, 189 students).
- **ECE 197SA – ECE Systems Appreciations**
First year course on electrical and computer systems and their societal impact
Instructor Spring 2010 (60 students), Spring 2011 (62 students), Spring 2012 (54 students), Spring 2014 (104 students).
- **ECE 242 – Data Structures and Algorithms**
Sophomore level course on programming data structures and algorithms in JAVA

Instructor Fall 2011 (discussions, 92 students), Fall 2013 (lectures, 96 students).

- **ECE 354 – Computer Systems Lab II**
Junior level microcontroller lab course
Instructor Spring 2003 (43 students), Spring 2004 (34 students).
- **ECE 415 & ECE 416 – Senior Design Project I & II**
Senior level capstone project course
Instructor AY 2007/08 (60 students), AY 08/09 (52 students), AY 2010/11 (50 students).
Team Advisor AY 2002/03, AY 2003/04, AY 2004/05, AY 2005/06, AY 2006/07, AY 2007/08, AY 2008/09, AY 2009/10, AY 2010/11, AY 2011/12, AY 2012/13, AY 2013/14, AY 2014/15 (4 students each year).
- **CS 423 – Introduction to Computer Networks**
Senior and graduate level course on computer networks (Washington University in St. Louis)
Instructor Fall 2001 (64 students).

Graduate Teaching

- **ECE 671 – Computer Networks** (previously ECE 697AA)
Graduate level Ph.D. core course on computer networks
Instructor Spring 2005 (20 students), Spring 2006 (22 students), Spring 2007 (29 students), Spring 2008 (21 students), Fall 2008 (15 students), Fall 2010 (43 students), Fall 2011 (36 students).
- **ECE 697J – Advanced Topics in Computer Networking**
Graduate level research course on network system design
Instructor Fall 2002 (10 students), Fall 2003 (9 students).
- **ENGIN 697T – Teaching Seminar**
Graduate level seminar for freshman seminar instructors
Instructor Fall 2015 (12 students), Fall 2016 (13 students).

Other Teaching Experience

- **Several courses** at Washington University in St. Louis and Universität Stuttgart
Teaching Assistant 1994 – 2000.

ADVISING

Doctoral Students

- **Ning Weng, Ph.D.**, “Application Profiling and Mapping for Network Processing Systems,” July 2005. First position: Assistant Professor, ECE Department, University of Southern Illinois at Carbondale.
- **Ramaswamy Ramaswamy, Ph.D.**, “An Embedded High-Performance Network Measurement Architecture,” August 2006. First position: Cisco Systems, Inc.
- **Xin Huang, Ph.D.**, “Protocol and System Design for a Service-Centric Network Architecture,” September 2009. First position: Deutsche Telekom R&D Lab USA.
- **Qiang Wu, Ph.D.**, “Dynamic Resource Management for High-Performance Many-Core Packet Processing Systems,” December 2010. First position: Juniper Networks, Inc.
- **Yan Cai, Ph.D.**, “Queue Length Based Pacing of Internet Traffic,” May 2011. First position: Cisco Systems, Inc. Co-advised with Weibo Gong.
- **Sinan Hanay, Ph.D.**, “Improving Network Performance through Pacing,” July 2011. First position: Post-doctoral Researcher, Advanced Network Architecture Research Laboratory, Osaka University, Japan.
- **Shashank Shanbhag, Ph.D.**, “On Data-Path Customization in Next-Generation Networks,” September 2011. First position: Nimbula, Inc.
- **Danai Chasaki, Ph.D.**, “Security Issues in Networked Embedded Devices,” April 2012. First position: Assistant Professor, Villanova University.
- **Sriram Natarajan, Ph.D.**, “Security Issues in Network Virtualization for the Future Internet,” July 2012. First position: NTT Multimedia Communication Labs.
- **Nauman Javed, Ph.D.**, “Interpreting Sensor Information in Large-Scale Distributed Cyber-Physical System,” October 2013. First position: Department of Avionics Engineering, National University of Sciences and Technology, Pakistan. Co-advised with Michael Zink.

- **Jeremy Gummeson, Ph.D.**, “Exploiting Energy Harvesting for Passive Embedded Computing Systems,” November 2013. First position: Hewlett Packard Labs. Co-advised with Deepak Ganesan.
- **Xinming Chen, Ph.D.**, “Design and Implementation of an Economy Plane for the Internet,” June 2015. First position: Google, Inc.
- **Hao Cai**, expected December 2017.
- **Abhishek Dwaraki**, expected December 2017.
- **Thiago Teixeira**, expected May 2018.
- **Arman Pouraghily**, expected May 2018.

Masters Students

- **Ning Yang, M.S.**, “Design and Implementation of an On-line Query System for Network Measurement,” December 2005.
- **Chia-Hui Tai, M.S.**, “Analysis of Network Processing Delay,” July 2006. First position: Ph.D. student, EE Department, Stanford University.
- **Siddhartha Bunga, M.S.**, “Online Passive Network Measurement,” July 2006. First position: Cisco Systems, Inc.
- **Shulin You, M.S.**, “Design of Transparent TCP Acceleration using Network Processors,” August 2006. First position: eloomberg, China.
- **Sameer Ladiwala, M.S.**, “Implementation of Transparent TCP Acceleration on Network Processor System,” August 2006. First position: Cisco Systems, Inc.
- **Shashank Shanbhag, M.S.**, “Design and Implementation of Parallel Anomaly Detection,” August 2007. First position: Ph.D. student, ECE Department, University of Massachusetts.
- **Soumya Mahadevan, M.S.**, “Performance Analysis of Offloading Application-Layer Tasks to Network Processors,” August 2007. First position: Cisco Systems, Inc.
- **Aditya Nemmaluri, M.S.**, “Sherlock: RFID Localization for Pervasive Multimedia,” January 2008. First position: Cisco Systems, Inc. Co-advised with Prashant Shenoy.
- **Shufu Mao, M.S.**, “Hardware Support for Secure Processing in Embedded Systems,” January 2008. First Position: WorldQuant, LLC.
- **Pooja Subramanya, M.S.**, “Implementation of an Online Query Management System for Network Measurement,” January 2008. First position: Cisco Systems, Inc.
- **Sivakumar Ganapathy, M.S.**, “Implementation of a Service-Oriented Network Architecture,” May 2008. First position: Airvana, Inc.
- **Wei Chen, M.S.**, “Task Partitioning and Mapping Algorithms for Multi-Core Packet Processing Systems,” September 2008. First position: Nvidia Corp.
- **Danai Chasaki, M.S.**, “Design and Evaluation of Path Recording Techniques in Secure MANET,” December 2008. First position: Ph.D. student, ECE Department, University of Massachusetts.
- **Santosh Proddatoori, M.S.**, “Implementation of Network Services Supporting Multi-Party Policies,” June 2009. First position: Cisco Systems, Inc.
- **Kamlesh Vasudevan, M.S.**, “Implementation of Data Path Credentials for High-Performance Capabilities-Based Networks,” July 2009. First position: RSA, The Security Division of EMC.
- **Anindya Misra, M.S.**, “Simulation of Packet Pacing in Small-Buffer Networks,” November 2009. First position: RSA, The Security Division of EMC.
- **Jeremy Gummeson, M.S.**, “Leveraging Multi-Radio Communications for Wireless Sensor Networks,” September 2010. First position: Ph.D. student, ECE Department, University of Massachusetts. Co-advised with Prashant Shenoy.
- **Arun Reddy Kandoor, M.S.**, “Algorithms and Benchmarking for Virtual Network Mapping,” December 2010. First position: Qualcomm, Inc.
- **Abhishek Dwaraki, M.S.**, “Hardware Implementation of Queue Length Based Pacing for Small-Buffer Networks,” March 2011. First position: RSA, The Security Division of EMC.
- **Cong Wang, M.S.**, “Virtual Network Mapping with Traffic Matrices,” August 2011. First position: Ph.D. student, ECE Department, University of Massachusetts.
- **Karthikeswar Ivaturi, M.S.**, “Design of a Mapping Algorithm for Delay Sensitive Virtual Networks,” March 2012. First position: RSA, The Security Division of EMC.
- **Vikram Desai, M.S.**, “Techniques for Detection of Malicious Packet Drops in Networks,” May 2012. First position: Cisco Systems, Inc.
- **Jin Zhu, M.S.**, “Benchmarking Virtual Network Mapping Algorithms,” July 2012. First position: Cisco

Systems, Inc.

- **Peng Wu, M.S.**, “Stack Protection Mechanisms in Packet Processing Systems,” November 2012. First position: Cisco Systems, Inc.
- **Xianglong Kong, M.S.**, “Analysis of Sensor Data in Cyber-Physical Systems,” May 2013. First position: BroadVision, Inc.
- **Yunsheng Qi, M.S.**, “Design and Implementation of a Network Service Marketplace,” June 2014. First position: Epic Systems Corporation.
- **Pengcheng Wang**, “Design and Implementation of Digital Information Security for Physical Documents,” February 2015. First position: VMTurbo, Inc.
- **Shuai Chen**, “Evaluation of Two-Dimensional Codes for Digital Information Security in Physical Documents,” April 2015. First position: Hughes Network Systems LLC.
- **Xue Yu**, “Design and Implementation of a Digital Information Security Service for Physical Documents,” May 2015. First position: Amazon.com, Inc.
- **Padmaja Duggisetty**, “Design and Implementation of a High-Performance Network Processor with Dynamic Workload Management,” June 2015. First position: Intel Corporation.
- **Chunqiu Liu**, “Infrastructure-Free Secure Pairing of Mobile Devices,” August 2016. First position: OriginLab Corporation.
- **Jingrui Li**, “Protecting Controllers Against Denial-of-Service Attacks in Software-Defined Networks,” August 2016.
- **Jie-Kai Yang**, expected May 2018.

Undergraduate Students

- **Andrew Maxwell**, Research Experiences for Undergraduates (for G-2), “Highly Accurate Time Stamping for Network Measurements,” Summer 2004.
- **Brian Roberts**, Honors Thesis, “Application-Layer Routing Overlay Network,” May 2006.
- **Nafis Azad**, Research Experiences for Undergraduates (for G-5), “Development of Workload Scenarios for Network Processor Run-time Environments,” Summer 2006.
- **Ernard Nicolas**, Research Experiences for Undergraduates (for G-5), “Design and Implementation of an XML Interface for an Application Partitioning and Mapping Tool,” Summer 2006.
- **Edmar Gonçalves**, Research Experiences for Undergraduates (for G-11), “Application-Layer Measurement of Pacing Effects,” Summer 2011.
- **Joel Jean-Claude**, Research Experiences for Undergraduates (for G-11), “Application of Pacing to Network Protocol Design,” Summer 2011.
- **Zachary Goodman**, Research Experiences for Undergraduates (for G-18), “Runtime Optimization for a Secure Router Infrastructure,” Summer 2013.
- **Noah Pell**, Research Experiences for Undergraduates (for G-18), “Improved Monitoring for FPGA-Based Network Processors,” Summer 2013.
- **Cameron Foss**, Research Experiences for Undergraduates (for G-19), “Video Streaming Application for the ChoiceNet Infrastructure,” Summer 2013.
- **William Sullivan**, Research Experiences for Undergraduates (for G-19), “Video Streaming Application for the ChoiceNet Infrastructure,” Summer 2013.

PROFESSIONAL SERVICE

Editorships

- **IEEE/ACM Transactions on Networking**
Associate Editor September 2007 – March 2012.
- **IEEE Micro**
Associate Editor November 2005 – April 2016.
- **Computer Networks** (Elsevier)
Guest Editor Special Issue on Architectures and Protocols for the Future Internet, Volume 55, Number 4, March 2011.
- **International Journal on Design Automation for Embedded Systems** (Springer)
Guest Editor Special Issue on Embedded System Security, Volume 12, Number 3, September 2008.

Officerships in Professional Societies

- **ACM Special Interest Group on Communication (SIGCOMM)**
Treasurer June 2005 – June 2013 (re-elected 2007 and 2009).
- **Internet Research Task Force (IRTF) End Middle End (EME) Research Group**
Co-Chair October 2006 – February 2008.

Advisory Boards and Steering Committees

- **Awards Committee, IEEE Communications Society** *Member*, January 2016 – present.
- **Steering Committee of IEEE/ACM Transactions on Networking**
Chair, July 2013 – June 2014, *Member*, April 2012 – present.
- **Steering Committee of ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)**
Member, October 2012 – present.
- **External Advisory Board, Department of Computer Science and Engineering, Washington University in St. Louis**
Member, 2010 – present.
- **Steering Committee of Global Internet Symposium (GI)**
Member, March 2010 – December 2016.

Conference Organization and Technical Program Committees

- **ACM/IEEE Symposium on Architectures for Networking and Communication Systems (ANCS)**
General Chair 2012, *Technical Program Co-Chair* 2011, *Finance Chair* 2010, *Technical Program Committee Member* 2005, 2006, 2007, 2008, 2009, 2010, 2013, 2017.
- **IEEE International Conference on Computer Communications and Networks (ICCCN)**
General Co-Chair 2010, *Technical Program Co-Chair* 2009, *Track Co-Chair* 2008, *Technical Program Committee Member* 2007, 2008, 2012.
- **IEEE International Conference on Network Protocols (ICNP)**
Technical Program Co-Chair 2013, *Technical Program Committee Member* 2008, 2009, 2010, 2011, 2017.
- **IEEE Conference on Communications and Network Security (CNS)**
Technical Program Co-Chair 2016, *Area Chair* 2014, 2015, 2017 *Technical Program Committee Member* 2013.
- **IFIP Networking**
Technical Program Co-Chair 2017, *Technical Program Committee Member* 2010, 2011, 2012, 2014, 2015, 2016, 2018.
- **International Conference on Parallel Processing (ICPP)**
Track Co-Chair 2014, *Technical Program Committee Member* 2003.
- **Annual Joint Conference of the IEEE Computer and Communications Societies (INFOCOM)**
Panel Co-Chair 2015, *Area Chair* 2015, 2016, 2017, 2018, *Technical Program Committee Member* 2003, 2004, 2006, 2008, 2009, 2010, 2011, 2012.
- **ACM Annual Conference of the Special Interest Group on Data Communication (SIGCOMM)**
Student Travel Grant Chair 2004, 2014.
- **IEEE Conference on Open Architectures and Network Programming (OPENARCH)**
Publicity Chair 2003, *Technical Program Committee Member* 2003.
- **IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)**
Publicity and Web Co-Chair 2001, *Technical Program Committee Member* 2010.
- **IEEE International Conference on Internet-of-Things Design and Implementation (IoTDI)**
Technical Program Committee Member 2017, 2018.
- **International Teletraffic Congress (ITC)**
Technical Program Committee Member 2017.
- **ACM Symposium on Software-Defined Networking Research (SOSR)**
Technical Program Committee Member 2016.
- **ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT)**
Technical Program Committee Member, 2015.

- **IEEE Sensing, Communication and Networking (SECON)**
Technical Program Committee Member, 2016.
- **IEEE Conference on Network Function Virtualization and Software Defined Networks (NFV-SDN)**
Technical Program Committee Member 2015, 2016, 2017.
- **IEEE Globecom – Next Generation Networking and Internet Symposium**
Technical Program Committee Member 2012.
- **IEEE International Conference on Communications in China (ICCC)**
Technical Program Committee Member 2012.
- **International Working Conference on Active Networks (IWAN)**
Technical Program Committee Member 2002, 2003, 2004, 2005, 2006.
- **ACM Symposium on Applied Computing (SAC), Special Track on Embedded Systems**
Technical Program Committee Member 2009, 2010, 2011, 2012, 2014.
- **IEEE International Conference on Communications (ICC)**
Technical Program Committee Member 2011, 2012, 2015, 2016.
- **International Conference on Future Information Networks (ICFIN)**
Technical Program Committee Member 2009.
- **ISCA International Conference on Parallel and Distributed Computing and Communication Systems (PDCCS)**
Technical Program Committee Member 2008.
- **Annual IEEE International Symposium on Workload Characterization (IISWC)**
Technical Program Committee Member 2005.

Workshop Organization and Technical Program Committees

- **Global Internet Symposium (GIS)** in conjunction with the IEEE Conference on Computer Communications (INFOCOM)
Workshop Co-Chair 2010, Technical Program Committee Member 2008, 2009, 2011, 2012, 2014, 2015.
- **Workshop on Re-Architecting the Internet (ReArch)** in conjunction with the ACM International Conference on emerging Networking EXperiments and Technologies (CoNEXT)
Workshop Co-Chair 2009, Technical Program Committee Member 2008, 2010.
- **Workshop on Performance Evaluation of Next-Generation Networks (NetEval)** in conjunction with the IEEE International Symposium on Performance Analysis of Systems and Software (ISPASS)
Workshop Co-Chair April 2009.
- **Second Workshop on Embedded System Security (WESS)** in conjunction with ACM EMSOFT
Workshop Co-Chair 2007, Technical Program Committee Member 2008, 2009, 2010, 2011.
- **Advanced Networking and Communications Hardware Workshop (ANCHOR)** in conjunction with The Annual International Symposium on Computer Architecture (ISCA)
Workshop Co-Chair 2006.
- **IEEE Workshop on Enabling the Future Service-Oriented Internet** in conjunction with IEEE Globecom
Technical Program Committee Member 2007, 2008, 2009, 2010.
- **IEEE Workshop on Local and Metropolitan Area Networks (LANMAN)**
Technical Program Committee Member 2008, 2014, 2015, 2016.
- **Workshop on Heterogeneous and Unconventional Cluster Architectures and Applications (HU-CAA)** in conjunction with International Conference on Parallel Processing (ICPP)
Technical Program Committee Member 2013, 2014.
- **Workshop on Secure Network Protocols (NPSec)**
Technical Program Committee Member 2014, 2015.
- **International Workshop on the Network of the Future (FutureNet)**
Technical Program Committee Member 2011.
- **FTRA International Workshop on Security and Application for Embedded Smart Systems (SAE)**
Technical Program Committee Member 2011.
- **International Workshop on Security and Privacy in Cloud Computing (SPCC)**
Technical Program Committee Member 2010.
- **Workshop on the Influence of I/O on Microprocessor Architecture (IOM)**
Technical Program Committee Member 2009.

- **IEEE INFOCOM High-Speed Networks Workshop (HSN)**
Technical Program Committee Member 2008.
- **Passive and Active Measurement Conference (PAM)**
Technical Program Committee Member 2007.
- **Workshop on Network Processors (NP)**
Technical Program Committee Member 2003, 2004.

Reviews

- Numerous **IEEE and ACM conferences and journals**
Reviewer 2000 – present.
- **National Science Foundation**
Panelist 2003 – present.

UNIVERSITY SERVICE

Administrative Service

- **Center for the Integration of Research, Teaching and Learning (CIRTL)**
Faculty Co-Leader June 2013 – present.
- **Five-Year B.S./M.S. Program in Electrical and Computer Engineering**
Director May 2009 – August 2015.

University Committees

- **Program and Budget Council**
Member, AY 2017/18.
- **Faculty Senate Research Council**
Member, AY 2015/16, AY 2016/17.
- **Faculty Senate Graduate Council**
Member, AY 2015/16, AY 2016/17, AY 2017/18.
- **Faculty Senate Information and Communication Technology Council**
Member, AY 2014/15, AY 2015/16, AY 2016/17.
- **Teaching Commons Advisory Committee**
Member, AY 2010/11, AY 2011/12, AY 2012/13, AY 2013/14, AY 2014/15, AY 2015/16, AY 2016/17.
- **Search Committee, Center for Teaching**
Member, AY 2008/09.

Departmental Committees

- **Department Personnel Committee**
Chair AY 2008/09, AY 2013/14 (January) Member AY 2004/05, AY 2005/06, AY 2010/11.
- **Department Instructional Offerings Committee**
Chair AY 2010/11, AY 2011/12, AY 2012/13 Member AY 2013/14.
- **Department Equipment Committee**
Chair AY 2007/08, AY 2008/09, AY 2009/10, AY 2010/11, Member AY 2002/03, AY 2003/04, AY 2004/05, AY 2005/06, AY 2006/07.
- **Department B.S./M.S. Committee**
Chair AY 2007/08, AY 2008/09.
- **Department Activities Committee**
Chair AY 2007/08, Member 2008/09.
- **Instructional Development Committee**
Member AY 2013/14, AY 2014/15, AY 2015/16, AY 2016/17.
- **Graduate Curriculum Committee**
Member AY 2003/04, AY 2004/05, AY 2005/06, AY 2006/07, AY 2009/10, AY 2010/11.
- **Graduate Admissions Committee**
Member AY 2002/03, AY 2003/04, AY 2004/05, AY 2007/08.

- **Faculty Search Committee**
Member AY 2006/07, AY 2008/09, AY 2011/12.
- **Comprehensive Exam Modification Committee**
Member AY 2003/04.

Student Group Advising

- **Massachusetts Zeta Chapter of Tau Beta Pi** (Engineering Honor Society)
Advisor, AY 2004/05, AY 2005/06, AY 2006/07.
- **Delta Eta Chapter of Eta Kappa Nu** (Electrical Engineering Honor Society)
Advisor, AY 2005/06.

MEMBERSHIPS

Professional Societies

- **Institute of Electrical and Electronics Engineers (IEEE)**
Senior Member 2007 – present, Member 2002 – 2007, Student Member 2000 – 2002.
- **Association of Computing Machinery (ACM)**
Senior Member 2007 – present, Member 2002 – 2007, Student Member 2000 – 2002.
- **American Association for the Advancement (AAAS)**
Member 2013 – present.

Honor Societies

- **Tau Beta Pi** (Engineering Honor Society)
Member 1998 – present.
- **Eta Kappa Nu** (Electrical and Computer Engineering Honor Society)
Member 2001 – present.