

CURRICULUM VITAE

Kenneth Leonard Calvert

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EDUCATIONAL BACKGROUND

Ph.D. 1991 University of Texas at Austin Computer Sciences
Thesis: *Protocol Conversion and Quotient Problems*
Advisor: Prof. Simon S. Lam
M.S. 1980 Stanford University Computer Science
S.B. 1979 M. I. T. Computer Science and Engineering

EMPLOYMENT HISTORY

2012–present Interim Director, Center for Visualization and Virtual
Environments, University of Kentucky
2007–2013 Chairman, Computer Science Department, University of Kentucky
2007–present Professor, Computer Science, University of Kentucky
2004–05 Acting President, Lumenware, LLC, Lexington, KY (Sabbatical)
1998–2007 Associate Professor, Computer Science, University of Kentucky
1991–98 Assistant Professor, College of Computing, Georgia Tech
1984–91 Research Fellow/Assistant, University of Texas at Austin
1979–84 Member of Technical Staff, Bell Telephone Laboratories, Holmdel, NJ

INTERESTS/EXPERTISE

Future Internet architecture
Routing and forwarding architectures
Programmable/configurable network services
Modeling and understanding Internet topology
Home networking architecture
Network security

AWARDS AND HONORS

IEEE Fellow	Jan. 2012
Best Paper Award, IWAN 2003 Conference	Dec. 2003
Gill Associate Professorship, University of Kentucky	Aug. 2002–2007
Outstanding Computer Science Teacher, University of Kentucky	2000, 2003, 2009
Faculty Fellowship Award, Georgia Tech	May 1996
Wm. A. “gus” Baird Teaching Award, Georgia Tech	May 1996

RESEARCH AND CREATIVE SCHOLARSHIP

Research Honors and Awards

Fellow of the Institute of Electrical and Electronics Engineers, “for contributions to Internet Topology and Active Networks”.

Best Paper Award, International Working Conference on Active Networks, 2003

Gill Associate Professorship, College of Engineering, University of Kentucky, 2002–2007

Georgia Tech College of Computing E-Systems Faculty Fellowship Award, for “Home Information Infrastructure Lab”, 1996

Best Student Paper Award, ACM SIGCOMM Symposium, for “Deriving a Protocol Converter: A Top-Down Method,” 1989

Note: In the following paper listings, student coauthors are indicated by “*”.

Refereed Journal Articles and Book Chapters

1. J. N. Griffioen, K. L. Calvert, O. Ascigil* and S. Yuan*, “Separating Routing Policy from mechanism in the Network Layer”, in *Next-Generation Internet Architectures and Protocols*, B. Ramamurthy, G. Rouskas and K. Sivalingam, eds., Cambridge University Press, 2011.
2. K. L. Calvert, W. Keith Edwards, N. Feamster, R. Grinter, Y. Deng*, X. Zhou*, “Instrumenting Home Networks”, *Computer Communication Review*, Volume 41, Issue 1, January 2011, pp. 84–89. (The same paper appeared in the SIGCOMM 2010 Workshop on Home Networks; it was published in a section of the Best Papers from the SIGCOMM 2010 workshops.)
3. S. Chakrabarti*, S. Chandrasekhar*, M. Singhal and K. L. Calvert, “Efficient Proxy Signatures Based on Trapdoor Hash Functions”, *IET Information Security*, 4(4), December 2010, pp. 322–332.
4. S. Chakrabarti*, S. Chandrasekhar*, M. Singhal and K. L. Calvert, “An Efficient and Scalable Quasi-Aggregate Signature Scheme Based on LFSR Sequences”, *IEEE Transactions on Parallel and Distributed Systems*, 20(7), July 2009, pp. 1059–1072.
5. Q. Zhang*, K. L. Calvert, “A Peer-Based Recovery Scheme for Group Rekeying in Secure Multicast”, *International Journal of Network Security*, 6(1), January 2008, pp. 15–25.
6. L. Poutievski*, K. L. Calvert and J. N. Griffioen, “Routing and Forwarding with Flexible Addressing”, *Journal of Communications and Networks*, 9(4), December 2007, pp. 383–393.
7. A. Sehgal*, K. L. Calvert, J. N. Griffioen, “A Flexible Concast-based Grouping Service”, *Computer Networks* 50(14), October 2006, pp. 2532–2547.
8. C. S. Dhillon*, M. Bond*, J. N. Griffioen, K. L. Calvert, “Building Layered Active Services”, *Computer Networks* 50(14), October 2006, pp. 2475–2487.
9. K. L. Calvert, J. N. Griffioen, S. Venkatraman, “Authenticated Access to Reserved Resources”, *International Journal of Network Security*, 3(1), July 2006, pp. 54–64.

10. K. L. Calvert and J. N. Griffioen, "Scalable Network Management using Lightweight Active Services", *Journal of Network and Systems Management*, 14(1), March 2006.
11. K. L. Calvert, J. N. Griffioen, B. Mullins*, S. Natarajan*, L. Poutievski*, A. Sehgal*, and S. Wen*, "Leveraging Emerging Network Services to Scale Multimedia Applications", *Software: Practice and Experience*, volume 33, 2003, pp. 1377–1397.
12. S. Wen*, J. N. Griffioen, and K. L. Calvert, "Building Multicast Services from Unicast Forwarding and Ephemeral State", *Computer Networks* 38(3), February 2002, pp. 327–345.
13. K. L. Calvert, J. N. Griffioen, B. Mullins*, A. Sehgal*, and S. Wen*, "Concast: Design and Implementation of an Active Network Service", *IEEE Journal on Selected Areas in Communications*, 19(3), special issue on Active and Programmable Networks, March 2001, pp. 426–437.
14. R. H. Kravets*, K. L. Calvert, and K. Schwan, "Payoff Adaptation of Communication for Distributed Interactive Applications", *Journal of High-Speed Networks*, 7(1998), pp. 301–317.
15. S. Bhattacharjee*, K. L. Calvert, E. W. Zegura, and J. P. Sterbenz, "Directions in Active Networks", *IEEE Communications Magazine*, 36(10), October 1998, pp. 72–78.
16. R. D. Krupczak*, K. L. Calvert, and M. A. Ammar, "Implementing Communication Protocols in Java", *IEEE Communications Magazine*, 36(10), October 1998, pp. 93–99.
17. S. Bhattacharjee*, K. L. Calvert, and E. W. Zegura, "On Active Networking and End-To-End Arguments", *IEEE Network*, 12(3), May/June 1997, pp. 66–67.
18. M. J. Donahoo*, K. L. Calvert, and E. W. Zegura, "Center Selection and Migration for Wide-Area Multicast Routing", *Journal of High-Speed Networks*, 6(2), 1997, pp.141–164.
19. R. J. Clark*, M. A. Ammar, and K. L. Calvert, "Protocol Discovery in Multiprotocol Networks", *Balzer/ACM Mobile Networks and Applications*, 2, 1997, pp.271–284.
20. E. W. Zegura, K. L. Calvert, and M. J. Donahoo*, "A Quantitative Comparison of Graph-based Models for Internet Topology", *IEEE/ACM Transactions on Networking*, 5(6), December 1997, pp.770–783.
21. R. D. Krupczak*, K. L. Calvert, and M. A. Ammar, "Increasing the Portability and Reusability of Protocol Code", *IEEE/ACM Transactions on Networking*, 5(4), August 1997, pp. 445–459.
22. K. L. Calvert, E. W. Zegura, and M. Doar, "Modeling Internet Topology", *IEEE Communications Magazine*, 35(6), June 1997, pp. 160–163.
23. R. V. Clayton* and K. L. Calvert, "Structuring Protocols with Data Streams," *Journal of Electrical and Electronics Engineering, Australia*, 16(1), March 1996, pp. 29–36.
24. K. L. Calvert, "Eliminating Disjunctions of Leads-to Properties," *Information Processing Letters*, 49(4), 24 February 1994, pp. 189–194.
25. K. L. Calvert and S. S. Lam, "Formal Methods for Protocol Conversion," *IEEE Journal on Selected Areas in Communications*, 8(1), January 1990, pp. 127–142.

Refereed Conference Papers

1. Shufeng Huang*, James Griffioen, and K. L. Calvert, "Fast-tracking GENI Experiments Using HyperNets", Research and Educational Experiments Workshop, Second GENI Engineering Conference, Salt Lake City, March 2013.
2. Song Yuan*, Onur Ascigil, J. N. Griffioen, and K. L. Calvert, "Leveraging Legacy Software in Clean-Slate Network Architectures", Proceedings International Conference on Computer Communication and Networks (ICCCN 2012), Munich, July 2012.
3. Yinfang Zhuang* and K. L. Calvert, "Measuring the Effectiveness of Hierarchical Address Assignment", Proceedings of IEEE Globecom 2010, Miami, 6–10 December 2010.
4. K. L. Calvert, W. Keith Edwards, Nick Feamster, Rebecca E. Grinter, Ye Deng*, and XuZi Zhou*, "Instrumenting Home Networks", Proceedings of the first ACM SIGCOMM Workshop on Home Networks, New Delhi, 3 September 2010.
5. Onur Ascigil*, Song Yuan*, J. N. Griffioen, and K. L. Calvert, "Deconstructing the Network Layer", Proceedings of IEEE International Conference on Computer Communications and Networks (ICCCN), Future Internet Architectures and Protocols Track, St. Thomas, USVI, 4–7 August 2008.
6. K. L. Calvert, W. Keith Edwards and R. E. Grinter, "Moving Toward the Middle: the Case Against the End-to-End Argument in Home Networking", Sixth ACM Workshop on Hot Topics in Networking, Atlanta, 14–15 November 2007.
7. S. Chandrasekhar*, M. Singhal, S. Chakrabarti and K. L. Calvert, "Efficient Blind Signatures for Accountability", Proceedings of the 2007 Workshop on Network Protocol Security (IEEE ICNP NPSec), Beijing, 16 October 2007.
8. S. Chakrabarti*, S. Chandrasekhar*, M. Singhal, K. L. Calvert, "Authenticated Feedback in Multicast Applications Using a Novel Multisignature Scheme Based on Cubic LFSR Sequences", *Third IEEE International Symposium on Security in Networks and Distributed Systems*, Niagara Falls, Canada, May 2007.
9. L. Poutievski*, K. L. Calvert, J. N. Griffioen, "Toposemantic Clustering", *IEEE Globecom 2006*, Symposium on Network Internet Services and Enabling Technologies, San Francisco, November 2006.
10. L. Wang*, J. N. Griffioen, K. L. Calvert, "An Intersection-Based Multipath Routing Scheme", *IEEE Globecom 2006*, Symposium on Network Internet Services and Enabling Technologies, San Francisco, November 2006.
11. K. L. Calvert, J. N. Griffioen, "On Information Hiding and Network Management", *ACM Workshop on Internet Network Management (at SIGCOMM 2006)*, Pisa, Italy, September 2006.
12. M. Muthulakshmi, J. R. Heath, K. L. Calvert, J. N. Griffioen, "A Node-Processor Microarchitecture For Implementation of the ESP Network Service Development Paradigm", *Proceedings of the 2005 International Conference on Information Systems: New Generations*, Las Vegas, April 2005.
13. K. L. Calvert, J. N. Griffioen, B. Mullins*, L. Poutievski*, A. Sehgal*, "Secure, Customizable Many-to-One Communication", *Proceedings of IFIP International Working Conference on Active Networks (IWAN 2004)*, Lawrence, Kansas, October 28–29, 2004.

14. M. Muthulakshmi, J. R. Heath, K. L. Calvert, J. N. Griffioen, "ESP: A Flexible, High-Performance, PLD-Based Network Service", *Proceedings of 2004 IEEE International Conference on Communications—High-Speed Networks Symposium*, Paris, France, June 20–24, 2004.
15. L. Wang*, J. N. Griffioen, K. L. Calvert, S. Shi, "Passive Inference of Path Correlation", *Proceedings of NOSSDAV '04*, Cork, Ireland, June 18–19, 2004.
16. S. Shi, L. Wang*, K. Calvert, and J. N. Griffioen, "A Multipath Routing Service for Immersive Environments", *Proceedings of Workshop on Grids and Advanced Networks 2004 (GAN'04)* (at 4th IEEE/ACM International Symposium on Cluster Computing and the Grid), Chicago, April 2004.
17. L. Poutievski*, K. L. Calvert, J. N. Griffioen, "Speccast", *Proceedings of IEEE INFOCOM 2004*, Hong Kong, March 9–11, 2004.
18. N. Imam*, J. Li*, K. L. Calvert, J. N. Griffioen, "Challenges in Implementing an ESP Service", *Proceedings of the 2003 International Working Conference on Active Networks (IWAN '03)*, Kyoto, Japan, December 2003 (**Best Paper Award**).
19. Q. Zhang*, K. L. Calvert, "On Rekey Policies for Secure Group Applications", *Proceedings of the 2003 IEEE International Conference on Computer Communications and Networks (ICCCN '03)*, Dallas, Texas, October 2003, pp. 559–564.
20. B. Mullins*, J. N. Griffioen, K. L. Calvert, "Multicast TCP via Concast Merged Acknowledgements", *Proceedings of the 2003 IEEE International Conference on Computer Communications and Networks (ICCCN '03)*, Dallas, Texas, October 2003.
21. K. L. Calvert, J. Eagan*, A. Namjoshi*, S. Merugu*, J. Stasko, E. Zegura, "Extending and Enhancing GT-ITM", *Proceedings of the ACM Workshop on Networking Models, Methodologies and Tools*, (at SIGCOMM 2003), Karlsruhe, Germany, August 2003, pp. 23–27.
22. C. Jaynes, W. B. Seales, K. Calvert, Z. Fei, J. Griffioen, "The Metaverse: A networked collection of inexpensive, self-configuring, immersive environments", *7. Immersive Projection Technologies Workshop*, 9. Eurographics Workshop on Virtual Environments, Zürich, May 2003.
23. A. Sehgal*, K. L. Calvert, J. N. Griffioen, "A Generic Set-Formation Service", *Proceedings of IEEE OPENARCH 2003*, San Francisco, April 2003.
24. M. Bond*, J. N. Griffioen, C. S. Dhillon*, K. L. Calvert, "Designing Service-Specific Execution Environments", *Proceedings of the 2002 International Working Conference on Active Networks (IWAN '02)*, Zürich, Switzerland, December 2002, pp. 191–203 (Available as Springer Lecture Notes in Computer Science #2546).
25. A. Sehgal*, K. L. Calvert, J. N. Griffioen, "A Flexible Concast-based Grouping Service", *Proceedings of the 2002 International Working Conference on Active Networks (IWAN '02)* Zürich, Switzerland, December 2002, pp. 216–228 (Available as Springer Lecture Notes in Computer Science #2546).
26. K. L. Calvert, J. N. Griffioen, S. Wen*, "Lightweight Network Support for Scalable End-to-End Services", *Proceedings ACM SIGCOMM 2002*, Pittsburgh, August 2002, pp. 265–278.
27. S. Wen*, J. N. Griffioen, K. L. Calvert, "CALM: Congestion-Aware Layered Multicast", *Proceedings of IEEE OPENARCH 2002*, New York, June 2002, pp. 179–180.

28. K. L. Calvert, S. Venkatraman*, J. N. Griffioen, "FPAC: Fast, Fixed-Cost Authentication for Access to Reserved Resources", *Proceedings of IEEE INFOCOM 2002*, New York, June 2002, pp. 1049–1058.
29. M. Bond*, K. Calvert, J. N. Griffioen, B. Mullins*, S. Natarajan*, L. Poutievski*, A. Sehgal*, S. Venkatraman*, S. Wen*, "ActiveCast: Toward Application-Friendly Active Network Services", *Proceedings of DARPA Active Networks Conference and Exposition*, San Francisco, May 2002.
30. S. Bhattacharjee*, K. Calvert, Y. Chae, S. Merugu, M. Sanders, E. W. Zegura, "CANES: An Execution Environment for Composable Services", *Proceedings of DARPA Active Networks Conference and Exposition*, San Francisco, May 2002.
31. K. L. Calvert, J. N. Griffioen, S. Natarajan*, B. Mullins*, L. Poutievski*, A. Sehgal*, S. Wen*, "Leveraging Emerging Network Services to Scale Multimedia Applications", *Proceedings of IEEE 2001 International Conference on Computer Communications and Networks*, Scottsdale, Arizona, October 2001.
32. M. Sanders, M. Keaton, S. Bhattacharjee*, K. L. Calvert, S. Zabele, E. W. Zegura, "Active Reliable Multicast on CANEs: A Case Study", *Proceedings of IEEE OpenArch 2001*, Anchorage, Alaska, April 2001, pp. 49–60.
33. S. Wen*, J. N. Griffioen, K. L. Calvert, "Building Multicast Services from Unicast Forwarding and Ephemeral State", *Proceedings of IEEE OpenArch 2001*, Anchorage, Alaska, April 2001, pp. 327–345.
34. K. L. Calvert, J. N. Griffioen, A. Sehgal*, S. Wen*, "Building A Programmable Multiplexing Service Using Concast", *Proceedings of the 2000 International Conference on Network Protocols (ICNP '00)*, Osaka, Japan, November 2000, pp. 230–239.
35. S. Merugu*, S. Bhattacharjee, E. W. Zegura, K. L. Calvert, "Bowman: A Node OS for Active Networks", *Proceedings of IEEE INFOCOM 2000*, March 2000, Tel Aviv, Israel, pp. 1127–1136.
36. K. L. Calvert, J. N. Griffioen, A. Sehgal*, S. Wen*, "Concast: Design and Implementation of a New Network Service", *Proceedings of 1999 IEEE International Conference on Network Protocols (ICNP '99)*, Toronto, Canada, November 1999, pp. 335–344.
37. S. Bhattacharjee*, K. L. Calvert, E. W. Zegura, "Reasoning About Active Network Protocols", *Proceedings of 1998 IEEE International Conference on Network Protocols (ICNP '98)*, Austin, Texas, October 14–16, 1998, pp. 31–40.
38. R. H. Kravets*, K. L. Calvert, K. Schwan, "Payoff-based Communication Adaptation based on Network Service Availability", *Proceedings of IEEE International Conference on Multimedia Computing and Systems*, Austin, Texas, June 1998, pp. 33–42.
39. S. Bhattacharjee*, K. L. Calvert, E. W. Zegura, "Self-Organizing Wide-Area Network Caches", *Proceedings of IEEE INFOCOM '98*, San Francisco, April 1998, pp. 600–608.
40. R. D. Krupczak*, K. L. Calvert, M. A. Ammar, "Implementing Protocols in Java: The Price of Portability", *Proceedings of IEEE INFOCOM '98*, San Francisco, April 1998, pp. 765–773.
41. R. V. Clayton*, K. L. Calvert, "A Reactive Implementation of the Tau Protocol Composition Framework", *Proceedings of IEEE OpenArch '98*, San Francisco, April 1998, pp. 101–114.

42. S. Bhattacharjee*, K. L. Calvert, E. W. Zegura, "Active Networking and the End-to-End Argument", *Proceedings 1997 International Conference on Network Protocols (ICNP '97)*, Atlanta, October 1997, pp. 220–228.
43. J. T. Dixon*, K. L. Calvert, "Effective Search Strategies for Application-Independent Speedup in UDP Demultiplexing", *Proceedings of the Sixth International Conference on Computer Communications and Networks (ICCCN)*, Las Vegas, September 1997, pp. 468–474.
44. S. Bhattacharjee*, K. L. Calvert, E. W. Zegura, "An Architecture for Active Networking", *Proceedings of the Seventh IFIP Conference on High Performance Networking*, White Plains, New York, April 1997, 265–279.
45. R. H. Kravets*, K. L. Calvert, P. Krishnan, K. Schwan, "Adaptive Variation of Reliability", *Proceedings of the Seventh IFIP Conference on High Performance Networking*, White Plains, New York, April 1997, pp. 202–216.
46. R. D. Krupczak*, K. L. Calvert, M. A. Ammar, "Protocol Portability Through Module Encapsulation", *Proceedings of 1996 IEEE International Conference on Network Protocols (ICNP '06)*, Columbus, Ohio, October 1996, pp. 56–63.
47. J. T. Dixon*, K. L. Calvert, "Increasing Demultiplexing Efficiency in TCP/IP Network Servers", *Proceedings of the Fifth International Conference on Computer Communications and Networks (ICCCN)*, Rockville, Maryland, October 1996.
48. R. D. Krupczak*, M. A. Ammar, K. L. Calvert, "Multi-subsystem Protocol Architectures: Motivation and Experiences with an Adapter-based Approach", *Proceedings of IEEE INFOCOM '96*, San Francisco, March 1996, pp. 1149–1156
49. E. W. Zegura, K. L. Calvert, S. Bhattacharjee*, "How to Model an Internetwork", *Proceedings of IEEE INFOCOM '96*, San Francisco, March 1996, pp. 594–602.
50. R. V. Clayton*, K. L. Calvert, "Structuring Protocols with Data Streams," Workshop on High Performance Protocol Architectures (HIPPARCH '95), Sydney, Australia, December 1995.
51. R. J. Clark*, K. L. Calvert, M. A. Ammar, "Protocol Discovery in Multiprotocol Networks", *Proceedings of the Fourth International Conference on Computer Communications and Networks (ICCCN)*, Las Vegas, September 1995, pp. 361–368.
52. M. J. Donahoo*, E. W. Zegura, K. L. Calvert, "Core Selection Methods for Multicast Routing", *Proceedings of the Fourth International Conference on Computer Communications and Networks (ICCCN)*, Las Vegas, September 1995, pp. 638–642.
53. K. L. Calvert, "Specifying and Verifying Conditional Progress", *Proceedings of the 14th International IFIP Symposium on Protocol Specification, Testing and Verification*, Vancouver, British Columbia, June 1994, pp. 303-318.
54. R. J. Clark*, M. A. Ammar, K. L. Calvert, "On the Use of Directory Services to Support Multiprotocol Interoperability", *Proceedings of IEEE INFOCOM '94*, Toronto, Canada, June 1994, pp. 784-791.
55. K. L. Calvert, "Beyond Layering: Modularity Considerations for Protocol Architectures", *Proceedings 1993 IEEE International Conference on Network Protocols (ICNP '93)*, San Francisco, October 1993, pp. 90–97.

56. R. J. Clark*, M. A. Ammar, K. L. Calvert, "Multi-Protocol Architectures as a Paradigm for Achieving Inter-Operability", *Proceedings of IEEE INFOCOM '93*, San Francisco, March 1993, pp. 136–143.
57. K. L. Calvert, "Module Composition and Refinement with Applications to Protocol Conversion," *Proceedings of 12th International IFIP Symposium on Protocol Specification, Testing, and Verification*, Orlando, June 1992.
58. K. L. Calvert, S. S. Lam, "Adaptors for Protocol Conversion," *Proceedings of IEEE INFOCOM '90*, San Francisco, June 1990.
59. K. L. Calvert, S. S. Lam, "The Protocol Conversion Problem—Finding a Quotient of Specifications," *Proceedings of the 27th Annual Allerton Conference on Communication, Control, and Computing*, Allerton, Illinois, September 1989.
60. K. L. Calvert and S. S. Lam, "Deriving a Protocol Converter: A Top-Down Method," *Proceedings of ACM SIGCOMM '89 Symposium*, Austin, Texas, September 1989, pp. 247–258 (**Best Student Paper award**).
61. K. L. Calvert and S. S. Lam, "An Exercise in Deriving a Protocol Converter," *Proceedings of ACM SIGCOMM '87 Workshop*, Stowe, Vermont, August 1987, pp. 151–160.

Papers in Submission

1. M. Onur Ascigil*, K. L. Calvert, and James Griffioen, "On the Scalability of Interdomain Route Computations", submitted to *IFIP Networking 2014*.
2. Tilman Wolf, Jim Griffioen, K. L. Calvert, Rudra Dutta, George Rouskas, Ilya Baldin, and Anna Nagurney, "ChoiceNet: Toward an Economy Plane for the Internet", submitted to *Computer Communications Review*.
3. Ilya Baldin, Tilman Wolf, Jim Griffioen, Ken Calvert, Rudra Dutta, and George Rouskas, "Identity and Authorization Mechanisms for the Internet Economy Plane" (short paper), submitted to *IEEE ICC 2014*.
4. Tilman Wolf, Jim Griffioen, Ken Calvert, Rudra Dutta, George Rouskas, Ilya Baldin, and Anna Nagurney, "The Economy Plane: Igniting Innovation in the Internet", submitted to *IEEE ICC 2014*.

Patents

U.S. Patent #7,317,729, *System and Process for Providing Auxiliary Information for a Packet-Switched Network of Shared Nodes Using Dedicated Associative Store*, K. L. Calvert and J. N. Griffioen, issued 8 January 2008. (Note: the patent document has "Calvert" misspelled as "Calver".)

Journal Special Issue Edited

Co-Editor: *IEEE Journal on Selected Areas in Communications*, Special Issue on Active and Programmable Networks, Volume 19, Number 3, March 2001.

Conference Proceedings Edited

1. Editor: IEEE Conference on Open Architectures and Network Programming (OPENARCH '99), New York, 26–27 March 1999.

2. Co-Editor: International Conference on Network Protocols (ICNP 2002), Paris, France, 12–15 November 2002.
3. Co-Editor: International Conference on Network Protocols (ICNP 2007), Beijing, China, 16–19 October 2007.

Invited Keynote Presentations

1. “ChoiceNet: Technology and Economics in the Future Internet”, 2013 Conference on the Future Internet, Beijing, China, 5 June 2013.
2. “Infrastructure and Self-Organization in Postmodern Internet Architecture”, 2007 International Workshop on Self-Organizing Systems, 11–13 September, 2007, The Lake District, England.
3. “Reflections on the Development of Active and Programmable Networks”, 2005 IFIP International Working Conference on Active and Programmable Networks (IWAN 2005), November 21–23, 2005, Sophia-Antipolis, France.
4. “Active Networking Architecture: History, Observations and Issues”, Presented at the First International Workshop on Active Network Technologies and Applications, Tokyo, Japan, March 25–26, 2002.

Invited Conference Papers/Presentations

1. George N. Rouskas, Ilia Baldine, K. L. Calvert, Rudra Dutta, Jim Griffioen, Anna Nagurney, and Tilman Wolf, “ChoiceNet: Network innovation through choice”, Proceedings of 17th International Conference on Optical Network Design and Modeling (ONDM 2013), April 2013.
2. “Back to the Future: Postmodern Routing and Forwarding Design”, presentation at *NetArch 2009*, Monte Verita, Italy.
3. “Separating Routing and Forwarding: A Clean-Slate Network Layer Design”, K. L. Calvert, J. N. Griffioen, and L. Poutievski*, Proceedings of IEEE Broadnets 2007, Raleigh, NC, September 10–14, 2007.
4. K. L. Calvert, “Active Networking Architecture: History, Observations and Issues”, Proceedings of the First International Workshop on Active Network Technologies and Applications, Tokyo, Japan, March 25–26, 2002.
5. K. L. Calvert, J. N. Griffioen, A. Sehgal*, and S. Wen*, “Implementing Concast” *Proceedings of the 37th Allerton Conference on Communications and Control*, Monticello, Illinois, September 22–24, 1999.
6. S. Merugu, S. Bhattacharjee, Y. Chae, M. Sanders, K. L. Calvert, and E. W. Zegura, “Bowman and CANEs: Implementation of an Active Network”, *Proceedings of the 37th Allerton Conference on Communications and Control*, Monticello, Illinois, USA, September 22–24, 1999.

Other Publications

1. K. L. Calvert, “Reflections on Network Architecture: An Active Networking Perspective”, *ACM SIGCOMM Computer Communication Review*, 36(2), April 2006, pp. 27–30.

2. K. L. Calvert (editor) "Architectural Framework for Active Networks", DARPA Active Networks working group, July 1999.
3. J. M. Smith, K. L. Calvert, S. L. Murphy, H. K. Orman, L. L. Peterson, "Activating Networks: A Progress Report", *IEEE Computer*, 32(4), April 1999.
4. R. J. Clark*, K. L. Calvert, and M. A. Ammar, "Multiprotocol Interoperability In IPng", Internet Engineering Task Force Request for Comments 1683, August 1994.

Software

1. **GT-ITM:** One of the first software packages for constructing and analyzing graph models of large Internetworks. Used at hundreds of institutions worldwide. (Portions of the code were developed in collaboration with Ellen Zegura at Georgia Tech.)
<http://www-static.cc.gatech.edu/fac/Ellen.Zegura/graphs.html>
2. **Odyssey Environment for Active Networking:** A framework for developing and composing active network applications. Includes the **CANes** Execution Environment, one of five "sanctioned" execution environments in the DARPA Active Networks program (used by researchers at the University of Illinois and the University of Massachusetts), as well as the **Bowman:** user-space NodeOS support platform (used by researchers at the University of Illinois). Developed in collaboration with students and staff at Georgia Tech.
<http://www-static.cc.gatech.edu/projects/canes/software.html>
3. **Concast:** an implementation of the many-to-one network service for the Linux kernel. Developed in collaboration with J. Griffioen, students and staff at the University of Kentucky.
<http://protocols.netlab.uky.edu/%7Eacast/concast.distribution.html>
4. **Ephemeral State Processing:** multiple kernel-space implementations of ESP. Developed in collaboration with J. Griffioen and students at the University of Kentucky.
<http://protocols.netlab.uky.edu/%7Eesp/>

Invited Seminar Presentations (last 10 years)

1. 1 February 2013, University of California at Irvine, "Refactoring the Internet for the 21st Century".
2. 6 September 2012, Technical University Munich, "Quantifying Addressing (In)Efficiency in the Internet".
3. 14 February 2011, University of Utah, "Toward a 21st Century Internet".
4. 4 October 2010, University of Tokyo, "Postmodern Routing and Forwarding Architecture".
5. 14 April 2009, University of Göttingen, Germany. "Postmodern Routing and Forwarding Architecture".
6. 8 August 2008, NSF FIND Routing Workshop, Tucson, Arizona. "Rethinking Routing and Forwarding".
7. 20 February 2008, CS Seminar, University of California at San Diego, "Rethinking Routing and Forwarding".
8. 1 December 2006, Columbia Institute for Tele-Informatics, Columbia University, "What would one do with a Gigabit per Second?"

9. 2 November 2006, Max Plank Institut for Informatik, Saarbrücken, Germany, “Scalable Network Management Using Ephemeral State”
10. 31 October 2006, Dagstuhl Seminar on Naming and Addressing for Next-Generation Networks, “On What to Name”
11. 17 April 2006, University of Illinois at Urbana-Champaign, Department of Computer Science, “Scalable Network Management Using Ephemeral State”
12. 5 January 2006, Dagstuhl Perspective-Seminar an Autonomic Networking, “On Policies and Building-Block Functions”
13. 21 November 2005, Eurecom, Sophia-Antipolis, France, “Routing Without Addresses”
14. 4 October 2004, Dagstuhl Seminar on Service Management and Self-Organization in IP-based Networks, “Toward a More General Network Layer”

Invited Panel Participation

1. (Moderator) “The Future of Information-Centric Networking”, International Conference on Network Protocols, October 2013.
2. “Internet Protocol Considered Harmful”, Home Networking Panel, 1st ACM SIGCOMM Workshop on Home Networks, New Delhi, 3 September 2010.
3. “On Addressing, Architecture and Reachability”, Workshop on Secure Network Protocols (part of ICNP 2008), November 2008. Panel,
4. “Visions of Networking in 2024”, 2004 IEEE International Conference on Network Protocols, Berlin, Germany, October 2004.
5. “Active Networks vs. the End-to-End Argument: Are the Two Compatible?”, OPENSIG 2000, Napa, California, October 2000.
6. “Symmetry, Simplicity, and Separation of Concerns in the Internet”, *In Pursuit of Simplicity*, a Symposium in honor of Prof. Dr. E. W. Dijkstra on the occasion of his retirement, Austin, Texas, May 2000.
7. “Middleware”, NSF Networking PI Meeting, Washington, D.C., January 1999.
8. “Intelligence in the Network”, Computer Communications Workshop (IEEE Technical Committee on Computer Communications), Phoenix, Arizona, September 1997.
9. “An Active Networks Forum”, Intel Architecture Labs, Hillsboro, Oregon, 1 August 1997.
10. “Interoperability: Beyond Formal Methods?”, *14th International IFIP Symposium on Protocol Specification, Testing and Verification*, Vancouver, Canada, June 1994.
11. “Protocol Conversion and Internetworking”, *1993 International Conference on Network Protocols*, San Francisco, October 1993.

Funded Research Proposals and Grants (while at Kentucky)

Calvert is PI unless otherwise noted.

1. *NeTS: Large: Collaborative Research: Network Innovation Through Choice*
PI: J. Griffioen; joint project with U. of Massachusetts, North Carolina State University, and RENCI
National Science Foundation — Networking Technology and Systems
\$697,527 (9/15/11–8/31/14)
2. *CII-II-NEW: Collaborative Research: Measurement Infrastructure for Home Networks*
National Science Foundation — Computing Infrastructure
\$145,000 (2/14/11–1/31/15)
3. *NetSE: Medium: Collaborative Research: Towards Human-Network Interaction (HNI) for the Home*
Joint project with K. Edwards and R. Grinter, Georgia Tech
National Science Foundation — Networking Science and Engineering
\$380,930 (9/15/09–8/31/12)
4. *NeTS-FIND: Collaborative Research: Postmodern Internetwork Architecture*
Co-PI: J. Griffioen; Joint project with Universities of Maryland and Kansas
National Science Foundation — Networking Technology and Systems
\$399,664 (9/1/06–8/31/09)
5. *NeTS-NBD: Collaborative Research: Human-Centered Networking for the Home*
Joint project with K. Edwards and R. Grinter, Georgia Tech
National Science Foundation — Networking Technology and Systems
\$186,583 (9/1/06–8/31/09)
6. *Center for Resilient Information Systems*
U.S. Treasury Department
Technical PI: J. Griffioen; Co-PIs: Z. Fei, R. Finkel, D. Manivannan, M. Singhal
\$2,700,000 (1/1/06–5/31/07)
7. *Extending Ephemeral State Processing to Support App-level Services*
Co-PI: J. Griffioen
Cisco Systems, Inc.
\$85,477 (1/1/05–12/31/05).
8. *NeTS-NR: Generalizing the Network Layer*
Co-PI: J. Griffioen
National Science Foundation — Networking Research
\$500,000 (9/1/04–8/31/08).
9. *Enhancing Network Layer Services*
PI: J. Griffioen
Kentucky Science and Engineering Foundation R&D Excellence Award
\$86,706 (7/2/04–6/30/06).
10. *Acquisition, Representation, and Remote Visualization of Digital Artifacts*
PI: W. Seales; Co-PIs: J. Griffioen, C. Jaynes
National Science Foundation — Information Technology Research
\$1,000,000 (1/1/02–12/31/03).

11. *The Metaverse: A Laboratory for Digital Media Networks*
 PI: J. Griffioen; Co-PIs: C. Jaynes, J. Mazur, B. Seales, Z. Fei, J. McDonough, D. Maloney
 National Science Foundation — Research Infrastructure
 \$824,621 + \$400,000 University Match, (9/1/2001–8/31/2004).
12. *Enhancing Network Services Using Lightweight Router Processing Modules*
 PI: J. Griffioen
 Intel Corporation
 \$104,000 + equipment, (2/1/2001–1/31/2003)
13. *ITR/SII: Collaborative Research in Internet Topology Models*
 Joint project with E. Zegura, Georgia Tech
 National Science Foundation — Information Technology Research
 \$112,383, (9/1/00–8/31/03).
14. *Secure Multicast Services and Applications*
 Joint project with S. Lam, University of Texas
 National Science Foundation — Networking Special Projects
 \$262,985, three years.
15. *Gigabit Switch Kit*
 National Science Foundation/Washington University
 Hardware value \$50,000, July 1999.
16. *UK Laboratory for Advanced Networking*
 PI: J. Griffioen; Co-PIs: D. Friskney, M. Truszczynski
 National Science Foundation/Kentucky EPSCoR agreement
 \$1,000,000 (1/1/99–12/31/01).
17. *ActiveCast*
 Co-PIs: J. Griffioen, Kentucky; E. Zegura, Georgia Tech
 DARPA
 \$1,696,000, (5/28/99–12/31/03).
18. *CANEs: Composable Active Network Elements*
 Joint project with E. Zegura, Georgia Tech
 DARPA
 \$950,000 (6/1/97–6/1/00).
19. *A Flexible End-to-End Protocol Framework*
 National Science Foundation
 \$182,305, (7/1/97–7/1/00).

TEACHING

Teaching Honors and Awards

1996 **William A. "gus" Baird Faculty Teaching Award**, presented annually to the outstanding teacher in the College of Computing at Georgia Tech

2000 **Department of Computer Science Tau Beta Pi** Outstanding Teacher Award, University of Kentucky

2000 **Department of Computer Science ACM/Upsilon Pi Epsilon Outstanding Teacher Award**, University of Kentucky

2003 and 2009 **Department of Computer Science Outstanding Teacher Award**, University of Kentucky

2003 Nominated for **Henry Lutes Teaching Award**, College of Engineering, University of Kentucky

2009 **Department of Computer Science Outstanding Teacher Award**, University of Kentucky

Textbooks

TCP/IP Sockets in C: Practical Guide for Programmers, second edition, M. J. Donahoo and K. L. Calvert, Morgan Kaufman, 2009. Supplementary text for networking courses. (First edition published in 2000.)

TCP/IP Sockets in Java: Practical Guide for Programmers, second edition, K. L. Calvert and M. J. Donahoo, Morgan Kaufmann, 2008. (First edition published in 2001.)

TCP/IP Sockets in C#: Practical Guide for Programmers, D. B. Makofske, K. L. Calvert and M. J. Donahoo, Morgan Kaufmann, 2004.

Ph.D. Theses Supervised

1. Robert Krupczak (co-supervised with Prof. M. Ammar)
Graduation date: September 1997 (Georgia Institute of Technology)
Thesis title: *Protocol Subsystem Support for Efficient and Flexible Communication Services*
Employment: self-employed (startup)
2. Richard Clayton
Graduation date: June 1999 (Georgia Institute of Technology)
Thesis title: *Structuring and Destructuring Protocols*
Employment: Adjunct Professor, Computer Science, Monmouth University, New Jersey
3. Robin H. Kravets (co-supervised with Prof. K. Schwan)
Graduation date: August 1999 (Georgia Institute of Technology)
Thesis title: *Cooperative Solutions to the Dynamic Management of Communication Resources*
Employment: Associate Professor, Computer Science, University of Illinois at Urbana-Champaign

4. Samrat Bhattacharjee (co-supervised with Prof. E. Zegura)
 Graduation date: August 1999 (Georgia Institute of Technology)
 Thesis title: *Active Networks: Architectures, Composition, and Applications*
 Employment: Associate Professor, Computer Science,
 University of Maryland at College Park
5. Su Wen (co-supervised with Prof. J. Griffioen)
 Graduation date: December 2002
 Thesis Title: *Supporting Group Communication
 on a Lightweight Programmable Network*
 Employment: Research Scientist, Institute for Infocom Research, Singapore
6. Lili Wang (co-supervised with Prof. J. Griffioen)
 Graduation date: December 2006
 Thesis title: *Improving End-to-End Performance Using
 Multipath Overlay Services*
 Employment: Juniper Networks
7. Qingyu Zhang
 Graduation date: May 2007 (Defended December 2006)
 Thesis title: *Improving Group Rekeying for Secure Multicast*
 Employment: Citrix
8. Leonid Poutievski (co-supervised with Prof. J. Griffioen)
 Graduation date: December 2007 (Defended November 2007)
 Thesis title: *Speccast: Toward a more general network layer*
 Employment: Google
9. Amit Sehgal (co-supervised with Prof. J. Griffioen)
 Graduation date: August 2008 (Defended June 2008)
 Thesis title: *A Group-Formation Service*
 Employment: Microsoft
10. Saikat Chakrabarti (co-supervised with Prof. M. Singhal)
 Graduation date: August 2008 (Defended July 2008)
 Thesis title: *Efficient and Scalable Security Protocols Based on LFSR Sequences*
 Employment: Siemens
11. Yinfang Zhuang
 Graduation date: December 2012
 Thesis title: *Measuring Effectiveness of Address Schemes for AS-level Graphs*
 Employment: Microsoft

Masters Theses Supervised

1. Najati Imam
 Graduation date: December 2003
 Thesis title: *Implementation of an Ephemeral State Processor on the Intel IXP 1200*
2. Aditya Namjoshi
 Graduation date: December 2006
 Thesis title: *Extending and Enhancing GT-ITM*

Courses Taught (last five years)

Course	Title	Terms
CS 100	Intro to CS Professions	Fall '09,'10,'11,'12
CS 585	Cybercrime: Legal Issues and Investigative Procedures	Fall '09
CS 221	First Course in CS for Engineers	Fall '10, '11
CS 485	Topics in Concurrency (with J. Jaromczyk)	Spring '11,'12,'13
CS 471	Computer Networks	Spring '13
CS 485	Network Security	Fall '13
CS 485	Concurrency	Spring '14

Curriculum Development

Systems Area Curriculum. Redesign of systems courses in Department of Computer Science at U.K., 1998–99.

Computer Engineering Program Committee. Development of curriculum proposal for a Bachelor of Science in Computer Engineering program at the University of Kentucky, 1999-2000.

New courses developed include: **Formal Methods for Communicating Systems** (graduate), **Computer Network Protocols** (upper-division undergraduate lab course), **Network Security** (undergraduate and graduate), **Advanced Computer Networks** (graduate), **Network Algorithmics** (graduate), **Cybercrime: Legal Issues and Investigative Procedures** (co-developed with Dr. Thomas Johnson) **Topics in Concurrency** (upper-division undergraduate, with Prof. J. Jaromczyk).

Other Academic and Teaching Activities

1. NSF-sponsored Symposium “Teaching Formal Methods to Undergraduates”, Southwestern University, Georgetown Texas, 3–6 June 1993. Presentation: “What Every Undergraduate Should Know About the Curry-Howard Isomorphism”.
2. Programming Team Coach for ACM Programming Contest at Georgia Tech, 1995, 1997, 1998. Team advanced to World Championships in 1995.
3. Module on Networking, taught to Rogers Scholars (high school students from Eastern Kentucky) Summer 2000.

PROFESSIONAL ACTIVITIES AND SERVICE

Professional Societies

Fellow, Institute of Electrical and Electronics Engineers; also member of Computer and Communications Societies. **Vice-Chair** of IEEE Communication Society Technical Committee on Computer Communications, 2004-2007. **Executive Committee Member**, IEEE Computer Society Technical Committee on Internet, 2014.

Member, Association for Computing Machinery, also Special Interest Group on Computer Communications (SIGCOMM)

Editorial and Reviewer Work for Technical Journals and Publishers

Associate Editor for *IEEE/ACM Transactions on Networking*, 1999–2005. (This is the top journal in my field. According to CiteSeer, it has the fourth-highest impact rating among CS journals.)

Referee for (not an exhaustive list):

IEEE/ACM Transactions on Networking

IEEE Transactions on Communications

Information Processing Letters

ACM Transactions on Programming Languages and Systems

IEEE Transactions on Software Engineering

Computer Networks and ISDN Systems

ACM SIGCOMM Conference

IEEE INFOCOM Conference

Conference Committee Activities

Steering Committee Chair, IEEE International Conference on Network Protocols, 2009–present (Steering Committee member since 2004)

General Co-Chair, IEEE International Conference on Network Protocols, 2013.

Workshops Co-Chair, ACM SIGCOMM 2011 Conference

Technical Program Co-Chair, IEEE International Conference on Network Protocols 2002, 2007

Technical Program Co-Chair, 2004 IFIP International Working Conference on Active Networks (IWAN '04)

General Co-Chair, IEEE International Conference on Network Protocols 1997, 2003, 2012

Technical Program Chair, IEEE Conference on Open Architectures and Network Programming, 1999 (OpenArch '99)

Technical Program Committee Member (Selected):

ACM CoNext Conference	2012, 2013
ACM SIGCOMM Conference	2004
IEEE International Conf. on Network Protocols	'94, '97-'04, '06-'13
IEEE Infocom	'98, '01-'03, '06
Int'l Conf. on Distributed Computing Systems	'98, '00, '02, '03, '06, '12
IEEE OpenArch	'99, '00-'02
IFIP Int'l Working Conf. on Active Networks	'02-'06
IEEE Globecomm, various symposia	'06

Tutorial Presentations

Active Networks (half-day tutorial) at International Conference on Network Protocols, Osaka, Japan, November 2000.

Expert Witness Consulting

2008 Retained by McDonnell Boehnen Hulbert & Berghoff LLP as consultant in a Kentucky case. (Nature of the work confidential.)

2012 Retained by Irell and Manella LLP as an expert witness in patent infringement litigation on behalf of Juniper Networks, Incorporated (defendant).

Plaintiff: Implicit Networks, Inc.

Subject: network router technology

Location: Northern District of California

Result: Submitted expert report and gave deposition on invalidity of asserted patents. Motion for summary judgment of patent invalidity was granted by Judge Susan Ilston on 13 March 2013.

Other Consulting

DVT, Norcross, Georgia, 1996-98. Implementing TCP/IP for an embedded device (DVT SmartSensor).

AT&T Bell Laboratories, Holmdel, NJ, Summer 1995. Formal methods for protocol verification.

Research Project Reviewer

National Science Foundation—Communications and Networking Systems (multiple panels).

Swiss National Science Foundation, external proposal review.

Government of Hong Kong, external grant proposal review.

Campus Service

Committee Service (selected)

University Information Technology Coordinating Committee	2010-2013
Informatics Data Governance Board	2010-present
University Faculty Senate (College of Engineering)	2005-2008
Computer Engineering Degree Program Proposal	1999-2000
"Clear Pathways" Task Force	2013