

Allen B. MacKenzie

Curriculum Vitae

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Education

Ph.D. in Electrical and Computer Engineering, Cornell University, May 2003. Dissertation: *Game Theoretic Analysis of Power Control and Medium Access Control*. Advisor: Professor Steven B. Wicker.

B.Eng. in Electrical and Computer Engineering and Mathematics, Vanderbilt University, May 1999, *summa cum laude* and Founder's Medal.

Professional Experience

Associate Professor, Bradley Department of Electrical and Computer Engineering, Virginia Tech, 2010–present.

E.T.S. Walton Visiting Professor, CTVR / the telecommunications research centre, Trinity College Dublin, Ireland, 2012–2013.

Assistant Professor, Bradley Department of Electrical and Computer Engineering, Virginia Tech, 2003–2010.

Awards and Honors

E.T.S. Walton Visitor Award from the Science Foundation of Ireland to support a year-long sabbatical at Trinity College Dublin, 2012–2013.

Elevated to Senior Member, IEEE, 2008.

Dean's Award for Outstanding New Assistant Professor, College of Engineering, Virginia Tech, 2006.

Faculty Early Career Development (CAREER) Award, National Science Foundation, 2005.

Selected to attend National Effective Teaching Institute, American Society for Engineering Education, 2004.

Graduate Research Fellowship, National Science Foundation, 2000–2003.

Founder's Medal in Engineering, awarded to the top student in the College of Engineering, Vanderbilt University, 1999.

Research and Scholarship Highlights

An active and influential researcher with more than 70 journal and refereed conference publications, many of which are highly cited, yielding an h-index of 21.¹

Participated in \$4.8M in sponsored research projects with personal responsibility of \$2.0M.

One of the first researchers to describe a “cognitive network.” The two papers first describing this concept, a conference paper in IEEE DySPAN 2005 and a magazine article in *IEEE Communications Magazine* in 2006, have now been cited 430 and 322 times, respectively.

A pioneering researcher in using game theory to analyze wireless networks, with a short tutorial monograph, *Game Theory for Wireless Engineers*, that has been cited 280 times and four articles on the subject that have been cited more than 200 times each (from *IEEE Communications Surveys and Tutorials*, 2005; *IEEE Info-com*, 2003; *IEEE Communications Magazine*, 2001; and *IEEE Globecom*, 2001).

¹All citation counts and reference statistics are taken from Google Scholar; last updated 2013-09-17.

An innovative researcher that works with experimental networks, including a unique project that created and ran a competition in ad hoc networking (the MANIAC Challenge, see *IEEE Communications Magazine* paper from 2012) and a project that has created open source networking software for the research community (the FINS Framework, see WiNTECh poster 2011).

Teaching Highlights

A versatile teacher that has taught a variety of subjects (including a courses on probability and random processes, programming, communications theory, and networking) at a variety of levels (from a second-year programming course to many graduate courses).

Regularly teaches undergraduate courses on Communication Systems, introducing the mathematics of signal processing for wireless and wired communications, and Telecommunication Networks, introducing the foundations of networking including applications to the telephone network, wired and wireless local area networks, and hybrid fiber coax cable networks.

An innovative teacher that organized an international graduate course on dynamic spectrum access networks, including students from both Virginia Tech and Trinity College Dublin, and attracted guest speakers from around the world.

A contributor to continuing education by giving tutorials at conferences and symposia and by leading short courses for researchers at Trinity College Dublin and the University of Oulu (Finland).

Service Highlights

An active contributor to the research community, currently serving as an Area Editor for *IEEE Transactions on Communications* (after a two-year term as Associate Editor) and as an Associate Editor for *IEEE Transactions on Mobile Computing*. Also served as a guest editor for a special topic in *IEEE Communications Magazine* in 2011.

Also involved in conference organization, currently serving as the Tutorials Co-Chair for *IEEE DySPAN* 2014 and as the Dynamic Spectrum Management Track Chair for *Crowncom* 2014. Previously served as the inaugural Co-Chair for *GameNets* (2006) and the Poster and Travel Grants Chair for *IEEE DySPAN* (2011), in addition to serving as a technical program committee member for many conferences.

Actively involved in the university community through leadership and service on department committees, particularly in the areas of curriculum and graduate student recruitment. Currently serving on a search committee for a tenure track faculty member.

Publications

Books

1. W. H. Tranter and A. B. MacKenzie, *A Tutorial on Queueing and Trunking with Applications to Communications*. Morgan and Claypool, 2012.
2. A. B. MacKenzie and L. A. DaSilva, *Game Theory for Wireless Engineers*. Morgan and Claypool, 2006.

Book Chapters

1. J. Neel, J. H. Reed, and A. B. MacKenzie, "Cognitive radio network analysis," in *Cognitive Radio Technology*, 2nd ed., B. Fette, Ed. Elsevier, 2009, ch. 15, pp. 483–533.
2. R. W. Thomas, D. H. Friend, L. A. DaSilva, and A. B. MacKenzie, "Cognitive networks," in *Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems*, H. Arslan, Ed. Dordrecht, The Netherlands: Springer, 2007, pp. 17–41.

3. D. H. Friend, R. W. Thomas, A. B. MacKenzie, and L. A. DaSilva, "Distributed learning and reasoning in cognitive networks," in *Cognitive Networks: Towards Self-Aware Networks*, Q. Mahmoud, Ed. Wiley, 2007.
4. J. Neel, J. H. Reed, and A. B. MacKenzie, "Cognitive radio network analysis," in *Cognitive Radio Technology*, B. Fette, Ed. Elsevier, 2006, ch. 15, pp. 501–579.

Journal & Magazine Articles

1. M. S. Thompson, J. M. Reed, A. S. Abdallah, A. B. MacKenzie, and L. A. DaSilva, "The FINS framework: An open-source, userspace networking subsystem for linux," 2014, to appear in *IEEE Network: The Magazine of Global Internetworking*.
2. X. Chen, H. Zhang, A. B. MacKenzie, and M. Matinmikko, "Predicting spectrum occupancies using a non-stationary hidden markov model," 2014, to appear in *IEEE Wireless Communications Letters*.
3. P. D. Francesco, S. McGettrick, U. K. Anyanwu, J. C. O'Sullivan, A. B. MacKenzie, and L. A. DaSilva, "A split MAC approach for SDR platforms," *IEEE Transactions on Computers*, 2014.
4. M. W. Baidas and A. B. MacKenzie, "Many-to-many space-time network coding for amplify-and-forward cooperative networks: Nod selection and performance analysis," *EURASIP Journal on Wireless Communications and Networking*, vol. 2014, no. 48, March 2014.
5. —, "Altruistic coalition formation in cooperative wireless networks," *IEEE Transactions on Communications*, vol. 61, no. 11, pp. 4678–4689, November 2013.
6. M. Baidas, A. B. MacKenzie, and R. M. Buehrer, "Network-coded bi-directional relaying for amplify-and-forward cooperative networks: A comparative study," *IEEE Transactions on Wireless Communications*, vol. 12, no. 7, pp. 3238–3252, July 2013.
7. R. E. Irwin, A. B. MacKenzie, and L. A. DaSilva, "Resource-minimized channel assignment for multi-transceiver cognitive radio networks," *IEEE Journal on Selected Areas in Communications*, vol. 31, no. 3, pp. 442–450, March 2013.
8. A. B. MacKenzie and L. A. DaSilva, "Application of signal processing to addressing wireless data demand [in the spotlight]," *IEEE Signal Processing Magazine*, vol. 29, no. 6, pp. 168, 163–166, November 2012.
9. M. W. Baidas and A. B. MacKenzie, "An auction mechanism for power allocation in multi-source, multi-relay cooperative wireless networks," *IEEE Transactions on Wireless Communications*, vol. 11, no. 9, pp. 3250–3260, September 2012.
10. M. S. Thompson, A. B. MacKenzie, L. A. DaSilva, and G. Hadjichristofi, "A mobile ad hoc networking competition: A retrospective look at the MANIAC challenge," *IEEE Communications Magazine*, vol. 50, no. 7, pp. 121–127, July 2012.
11. J. Deaton, S. Ahmad, U. Shukla, R. Irwin, L. DaSilva, and A. MacKenzie, "Evaluation of dynamic channel and power assignment for cognitive networks," *Wireless Personal Communications*, vol. 57, no. 1, pp. 5–18, 2011.
12. R. S. Komali, R. W. Thomas, L. A. DaSilva, and A. B. MacKenzie, "The price of ignorance: Distributed topology control in cognitive networks," *IEEE Transactions on Wireless Communications*, vol. 9, no. 4, pp. 1434–1445, 2010.
13. J. Suris, L. Dasilva, Z. Han, A. MacKenzie, and R. Komali, "Asymptotic optimality for distributed spectrum sharing using bargaining solutions," *IEEE Transactions on Wireless Communications*, vol. 8, no. 10, pp. 5225–5237, October 2009.

14. R. Menon, R. M. Buehrer, A. B. MacKenzie, and J. H. Reed, "Interference avoidance in networks with distributed receivers," *IEEE Transactions on Communications*, vol. 57, no. 10, pp. 3078–3091, October 2009.
15. A. B. MacKenzie, J. H. Reed, P. Athanas, C. W. Bostian, R. M. Buehrer, L. A. DaSilva, S. W. Ellingson, Y. T. Hou, M. Hsiao, J.-M. Park, C. Patterson, S. Raman, and C. R. C. M. da Silva, "Cognitive radio and networking research at virginia tech," *Proc. of the IEEE*, vol. 97, no. 4, pp. 660–688, April 2009.
16. R. Menon, A. B. MacKenzie, J. E. Hicks, R. M. Buehrer, and J. H. Reed, "A game-theoretic framework for interference avoidance," *IEEE Transactions on Communications*, vol. 57, no. 4, pp. 1087–1098, April 2009.
17. S. V. Ginde, A. B. MacKenzie, R. M. Buehrer, and R. S. Komali, "A game-theoretic analysis of link adaptation in cellular radio networks," *IEEE Transactions on Vehicular Technology*, vol. 57, no. 5, pp. 3108–3120, September 2008.
18. R. S. Komali, A. B. MacKenzie, and R. P. Gilles, "Effect of selfish node behavior on efficient topology design," *IEEE Transactions on Mobile Computing*, vol. 7, no. 9, pp. 1057–1070, September 2008.
19. R. W. Thomas, D. H. Friend, L. A. DaSilva, and A. B. MacKenzie, "Cognitive networks: Adaptation and learning to achieve end-to-end performance objectives," *IEEE Communications Magazine*, pp. 51–57, December 2006.
20. V. Srivastava, J. Neel, A. B. MacKenzie, R. Menon, L. A. DaSilva, J. E. Hicks, J. H. Reed, and R. P. Gilles, "Using game theory to analyze wireless ad hoc networks," *IEEE Communications Surveys and Tutorials*, vol. 7, no. 4, pp. 46–56, 2005.
21. A. B. MacKenzie and S. B. Wicker, "Game theory and the design of self-configuring, adaptive wireless networks," *IEEE Communications Magazine*, vol. 39, no. 11, pp. 126–131, Nov. 2001.

Peer Reviewed Conference Papers

1. T. Taher, R. Attard, A. Riaz, D. Roberson, J. Taylor, K. Zdunek, J. Hallio, R. Ekman, J. Paavola, J. Suutala, J. Rönning, M. Matinmikko, M. Höyhty, and A. B. MacKenzie, "Global spectrum observatory network setup and initial findings," in *Proc. of the International Conference on Cognitive Radio Oriented Wireless Networks (CROWNCOM)*, June 2014.
2. C. W. Patterson, A. B. MacKenzie, S. Glisic, B. Lorenzo, J. Rönning, and L. A. DaSilva, "An economic model of data offloading between mobile network operators and WLAN operators," in *Proc. of the International Symposium on Modeling and Optimization in Mobile, Ad Hoc, and Wireless Networks (WiOpt)*, May 2014, under review for conference publication.
3. P. D. Francesco, S. McGettrick, U. K. Anyanwu, J. C. O'Sullivan, A. B. MacKenzie, and L. A. DaSilva, "A split architecture for random access MAC for SDR platforms," in *Proc. of the International Conference on Cognitive Radio Oriented Wireless Networks (CrownCom)*, Washington, DC, July 2012.
4. R. E. Irwin, A. B. MacKenzie, and L. A. DaSilva, "Traffic-aware channel assignment for multi-radio wireless networks," in *Proc. of the International IFIP TC 6 Networking Conference (NETWORKING)*, Prague, May 2012, pp. 331–342.
5. M. Baidas, A. B. MacKenzie, and R. M. Buehrer, "Performance analysis of network-coded bi-directional relaying for amplify-and-forward cooperative wireless networks," in *Proc. of the IEEE International Wireless Communications and Mobile Computing Conference (IWCMC)*, Limassol, August 2012, pp. 222–227.
6. A. E. Hilal and A. B. MacKenzie, "Mitigating the effect of mobility on cooperation in wireless ad hoc networks," in *Proc. IEEE International Conference on Wireless and Mobile Computing, Networking, and Communications (WiMob)*, Barcelona, October 2012, pp. 365–372.

7. M. W. Baidas and A. B. MacKenzie, "On the impact of power allocation on coalition formation in cooperative wireless networks," in *Proc. IEEE International Conference on Wireless and Mobile Computing, Networking, and Communications (WiMob)*, October 2012, pp. 488–495.
8. M. Baidas and A. B. MacKenzie, "Auction-based power allocation for multi-source multi-relay cooperative wireless networks," in *Proc. IEEE Global Telecommunications Conference (GLOBECOM)*, December 2011.
9. R. E. Irwin, A. B. MacKenzie, and L. A. DaSilva, "Resource-minimized channel assignment for multi-transceiver wireless networks," in *Proc. IEEE Global Telecommunications Conference (GLOBECOM)*, December 2011.
10. Y. Shi and A. B. MacKenzie, "Distributed algorithms for resource allocation in cellular networks with coexisting femto- and macrocells," in *Proc. IEEE Global Telecommunications Conference (GLOBECOM)*, December 2011.
11. M. S. Thompson, A. B. MacKenzie, and L. A. DaSilva, "A method of proactive MANET routing protocol evaluation applied to OLSR protocol," in *Proc. ACM Workshop on Wireless Network Testbeds, Experimental Evaluation, and Characterization (WiNTECH)*, September 2011.
12. A. S. Abdallah, M. D. Horvath, M. S. Thompson, A. B. MacKenzie, and L. A. DaSilva, "Poster abstract: Facilitating experimental networking research with the fins framework," in *Proc. ACM Workshop on Wireless Network Testbeds, Experimental Evaluation, and Characterization (WiNTECH)*, September 2011.
13. M. W. Baidas and A. B. MacKenzie, "Auction-based power allocation for many-to-one cooperative wireless networks," in *Proc. IEEE International Wireless Communications and Mobile Computing Conference (IWCMC)*, July 2011.
14. A. S. Abdallah, A. B. MacKenzie, L. A. DaSilva, and M. S. Thompson, "On software tools and stack architectures for wireless network experiments," in *Proc. IEEE Wireless Communications and Networking Conference (WCNC)*, Cancun, Mexico, March 2011.
15. M. Baidas and A. B. MacKenzie, "Space-time network coding with optimal node selection for amplify-and-forward cooperative networks," in *Proc. IEEE Consumer Communications and Networking Conference (CCNC)*, Las Vegas, Nevada, January 2011.
16. F. Ge, A. Radhakrishnan, M. Y. ElNainay, Q. Chen, C. W. Bostian, and A. B. MacKenzie, "Software radio-based decentralized dynamic spectrum access networks: A prototype design and experimental results," in *Proc. IEEE Global Telecommunications Conference (GLOBECOM)*, Miami, Florida, December 2010.
17. Y. Shi, A. B. MacKenzie, L. A. DaSilva, K. Ghaboosi, and M. Latva-aho, "On resource reuse for cellular networks with femto- and macrocell coexistence," in *Proc. IEEE Global Telecommunications Conference (GLOBECOM)*, Miami, Florida, December 2010.
18. C. H. M. de Lima, K. Ghaboosi, M. Bennis, A. B. MacKenzie, and M. Latva-aho, "A stochastic association mechanism for macro-to-femto handover," in *Proc. Asilomar Conference on Signals, Systems, and Computers*, November 2010, pp. 1570–1574.
19. S. Namal, K. Ghaboosi, C. H. M. de Lima, M. Bennis, A. B. MacKenzie, and M. Latva-aho, "Joint admission control & interference avoidance in self-organized femtocells," in *Proc. Asilomar Conference on Signals, Systems, and Computers*, November 2010, pp. 1067–1071.
20. M. Nazir, M. Bennis, K. Ghaboosi, A. B. MacKenzie, and M. Latva-aho, "Learning based mechanisms for interference mitigation in self-organized femtocell networks," in *Proc. Asilomar Conference on Signals, Systems, and Computers*, November 2010, pp. 1886–1890.

21. M. S. Thompson, A. E. Hilal, A. S. Abdallah, L. A. DaSilva, and A. B. MacKenzie, "The MANIAC challenge: Exploring MANETs through competition," in *Proc. of the International Workshop on Wireless Networks: Communication, Cooperation, and Competition (WNC3)*, May 2010.
22. H. Liu, A. B. MacKenzie, and B. Krishnamachari, "Bargaining to improve channel sharing between selfish cognitive radios," in *Proc. IEEE Global Telecommunications Conference (GLOBECOM)*, Honolulu, Hawaii, November–December 2009.
23. M. D. Silvius, A. B. MacKenzie, and C. W. Bostian, "Rendezvous MAC protocols for use in cognitive radio networks," in *Proc. IEEE Military Communications Conference (Milcom)*, Boston, Massachusetts, October 2009.
24. S. A. Ahmad, J. Deaton, U. Shukla, R. Irwin, L. A. DaSilva, and A. B. MacKenzie, "A comparison of channel assignment techniques with power control in ad hoc networks," in *Proc. of the International Workshop on Cognitive Networks and Communications (COGCOM)*, 2009.
25. R. S. Komali, A. B. MacKenzie, and P. Mähönen, "On selfishness, local information, and network optimality: A topology control example," in *Proc. of the International Conference on Computer Communications and Networks (ICCCN)*, 2009.
26. R. Komali and A. MacKenzie, "Analyzing selfish topology control in multi-radio multi-channel multi-hop wireless networks," in *Proc. IEEE International Conference on Communications (ICC)*, June 2009, pp. 1 –6.
27. M. D. Silvius, R. Rangnekar, A. B. MacKenzie, and C. W. Bostian, "The smart radio channel change protocol: A primary user avoidance technique for dynamic spectrum sharing cognitive radios to facilitate co-existence in wireless communication networks," in *Proc. of the International Conference on Cognitive Radio Oriented Wireless Networks (CrownCom)*, Hannover, Germany, June 2009.
28. A. Bell, S. Raman, A. B. MacKenzie, P. Plassman, C. Wyatt, L. A. DaSilva, L. Nazhandali, and M. Agah, "Increasing the enrollment, retention, and satisfaction of first-year students in electrical engineering, computer engineering, and computer science," in *Proc. ASEE Annual Conference and Exposition*, Austin, Texas, June 2009.
29. M. Y. ElNainay and A. B. MacKenzie, "Effect of non-cooperation on dynamic spectrum cognitive networks," in *Proc. of the International Wireless Communications and Mobile Computing Conference (IWCMC)*, Leipzig, Germany, June 2009, pp. 121–125.
30. M. Y. ElNainay, F. Ge, Y. Wang, A. E. Hilal, Y. Shi, A. B. MacKenzie, and C. W. Bostian, "Channel allocation for dynamic spectrum access cognitive network using localized island genetic algorithm," in *Proc. of the International Conference on Testbeds and Research Infrastructures for the Development of Networks and Communities (TridentCom)*, April 2009.
31. K. Ghaboosi, A. B. MacKenzie, L. A. DaSilva, A. S. Abdallah, and M. Latva-Aho, "A channel selection mechanism based on incumbent appearance expectation for cognitive networks," in *Proc. IEEE Wireless Communications and Networking Conference*, Budapest, April 2009, p. 6.
32. L. A. DaSilva, A. B. MacKenzie, C. R. C. M. da Silva, and R. W. Thomas, "Requirements of an open platform for cognitive networks experiments," in *Proc. IEEE Dynamic Spectrum Access Networks (DySPAN)*, Chicago, October 2008.
33. M. Y. ElNainay, D. H. Friend, and A. B. MacKenzie, "Channel allocation & power control for dynamic spectrum cognitive networks using a localized island genetic algorithm (short paper)," in *Proc. IEEE Dynamic Spectrum Access Networks (DySPAN)*, 2008.
34. D. H. Friend and A. B. MacKenzie, "Environmentally-friendly secondary network topology control for minimizing outage potential," in *Proc. IEEE Dynamic Spectrum Access Networks (DySPAN)*, Chicago, October 2008.

35. V. Srivastava, A. E. Hilal, M. S. Thompson, J. N. Chattha, A. B. MacKenzie, and L. A. DaSilva, "Characterizing mobile ad hoc networks — The MANIAC challenge experiment," in *Proc. of the ACM International Workshop on Wireless Network Testbeds, Experimental Evaluation, and Characterization (WiNTECH)*, San Francisco, September 2008.
36. A. E. Hilal, J. N. Chattha, V. Srivastava, M. S. Thompson, A. B. MacKenzie, and L. A. DaSilva, "Interactions between cooperation strategies in mobile ad hoc networks," in *Proc. ACM Workshop on Wireless Network Testbeds, Experimental Evaluation, and Characterization (WiNTECH)*, San Francisco, California, September 2008, pp. 99–100.
37. V. Srivastava, R. S. Komali, A. B. MacKenzie, and L. A. DaSilva, "Cooperation-aware topology control (invited paper)," in *Proc. International Symposium on Wireless Personal Multimedia Communications (WPMC)*, September 2008.
38. S. Raman, M. Agah, L. DaSilva, A. B. MacKenzie, C. Maxey, and A. Bell, "A first year engineering experience in wireless sensor networks for electrical/computer engineering and computer science students," in *Proc. ASEE Annual Conference and Exposition*, Pittsburg, PA, June 22–25 2008.
39. R. S. Komali and A. B. MacKenzie, "Impact of selfish packet forwarding on energy-efficient topology control," in *Proc. WiOpt: Modeling and Optimization in Mobile, Ad Hoc and Wireless Networks*, April 2008.
40. M. D. Silvius, F. Ge, A. Young, A. B. MacKenzie, and C. W. Bostian, "Smart radio: Spectrum access for first responders," in *Proc. of the SPIE Defense and Security Symposium: Wireless Sensing and Processing III*, vol. 6980, no. 1, 2008, pp. 698 008–1 – 698 008–12.
41. D. H. Friend, M. Y. ElNainay, Y. Shi, and A. B. MacKenzie, "Architecture and performance of an island genetic algorithm-based cognitive network," in *Proc. IEEE Consumer Communications and Networking Conference*, Las Vegas, January 10–12 2008, pp. 993–997.
42. R. Menon, A. B. MacKenzie, R. M. Buehrer, and J. H. Reed, "Joint power control and waveform adaptation for distributed networks," in *Proc. IEEE Global Telecommunications Conference (GLOBECOM)*, Washington, DC, November 2007, pp. 694–699.
43. T. W. Rondeau, A. B. MacKenzie, C. W. Bostian, K. E. Nolan, L. E. Doyle, C. Doerr, D. Grunwald, G. Minden, J. Evans, and D. Raychaudhuri, "International collaboration for a cognitive radio testbed," in *Proc. of the Software Defined Radio Technical Conference*, 2007.
44. J. Neel, R. Menon, A. B. MacKenzie, J. H. Reed, and R. P. Gilles, "Interference reducing networks," in *Proc. of the International Conference on Cognitive Radio Oriented Wireless Networks and Communications (CrownCom)*, 31 July – 3 August 2007.
45. R. W. Thomas, R. S. Komali, L. A. DaSilva, and A. B. MacKenzie, "Joint power and channel minimization in topology control: A cognitive network approach," in *Proc. IEEE International Conference on Communications*, Glasgow, Scotland, June 24–28 2007, pp. 6538–6543.
46. J. E. Suris, L. A. DaSilva, Z. Han, and A. B. MacKenzie, "Cooperative game theory for distributed spectrum sharing," in *Proc. IEEE International Conference on Communications*, Glasgow, Scotland, June 2007, pp. 5282–5287.
47. R. Menon, A. B. MacKenzie, R. M. Buehrer, and J. H. Reed, "A game-theoretic framework for interference avoidance in ad hoc networks," in *Proc. of IEEE Global Conference on Communications*, 2006.
48. T. W. Rondeau, B. Le, D. M. Maldonado, D. Scaperth, A. B. MacKenzie, and C. W. Bostian, "Optimization, learning, and decision making in a cognitive engine," in *Proc. of the Software Defined Radio Technical Conference*, Orlando, Florida, 2006.

49. L. A. DaSilva, A. B. MacKenzie, and G. C. Hadjichristofi, "Poster abstract: Mobile ad hoc network interoperability (MANIAC) challenge: Objectives and architecture," in *Proc. of the ACM International Symposium on Mobile Ad Hoc Networking (MobiHoc)*, 2006.
50. R. S. Komali and A. B. MacKenzie, "Distributed topology control in ad-hoc networks: A game theoretic perspective," in *Proc. IEEE Consumer Communications and Networking Conference*, vol. 1, January 2006, pp. 563–568.
51. R. W. Thomas, L. A. DaSilva, and A. B. MacKenzie, "Cognitive networks," in *First IEEE International Symposium on New Frontiers in Dynamic Spectrum Access Networks (DySpan)*, November 2005, pp. 352 – 360.
52. J. Neel, R. Menon, A. B. MacKenzie, and J. H. Reed, "Using game theory to analyze physical layer cognitive radio algorithms," in *presented to the Conference on Economics, Technology, and Policy of Unlicensed Spectrum*, May 2005.
53. R. Menon, A. B. MacKenzie, R. M. Buehrer, and J. H. Reed, "Game theory and interference avoidance in decentralized networks," in *Proc. of the Software Defined Radio Technical Conference and Product Exposition*, November 2004.
54. J. E. Hicks, A. B. MacKenzie, J. A. Neel, and J. H. Reed, "A game theory perspective on interference avoidance," in *Proc. of IEEE Globecom*, vol. 1, 2004, pp. 257–261.
55. A. B. MacKenzie and S. B. Wicker, "Stability of multipacket slotted aloha with selfish users and perfect information," in *INFOCOM 2003. Twenty-second Annual Joint Conference of the IEEE Computer and Communications Societies*, vol. 3, 2003, pp. 1583–1590.
56. —, "Game theory in communications: Motivation, explanation, and application to power control," in *Proceedings of Globecom 2001*, vol. 2, 2001, pp. 25–29.
57. —, "Selfish users in aloha: A game theoretic approach," in *Proc. of the Fall IEEE Vehicular Technology Conference*, vol. 3, October 2001, pp. 1354–1357.

Invited Presentations

1. A. B. MacKenzie, "The Future of Wireless Resource Management: Bootstrapping and Automated Negotiation," Queen's University Belfast, 20 June 2013.
2. A. B. MacKenzie, "The Future of Wireless Resource Management: Bootstrapping and Automated Negotiation," National University of Ireland, Maynooth, 9 May 2013.
3. A. B. MacKenzie, "The Future of Wireless Resource Management: Bootstrapping and Automated Negotiation," Dublin Institute of Technology, 30 April 2013.
4. A. B. MacKenzie, "The Future of Wireless Resource Management: Bootstrapping and Automated Negotiation," University College Cork, 11 February 2013.
5. A. B. MacKenzie, "The Future of Wireless Resource Management: Bootstrapping and Automated Negotiation," Dublin City University, 22 January 2013.
6. A. B. MacKenzie, "The Future of Wireless Resource Management: Bootstrapping and Automated Negotiation," CTVR, Trinity College Dublin, 26 October 2012.
7. A. B. MacKenzie, "Dynamic Spectrum Access Networks: From Dream to Reality," CTVR, Trinity College Dublin, 29 June 2009.
8. A. B. MacKenzie, "Dynamic Spectrum Access Networks: From Dream to Reality," Summer Research Institute, School of Computer and Communication Sciences, Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland, 26 June 2009.

9. A. B. MacKenzie, "Dynamic Spectrum Access Networks: From Dream to Reality," RWTH Aachen University, Aachen, Germany, 25 June 2009.
10. A. B. MacKenzie, "Building and Analyzing Cognitive Radio Networks," Graduate Seminar, Old Dominion University, 28 March 2008.
11. C. W. Bostian, S. Raman, and A. B. MacKenzie, "RF/System Requirements for Cognitive Radio," presented at the *IEEE International Microwave Symposium*, 2007.
12. A. B. MacKenzie, "Analyzing Cognitive Radio Networks with Game Theory," MIT Lincoln Labs, Boston, Massachusetts, 12 July 2006.
13. A. B. MacKenzie, "Analyzing Cognitive Radio Networks with Game Theory," Cornell University, Ithaca, New York, 10 July 2006.
14. A. B. MacKenzie, "Analyzing Cognitive Radio Networks with Game Theory," Electrical Engineering Department, University of Southern California, Los Angeles, 27 June 2006.
15. A. B. MacKenzie, "Analyzing Cognitive Radio Networks with Game Theory," Electrical Engineering Department, University of California Los Angeles, 26 June 2006.

Sponsored Research Projects

1. "Collaborative Research: EAGER: Global Spectrum Opportunity Assessment," National Science Foundation, \$124,056 from 2/2013 – 1/2015, PI with 100% responsibility.
2. "Game Theoretic Cross-Layer Control Mechanism for Tactical Networks," US Army CERDEC, \$69,768 from 6/2011 – 2/2013, PI with 100% responsibility.
3. "Economic Models for Collaborative Access Network Provisioning: US-Finland Collaboration," National Science Foundation, \$290,000 from 9/2011 - 8/2013, PI with 50% responsibility (\$145,000).
4. "NeTS: Small: Collaborative Research: The Flexible Internetwork Stack (FINS) Framework," National Science Foundation, \$348,641 from 9/2009 - 9/2012, PI with 90% responsibility (\$313,777). REU supplement of \$16,000 also obtained.
5. "Reasoning and Learning in Adaptive Wireless Networks," BBN Technologies (subcontract on DARPA-funded project), initial phase of \$219,870 from 9/2007 to 12/2008, Co-PI with 25% responsibility (\$54,968). A second phase of \$319,187 from 4/09 to 3/10 with MacKenzie as PI with 25% responsibility (\$79,797).
6. "A Discovery-Based First Year Electrical and Computer Engineering Course Emphasizing Real-World Projects that Benefit Society," National Science Foundation, \$150,000 from 1/2007 to 12/2008, 11% responsibility (\$16,500).
7. "Network Advisory Board for DARPA WANN Team," M/A-Com (subcontract on DARPA-funded project), \$25,000 from 12/2006 - 6/2007, 50% responsibility (\$12,500).
8. "NeTS-ProWIN: An Enabling Technology for Wireless Networks - The VT Cognitive Engine," National Science Foundation, \$749,796 from 9/2005 to 8/2008, 23% responsibility (\$172,453).
9. "A Prototype Public Safety Cognitive Radio for Universal Interoperability," National Institute of Justice. Initial project was for \$419,995 from 10/05 - 3/07, 33% responsibility (\$138,598). A first continuation was funded at \$725,000 from 2/2007 - 1/2008, 20% responsibility (\$145,000). A second continuation was funded at \$500,000 from 2/2008 to 1/2009, 20% responsibility (\$100,000).
10. "NeTS-NBD: Mobile Ad Hoc Networking Interoperability and Cooperation Challenge (MANIAC Challenge)," National Science Foundation, \$450,000 from 8/2005 to 7/2008, 50% responsibility (\$225,000).
11. "CAREER: Game Theoretic Models of Cooperation in Wireless Networks," National Science Foundation, \$400,000 from 6/2005 to 5/2012, 100% responsibility (\$400,000).

Courses Taught

1. ECE 4614: Telecommunication Networks (Spring 2014, Spring 2012, Spring 2010, Spring 2009, Spring 2007)
2. ECE 3614: Introduction to Communication Systems (Spring 2014, Spring 2005, Fall 2003)
3. ECE 5634: Information Theory (Fall 2013, Fall 2008, Fall 2006)
4. ECE 5605/BMES 5525: Stochastic Signals and Systems I (Fall 2011, Fall 2005, Fall 2004)
5. ECE 2574: Introduction to Data Structures and Algorithms (Spring 2011)
6. ECE 5544: Coding Theory (Fall 2009, Fall 2007, Spring 2004)
7. ECE 5984: Special Studies: Cognitive Radios, Cognitive Networks, and Dynamic Spectrum Access (Spring 2008)
8. ECE 5565: Network Architectures and Protocols I (Fall 2005)
9. ECE 5606: Stochastic Signals and Systems II (Co-taught, Spring 2005)

Current and Former Graduate Students Advised

1. Abdallah S. Abdallah, Ph.D. expected 2015.
2. Naomi Walker, M.S. expected 2015.
3. Cameron W. Patterson, M.S. expected 2014.
4. Varuni K. Sastry, M.Eng. expected 2014.
5. Ramakrishnan Kalyanaraman, M.Eng. expected 2014.
6. Jonathan Reed, M.S. 2014.
7. Amr Hilal, Ph.D. 2013, Engineer at Heyo.
8. William Rogers, M.S. 2013, Engineer at BIT Systems.
9. Ryan Irwin, Ph.D. 2012 (co-advised with Luiz DaSilva), Engineering Fellow at Insight Data Science.
10. Frank Bieberly, M.S. 2012, Engineer at MIT Lincoln Labs.
11. Mohammed Baidas, Ph.D. 2012, Assistant Professor at Kuwait University.
12. Uchenna Anyanwu, M.S. 2012.
13. Yongsheng Shi, Ph.D. 2010, Engineer at Qualcomm.
14. Umesh Shukla, M.S. 2010, Engineer at Apple.
15. Mark Silvius, Ph.D., 2009 Assistant Professor at Air Force Institute of Technology (co-advised with Charles Bostian).
16. Mustafa ElNainay, Ph.D. 2009, Assistant Professor at Alexandria University, Egypt.
17. Daniel H. Friend, Ph.D. 2009, Associate at Zeta Associates.
18. Ramakant S. Komali, Ph.D. 2008, Engineer at Cisco Systems.

Other Teaching Activities

Taught a nine-session short course titled “Game Theory for Wireless Engineers” at Trinity College Dublin during the 2012-2013 academic year.

Taught two invited short courses at the Centre for Wireless Communications, University of Oulu, Finland. In February 2008, taught a three-day short course titled “Cognitive Radios and Cognitive Networks” with Luiz DaSilva. In May 2009, taught a two-day short course titled “Resource Management for Dynamic Spectrum Access” also with Luiz DaSilva.

Designed an innovative research-focused special topics course (ECE 5984: Special Studies: Cognitive Radios, Cognitive Networks, and Dynamic Spectrum Access) with a significant international component (including participation from students at Trinity College, Dublin) and leading researchers in this emerging area as guest speakers. This course was taught during Spring 2008.

Developed a module to teach first-year electrical and computer engineering and computer science students about medium access control in a wireless network under NSF support. This module, which included a significant hands-on component and emphasized the importance of communications systems to society, was part of a redesign of ENGE 1104: Engineering Our Digital Future. This project was selected as an IEEE Real World Engineering Project, and is now available on the RWEP website.

Participated in major course revisions, including revisions of of ECE 3614: Introduction to Communication Systems, ECE 4614: Telecommunication Networks, and ECE 5544: Coding Theory.

Selected Professional Service

Area Editor, *IEEE Transactions on Communications*, initial term 2013–2016.

Tutorials Co-Chair, *IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN)*, 2014.

Dynamic Spectrum Management Track Chair, *International Conference on Cognitive Radio Oriented Wireless Networks (Crowncom)*, 2014.

Associate Editor, *IEEE Transactions on Mobile Computing*, initial term 2011–2013.

Associate Editor, *IEEE Transactions on Communications*, 2011–2013.

Guest Editor, *IEEE Communications Magazine*, feature topic on Game Theory, September 2011.

Poster and Travel Grants Chair, IEEE International Symposium on Dynamic Spectrum Access Networks (DySPAN), 2011.

Co-chair, GameNets 2006: Workshop on Game Theory for Networks, Piza, Italy, Oct. 14, 2006.

Proposal Reviewer, National Science Foundation, Science Foundation of Arizona, Academy of Finland (Suomen Akatemia), and Army Research Office.

Member of Technical Program Committee for numerous international conferences, workshops and symposia.

Reviewer for numerous top-tier international journals.

Selected University Service

Co-Chair, Faculty Search Committee in Wireless, 2013–2014.

Area Chair of Communications Area, 2013–2014, 2011–2012, 2010–2011.

Member, ECE Curriculum Committee, 2013–2014, 2011–2012, 2010–2011.

Graduate Recruiting Representative, Communications Area, 2013–2014, 2009–2010, 2008–2009.

EE Subcommittee Chair, ECE Curriculum Committee, 2011–2012.