William A. Arbaugh

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Current Status

Assistant Professor
Department of Computer Science and
University of Maryland Institute for Advanced Computer Studies
University of Maryland, College Park, Maryland.

Research Interests

Information Systems Security- focusing on wireless network security, embedded systems and active systems management.

Education

University of Pennsylvania. Philadelphia, Pennsylvania.
Advisors: Jonathan M. Smith and David J. Farber
Ph.D. in Computer Science, 1999.

Columbia University. New York, New York.
M.S. in Computer Science, 1985.

United States Military Academy. West Point, New York.
B.S. with a concentration in Computer Science, 1984.

Employment

Assistant Professor, Dept. of Computer Science, University of Maryland, College Park, Maryland.
Summer 2000–present.
Responsible for establishing and managing a world class research program in Information Systems Security. Duties also include the design and teaching of an Information Systems Security curriculum.

Senior Technical Advisor (Office of Advanced Network Programs), National Security Agency, Ft. Meade, Maryland.
1998–2000.
Senior Technical Advisor (Office of Advanced Network Programs) One of three senior technical advisors to the chief in an office of several hundred computer scientists, electrical engineers,

and mathematicians. Duties included providing advice and guidance to the chief on emerging technologies, and for providing technical oversight on all projects within the office.

Senior Computer Scientist (Office of Research and Technology), National Security Agency, Ft. Meade, Maryland.
1990–1998.
Responsible for the initial development and execution of an internal applied computer security research program. Specific responsibilities included providing leadership and mentoring for several junior researchers, and establishing and justifying the goals and budget to senior management. Additional duties included leading an operational computer security evaluation team (Tiger Team) to perform vulnerability assessments. Examples of successful projects:

- Received the Louis W. Tordella award and the Science and Technology award for leading a team of seventeen mathematicians, computer scientists, and electrical engineers in transferring computer security research into internal operational use.

- Led a team of approximately twelve mathematicians and computer scientists that designed and implemented an Internet firewall with cryptographic support for remote authentication using PC cryptographic hardware tokens. The design, implementation, and initial operating capability took place over a period of three months. The resulting implementation and design document served as the basis for the Defense Message System firewall design. Furthermore, the system remained operational for over two years until commercial firewalls could provide the same level of security.

Senior Software Engineer (Office of the Chief of Staff), U.S. Army, Alexandria, Virginia.
1987–1990.

Area Signal Node Platoon Leader (Second Infantry Division), U.S. Army, Republic of South Korea.
1986–1987.

Publications

Books

Jonathan Edney, and William A. Arbaugh, *Real 802.11 Security: WiFi-Protected Access and 802.11i*, Addison-Wesley, July 2003, ISBN 0-321-13620-9, 451 pages. (26 citations[1])

Book Chapters

D. S. Alexander, W. A. Arbaugh, A. D. Keromytis, and J. M. Smith, *Security in Active Networks*, ch. Mobile Code, pp. 433–451. No. 1603, Springer–Verlag, 1999.

Articles in Referred Journals

*Arunesh Mishra, Suman Banerjee, and William Arbaugh, "Weighted Coloring based Channel Assignment for WLANs," *To appear in Mobile Computing and Communications Review*, 2005.

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[1]Citation information is from Google Scholar.

*Min-ho Shin, *Justin Ma, *Arunesh Mishra and William Arbaugh, "Wireless Network Security and Interworking," *To appear in the Proceedings of the IEEE*, 2005.

*Arunesh Mishra, *Nick L. Petroni, and William A. Arbaugh, "Security Issues in IEEE 802.11 Wireless Local-Area Networks: A Survey," *Wireless Communications and Mobile Computing Journal*, vol. 4, no. 8, pp. 821–833, 2004.

*Arunesh Mishra, *Min Ho Shin, *Nick L. Petroni Jr., *T. Charles Clancy, and William A. Arbaugh, "Proactive Key Distribution Using Neighbor Graphs," *IEEE Wireless Communications*, vol. 11, pp. 26–36, February 2004. (11 citations including presentation)

R. Housley and W. A. Arbaugh, "Security Problems in 802.11-based networks," *Communications of the ACM*, vol. 46, pp. 31 – 34, May 2003. (17 citations)

*A. Mishra, *M. ho Shin, and W. A. Arbaugh, "An Empirical Analysis of the IEEE 802.11 MAC layer handoff process," *ACM Computer Communications Review*, vol. 33, no. 2, pp. 93 – 102, 2003. (69 citations)

*Nick L. Petroni Jr. and William A. Arbaugh, "The Dangers of Mitigating Security Design Flaws: A Wireless Case Study," *IEEE Security and Privacy*, vol. 1, pp. 28 – 36, January/February 2003. (4 citations)

W. A. Arbaugh, *N. Shankar, *J. Wang, and K. Zhang, "Your 802.11 network has no clothes," *IEEE Wireless Communications*, vol. 9, pp. 44 – 51, December 2002. (113 citations)

D. S. Alexander, P. B. Menage, A. D. Keromytis, W. A. Arbaugh, K. G. Anagnostakis, and J. M. Smith, "The Price of Safety in an Active Network," *Journal of Communications and Networks (JCN), special issue on programmable switches and routers*, vol. 3, pp. 4 – 18, March 2001. (29 citations)

W. A. Arbaugh, W. L. Fithen, and J. McHugh, "Windows of Vulnerability: A Case Study Analysis," *IEEE Computer*, vol. 33, pp. 52–59, December 2000. (44 citations)

D. S. Alexander, W. A. Arbaugh, A. D. Keromytis, and J. M. Smith, "Secure Quality of Handling (SQoSH)," *IEEE Communications*, vol. 38, no. 4, pp. 106–112, 1999. (20 citations)

D. S. Alexander, W. A. Arbaugh, A. D. Keromytis, and J. M. Smith, "Safety and Security of Programmable Network Infrastructures," *IEEE Communications*, vol. 36, no. 10, pp. 84–92, 1998. (40 citations)

W. A. Arbaugh, J. R. Davin, D. J. Farber, and J. M. Smith, "Security for Virtual Private Intranets," *IEEE Computer*, pp. 48–55, September 1998. (2 citations)

D. S. Alexander, W. A. Arbaugh, M. Hicks, P. Kakkar, A. D. Keromytis, J. T. Moore, C. A. Gunter, S. M. Nettles, and J. M. Smith, "The SwitchWare Active Network Architecture," *IEEE Network*, vol. 12, no. 3, pp. 29–36, 1998. (184 citations)

D. S. Alexander, W. A. Arbaugh, A. D. Keromytis, and J. M. Smith, "A Secure Active Network Environment: Realization in Switchware," *IEEE Network Magazine*, vol. 12, no. 3, pp. 37–45, 1998. (77 citations)

Patents

Nick L. Petroni Jr., Timothy Fraser, Jesus Molina, and William A. Arbaugh, *A Method for Monitoring the Integrity of System Memory*, Patent filed, July 2004.

Arunesh Mishra, Min-ho Shin, William A. Arbaugh, Insun Lee, and Kyunghun Jang, *A Method for Fast and Secure Wireless Local Area Network Handoffs*, Patent filed, November 2003.

Arunesh Mishra, Min-ho Shin, William A. Arbaugh, Insun Lee, and Kyunghun Jang, *A Method for Fast and Secure Internetwork Handoffs*, Patent filed, January 2004.

William A. Arbaugh, David J. Farber, and Jonathan M. Smith, *A Secure Bootstrap Process*, Patent #6,185,678, February 2001.

Referred Conferences and Workshops

*A. Mishra, E. Rozner, S. Banerjee, and W. Arbaugh, "Expoliting Partially Overlapping Channels in Wireless Networks: Turning Peril into an Advantage," in *To appear in the Proceedings of the Internet Measurement Conference*, USENIX, October 2005. (24% acceptance)

H. Yang, F. Ye, *Y. Yuan, S. Lu, and W. Arbaugh, "Toward resilient security in wireless sensor networks," in *Proceedings of Mobihoc 2005*, pp. 34 – 45, ACM, May 2005. (14% acceptance)

Z. Yu, *C.-Y. Seng, T. Jiang, X. Wu, and W. Arbaugh, "Robust routing in malicious environment for ad hoc networks.," in *The First Information Security Practice and Experience Conference*, pp. 36–47, Apr. 2005.

*Y. Yuan and W. A. Arbaugh, "A Secure Service Discovery Protocol for MANET," in *IEEE Proceedings on Personal, Indoor and Mobile Radio Communications*, pp. 502 – 506, 2003. (5 citations)

*Y.Yuan, D. Gu, W. Arbaugh, and J. Zhang, "High-performance mac for high-capacity wireless lans," in *Proceedings of the International Conference On Computer Communications and Networks (ICCCN 2004), October 11-13, 2004, Chicago, IL, USA*, pp. 167 – 172, IEEE, 2004. (35% acceptance)

*Y. Yuan, D. Gu, W. Arbaugh, and J. Zhang, "Achieving packet-level quality of service through scheduling in multirate WLANs," in *IEEE Vehicular Technology Conference (VTC), VTC Fall 2004*, pp. 2730-2734, Sept. 2004. (1 citation) (55% acceptance)

*Nick L. Petroni Jr., Tim Fraser, *Jesus Molina, and William A. Arbaugh, "Copilot- A Coprocessor-based Kernel Runtime Integrity Monitor," in *Proceedings of the 11th USENIX Security Symposium*, pp. 179–194, August 2004. (8 citations)(12% acceptance)

*Min-ho Shin, *Arunesh Mishra, and William A. Arbaugh, "An Efficient Handoff Scheme in IEEE 802.11 using Neighbor Graphs," in *Proceedings of the Second International Conference on Mobile Systems, Applications, and Services*, pp. 70–83, June 2004. (28 citations including early tech report)(14% acceptance)

*Arunesh Mishra, *Min-ho Shin, and William A. Arbaugh, "Context Caching using Neighbor Graphs for Fast Handoffs in a Wireless Network," in *Proceedings of the 23rd Conference on Computer Communications (INFOCOM)*, pp. 351–361, March 2004. (16 citations to tech report)(18% acceptance)

*Adam Agnew, *Adam Sulmicki, Ronald Minnich, and William A. Arbaugh, "Flexibility in ROM: A Stackable Open Source BIOS," in Proceedings of the 2003 USENIX Annual Technical Conference, FREENIX Track, pp. 115-124, June 2003. (38% acceptance)

Rakesh Bobba, Laurent Eschenauer, Virgil Gligor, and William Arbaugh, "Bootstrapping Security Associations for Routing in Mobile ad-hoc Networks," in *Global Telecommunications Conference (GLOBECOM), 2003*, vol. 3, pp. 1511 – 1515. (12 citations)(36% acceptance)

*A. Khalili, J. Katz, and W. A. Arbaugh, "Toward Secure Key Distribution in Truly Ad-Hoc Networks," in *IEEE Workshop on Security and Assurance in Ad-Hoc Networks in conjunction with the 2003 International Symposium on Applications and the Internet*, pp. 342–346, IEEE Computer Society, January 2003. (23 citations)

*J. Molina and W. A. Arbaugh, "Using Independent Auditors as Intrusion Detection Systems," in *Proceedings of the Fourth International Conference on Information and Communications Security* (S. Qing, F. Bao, and J. Zhou, eds.), vol. 2513 of *LNCS*, pp. 291 – 302, 2002. (4 citations)

W. A. Arbaugh, "Active Systems Management: The Evolution of Firewalls," in *Invited paper to the Third International Workshop on Information Security Applications*, pp. 19–30, August 2002.

W. A. Arbaugh, *N. Shankar, and *J. Wang, "Your 802.11 Network has no Clothes," in *Proceedings of the First IEEE International Conference on Wireless LANs and Home Networks*, pp. 131 – 144, December 2001. (23 citations)

N. Itoi, W. A. Arbaugh, S. Pollack, and D. M. Reeves, "Personal Secure Booting," in *Proceedings of the Sixth Australian Conference on Information Security and Privacy*, pp. 130 – 144, July 2001. (13 citations)

*H. Browne, W. A. Arbaugh, J. McHugh, and W. L. Fithen, "A Trend Analysis of Exploitations," in *Proceedings of the 2001 IEEE Symposium on Security and Privacy*, pp. 214 – 229, May 2001. (29 citations)(17% acceptance rate)

W. A. Arbaugh, A. D. Keromytis, and J. M. Smith, "DHCP++: Applying an efficient implementation method for fail-stop cryptographic protocols," in *Proceedings of Global Internet (GlobeCom) '98*, pp. 59–65, November 1998. (13% acceptance)

W. A. Arbaugh, A. D. Keromytis, D. J. Farber, and J. M. Smith, "Automated Recovery in a Secure Bootstrap Process," in *Proceedings of Network and Distributed System Security Symposium*, pp. 155–167, Internet Society, March 1998. (30 citations)(20% acceptance)

W. A. Arbaugh, D. J. Farber, and J. M. Smith, "A Secure and Reliable Bootstrap Architecture," in *Proceedings 1997 IEEE Symposium on Security and Privacy*, pp. 65–71, May 1997. (114 citations)(18% acceptance)

Technical Reports, and Notes

*T. C. Clancy and W. Arbaugh, "Internet draft: Eap password authenticated exchange," May 2004.

*T. C. Clancy, *N. Petroni, and W. Arbaugh, "Internet draft: Technique for method-specific fast eap rekeying," February 2004.

W. A. Arbaugh, "The Real Risk of Digital Voting," *IEEE Computer*, vol. 37, pp. 124 – 125, December 2004.

W. A. Arbaugh, "A Patch in Nine Saves Time," *IEEE Computer*, vol. 37, pp. 82 – 83, June 2004. (2 citations)

W. A. Arbaugh, "Firewalls: An Outdated Defense," *IEEE Computer*, vol. 36, pp. 112 – 113, June 2003.

W. A. Arbaugh, "Wireless Security is Different," *IEEE Computer*, vol. 36, pp. 99 – 101, August 2003. (14 citations)

*N. Shankar and W. A. Arbaugh, "On Trust for Ubiquitous Computing," in *Invited paper in the Workshop on Security for Ubiquitous Computing, UBICOMP*, October 2002.

*Z. Yu, T. Jiang, X. Wu, and W. A. Arbaugh, "Risk Based Probablistic Routing for Ad Hoc Networks." Peer reviewed poster session at Wireless Security Workshop in conjunction with Mobicom, September 2002.

W. A. Arbaugh, "Improving the TCPA," *IEEE Computer*, vol. 35, pp. 77 – 79, August 2002. (25 citations)

W. A. Arbaugh, "Security: Technical, Social, and Legal Challenges," *IEEE Computer*, vol. 35, pp. 109 – 111, February 2002. (3 citations)

*A. Mishra and W. A. Arbaugh, "An Initial Security Analysis of the IEEE 802.1X Standard," Tech. Rep. CS-TR-4328, University of Maryland, College Park, February 2002. (71 citations)(212,547 downloads).

W. A. Arbaugh and L. van Doorn, "Special Issue on Embedded Systems Security," *IEEE Computer*, pp. 11 – 13, October 2001.

L. van Doorn, G. Ballintijn, and W. A. Arbaugh, "Design and Implementation of Signed Executables for Linux," Tech. Rep. CS-TR-4259, University of Maryland, College Park, June 2001. (13 citations)

*N. Shankar, W. A. Arbaugh, and K. Zhang, "A Transparent Key Management Scheme for Wireless LANs Using DHCP," Tech. Rep. HPL-2001-227, HP Laboratories, 2001.

R. Droms and W. Arbaugh, "Authentication for DHCP Messages." RFC 3118, June 2001. (36 citations)

W. A. Arbaugh, *Chaining Layered Integrity Checks*. PhD thesis, University of Pennsylvania, 1999. (9 citations)

Invited Talks and Presentations

Invited Conference talks

Treacherous or Trusted Computing?, Invited talk at USENIX Security Symposium, August 2005.

Ad-hoc network security: Is it a Real Problem?, Invited talk at SecureComm, Athens, *Greece*, September 2005.

The Convergence of Ubiquity, Invited talk at USENIX Annual Technical Conference, San Antonio, Texas, June, 2003.

Active Systems Management: The Evolution of Firewalls, Invited talk at the International Workshop on Information Security Applications, Jeju, *South Korea*, August 2002.

Government Presentations

Computer Security Issues

The President's Commission on Critical Infrastructure Protection, January 1997.

Director of Central Intelligence (Designate), Anthony Lake, January 1997.

Secretary of Defense, William J. Perry, November 1996.

Chairman of the Joint Chiefs of Staff, General John Shalikashvili, June 1996.

Deputy Director of Central Intelligence, George J. Tenet, May 1996.

Senator Daniel Patrick Moynihan, April 1996.

Senator Barbara A. Mikulski, April 1996.

Workshop talks

Semantic Integrity, Invited talk at the Katholieke Universiteit Leuven, *Belgium*, May 2005.

High Assurance Rootkit Detection and Respsone, talk at ARDA Workshop on next generation malware, April 2005.

UWIN: Ubiquitous Wireless Internetworking Test-bed, Invited talk at Microsoft's Mesh Networking Summit, June 2004.

Neighbor Graphs and Mobility, Invited talk at Microsoft Research, November 2003.

Comparing Secure boot with Authenticated boot, Trusted Computing: Who's in Control Panel, invited panelist, Fifth Smart Card Research and Advanced Application Conference, San Francisco, California, November 2002.

Wireless LAN Security: Problems and Solutions, half day tutorial given at the Network and Distributed System Security conference, February 2002.

Wireless LAN Security: Problems and Solutions, Short course given at SANS Network Security Conference, October 2001.

Wireless Local Area Network Security: Fact or Fiction

> COMDEX, November 2001.
>
> Mitretek, June 2001.
>
> T.J. Watson Research, IBM, June 2001.

An Inductive Chosen Plaintext Attack against WEP/WEP2, IEEE 802.11 Task Group on Security (TGi), May 2001.

Bootstrap Related Security Issues

> San Diego Supercomputer Center, University of San Diego, February 1999.
>
> Naval Post Graduate School, July 1999.
>
> Microsoft Research, July 1997.

A Secure and Reliable Bootstrap Architecture, The Platform Architecture Laboratory, Intel Corporation, June 1997.

Software Artifacts

IEEE 802.1X implementation. The first open source mplementation of the IEEE standard for authentication and access control. As a result, both the client and server portions have been used in multiple commercial products– available at `http://www.open1x.org`.

Gifts, Grants, and Contracts

Summary 2000–2005
Grants: Approximately $4,000,000
Gifts: Approximately $300,000

Mesh Network Security. Microsoft Research, $15,000 (gift)
> *July 2005.*

Wireless Wide-Area Test-bed. DoCoMo USA Laboratory, $60,000 (grant)
> *October 2004 – October 2005.*

UWIN Test-bed. Samsung Advanced Institute of Technology, $120,000 (Gift and Grant),
> *December 2004 – December 2005.*

Wireless Wide-Area Test-bed. U.S. Department of Defense Laboratory for Telecommunications Science (Joseph JaJa, PI), $390,000,
> *January 2004 – December 2004.*

Active Systems Managemant. U.S. Department of Defense Laboratory for Telecommunications Science (Joseph JaJa, PI), $250,000,
> *January 2004 – December 2004.*

WLAN Secure Roaming, Samsung Advanced Institute of Technology, $100,000 (Gift and Grant),
> *June 2003 – June 2004.*

WLAN Secure Roaming, Samsung Advanced Institute of Technology, $97,542 (Gift and Grant),
 June 2002 – June 2003.

CAREER: Active Systems Management, NSF CAREER award, $488,188,
 September 2002 – September 2007.

A Secure Wireless LAN/MAN Infrastructure Test Bed, NIST, $1,783,268,
 October 2001 – October 2005, joint with Prof. Ashok Agrawala.

Security Enchanced Booting for Operating Systesm. DARPA, $585,113,
 June 2001 – July 2003.

IBM Faculty Partnership Award. IBM Corporation, $40,000,
 June 2001.

Active Systems Managemant. U.S. Department of Defense Laboratory for Telecommunications
 Science (Joseph JaJa, PI), $250,038,
 January 2001 – December 2001.

Maryland Information Security Laboratory. IBM equipment grant (SUR), $110,000,
 December 2000.

IBM Faculty Partnership Award, IBM Corporation, $40,000,
 August 2000.

Out of Band Cryptographic Configuration Management. DARPA via University of Pennsylvania,
 $98,559,
 July 2000 – July 2001.

Honors and Awards

Louis W. Tordella Award: One of two NSA wide awards given in recognition of exceptional
 teamwork, collaboration, and success in the mission of World Class Cryptography, June 1997.

Science and Technology Award: The highest award given in the Directorate of Engineering and
 Technology for the recognition of an exceptional individual technical accomplishment, May
 1997.

Signals Intelligence Engineering Medal: An award given by the Deputy Director of Technology
 (DDT) recognizing a significant technical accomplishment by an individual. This was the
 first time that a member of the research organization received the medal, May 1996.

Honor Graduate: U.S. Army Signal (Communications) Officer Basic Course. The top three grad-
 uates out of 200 students are named an honor graduate, March 1985.

U.S. Grant Memorial Award: Given to the graduating student with the highest grade point average
 in computer science. United States Military Academy, May 1984.

Service and Teaching

Editorial Positions

Board member, IEEE Security and Privacy Magazine Editorial board, May 2003 - present.

Board member, IEEE Computer Magazine Editorial board, January 2002 - present.

Editor, IEEE Computer Magazine Information Security bi-monthly column, January 2002 - present.

Conference Discussion Panels

Panelist, Infocom, Paranoid Protocol Design for Wireless Networks, Jean-Pierre Hubaux, Ed Knightly, Adrian Perrig, Nitin Vaidya, Markus Jakobsson, March 2005.

Panelist, USENIX Security, Revisiting Trusted Computing, David Farber, Lucky Green, Leendert van Doorn, Peter Biddle, August 2003.

Panelist, Smart Card Research and Advanced Application Conference, Trusted Computing, November 2002.

Advisory Boards and Workshops

Member, Defense Advanced Research Project Agency, Information Science and Technology Study Group, 2004 - present.

ARDA Workshop, Next Generation Malware, Columbia, Maryland. April, 2005.

AAAS Workshop, AAAS Workshop on E-Voting Technologies, Washington, DC. September, 2004.

Organizer, *DIMACS Workshop on Mobile and Wireless Security*, November 3–4, 2004.
http://dimacs.rutgers.edu/Workshops/MobileWireless/

ARIB Frequency Resources Development Symposium, May 2003, Tokyo, *Japan*.
http://www.arib.or.jp/english/

DARPA Workshop, Composable High Assurance Trusted Systems #2 (CHATS2), Napa, California. November 2000.

Program Committees

Program Committee Member, USENIX Security 2006.

Program Committee Co-Chair, 2006 Network and Distributed Security Symposium.

Program Committee Member, Mobicom 2005.

Program Committee Member, Mobisys 2005.

Program Committee Member, Network and Distributed Security Symposium, 2003, 2004 Program Committees.

Program Committee Member, IEEE Security and Privacy Conference, 2002, and 2005 Program Committees.

Reviewer, IEEE Security and Privacy Conference, 2001.

Teaching

CMSC 414, Computer and Network Security, Fall 2005, 57 students.

CMSC 818A, Embedded Security Seminar class, Spring 2005, 5 students.

CMSC 311, Computer Organization, Fall 2004, 50 students.

CMSC 311, Redesign of Computer Organization syllabus, Spring 2004, two sections, est. 80 students.

CMSC 414, Computer and Network Security, Spring 2003, 42 students.

CMSC818Y, Advanced Topics in Computer and Network Security: Wireless Network Security, Spring 2002, 32 students.

CMSC414, Computer and Network Security, Fall 2001, 61 students.

CMSC414, Computer and Network Security, Spring 2001, 41 students.

CMSC818Z, Advanced Topics in Computer and Network Security, Fall 2000, 18 students.

Graduated Students

Jesus Molina, MS ECE, Jan. 2001, *Out of Band Cryptographic Audits*

Current Students

Arunesh Mishra, PhD student, defending November 11, 2005.

Nick Petroni, PhD student, proposing in Fall 2005.

Min-ho Shin, PhD student, proposing in Fall 2005.

Chuk Seng, PhD student.

Charles Clancy, PhD student, proposing October 27, 2005.

Administrative Service

Chair, Systems Field Area. Fall 2003 – Spring 2004.

Member, Graduate Program Review Committee. Spring 2002.

Member, Laboratory Committee. Fall 2000 – present.

Member, UMIACS APT Committee, Fall 2001.

Member, CS Hiring Committee, Fall 2001.

Chair, Administrative Hiring Committee, Summer 2001.

Selected Press Coverage

CBS Evening News, "Maryland voting machines," February 2004.

J. Markoff, "Flaws in Popular Wireless Standard." New York Times, April 2001.

J. Schwartz, "Security Poor in Electronic Voting Machines, Study Warns." New York Times, January 2004.

"Wireless Security." The Economist Technology Quarterly, September 2001.

All Things Considered, "Hackers help test voting machines." `http://www.npr.org/templates/story/story.php?storyId=1624506`, January 2004.

P. Connolly, "Summer smorgasbord." `http://iwsun4.infoworld.com/articles/op/xml/01/06/25/010625opsecurity.x%ml`, June 2001. InfoWorld.

P. Connolly, "Wireless security riddled with flaws." `http://www.infoworld.com/cgi-bin/fixup.pl?story=http://www.infoworld.co%m/articles/tc/xml/01/06/25/010625tcsecurity.xml\&dctag=security`, June 2001. InfoWorld.

Slashdot, "New flaws in 802.11b." `http://www.slashdot.org/articles/01/04/03/160236.shtml`, March 2001.

Slashdot, "LinuxBIOS Boots Linux, OpenBSD, Windows." `http://developers.slashdot.org/article.pl?sid=02/11/25/0331220&tid=8&ti%d=106`, November 2002.

Slashdot, "LinuxBIOS Project USENIX Paper." `http://developers.slashdot.org/article.pl?sid=03/12/10/1434210&tid=190%&tid=185&tid=8&tid=137`, December 2003.

Slashdot, "Maryland Electronic Voting Sytems Found Vulnerable." `http://yro.slashdot.org/article.pl?sid=04/01/30/1631243&tid=103&tid=126%&tid=17`, January 2004.

Arbaugh, October 2005