

WILLIAM HAROLD ENCK

PH.D. Candidate

Computer Science and Engineering ◊ The Pennsylvania State University

Office : 344 IST Building ◊ University Park, PA 16802 ◊ (814) 863-7745

email: enck@cse.psu.edu ◊ *Homepage*: <http://www.enck.org/>

EDUCATIONAL BACKGROUND

PH.D., The Pennsylvania State University, Computer Science and Engineering

(expected graduation date: May 2011)

Dissertation Topic: Mobile phone operating system security

Advisor: Dr. Patrick McDaniel

M.S., The Pennsylvania State University, Computer Science and Engineering, May 2006

Thesis Title: *Analysis of Open-Functionality in SMS-Capable Cellular Networks*

Advisor: Dr. Patrick McDaniel

B.S., The Pennsylvania State University, Computer Engineering, May 2004

With Honors and Highest Distinction

Thesis Title: *Study of Adaptive Routing Algorithms for NoC Architectures*

Thesis Supervisor: Dr. Chita R. Das

RESEARCH AND TEACHING EXPERIENCE

The Pennsylvania State University, Research Assistant, 2005-*Present*

- Investigated security of mobile phone operating systems, Funded by NSF CNS-0721579, CNS-0905447, Jun. 2007 - *Present*.
- Continued investigation and development of the PRESTO automated router configuration system, Funded by AT&T, Jan. 2006 - May 2007.
- Investigated telecommunications security, network security, and trusted computing, Jun.-Dec. 2005.

Lead Graduate Student, Systems and Internet Infrastructure Security (SIIS) Laboratory, The Pennsylvania State University, Jan. 2009 - *Aug 2010*

- Administrative and logistical lead student in the SIIS lab. Ran weekly meetings of 12+ members, met with students individually for mentoring and development of leadership and research skills. Responsible for most daily operational activities in the lab.

co-Instructor, Mobile Phone Security, The Pennsylvania State University, Jan.-May. 2009

- co-Instructor for CSE597a, a graduate seminar on mobile phone operating system security.

Instructor, Communication Networks, The Pennsylvania State University, Jun.-Aug. 2007

- Instructor for EE/CSE 458, the senior undergraduate course on computer networking.

Teaching Assistant, Microcomputer Laboratory, The Pennsylvania State University, Jan.-May. 2005

- Provided hands-on aid for CSE473, the undergraduate embedded systems development course.

INDUSTRIAL EXPERIENCE

Research Intern, Intel Labs, Seattle, WA, Summer 2009

- Developed a system-wide information flow tracking system for the Android mobile phone platform.

Research Intern, AT&T Research, Florham Park, NJ, Summer 2006

- Developed a system for massive-scale automated router configuration deployment.

Summer Intern, IBM Corp., Poughkeepsie, NY, Summer 2003

- Performed error propagation logic testing for the zSeries mainframe processor hardware caches.

Systems Administrator, Lebanon MobileFone Inc., Lebanon, PA, Summers 2000-2002 and 2004

- Administrated Web and Email servers. Designed spam detection system for the ISP. Performed corporate and residential installation of wired and wireless broadband equipment. Repaired personal computers and performed phone and on-site customer technical support.

AWARDS, HONORS, AND SCHOLARSHIPS

Graduate Research Assistant Award, Department of Computer Science and Engineering, The Pennsylvania State University, 2010.

Google Security and Product Safety Acknowledgement, 2008: in recognition of efforts in improving the security of the Google Android cellular phone operating system.

National Science Foundation (NSF) Graduate Research Fellowship, Honorable Mention, 2006.

H. Thomas and Dorothy Willits Hallowell Scholarship, The Pennsylvania State University, 2003.

Chris Mader Scholarship, The Pennsylvania State University, 2002

Lockheed Martin Engineering Scholars Award, The Pennsylvania State University, 2002

Richard A. McQuade Memorial Scholarship, The Pennsylvania State University, 2001

Student Travel Awards: USENIX Association, 2007, 2008; ACM Conference on Computer and Communications Security, 2009.

PROFESSIONAL SERVICE

Conference and Workshop Organization:

- Information Security Conference (ISC), PC Member, 2009.
- International Conference on Information Security and Assurance (ISA), PC Member, 2009.
- International Conference on Information Systems Security (ICISS), PC Member, 2007
- International Conference on Information Technology (ICIT), PC Member, 2009.
- International Conference on Internet Monitoring and Protection (ICIMP), PC Member, 2009, 2010, 2011.
- International Workshop on Security (IWSEC), PC Member, 2010.
- USENIX Security Symposium, PC Member, 2011.

Reviewer (Journal and Book): ACM Computing Surveys, 2009; ACM Transactions on Information and System Security (TISSEC), 2008; ACM Transactions on Internet Technology (TOIT), 2006, 2009, 2010; Handbook of Computer Networks, 2006; IEEE Communications Letters, 2008, 2009; IEEE Transactions on Computers, 2009; IEEE Transactions on Software Engineering, 2007, 2010; Journal of Autonomic and Trusted Computing (JoATC), 2006; Transactions on Computational Science (Springer-Verlag), 2010.

Reviewer (Conference and Workshop): ACM Computer Security Architecture Workshop (CSAW), 2008; ACM Conference on Computer and Communications Security (CCS), 2008, 2010; ACM Symposium on Access Control Models and Technology (SACMAT), 2006, 2008, 2009; Annual Computer Security Applications Conference (ACSAC), 2005, 2006, 2007, 2009 2010; European Symposium on Research in Computer

Security (ESORICS), 2005; Financial Cryptography (FC), 2007; International Conference on Availability, Reliability and Security (ARES), 2009; International Conference on Cryptology and Network Security (CANS), 2009; International Conference on Distributed Computing Systems (ICDCS), 2008; International Conference on Emerging Trends in Information and Communications Security (ETRICS), 2006; International Conference on Information Systems Security (ICISS), 2006, 2008; International World Wide Web Conference (WWW), 2010; International Workshop on Security (IWSec), 2006, 2007; IEEE Conference on Computer Communications (Infocom), 2007; IEEE Symposium on Security and Privacy (Oakland), 2007, 2008; ISOC Network and Distributed System Security Symposium (NDSS), 2007, 2009; USENIX Annual Technical Conference, 2010; USENIX Security Symposium, 2006, 2007, 2008, 2009; USENIX Workshop on Hot Topics in Security (HotSec), 2008, 2010; Workshop on Virtual Machine Security (VMSec), 2008.

BOOK CHAPTERS

1. K. Butler, William Enck, Patrick Traynor, Jennifer Plasterr, and Patrick McDaniel. Privacy Preserving Web-Based Email. *Algorithms, Architectures and Information Systems Security, Statistical Science and Interdisciplinary Research*, World Scientific Computing. November 2008. *Editor*: Bhargab Bhattacharya, Susmita Sur-Kolay, Subhas Nandy and Aditya Bagchi. (extends iciss06b)

JOURNAL PUBLICATIONS

2. Patrick Traynor, Kevin Butler, William Enck, Kevin Borders, and Patrick McDaniel, malnets: Large-Scale Malicious Networks via Compromised Wireless Access Points. *Journal of Security and Communication Networks*, 3(2):102–113, March, 2010.
3. William Enck, Machigar Ongtang, and Patrick McDaniel, Understanding Android Security. *IEEE Security & Privacy Magazine*, 7(1):50–57, January/February, 2009.
4. William Enck, Thomas Moyer, Patrick McDaniel, Subhabrata Sen, Panagiotis Sebos, Sylke Spoerel, Albert Greenberg, Yu-Wei Eric Sung, Sanjay Rao, and William Aiello, Configuration Management at Massive Scale: System Design and Experience. *IEEE Journal on Selected Areas in Communications (JSAC)*, 27(3):323–335, April, 2009. (extends ems+07)
5. Patrick Traynor, William Enck, Patrick McDaniel, and Tom La Porta, Mitigating Attacks on Open Functionality in SMS-Capable Cellular Networks. *IEEE/ACM Transactions on Networking (TON)*, 17(1), February, 2009. (extends teml06)
6. Patrick Traynor, William Enck, Patrick McDaniel, and Tom La Porta, Exploiting Open Functionality in SMS-Capable Cellular Networks. *Journal of Computer Security*, 16(6), December, 2008. (extends etml05)
7. Wesam Lootah, William Enck, and Patrick McDaniel, TARP: Ticket-based Address Resolution Protocol. *Computer Networks*, Elsevier, 51(15):4322–4337, October, 2007. (extends lem05)
8. Heesook Choi, William Enck, Jaesheung Shin, Patrick McDaniel, and Thomas F. La Porta, ASR: Anonymous and Secure Reporting of Traffic Forwarding Activity in Mobile Ad Hoc Networks. *Wireless Networks (WINET)*, ACM/Kluwer, 15(4):525–539, May, 2009. (Published online October 2007). (extends ces+05)

CONFERENCE PUBLICATIONS

9. William Enck, Peter Gilbert, Byung-gon Chun, Landon P. Cox, Jaeyeon Jung, Patrick McDaniel, and Anmol N. Sheth. TaintDroid: An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones. *Proceedings of the 9th USENIX Symposium on Operating Systems Design and Implementation (OSDI)*, October 2010. Vancouver, BC. (acceptance rate=16.1%)
10. Machigar Ongtang, Stephen McLaughlin, William Enck, and Patrick McDaniel. Semantically Rich Application-

Centric Security in Android. *Proceedings of the 25th Annual Computer Security Applications Conference (ACSAC)*, December 2009. Honolulu, HI. (**best paper**). (acceptance rate=19.0%)

11. William Enck, Machigar Ongtang, and Patrick McDaniel. On Lightweight Mobile Phone Application Certification. *Proceedings of the 16th ACM Conference on Computer and Communications Security (CCS)*, November 2009. Chicago, IL. (acceptance rate=18.4%)
12. William Enck, Patrick McDaniel, and Trent Jaeger. PinUP: Pinning User Files to Known Applications. *Proceedings of the 24th Annual Computer Security Applications Conference (ACSAC)*, December 2008. Anaheim, CA. (acceptance rate=24.3%)
13. William Enck, Kevin R. B. Butler, Thomas Richardson, Patrick McDaniel, and Adam Smith. Defending Against Attacks on Main Memory Persistence. *Proceedings of the 24th Annual Computer Security Applications Conference (ACSAC)*, December 2008. Anaheim, CA. (acceptance rate=24.3%)
14. Patrick Traynor, Kevin Butler, William Enck, and Patrick McDaniel. Realizing Massive-Scale Conditional Access Systems Through Attribute-Based Cryptosystems. *Proceedings of the 15th Annual Network & Distributed System Security Symposium*, February 2008. San Diego, CA. (acceptance rate=17.7%)
15. William Enck, Patrick McDaniel, Shubho Sen, Panagiotis Sebos, Sylke Spoerel, Albert Greenberg, Sanjay Rao, and William Aiello. Configuration Management at Massive Scale: System Design and Experience. *Proceedings of the USENIX Annual Technical Conference*, June 2007. Santa Clara, CA. (acceptance rate=23.8%)
16. Hosam Rowihy, William Enck, Patrick McDaniel, and Thomas La Porta. Limiting Sybil Attacks in Structured P2P Networks. *Proceedings of the IEEE INFOCOM'07 Minisymposium*, May 2007. Anchorage, Alaska. (acceptance rate=25%)
17. Kevin Butler, William Enck, Jennifer Plasterr, Patrick Traynor, and Patrick McDaniel. Privacy-Preserving Web-Based Email. *Proceedings of 2nd International Conference on Information Systems Security (ICISS)*, December 2006. Kolkata, India. (acceptance rate=30.4%)
18. Luke St. Clair, Lisa Johansen, William Enck, Matthew Pirretti, Patrick Traynor, Patrick McDaniel, and Trent Jaeger. Password Exhaustion: Predicting the End of Password Usefulness. *Proceedings of 2nd International Conference on Information Systems Security (ICISS)*, December 2006. Kolkata, India. (Invited).
19. Patrick Traynor, William Enck, Patrick McDaniel, and Tom La Porta. Mitigating Attacks on Open Functionality in SMS-Capable Cellular Networks. *Proceedings of the Twelfth Annual International Conference on Mobile Computing and Networking (MobiCom)*, September 2006. Los Angeles, CA. (acceptance rate=11.7%)
20. Wesam Lootah, William Enck, and Patrick McDaniel. TARP: Ticket-Based Address Resolution Protocol. *21st Annual Computer Security Applications Conference (ACSAC)*, pages 95–103, December 2005. Tuscon, AZ. (acceptance rate=19.2%)
21. William Enck, Patrick Traynor, Patrick McDaniel, and Tom La Porta. Exploiting Open Functionality in SMS-Capable Cellular Networks. *Proceedings of the 12th ACM Conference on Computer and Communications Security (CCS)*, pages 393–404, November 2005. Alexandria, VA. (acceptance rate=15.0%)
22. Heesook Choi, William Enck, Jaesheung Shin, Patrick McDaniel, and Thomas F. La Porta. Secure Reporting of Traffic Forwarding Activity in Mobile Ad Hoc Networks. *MobiQuitous 2005*, July 2005. San Diego, CA. (acceptance rate=35%)

WORKSHOP PUBLICATIONS

23. Kevin Butler, William Enck, Harri Hursti, Stephen McLaughlin, Patrick Traynor, and Patrick McDaniel. Systemic Issues in the Hart InterCivic and Premier Voting Systems: Reflections Following Project EVER-

EST. *Proceedings of the USENIX/ACCURATE Electronic Voting Technology (EVT) Workshop*, July 2008. (acceptance rate=44.1%)

24. William Enck, Sandra Rueda, Yogesh Sreenivasan, Joshua Schiffman, Luke St. Clair, Trent Jaeger, and Patrick McDaniel. Protecting Users from "Themselves". *Proceedings of the 1st ACM Computer Security Architectures Workshop*, November 2007. Alexandria, VA. (acceptance rate=30%)

TECH REPORTS

25. William Enck and Patrick McDaniel, Federated Information Flow Control for Mobile Phones. Technical Report NAS-TR-0136-2010, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, July 2010.
26. William Enck, Peter Gilbert, Byung-Gon Chun, Landon P. Cox, Jaeyeon Jung, Patrick McDaniel, and Anmol N. Sheth, TaintDroid: An Information-Flow Tracking System for Realtime Privacy Monitoring on Smartphones. Technical Report NAS-TR-0120-2010, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, February.
27. Machigar Ongtang, Stephen McLaughlin, William Enck, and Patrick McDaniel, Semantically Rich Application-Centric Security in Android. Technical Report NAS-TR-0116-2009, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, June 2009.
28. William Enck, Machigar Ongtang, and Patrick McDaniel, On Lightweight Mobile Phone App Certification. Technical Report NAS-TR-0113-2009, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, April 2009.
29. William Enck, Machigar Ongtang, and Patrick McDaniel, Mitigating Android Software Misuse Before It Happens. Technical Report NAS-TR-0094-2008, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, September 2008. Updated November 2008.
30. Kevin Butler, William Enck, Harri Hursti, Stephen McLaughlin, Patrick Traynor, and Patrick McDaniel, Systemic Issues in the and Hart InterCivic Voting System: Reflections Following Project EVEREST. Technical Report NAS-TR-0088-2008, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, April 2008.
31. Kevin Butler, William Enck, Harri Hursti, Stephen McLaughlin, Patrick Traynor, and Patrick McDaniel, Systemic Issues in the and Premier Voting System: Reflections Following Project EVEREST. Technical Report NAS-TR-0087-2008, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, April 2008.
32. William Enck, Sandra Rueda, Joshua Schiffman, Yogesh Sreenivasan, Luke St. Clair, Trent Jaeger, and Patrick McDaniel, Protecting Users From "Themselves". Technical Report NAS-TR-0073-2007, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, June 2007.
33. Patrick Traynor, Kevin Butler, William Enck, and Patrick McDaniel, Realizing Massive-Scale Conditional Access Systems Through Attribute-Based Cryptosystems. Technical Report NAS-TR-0070-2007, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, May 2007.
34. William Enck, Patrick McDaniel, and Trent Jaeger, PinUP: Pinning User Files to Known Applications . Technical Report NAS-TR-0063-2007, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, February 2007. Updated August 2008.

35. Lisa Johansen, Kevin Butler, William Enck, Patrick Traynor, and Patrick McDaniel, Grains of SANs: Building Storage Area Networks from Memory Spots. Technical Report NAS-TR-0060-2007, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, January 2007.
36. Patrick Traynor, William Enck, Patrick McDaniel, and Thomas La Porta, Mitigating Attacks on Open Functionality in SMS-Capable Networks. Technical Report NAS-TR-0051-2006, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, October 2006.
37. Patrick Traynor, Kevin Butler, William Enck, Kevin Borders, and Patrick McDaniel, *malnets: Large-Scale Malicious Networks via Compromised Wireless Access Points*. Technical Report NAS-TR-0048-2006, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, September 2006.
38. Heesook Choi, William Enck, Jaesheung Shin, Patrick McDaniel, and Tom LaPorta, ASR: Anonymous and Secure Reporting of Traffic Forwarding Activity in Mobile Ad Hoc Networks. Technical Report NAS-TR-0034-2006, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, March 2006.
39. William Enck, Kevin Butler, Thomas Richardson, and Patrick McDaniel, Securing Non-Volatile Main Memory. Technical Report NAS-TR-0029-2006, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, February 2006.
40. Luke St. Clair, Lisa Johansen, William Enck, Matthew Pirretti, Patrick Traynor, Patrick McDaniel, and Trent Jaeger, Password Exhaustion: Predicting the End of Password Usefulness. Technical Report NAS-TR-0030-2006, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, February 2006.
41. Hosam Rowaihy, William Enck, Patrick McDaniel, and Thomas La Porta, Limiting Sybil Attacks in Structured Peer-to-Peer Networks. Technical Report NAS-TR-0017-2005, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, July 2005.
42. Wesam Lootah, William Enck, and Patrick McDaniel, TARP: Ticket-Based Address Resolution Protocol. Technical Report NAS-TR-0010-2005, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, June 2005.
43. Patrick Traynor, Kevin Butler, William Enck, Jennifer Plasterr, Scott Weaver, John van Bramer, and Patrick McDaniel, Privacy-Preserving Web-Based Email. Technical Report NAS-TR-0009-2005, Network and Security Research Center, Department of Computer Science and Engineering, Pennsylvania State University, University Park, PA, USA, June 2005.
44. William Enck, Patrick Traynor, Patrick McDaniel, and Tom La Porta, Exploiting Open Functionality in SMS-Capable Cellular Networks. Technical Report NAS-TR-0007-2005, Network and Security Center, Department of Computer Science, Pennsylvania State University, May 2005.

MISCELLANEOUS

45. William Enck, 17th USENIX Security Symposium Conference Summaries. *USENIX ;login Magazine*, December 2008.
46. Patrick McDaniel, Kevin Butler, William Enck, Harri Hursti, Stephen McLaughlin, Patrick Traynor, Matt Blaze, Adam Aviv, Pavol Cerny, Sandy Clark, Eric Cronin, Gaurav Shah, Micah Sherr, Giovanni Vigna, Richard Kemmerer, David Balzarotti, Greg Banks, Marco Cova, Viktoria Felmetzger, William Robertson,

Fredrik Valeur, Joseph Lorenzo Hall, and Laura Quilter, EVEREST: Evaluation and Validation of Election-Related Equipment, Standards and Testing. December 2007.

47. William Enck, 16th USENIX Security Symposium Conference Summaries. *USENIX ;login Magazine*, December 2007.

PRESENTATIONS AND INVITED TALKS

Enhanced Security Policy Frameworks for Android

Carleton University (Ottawa, ON, CA, March 2010).

On Lightweight Mobile Phone Certification

University of Delaware (Newark, DE, March 2010), University of Notre Dame (South Bend, IN, October 2009), ACM CCS'09 (Chicago, IL, November 2008).

Lightweight Information Tracking for Mobile Phones

USENIX Security'09, Works in Progress (Montreal, QC, Canada).

Understanding Android's Security Framework

University of Washington (Seattle, WA, July 2009), Georgia Institute of Technology (Atlanta, GA, January 2009), ACM CCS'08, Tutorial Session, joint tutorial with Patrick McDaniel (Alexandria, VA, October 2008).

Defending Against Attacks on Main Memory Persistence

ACSAC'08 (Anaheim, CA, December 2008).

PinUP: Pinning User Files to Known Applications

ACSAC'08 (Anaheim, CA, December 2008), USENIX Security'08, Poster Session (San Jose, CA, August 2008).

Systematic Issues in the Hart InterCivic and Premier Voting Systems: Reflections Following Project EVEREST

USENIX EVT'08 (San Jose, CA, July 2008).

Protecting User Files by Reducing Application Access

USENIX Security'07, Works in Progress (Boston, MA, August 2007).

PRESTO: A tool for Configuration Management at a Massive Scale

USENIX ATC'07 (Santa Clara, CA, June 2007), PRESTO'07 Workshop (Princeton, NJ, May 2007).

Mitigating DoS Through Basic TPM Operations

USENIX Security'05, Works in Progress (Baltimore, MD, August 2005).