

George P. Nychis

5000 Forbes Ave
Pittsburgh, PA 15213

Phone: (xxx) xxx-xxxx
gnychis@cmu.edu
<http://www.andrew.cmu.edu/user/gnychis/>

Education

PhD. Electrical & Computer Engineering, Carnegie Mellon University, Exp. 2013. (*GPA: 3.8 / 4.0*)

M.S. Information Networking, Carnegie Mellon University, 2007. (*GPA: 3.8 / 4.0*)

B.S. Computer Science, University of Pittsburgh, 2005. *Cum Laude*

Publications

Reclaiming the White Spaces: Spectrum Efficient Coexistence with Primary Users

G. Nychis, R. Chandra, T. Moscibroda, I. Tashev, P. Steenkiste

One of three papers nominated for Best Paper Award.

Conference on emerging Networking EXperiments and Technologies (CoNEXT), 2011.

A Campus-Wide Testbed over the TV White Spaces

R. Chandra, T. Moscibroda, P. Bahl, R. Murty, G. Nychis, X. Wang

ACM SIGMOBILE Computing and Communications Review (CCR), Vol 15 Issue 3, July 2011.

Next Generation On-Chip Networks: What Kind of Congestion Control Do We Need?

G. Nychis, C. Fallin, T. Moscibroda, Onur Mutlu

HotNets, 2010.

Addressing the Networking Challenges for the Next Generation of Wireless Spectrum Access

G. Nychis

MobiSys PhD Forum, 2010, Awarded Best Presentation

Supporting Cognitive Radio Network Protocols on Software-defined Radios

G. Nychis, P. Steenkiste, and S. Seshan.

Chapter 7 in Emerging Wireless Technologies and the Future Internet, published in 2010.

Enabling MAC Protocol Implementations on Software-Defined Radios.

G. Nychis, T. Hottelier, Z. Yeng, P. Steenkiste, and S. Seshan.

Networked Systems Design and Implementation, 2009.

Rationale for a Clean Slate Radio Architecture.

R. Farrell, A. Wyglinski, C. Anderson, ... G. Nychis, et al.

Software-defined Radio Technical Conference, Invited Paper, 2008.

An Empirical Analysis of Entropy-based Traffic Anomaly Detection.

G. Nychis, V. Sekar, D. Andersen, and H. Zhang, Carnegie Mellon University.

Internet Measurement Conference, 2008.

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Honors and Awards

Demonstrated my White Space research directly to the FCC chairman Genachowski.

A finalist for the Microsoft Research Fellowship, 2010.

Awarded the Vlahakis Fellowship in Spring 2008 by the ECE Department at CMU.

Founded CGRAN, now in use by 50+ of academic institutions and industry for software-defined radio research (<https://www.cgran.org>).

Worked directly with the founders of GNU Radio and the USRP.

Selected by the University of Pittsburgh Computer Science Department to participate in the:

- National ACM Collegiate Programming Competition at CMU, Pittsburgh, PA (2004)
- Computer Science Competition at McGill University in Montreal, Canada (2004)
- Carnegie Mellon University Invitational Programming Competition, Pittsburgh, PA (2005)
- Computer Science Competition at Laval University in Quebec, Canada (2005)

Notable Work Experience

Microsoft Research

Summer, 2010

For the summer of 2010, I was a returning intern for the Networking Research Group at Microsoft Research in Redmond, WA. I worked in a team with another student on developing a high throughput, zero-loss, wireless link for the Xbox team. The wireless support must maintain these key characteristics to support a real-time application and must be resilient to several types of interference: interference from other networks (coexistence), mobility (moving the wireless receiver), and human-interference (obstructions). During the internship, **I was a key contributor in identifying novel challenges in the newest generation of WiFi: 802.11n, in supporting high-throughput and low-loss wireless links.**

Microsoft Research

Summer, 2009

For the summer of 2009, I was an intern in the Networking Research Group at Microsoft Research in Redmond, WA. **I helped develop and deploy one of the first Whitespace (WhiteFi) networks in the world on the Redmond campus.** During the summer, I was the lead-intern on the deployment of the Whitespace-driven Internet connection on the campus shuttles. While doing so, I also developed a novel system in which Whitespace transmissions can coexist in the same TV channels as wireless microphones without audibly interfering with them and produced a working demonstration. The shuttle and microphone systems that I developed with others at Microsoft Research has been demonstrated to spectrum regulators from around the world (e.g., US, India, China, Brazil, and Singapore) who have traveled to the Redmond campus. **In the summer of 2010, I helped demonstrate the systems directly to FCC Chairman Genachowski.**

Carnegie Mellon University, Research Staff

May 2007 - November, 2008

I lead the development a flexible platform for wireless MAC protocol implementations and the first contention based wireless MAC in GNU Radio and the Universal Software Radio Peripheral (USRP), the most widely used software-defined radio platform in academia. Our work introduced a novel software-defined radio architecture to support low-latency MAC protocols, increasing the bandwidth of the wireless network significantly.

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Westinghouse Research

2005-2006

Worked with an interdisciplinary group of four other students from Carnegie Mellon University to research wireless network deployment and performance within nuclear containment where the environment is considered challenging for wireless transmissions due to the equipment and large water tanks. Wireless device development and testing was done at Westinghouse's Waltz Mill research facility.

Seagate Undergraduate Research

2005

Built a prototype of a cost efficient wireless home sensor network device through hardware and firmware modifications to WAP54G Linksys access points. The prototype was later used by another group of students in a project course at Carnegie Mellon University for further research and development with Seagate.

Teaching Experience

Teaching Assistant, 18-849: Graduate Distributed System, Carnegie Mellon University, Spring 2010.
Instructed by William Nace.

Teaching Assistant, 15-441: Computer Networks, Carnegie Mellon University, Spring 2009.
Instructed by Peter Steenkiste and Bruce Maggs.

Teaching Assistant, 15-441: Computer Networks, Carnegie Mellon University, Fall 2006.
Instructed by Srinivasan Seshan and David G. Andersen.

Teaching Assistant, 18-842: Graduate Distributed Systems, Carnegie Mellon University, Spring 2007.
Instructed by Greg Ganger.

Additional Research Experience

Master's Thesis

2006-2007

Hui Zhang and David G. Andersen

Carnegie Mellon University

Discovered a strong correlation between many entropy-based network traffic metrics through a large trace analysis of CMU and Internet2 traffic. After developing an anomaly detection sensitivity analysis technique, I derived implications from the correlation found in the metrics based on the magnitude of the anomalies which has been previously unstudied.

Independent Research

2007

David G. Andersen

Carnegie Mellon University

Built the Datapository Anomaly Detection Testbed which provides a framework and storage facility to develop and test new anomaly detection methods, run current detection methods, generate synthetic attacks in to traffic, develop new attack models, label anomalies, and analyze network traffic features.

Course Research Project

2006

Peter Steenkiste

Carnegie Mellon University

Implemented and evaluated the FastPass network DDoS prevention system in true hardware by using the IXP2400 platform. The project was the first to test and evaluate DDoS prevention "network capabilities" in hardware, strengthening the plausibility of their deployment through the evaluation.

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Graduate Course Research Project 2006
Srinivasan Seshan Carnegie Mellon University
Discovered that XCP, a congestion control protocol developed for wired networks, achieves up to 200% of TCP's throughput when used in lossy wireless networks. We conjecture that XCP could achieve greater performance if adapted for wireless networks after showing its stability and fairness fail its inability to estimate wireless channel capacity.

Graduate Course Research Project 2006
Hui Zhang Carnegie Mellon University
Captured live network traffic and generated controlled traffic over a month's period in home and campus-like network environments to study the affects of time insensitive network traffic such as P2P traffic, on time sensitive traffic such as HTTP. The evaluation of the affects can be used for future development of network QOS mechanisms.

Graduate Course Research Project 2006
Greg Ganger and Tina Wong Carnegie Mellon University
Researched the ability of erasure coding to increase the scalability and performance of peer to peer disk backup systems by building the system and performing evaluation on the Emulab testbed. The project was done in conjunction with the Parallel Data Lab, which provided erasure coding libraries.

Independent Research 2005
Michael Bigrigg The University of Pittsburgh
Designed a stateless sensor network access management protocol and performed an evaluation of the protocol in the Emulab testbed. A prototype of the system is also deployed in the ICES department of Carnegie Mellon University.