

Brad ZARIKOFF

BEng, MASC, PhD, MIEEE

PERSONAL DATA

EMAIL: zarikoff@ieee.org
WEBSITE: <http://www.hamilton.ie/bzarikoff>
LINKEDIN: <http://ca.linkedin.com/in/zarikoff>

WORK EXPERIENCE

- Current** Research Fellow at HAMILTON INSTITUTE, Maynooth, Ireland
01/2010 *Research Institute*
Focused on wireless and wired networks (WiFi, WiMAX, power line) and interference management/mitigation. Collaborated with national research institutes in Dublin and Waterford through the FAME (<http://www.fame.ie>) and Futurecomm (<http://futurecomm.tssg.org>) programmes.
Developed an interference sampling technique capable of identifying interference sources to WiFi networks using commodity hardware. Modified open-source Linux drivers (MADWiFi) and created Bash scripts for test automation. Demonstrated the technique using a commodity hardware test-bed and spectral analysis.
Supported Hamilton community by chairing and organizing weekly internal seminar series. Served as lecturer for third year modulation course. Please refer to WEBSITE for list of recent publications.
- 12/2008** RF Design Engineer at VECIMA NETWORKS, Victoria, Canada
12/2009 *Wireless Radio Design*
Led design review and hands-on RF/system verification for WiMAX 5 GHz base station. Liaised with production and certification houses. Shipped units internationally for customer trials, and personally dealt with customer queries.
Spearheaded investigation into dynamic frequency selection product modification. Acted as project coordinator, organizing contributions from senior firmware developer and remote FPGA designer. Upon leaving Vecima, the DFS project was nearing the test and verification stage.
Responsibilities included meeting with component suppliers and supporting technical issues with existing WiMAX base stations in the field (1.7 GHz, 2.5 GHz).
- 09/2002** Research/Teaching Assistant in ENGINEERING, Burnaby, Canada
10/2008 *Engineering Research (MASC, PHD)*
Completed research on coordinated MIMO systems. Investigated critical implementation issue of carrier frequency synchronization for coordinated downlink beamforming. Devised low complexity synchronization techniques which permit simultaneous estimation of offsets.
Served as president of the Engineering Graduate Student Association for two years. Revamped the student common room and ran successful student/staff social events. Duties included chairing meetings, liaising with faculty and staff, and budgetary issues.
- 12/2003** Visiting Researcher at TAIT RADIO COMMUNICATIONS, Christchurch, New Zealand
05/2004 *Wireless Radio Design*
Served as an in-house technical resource for detector and equalizer design issues. Consulted with engineers on improving existing products (power utilisation) and on a new world-class 12-element MIMO system. Delivered tutorials on areas of expertise.
- 05/2002** Student Engineer at WAVECOM ELECTRONICS, Victoria, Canada
09/2002 *Wireless Radio Design (now Vecima Networks)*
Contracted to design a balanced amplifier and associated analog control circuitry for a 2.4 GHz DOCSIS base station. The amplifier design is still included in Vecima's product line-up to this date.
- 01/2001** Co-op Student Engineer at EMS TECHNOLOGIES, Ottawa, Canada
04/2001 *Satellite and Packet Data Radio Design*

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Researched, designed, and tested an RF-over-fibre link for remote antenna operation. Completed product and engineering tests on an L-band packet data terminal designed for the truck transport industry.

05/2000 Co-op Student Engineer at BC HYDRO, Burnaby, Canada

08/2000 *Instrumentation*

Designed software for data collection using Psion handheld PC. Used Visual Basic to interface with a SQL database. Tried software on-site with field engineers.

MAJOR PROJECTS

- Femtocells** In the last two years, femtocells have leaped onto the cellular market. Our work here has been influenced by the FAME project and Alcatel-Lucent's interest in femtocells. Our interest is in the RF exposure dynamics in the presence of a femtocell. We have done a number of experiments and simulations for UMTS 3G systems on the transmit power control mechanism of a cellular handset [P9].
- Interference mitigation** Building on the Hamilton's expertise in uncoordinated network dynamics, I have done significant research into the mitigation of interference caused by co-channel transmissions, primarily in WiFi and WiMAX networks. Methods include interference identification [P7], channel selection, association control, and dynamic frequency selection [P6].
- Power Line Communications** In the Fall of 2010, a colleague and I started investigating wireless interference caused by power line communication signals running through household wiring, and the associated efficiency of the power line MAC layer. A publication from this Spring details our initial experiments and development of a power line network test bed [P4], while a recent submission details our experiments in RF power line interference [P8].
- 5 GHz WiMAX Base Station** My responsibilities on this project included system integration, verification and test. Key tasks including power amplifier tuning, radio calibration, chassis design (AUTOCAD), and radio conformance testing. I was instrumental in finding key hardware bugs, and delivered a final product that meets strict IEEE specifications. I also worked on implementing dynamic frequency selection in Vecima's WiMAX platform [P5]. This involved modifications to the radio firmware (using CVS), and required utilisation of one of the onboard FPGAs for real-time power level monitoring. I designed a Visual C++ software test suite for automation purposes using an Agilent ESG signal generator.
- Coordinated Base Stations for Downlink Transmission** I chose to investigate the challenges of implementing beamformers in a coordinated multi-cell (CMC) system. CMC system benefits include increased capacity due to the additional antennas and mitigation of large-scale shadowing effects due to the independent antenna locations. Specific issues that were addressed include carrier frequency offset [P2], frequency selectivity and time selectivity, and methods to compensate for the carrier offset [P3].
- 2.4 GHz DOCSIS Power Amplifier** After graduating in 2002, I took on a 4 month contract with WAVECOM to design a 2.4 GHz amplifier for a new DOCSIS base station. My contribution included power amplifier design, analogue control circuitry, and integration with the rest of the PCB. The amplifier had a unique balanced configuration, and the base station is still featured in the companies product offerings.

EDUCATION

- 10/2008 **Doctorate in APPLIED SCIENCE**
Simon Fraser University, Burnaby, Canada
Thesis: "[Frequency Synchronization Techniques for Coordinated Multibase MIMO Wireless Communication Systems](#)"
Advisor: Prof. Jim CAVERS | GPA: 4.07/4.33
- 06/2004 **Master in APPLIED SCIENCE**
Simon Fraser University, Burnaby, Canada
Thesis: "[Investigation of an Iterative Groupwise Soft Input/Soft Output Multiuser Detection Algorithm](#)"
Advisor: Prof. Jim CAVERS | GPA: 4.00/4.33
- 04/2002 **Bachelors in ENGINEERING**
University of Victoria, Victoria, Canada

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Project title: "Digital Input Power Meter"

GPA: 7.83/9.00

HONOURS AND AWARDS

- 2011 Science Foundation Ireland (SFI) Technology Innovation Development Award (€2,500)
- 2005 - 2008 National Science and Engineering Research Council (NSERC) Post-Graduate Scholarship (\$21,000/year)
- 2005 - 2008 Simon Fraser University Graduate Fellowships (\$6,000/year)
- 2001 - 2002 National Science and Engineering Research Council (NSERC) Undergraduate Student Research Award (\$2,500/year)
- 2002 Graduated with Honours (BEng, University of Victoria)

TECHNICAL EXPERIENCE

- Hardware Analog Devices AD9352 RFIC, Motorola 68HC11/68000/56303, network analyzer, oscilloscope, routing table, vector signal generator, vector spectrum analyzer, Xilinx Virtex-II Pro FPGA and test board
- Languages Assembly, Basic, embedded C, C++, HPVee, HTML, \LaTeX , Matlab, MathCAD, SCPI, scripts (Bash, Shell), SPICE, Turbo Pascal, T-SQL, VHDL, Visual Basic, Visual C++
- Software Agilent Signal Studio, AUTOCAD Lite 12/13, MADWiFi driver, Micro-Cap, Mentor PADS, Sere-nade, Touchstone, Xilinx EDK 9.2
- Standards IEEE 802.11abegn (WiFi); IEEE 802.16d (WiMAX); UMTS, LTE, LTE-Advanced (cellular); IEEE 1901, HomePlug 1.0/AV, TIA-1113 (power line)

VOLUNTEER EXPERIENCE

- IEEE SM 2000 - M 2008
Conference submission reviewer for IEEE conference, *e.g.* Globecom 2005, IWCMC 2006, WCNC 2007, ICCS 2008, VTC Spring 2008, VTC Fall 2008, ICC 2009, WoWMoM 2010, CoNext 2011
Journal submission reviewer for: IEEE Journal on Select Areas of Communications, IEEE Transactions on Commu-nications, IEEE Transactions on Vehicular Technology, IEEE Transactions on Wireless Communications
- EAST END FOOD
CO-OP Board of Directors, Communications, 2007-2008
- SIMON FRASER
UNIVERSITY Engineering Graduate Student Association, Secretary, 2007-2008
Engineering Graduate Student Association, President, 2005-2007
Simon Fraser Student Society Engineering Graduate Representative, 2005

INTERESTS AND ACTIVITIES

Community Initiatives, Technology
Climbing, Cycling, Football, Gardening, Squash, Traveling

SELECTION OF PEER-REVIEWED PAPERS: JOURNAL AND CONFERENCE (AVAILABLE UPON REQUEST)

- [P9] **B. W. Zarikoff** and D. Malone, "Note on RF Exposure Comparison Between Macro- and Femto-cells", manuscript in preparation.
- [P8] **B. W. Zarikoff** and D. Malone, "Experiments into Radiated Interference from In-Home Power Line Communication Networks", manuscript in preparation.
- [P7] **B. W. Zarikoff** and D. J. Leith, "Measuring Pulsed Interference in 802.11 Networks," submitted to IEEE/ACM/Transactions on Networking, July 2011, <http://bit.ly/oT7VQc>.
- [P6] **B. W. Zarikoff** and D. J. Leith "Analysis of Radar Detection Probabilities in a Time Division Duplexed System," submitted to IEEE Transactions on Vehicular Technology, June 2011, <http://bit.ly/mVR04d>.
- [P5] **B. W. Zarikoff** and D. Weldon, "Detection of Pulsed Radar in a Time Division Duplexed System," IEEE 73RD Vehicular Technology Conference, May 2011.
- [P4] **B. W. Zarikoff** and D. Malone, "Construction of a PLC Test Bed for Network and Transport Layer Experiments," IEEE 15TH Int. Symp. on Power Line Communications, vol. 1, pp. 135-140, Apr. 2011.
- [P3] **B. W. Zarikoff** and J. K. Cavers, "Coordinated Multi-Cell Systems: Carrier Frequency Offset Estimation and Correction," IEEE Journal on Selected Areas in Communications, vol. 28, pp. 1490-1501, Dec. 2010.
- [P2] **B. W. Zarikoff** and J. K. Cavers, "Multiple Frequency Offset Estimation for the Downlink of Coordinated MIMO Systems," IEEE Journal on Selected Areas in Communications, vol. 26, pp. 901-912, Aug. 2008.
- [P1] **B. W. Zarikoff**, J. K. Cavers, and S. Bavarian, "An Iterative Groupwise Multiuser Detector with Soft Output for MIMO Applications," IEEE Transactions on Wireless Communications, vol. 6, pp. 443-447, Feb. 2007.

REFERENCES

Available upon request