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RESEARCH INTERESTS Computer Networks, Wireless Systems, Mobile Computing, Distributed Systems

EDUCATION

PhD in Computer Science Cornell University	September 2005
M.S. in Computer Science Cornell University	May 2003
B. Tech. in Computer Science and Engineering Indian Institute of Technology (IIT), Kharagpur, India	May 1999

DISSERTATION Title: A Virtualization Architecture for Wireless Network Cards
(Web site: <http://research.microsoft.com/en-us/um/redmond/projects/virtualwifi/>)

- VirtualWiFi shipped as a feature in Windows 7
- Software downloaded more than 150,000 times since September, 2005
- Among top 5 downloaded software ever released by Microsoft Research
- Nominated by Cornell University for the ACM Best Dissertation Award

WORK EXPERIENCE

Senior Researcher Microsoft Research	Jun 2011 – current
Researcher Microsoft Research	Aug 2005 – May 2011
Visiting Assistant Professor Cornell University	Jan – Jun 2005

AWARDS & RECOGNITION

MIT Technology Review TR35 for Top Innovators Under 35	2010
Microsoft Gold Star Award	2010
ACM SIGCOMM Best Paper Award	2009
GigaOM's Top 15 Mobile Influencers	2009
Microsoft Research Tech Transfer Award (for VirtualWiFi)	2009
ACM CoNEXT Best Paper Award	2008
Microsoft Research Graduate Fellowship	2002-2004
Renewed after review	2004-2005
Sage Fellowship at Cornell University	1999-2000
Telco Award for academic excellence at IIT, all 4 years	1995-1999
Hitachi Award for best all-round student	1995
SBI Award for all India second rank in higher secondary exam	1995

SELECTED TALKS

Invited by the FCC to present research on white spaces as input to the Broadband Plan	September, 2009
Presented research to spectrum regulators from India (TRAI, including its Chairman Dr. J. S. Sarma), China (SARFT), Brazil	2009-2010

(ANATEL), Singapore (IDA), US (including FCC Chairman Genachowski)

WINLAB Annual Review, Rutgers University December, 2010

Keynote talk, ACM DIALM-POMC Workshop September, 2010

MIT CSAIL Wireless Networks Mini-Workshop June, 2010

Keynote talk, IEEE SECON Workshop on Cognitive Radios June, 2008

MSR Cognitive Wireless Networking Summit June, 2008

Networking Seminar, UC Berkeley February, 2008

Boeing Phantom Labs November, 2007

Workloads of the Future Workshop (UC Berkeley) October, 2007

Department Colloquia (UIUC, WUSTL, U. Rochester, U. Florida, Texas A&M, U. Washington, Purdue, Wisconsin, Duke, UT Austin, CUHK, University College London) 2005-2011

**PROFESSIONAL
ACTIVITIES**

Program Committee Chair:

IEEE Secon Whitespace/Software Defined Radio Workshop 2010

IEEE Cognitive Wireless Networking Workshop (with IEEE Infocom) 2010

ACM Cognitive Radio Networking Workshop (with ACM MobiCom) 2009

Organized [MSR Cognitive Wireless Networking Summit](#) 2008
(Leading researchers from academia & industry participated in this)

Patron Chair, IEEE DySpan 2010

Steering Committee, ACM CoRoNet (with ACM MobiCom) 2010 -

In the **Program Committee** of conferences and workshops below for at least one year: 2006-2010
(ACM Mobicom, ACM SIGCOMM, ACM/USENIX MOBISYS, ACM MOBIHOC, IEEE DYSPAN, ACM HOTMOBILE, IEEE ICDCS, ACM IMC, IEEE Green Computing Conference)

Tutorial Co-Chair, ACM MOBICOM 2008

Ph.D. committees: Omid Fatemieh (UIUC), Souvik Sen (Duke), Eric Rozner (UT Austin), George Nychis (CMU)

PUBLICATIONS

1. **"FLUID: Improving Throughputs in Enterprise Wireless LANs through Flexible Channelization"**, S. Rayanchu, V. Shrivastava, S. Banerjee, R. Chandra, *Proceedings of ACM MobiCom*, September 2011
2. **"SenseLess: A Database-Driven White Spaces Network"**, R. Murty, R. Chandra, T. Moscibroda, and P. Bahl, *Proceedings of IEEE Symposium on Dynamic Spectrum Access Networks (DySpan)*, May 2011 (**Selected as one of top 3 Papers**)
3. **"Using Classification to Protect the Integrity of Spectrum Measurements in White Space Networks"**, O. Fatemieh, A. Farhadi, R. Chandra, C. Gunter. *Proceedings of ISOC Network & Distributed System Security Symposium (NDSS)*, February 2011
4. **"dFault: A fault-localization system for Internet scale applications"**, P. Prakash, R. Kompella, R. Ramasubramanian, R. Chandra. *Proceedings of ACM/IFIP/USENIX International Middleware Conference*, December 2010
5. **"Shedding Light on Enterprise Network Failures using SpotLight"**, D. John, P. Prakash, R. Kompella, R. Chandra. *Proceedings of IEEE Symposium on Reliable Distributed Systems (SRDS)*, November 2010
6. **"Low Cost and Secure Smart Meter Communications using the TV White Spaces"**, O. Fatemieh, R. Chandra, and C. Gunter, *Proceedings of IEEE International*

Symposium on Resilient Control Systems (ISRCS '10), August 2010

7. **"MAUI: Making Smartphones Last Longer with Code Offload"**, E. Cuervo, A. Balasubramanian, D. Cho, A. Wolman, S. Saroiu, R. Chandra, P. Bahl, *Proceedings of ACM MobiSys*, June 15-18, 2010
8. **"Virtual Compass: Relative Positioning to Sense Mobile Social Interactions"**, N. Banerjee, S. Agarwal, P. Bahl, R. Chandra, A. Wolman, M. Corner, *Proceedings of Pervasive*, May 17-20, 2010
9. **"Secure Collaborative Sensing for Crowdsourcing Spectrum Data in White Space Networks"**, O. Fatemeh, R. Chandra, C. A. Gunter, *Proceedings of IEEE DySPAN*, April 6-9, 2010
10. **"DirCast: A Practical and Efficient Wi-Fi Multicast System"**, R. Chandra, S. Karanth, T. Moscibroda, V. Navda, J. Padhye, R. Ramjee, L. Ravindrananth, , *Proceedings of IEEE ICNP*, October 13-16, 2009
11. **"White Space Networking with Wi-Fi like Connectivity"**, P. Bahl, R. Chandra, T. Moscibroda, R. Murty, M. Welsh, *Proceedings of ACM SIGCOMM (Best Paper Award)*, August 17-20, 2009
12. **"Change Is Hard: Adapting Dependency Graph Models For Unified Diagnosis in Wired/Wireless Networks"**, L. Ravindranath, P. Bahl, R. Chandra, D. A. Maltz, J. Padhye, P. Patel, *Proceedings of ACM WREN*, 21 August 2009
13. **"Opportunistic Use of Client Repeaters to Improve Performance of WLANs"**, P. Bahl, R. Chandra, P. Lee, V. Mishra, J. Padhye, D. Rubenstein, Y. Yu, *IEEE/ACM Transactions on Networking, Volume 17, Number 4, pp. 1160-1171*, August 2009
14. **"An Agile Radio Framework for Unmanaged Wireless Environments"**, Z. Wang, R. Chandra, T. Moscibroda, A. Gefflaut, A. de Baynast, P. Bahl, *Proceedings of ACM MobiHoc*, May 18-21, 2009
15. **"Somniloquy: Augmenting Network Interfaces to Reduce PC Energy Usage"**, Y. Agarwal, S. Hodges, R. Chandra, J. Scott, V. Bahl, R. Gupta, *Proceedings of USENIX NSDI*, April 22-24, 2009
16. **"Opportunistic Use of Client Repeaters to Improve Performance of WLANs"**, P. Bahl, R. Chandra, P. P. C. Lee, V. Misra, J. Padhye, D. Rubenstein, Y. Yu, *Proceedings of ACM CoNEXT (Best Paper Award)*, December 9-12, 2008
17. **"Load-Aware Spectrum Distribution in Wireless LANs"**, T. Moscibroda, R. Chandra, Y. Wu, S. Sengupta, P. Bahl, Y. Yuan, *Proceedings of IEEE ICNP*, October 19-22, 2008
18. **"A Case for Adapting Channel Width in Wireless Networks"**, R. Chandra, R. Mahajan, T. Moscibroda, R. Raghavendra, P. Bahl. *Proceedings of ACM SIGCOMM*, Seattle, August 17-22, 2008
19. **"What's Going On? Learning Communication Rules in Edge Networks"**, S. Kandula, R. Chandra, D. Katabi. *Proceedings of ACM SIGCOMM*, Seattle, August 17-22, 2008
20. **"Designing High Performance Enterprise Wi-Fi Networks"**, R. Murty, J. Padhye, R. Chandra, A. Wolman, B. Zill. *Proceedings of USENIX NSDI*, San Francisco, April 16-18, 2008.
21. **"Context Based Routing: Technique, Applications and Experience"**, S. M. Das, Y. Wu, R. Chandra, Y. C. Hu. *Proceedings of USENIX NSDI*, San Francisco, April 16-18, 2008.
22. **"Wi-Fi Neighborcast: Enabling Communication Among Nearby Clients"**, R. Chandra, J. Padhye, L. Ravindrananth. *Proceedings of ACM HotMobile*, Napa Valley, February 25-26, 2008
23. **"Towards Highly Reliable Enterprise Network Services via Inference of Multi-level Dependencies"**, P. Bahl, R. Chandra, A. Greenberg, S. Kandula, D. A. Maltz,

- M. Zhang. *Proceedings of ACM SIGCOMM*, Kyoto, Japan, August 27-31, 2007
24. **"Allocating Dynamic Time-Spectrum Blocks in Cognitive Radio Networks"**, Y. Yuan, P. Bahl, R. Chandra, T. Moscibroda, Y. Wu. *Proceedings of ACM MobiHoc*, Montreal, Canada, September 9-14, 2007
 25. **"Wireless Wakeups Revisited: Energy Management for VoIP Over Wi-Fi Smartphones"**, Y. Agarwal, R. Chandra, A. Wolman, P. Bahl, K. Chin, R. Gupta. *Proceedings of ACM/USENIX MobiSys*, Puerto Rico, June 11-14, 2007
 26. **"A Hardware Platform for Utilizing the TV Bands with a Wi-Fi Radio"**, S. Narlanka, R. Chandra, P. Bahl, J. I. Ferrell. *Proceedings of IEEE LANMAN*, Princeton, NJ, June 10-13, 2007 (*Invited paper*)
 27. **"KNOWS: Kognitiv Networking Over White Spaces"**, Y. Yuan, P. Bahl, R. Chandra, P. A. Chou, I. Ferrel, T. Moscibroda, S. Narlanka, Y. Wu. *Proceedings of IEEE DySpan*, Dublin, April 17-20, 2007.
 28. **"A Location-based Management System for Enterprise Wireless LANs"**, R. Chandra, J. Padhye, A. Wolman, B. Zill. *Proceedings of USENIX NSDI*, Cambridge, April 11-13, 2007.
 29. **"BeaconStuffing: Wi-Fi Without Associations"**, R. Chandra, J. Padhye, L. Ravindrananth, A. Wolman. *Proceedings of IEEE HotMobile*, Tucson, February 26-27, 2007.
 30. **"Routing with a Markovian Metric to Promote Local Mixing"**, Y. Wu, S. M. Das, R. Chandra. *Proceedings of IEEE INFOCOM Minisymposium*, Anchorage, May 6-12, 2007.
 31. **"Discovering Dependencies for Network Management"**, P. Bahl, P. Barham, R. Black, R. Chandra, M. Goldszmidt, R. Isaacs, S. Kandula, L. Li, J. MacCormick, D. A. Maltz, R. Mortier, M. Wawrzoniak, M. Zhang. *Proceedings of ACM HotNets-V*, Irvine, November 29-30, 2006.
 32. **"WiFiProfiler: Cooperative Diagnosis in Wireless LANs"**, R. Chandra, V. N. Padmanabhan and M. Zhang. *Proceedings of ACM/USENIX MobiSys*, Uppsala, June 19-22, 2006.
 33. **"Enhancing the Security of Corporate Wi-Fi Networks Using DAIR"**, P. Bahl, R. Chandra, J. Padhye, L. Ravindranath, M. Singh, A. Wolman and B. Zill. *Proceedings of ACM/USENIX MobiSys*, Uppsala, June 19-22, 2006.
 34. **"Optimizing the Placement of Integration Points in Multi-hop Wireless Networks"**, R. Chandra, L. Qiu, K. Jain and M. Mahdian. *Proceedings of IEEE ICNP*, Berlin, October 6-8, 2004
 35. **"Architecture and Techniques for Diagnosing Faults in IEEE 802.11 Infrastructure Networks"**, A. Adya, P. Bahl, R. Chandra and L. Qiu. *Proceedings of ACM Mobicom*, Philadelphia, September 26-30, 2004
 36. **"SSCH: Slotted Seeded Channel Hopping for Capacity Improvement in IEEE 802.11 Ad Hoc Networks"**, P. Bahl, R. Chandra and J. Dunagan. In *Proceedings of ACM Mobicom*, Philadelphia, September 26-30, 2004
 37. **"MultiNet: Connecting to Multiple IEEE 802.11 Networks Using a Single Wireless Card"**, R. Chandra, P. Bahl and P. Bahl. *Proceedings of IEEE Infocom*, Hong Kong, March 7-11, 2004
 38. **"Adaptive Topology Discovery Algorithm for Hybrid Wireless Networks"**, R. Chandra, C. Fetzter and K. Höglstedt. *Proceedings of 1st International Conference on Ad Hoc Networks and Wireless*, and *Journal of Informatics*, Vol. 16, September 2002, Pages: 1-16
 39. **"Providing a Bidirectional Abstraction for Unidirectional Ad Hoc Networks"**, V. Ramasubramanian, R. Chandra and D. Mossé. *Proceedings of IEEE Infocom*, New York, June 23-27 2002

SELECTED
PRESS
ARTICLES

40. "Anonymous Gossip: Improving Multicast Reliability in Mobile Ad Hoc Networks", R. Chandra, V. Ramasubramanian, K. P. Birman. *Proceedings of IEEE ICDCS*, Phoenix, April 16-19, 2001

On white spaces:

- "Wi-Fi via White Spaces", Erica Naone, MIT's Technology Review, August 18, 2009
"Microsoft Makes White-Spaces Breakthrough for Rural Broadband", Simon Juran, GigaOM, August 18, 2009
"Microsoft 'White-Fi' to solve interference worries in white space", Marguerite Reardon, CNet, August 19, 2009
"WiFi on steroids? First 'WhiteFi' prototypes hit testing stage", Nate Anderson, Ars technica, August 27, 2009
"Microsoft tests limits of powerful Internet access in 'white spaces'", Todd Bishop, TechFlash, September 15, 2010
"Taking Waves: FCC Green Lights Unlicensed Use of Wireless 'White Space' Frequencies", Larry Greenemeier, Scientific American, October 15, 2010

On Somniloquy:

- "Making Computers Talk in their Sleep", Will Knight, MIT's Technology Review, August 18, 2009
"Microsoft, UC San Diego want your PCs to talk in their sleep", Alpha Doggs, NetworkWorld, April 27, 2009 (*also featured in NetworkWorld's 20 kick-ass projects*)
"Sleep talking! PCs save energy and money", PHYSORG.com, April 24, 2009 (also on Science Daily, May 1, 2009)
"As Economy Softens, Microsoft Ramps up Research", Jeremy Kirk, PC World, May 7, 2009

On Channel Widths:

- "Microsoft develops smart wireless networks", Marie Boran, siliconrepublic.com, August 19, 2008
"Tweaking Channel Widths to Improve Wireless Communication", Rob Knies, Microsoft Research, August 19, 2008
"Microsoft Research hits the road with mobile tech", Briony Smith, ITWorldCanada, March 10, 2008

On VirtualWiFi:

- "Microsoft Tests Virtual Wi-Fi Software", Chris Preimesberger, eWeek, October 20, 2005
"Virtual Wi-Fi doubles your adapter", Peter Judge, Techworld, October 19, 2005
"Microsoft's VirtualWiFi clones your WiFi card", Paul Miller, Engadget, October 17, 2005
"Microsoft Incorporates Virtual WiFi Technology into Windows 7", John Messina, PHYSORG.com, May 18, 2009

Personal:

- "3 Indians appear in MIT's prestigious Technology Review List", Press Trust of India (PTI), August 26, 2010 (appeared in *Times of India*, *NDTV*, among others)
"Delivering high-speed wireless Internet connections over longer distances", Tom Simonite, MIT's Technology Review TR35 article

["GigaOM's Top 15 Mobile Influencers"](#), Om Malik & Stacy Higginbotham, GigaOM, September 10, 2009

["Microsoft names 5 South Asians as research fellows"](#), Indiatimes, March 4, 2004

["Microsoft Research Fellowship Awards Underwrite Academic Excellence"](#), Microsoft PressPass, February 23, 2004

INTERNSHIPS Research Fellow - Intern, Microsoft Research, Redmond May-Aug 2002, 2003, 2004
Summer Intern, AT&T Labs Research, Florham Park Jun-Aug 2001
Research Assistant at Cornell Jan-May 2001
Research Assistant at Cornell May-Aug 2000

TEACHING EXPERIENCE **INSTRUCTOR**
[CS 414/415 Systems Programming and Operating Systems](#) Spring 2005

[CS 415 Operating Systems Practicum](#) Fall 2000

[CS 414 Operating Systems](#) Summer 2000

TEACHING ASSISTANT

CS 519 Computer Networks Prof. J. Matthews Spring 2002

PATENTS More than 40 patents filed, 12 of which have been granted by the USPTO to date. Some of the granted ones are:

- US 7,876,786: Dynamic time-spectrum block allocation for cognitive radio networks (Filed: 04/02/2008, Granted: 01/25/2011)
- US 7,760,654: Using a connected wireless computer as a conduit for a disconnected wireless computer (Filed: 01/31/2005, Granted: 07/20/2010)
- US 7,751,317: Cost-aware networking over heterogeneous data channels (Filed: 01/26/2006, Granted: 07/06/2010)
- US 7,720,045: Method to enable simultaneous connections to multiple wireless networks using a single radio (Filed: 05/02/2003, Granted: 05/18/2010)
- US 7,693,939: Context-based routing in multi-hop networks (Filed: 05/07/2007, Granted: 04/06/2010)
- US 7,668,513: Platform for enterprise wireless network management applications (Filed: 06/2006, Granted: 02/23/2010)
- US 7,640,460: Detect user-perceived faults using packet traces in enterprise networks (Filed: 02/2007, Granted: 12/29/2009)
- US 7,603,460: Detecting and diagnosing performance problems in a wireless network through neighbor collaboration (Filed: 01/2005, Granted: 10/13/2009)
- US 7,516,049: Wireless Performance Analysis System (Filed: 02/2007, Granted: 04/07/2009)
- US 7,379,447: Slotted seeded channel hopping for capacity improvement in wireless networks (Filed: 09/2004, Granted: 05/27/2008)
- US 7,366,113: Adaptive topology discovery in communication networks (Filed: 06/2003, Granted: 04/29/2008)
- US 7,317,914: Collaboratively locating disconnected clients and rogue access points in a wireless network (Filed: 01/2005, Granted: 01/08/2008)