

Sayandeep Sen

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Education

PhD in Computer Sciences (2012)

University of Wisconsin-Madison, WI, U.S.A.

Research Advisor: Prof. Suman Banerjee

Thesis: Value-aware Networking for Wireless Data Delivery.

M. Tech in Computer Science and Engineering (2006)

Indian Institute of Technology Kanpur, Kanpur, India

Research Advisor: Prof. Bhaskaran Raman

Thesis: Topology Planning for Long Distance Wireless Mesh Networks.

B. Tech in Computer Science and Engineering (2004)

University of Kalyani, West Bengal, India

Research Interests

Development (protocol/ application/ algorithm), measurement and analysis of new generation mobile and wireless systems. My dissertation work involved design and prototyping of systems to enhance media (streaming video) performance over wireless networks.

Achievements & Scholarships

- Patents based on dissertation work licensed by a major wireless chip vendor.
- Best Paper award at IEEE DySpan 2012.
- Google Fellowship in Mobile Computing, one among 14 recipients in U. S./Canada (2011-2012).
- Lawrence H. Landweber NCR Fellowship in Distributed Systems, CS Dept of UW Madison (2011).
- CS summer research assistantship by the CS Dept of UW Madison (2008).
- Best Paper award at INFOCOM 2008.
- Research-I-Foundation research assistantship by CSE Dept of IIT Kanpur (Fall'06-Spring'07).

Skills

Languages: C, C++, Java, Perl, Python, Matlab

Systems Programming: Linux kernel and driver programming (network stack)

Embedded Platforms and software: Soekris, OpenWrt, WARP, GNU Radio

Employment

Member of Technical Staff, Bell Labs India, Alcatel-Lucent India (Dec'12 - Present)

- Worked on fault diagnostics and remedial for live 2G/3G deployments.

Research Assistant, WiNGS Lab, with Prof. Suman Banerjee (Aug'07 - Dec'12)

- Worked on a single link abstraction for wireless repeaters with multiple interfaces to maximize available capacity for high bandwidth applications. (**Watch Demo: <http://youtu.be/0W1Mj1T6MkY>**)
- Worked on setting up a twenty node long distance whitespace network on the UW-Madison campus. Investigating system and protocol (MAC and transport) customizations for using the testbed for vehicular access (**HOTMOBILE'13**).
- Worked on enhancing the performance of streaming media and data transfer applications over single hop wireless links, by carrying out modifications at different layers of network protocol stack (**NSDI'10, SIGCOMM'10**).
- Worked on performance characterization of urban wireless mesh networks (**IMC'08**) and cellular networks (**IMC'11**).
- Worked on design and implementation of wireless network coding algorithms (**SIGMETRICS'08**).
- Worked on design and implementation of a new disk write interface which lets the disk controller (instead of the file-system) to select locations to write. Showed the performance benefits of this concept for journaling systems. (**OSDI 2008**)

Summer Intern Bell Labs New Jersey, with Dr. Milind Buddhikot (Summer'09, Summer'10, Fall'10)

- Worked on design and implementation of cognitive whitespace femtocell system. The work involved building prototype whitespace radios nodes which operate on dual frequency bands (whitespace and licensed) and seamlessly transition between whitespace and licensed bands for predictable client performance. (**Prototype demonstrated to multiple large US & European telecom service providers. Commercialization efforts are ongoing as part of an Alcatel-Lucent internal venture, DySPAN'12 best paper**)

Summer Intern Microsoft Research Redmond, with Dr. Sanjeev Mehrotra and Jin Li (Summer'08)

- Worked on design and implementation of a UDP based reliable transport protocol to improve the delay performance of Windows remote desktop (RemoteFX) application over Wide Area Networks. (**Successfully demonstrated the performance enhancements to the Windows Remote Desktop product group.**)

Sr. Research Associate Dept. of CSE, IITK with Prof. Bhaskaran Raman (Aug'05 - May'07)

- Worked on design and development of low cost 802.11b based rural community networks. I carried out measurements for characterizing properties of the wireless medium in rural settings (**MOBICOM'06 & INFOCOM'08**).

- Worked on designing algorithms for "Planning long distance wireless mesh networks" as part of my Masters thesis. (**WWW'07**).
- Worked on understanding the social and economic aspects of a rural telephony service using VoIP, over a 802.11b link (37 Km). Also, proposed a sustainable business model for the service. (**ICTD'06**).

Publications (Available for download at: www.cs.wisc.edu/~sdsen)

1. **Whitecell: A Dual Technology Femto Cell Architecture for Robust Communication using Whitespaces**, [Sayandeep Sen](#), Tan Zhang, Milind Buddhikot, Suman Banerjee, Peter Wolniansky, Susan Walker, Dragan Samardzija, **DySpan'12**. (**BEST PAPER**)
2. **Can they hear me now?: A case for a client-assisted approach to monitoring wide-area wireless networks**, [Sayandeep Sen](#), Jongwon Yoon, Joshua Hare, Justin Ormont, Suman Banerjee, **IMC'11**.
3. **Hybrid Window and Rate Based Congestion Control for Delay Sensitive Applications**, Sanjeev Mehrotra, Jin Li, Sudipta Sengupta, Manish Jain, [Sayandeep Sen](#), **GLOBECOM'10**.
4. **Design and Implementation of an "Approximate" Communication System for Wireless Media Applications**, [Sayandeep Sen](#), Syed Gilani, Shreesha Srinath, Steve Schmitt, Suman Banerjee, **SIGCOMM'10**.
5. **Scalable WiFi Media Delivery through Adaptive Broadcasts**, [Sayandeep Sen](#), Neel Kamal Madabhushi, and Suman Banerjee, **NSDI'10**.
6. **Avoiding File System Micromanagement with Range Writes**, Ashok Anand, [Sayandeep Sen](#), Andrew Krioukov, Florentina Popovici, Aditya Akella, Andrea A. Dusseau, Remzi A. Dusseau, Suman Banerjee, **OSDI'08**.
7. **A Measurement Study of a Commercial-grade Urban WiFi Mesh**, Vladimir Brik, Shravan Rayanchu, Sharad Saha, [Sayandeep Sen](#), Vivek Shrivastava, Suman Banerjee, **IMC'08**.
8. **Loss-Aware Network Coding for Unicast Wireless Sessions: Design, Implementation, and Performance Evaluation**, Shravan Rayanchu, [Sayandeep Sen](#), Jianming Wu, Sudipta Sengupta, Suman Banerjee, **SIGMETRICS 2008**.
9. **On the Feasibility of the Link Abstraction in (Rural) Mesh Networks**, Dattatraya Gokhale, [Sayandeep Sen](#), Kameswari Chebrolu, Bhaskaran Raman, **INFOCOM 2008**. (**BEST PAPER**)
10. **Long Distance Wireless Mesh Network Planning: Problem Formulation and Solution**, [Sayandeep Sen](#), Bhaskaran Raman, **WWW 2007**.
11. **Long-Distance 802.11b Links: Performance Measurements and Experience**, Kameswari Chebrolu, Bhaskaran Raman, [Sayandeep Sen](#), **MOBICOM 2006**.
12. **Rural Telephony: A Socio-Economic Case Study**, [Sayandeep Sen](#), Sukant Kole, and Bhaskaran Raman, **ICTD 2006**.

Journal

1. **Design and Implementation of an "Approximate" Communication System for Wireless Media Applications**, Sayandeep Sen, Tan Zhang, Syed Gilani, Shreesha Srinath, Steve Schmitt, Suman Banerjee, **IEEE/ACM Transactions on Networking** **12**. (Extended version of the SIGCOMM 2010 paper.)
2. **On the feasibility of the link abstraction in wireless mesh networks**, Bhaskaran Raman, Kameswari Chebrolu, Dattatraya Gokhale, Sayandeep Sen, April 2009, Vol. 17 (2), **IEEE/ACM Transactions on Networking**. (Extended version of the INFOCOM 2008 paper.)

Workshop, Posters, Demos

1. **Video Streaming Using Whitespace Spectrum for Vehicular Applications**, Tan Zhang, Sayandeep Sen, Suman Banerjee, **MobiSys'13**.
2. **Scout: An Asymmetric Vehicular Network Design over TV Whitespaces**, Tan Zhang, Sayandeep Sen, Suman Banerjee, **HotMobile'13**.
3. **Exploiting "Approximate Communication" for Mobile Media Applications**, Sayandeep Sen, Stephen Schmitt, Mason Donahue, Suman Banerjee, **HotMobile'09**.
4. **Exploiting "Approximate Communication" for Wireless Media Applications**, Sayandeep Sen, Stephen Schmitt, Mason Donahue, Suman Banerjee, Poster in **MOBICOM'08**
5. **Effect of Height (Fresnel Clearance) on Signal Strength and Throughput for Medium and Long Distance Wireless Links**, Madhuresh Agrawal, Sayandeep Sen. Poster in **WISARD'07, COMSWARE 2007**

Patents

1. System to characterize performance of wireless networks from a client perspective with a small amount of measurements. (*To be filed*)
2. USPTO App. No. 20110176590 - Wireless communication system mapping data bits to symbol bit positions according to error rates of those bit positions and data content.
3. USPTO App. No. 20110176596 - Wireless communication system controlling transmission parameters of data units according to data usefulness.
4. USPTO App. No. 20100195488 - Optimized transport protocol for delay-sensitive data.

Professional Activities

Program Committee: PhD Forum (MobiSys'09 workshop), IEEE SECON 2012, IEEE SECON 2013, IEEE ICDCN 2014

External Reviewer: INFOCOM (2009, 2011), MobiCom 2010, Comsnets 2010, NSDI 2011, ACM CCR, IEEE TMC, IEEE TON, IEEE TPDS, *MC²R*