

MSRI Summer School of Networking - An Informal Discussion

<http://research.microsoft.com/en-us/events/indiasummerschool2009/default.aspx>

IITB CSE Attendees

Students - Akshat Saxena, Manan Shah, Prashima Sharma, Ramesh Gopalakrishnan, Rijurekha Sen, Sujesha Sudevalayam, Vaibhao Tatte, Vishal Sevani

Faculty - Bhaskaran Raman, Kameswari Chebrolu, Purushottam Kulkarni, Sridhar Iyer

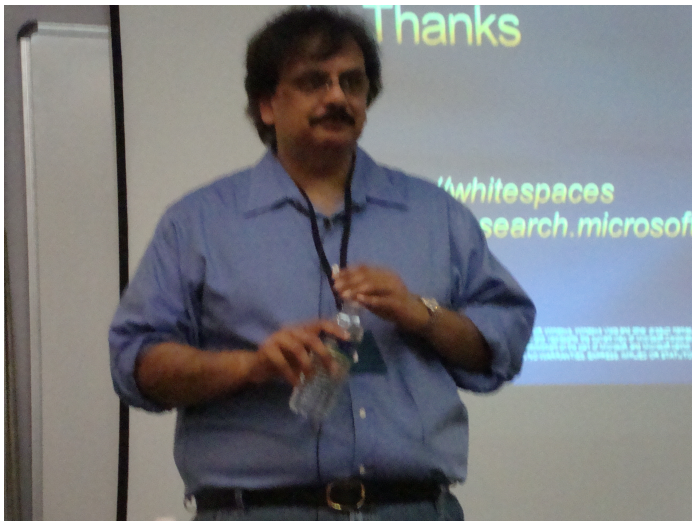
- Venkat Padmanabhan (MSRI)
 - Naming
 - Routing basics
 - End-to-End transport
 - Middleboxes and Overlays
- Ramchandran Ramjee (MSRI) - Wireless basics
- R.Sundaresan (IISC) - Physical layer

Teachers and Syllabus contd.

- Vern Paxson (Berkeley)- Internet Security
 - Network Intrusion system (Bro)
 - Scanners
 - Botnets
- Bhaskar Ramamurthy (IIT Chennai)- Physical layer in 4G
 - Orthogonalization of spectrum resources (CDMA & OFDMA)
 - OFDMA 4G technologies
 - System simulation
- Anthony Rowstron (MSR Cambridge) - Overlay Networks
 - Overlays (Structured and unstructured)
 - Content dissemination
 - Virtual ring routing (Underlay)
 - Physical versus virtual topology
- George Varghese (UCSD) - Network algorithmics
 - Network algorithms, introduction
 - Models
 - Principles and problems

Teachers and Syllabus contd.

- Jennifer Rexford (Princeton)
 - Internet routing
 - BGP
 - Interdomain routing security
 - BGP routing convergence
- Anurag Kumar (IISC)
 - Basics of discrete event stochastic processes
 - Stochastic models of wireless LANs
- Victor Bahl (MSR Redmond)
 - Wireless mesh network
 - Wireless network management
 - White space networking
- Balaji Prabhakar (Stanford)
 - Congestion management in data centers
 - A new approach to solve congestion problem



Balaji Prabhakar and Jennifer Rexford



WLAN Manager - A demo shown by EE students of IISC

Objective

WM is aimed to accomplish a set of performance objectives over WLANs. These include seamless mobility, policy based QoS and Call admission control

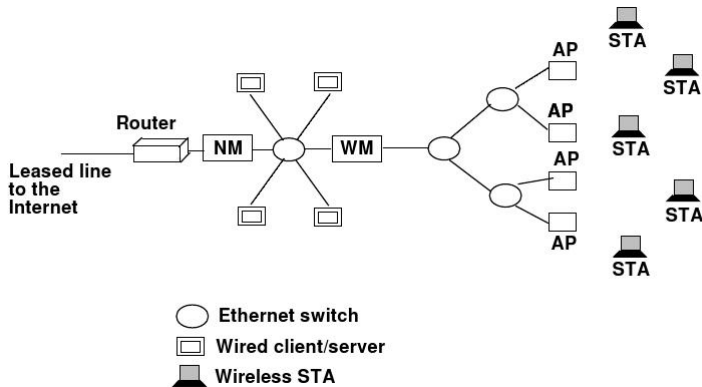


Figure: http://ece.iisc.ernet.in/network_labs/frames/wm.htm

Seamless Mobility

- 1 Useful when station moves frequently from one AP to another and uses voice calls
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Call Admission Control and QoS

- 1 Present APs have single buffer/queue for upload/download traffic
- 2 This virtually divides the traffic into different queues by acquiring queue control from AP
- 3 This shields one kind of traffic from another

For further readings, refer http://ece.iisc.ernet.in/network_labs/frames/wm.htm

Four points to remember while writing paper

- **Great problem** - meets a need
- **Intelligent solution** - should be ingenious, try to exploit own strength
- **Standard evaluation** - never be ingenious, be very thorough, question *good results* as well as *bad results*
- **Great writing** - practise, read good papers, document everything you do

Let's be thorough and honest with our work !!

*Victor Bahl said TPC's also accept papers that describe **failed systems**, if authors have been able to explain the failure, prove their thoroughness and documented the lessons learnt.*

Simulators, Emulators, Data traces

- Linux Kernel (within OS)
- NetFPGA (hardware for networking)
- Emulab ModelNet (Distributed system emulation)
- PlanetLab (Distributed System non emulation)
- Qualnet, Opnet, NS-2, Exata (wired or wireless simulator)
- OrbitLab (wireless)
- CAIDA (BGP routing table dumps)

Hot areas of research

- Data centers (energy management, heat profiling using sensors, network architecture, seamless replication of data)
- Home networks (interoperability, diagnosis)
- Network management (systematic WLAN design, David Kuhler)
- Cloud computing (Amazon)
- Multicore (Robert Morris)
- Virtualization
- Power Consciousness
- Emerging Markets
- Active networks (P.R.Kumar)

Hot areas of research contd.

- Social networking (infrastructure, measurement study)
- Mobile systems (Killer apps, privacy)
- Cognitive radio (white space)
- BGP routing (Pathlet routing, clean slate design like HLP, routing virtualization)
- Wireless interference cancellation, conflict graph calculation
- Protocol formalism
- Economic model for profit for IT companies (flat rate, usage based, ad based)

Questions for faculty

How do you choose our PhD problems and MTP topics? Are they hot? Is there any common research goal or vision in SYNERG?

- **Networks** - Sigcomm, NSDI(some system building), Infocomm, Conext
- **Mobile Communication** - Mobicomm, Mobisys
- **Performance** - Sigmetrics
- **Measurements** - Internet Measurement Conference(IMC)
- **Systems** - SOSP, OSDI, Eurosys, IMC
- **Sensors** - Sensys

Some generic *gyan*

- “Whatever might be your PhD research area or problem, give more stress on building up your skill set (analytical, statistical, algorithmic, programming) in these four-five years. Only that will come to use in future.” - Anurag Kumar
- “Read technical magazines and blogs along with papers. These show the trends in where technology is moving.” - George Varghese
- “Search for existing solutions exhaustively, even beyond your own research area. For e.g. regular expression matching in compilers and virus signature matching in network security, machine learning and anomaly detection in network security involve similar solutions. Be free to borrow ideas.” - Vern Paxson

A concern expressed by Dr. P Anandan, Managing Director, Microsoft Research India

1-2 lac students are CS/IT graduates, 2-3k are CS/IT Masters but only 60-70 are PhDs. This makes research in India suffer. What might be the reasons for this?

Extra curricular activities



- MSRI lab visit
- M G Road (Blossoms, MacD)
- City trip
- Relatives in bangalore visited

Learnt a lot and had lots of fun !!!

Before thanking you

Resources

- These slides are available at <http://www.cse.iitb.ac.in/synerg/doku.php?id=start>
- Hard copies of lecture notes/slides will be kept at circular hall. Borrow for reading and please do return.
- Visit <http://research.microsoft.com/en-us/collaboration/global/india/default.aspx> to get information on MSRI's external research programs. There are options for collaborative research, internships, travel grants, PhD fellowships etc. .
- SIGCOMM 2010 to be held in New Delhi, India. Visit <http://conferences.sigcomm.org/sigcomm/2010/> for updates. There will be concessions for student registration and options for volunteering.

Todo List

- Resuming the SYNERG reading group.
- Keep the SYNERG wiki updated with upcoming conference lists and important deadlines.

Thank You