

Curriculum Vitae

HEMANT KUMAR RATH

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Career Objective

My objective is to join an organization which can recognize and value my technical/research base and extensive experience with various organizations. I can contribute to the overall growth of an organization through my technical and organizational skills. Intensive research and leadership qualities are my positive attributes.

Summary

- Expertise in Network Planning, Design and Optimization
- Hands on Experience in Network Protocols
- Extensive Research Background in Wired and Wireless Networks, Speech Processing
- Extensive Programming using **Matlab, Scilab, NS2 and Qualnet**

Areas of Interests

- Wireless and Wired Network Design, Cross-layer Network Design,
 - Optimization in Communication Networks, Performance Analysis of Networks
 - Ethernet in First Mile, QoS in Internet, Speech Processing
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Academics

PhD, Communication Engineering, Dept. of Electrical Engineering, IIT Bombay, CPI: 9.79/10, (Expt. Month of Graduation: Aug, – 2009)

MTech, Communication Engineering, Dept. of Electrical Engineering, IIT Bombay, CPI: 9.37/10, 2004

BE, Electronics & Telecommunications Engineering, UCE Burla, Sambalpur, Orissa, 75.22% (Hons.), 1997

PhD Thesis Title: Cross-layer based Resource Allocation in Wireless Networks

Thesis Supervisor: Prof. Abhay Karandikar, Dept. of Electrical Engg. IIT Bombay

Abstract: *To provide Quality of Service (QoS) to users in wireless networks, one needs to allocate its resources like transmission power, bandwidth and transmission opportunities in an efficient and fair manner. The resource allocation can be of centralized or distributed in nature. In that direction, we first propose a joint congestion and power control mechanism to control congestion and to optimize transmission power. We formulate the congestion control problem as an optimization problem, in which nodes are feedback with congestion and energy cost of the link. It is a cross-layer technique involving PHY, MAC and TCP layers and is distributed in nature. In the second part, we propose centralized polling based uplink scheduling schemes for various class of traffic with hard delay bound in a multipoint-to-point IEEE 802.16-based network. We use credit based approach to ensure fairness among the users. Further, we extend the credit based approach to schedule TCP-based applications in the uplink of a multipoint-to-point IEEE 802.16-based network. We consider window size, TCP timeout of TCP layer and channel characteristics of PHY layer to perform scheduling at the MAC layer. It is also a cross-layer implementation involving PHY, MAC and TCP layers.*

MTech Project Title: Design of Metro Ethernet Customer Edge using Virtual LAN (VLAN)

Project Guide: Prof. Abhay Karandikar, Dept. of Electrical Engg. IIT Bombay

Abstract: *In this project, we have designed a Metro Ethernet Customer Edge (CE) using Virtual LAN (VLAN), used for Virtual Private Wired Services (VPWS) and Virtual Private LAN Services (VPLS). We have implemented Generic Attribute Registration Protocol (GARP)/ GARP VLAN Registration Protocol (GVRP) to dynamically assign VLANs in a uClinux-based Embedded Platform at CE. Further, we have implemented the signaling schemes between Provider Edge (PE) and CE, and encapsulation techniques for both PE and CE bound traffic.*

BE Project Title: Computation of Weak Visibility Polygon from a Continuous Convex curve

Project Guide: Prof. Amiya Ranjan Satapathy, Dept. of EI & TCE, UCE Burla

Important Publications

- H. K. Rath, A. Karandikar and V. Sharma, "Adaptive Modulation-based TCP-Aware Uplink Scheduling in IEEE 802.16 Networks", *IEEE ICC*, Beijing, China, May - 2008

- H. K. Rath and A. Karandikar, "On TCP-Aware Uplink Scheduling in IEEE 802.16 Networks", 3rd *IEEE COMSWARE*, Bangalore, Jan - 2008
- H. K. Rath, A. Bhorkar, V. Sharma, "An Opportunistic Uplink Scheduling Scheme to Achieve Bandwidth Fairness and Delay for Multiclass Traffic in Wi-Max (IEEE 802.16) Broadband Wireless Networks", *IEEE Globecom*, San Francisco, Nov-Dec, 2006
- H. K. Rath, A. Karandikar, "On Cross Layer Congestion Control for CDMA based Ad-hoc Networks", 14th *National Conference on Communication (NCC)*, IIT Bombay, Feb - 2008
- H. K. Rath, A. Sahoo, A. Karandikar, "A Cross Layer Congestion Control Algorithm in Wireless Networks for TCP Reno-2", 12th *NCC*, IIT Delhi, Jan - 2006
- H. K. Rath, S. N. Mishra, S. K. Sahoo, A. R. Satapathy, "Computation of weak visibility polygon from a continuous convex curve", 8th *National Seminar on Theoretical Computer Science (NSTCS)*, Jun - 1998

Papers Submitted

- H. K. Rath, A. Karandikar and V. Sharma, "Fair Uplink Scheduling Schemes with Soft Delay Guarantee in IEEE 802.16 Networks" (Manuscript under submission to *IEEE Transactions on Wireless Communications*)
- H. K. Rath, A. Karandikar and V. Sharma, "Uplink Scheduling Schemes with Strict Delay Guarantee in IEEE 802.16 Networks" (Manuscript under submission to *IEEE Transactions on Wireless Communications*)
- H. K. Rath, A. Karandikar, Atul.Amdekar, Naveen.Pendyala, "Performance Analysis of an IEEE 802.16-deployed Network using live Experiments" (Manuscript under Submission)

Other Projects Handled/Implemented

- Conducted Extensive Experiments on an IEEE 802.16-deployed Network (both on live networks and test-bed)
- Implemented "Power Control in Wireless Ad-hoc Networks" in NS2 Simulator
- Implemented "Transmission Control Protocol (TCP)" in Matlab for experiments on Cross-layer networks
- Implemented the basic **Functional Modules of the MAC layer of IEEE 802.16** in Qualnet
- Designed and Developed **B-Hive: The Cell Planning Tool** for GSM/CDMA Mobile Networks (under the guidance of Prof. Abhay Karandikar), Electrical Engg., IIT Bombay
- Implemented Protocols like **RIP, BGP, OSPF, CBQ and DNS** in Linux based Networks to study QoS in Internet.
- Designed and Developed **CEERI SPEECH PROCESSOR** (A semi-automatic labelling software tool developed using Visual Basic and C++ for Hindi speech, used for training in Hindi speech recognition), CEERI, New Delhi.

Work Experience

Consultant, DA-IICT, Gandhinagar, Jun - Jul 2003

- Research in Metro Ethernet, Campus Network Design

Associate Manager, Ushamartin Academy of Communication Technology, IIT Madras, Feb 2000 – Jul 2002

- Research in Speech Signal Analysis, Adaptive Multi Rate Coding using Scilab and Matlab
- Simulation/Implementation of Various Protocols like RIP, BGP, OSPF, DNS, HTTP to study QoS in Internet
- Design of New Research Labs (Digital Communication, Networking, Speech Processing)

Scientist, Central Electronics Engg. Research Institute (CEERI), New Delhi, Feb 1998 - Jan 2000

- Research on Development of Speech Data-Base in Hindi, Speech Ineligibility Enhancement by Synthesis,
- PC based Speech Analyser. Developed CSP: CEERI SPEECH PROCESSOR
- Research and Development of Text to Speech Conversion in Hindi

Visiting Lecturer, Sambalpur University, Jyoti Vihar, Burla, Orissa, Oct 1997 - Jan 1998

- Teaching 7th Semester BE, 2nd Semester MCA and PGDCA Students (Digital Circuits and Control Systems)

Invited Talks

- On "Network Modeling using NS2 and Trouble shooting in NS2", National Workshop on NS2, Charotar Institute of Technology Changa, Gujarat, India, Mar - 2009
- "On CDMA and WCDMA", Lokamanya Tilak College of Engg, Mumbai, DST/AICTE Sponsored Short Term Training Programme on Recent Trends In Wireless Communication, Jun - 2008
- "Securities in IEEE 802.16 based Networks", SecNet'07, Platinum Jubilee Seminar on Network Security, Air Force Technical College, Bangalore, Sept - 2007
- "Scheduling in WiMAX Networks", Comnet 2007, 1st Annual Meet of RSs of IITs and IISC, IIT Bombay, Jul - 2007

