Curriculum Vitae

HEMANT KUMAR RATH

LB-190, Stage-2, (Behind High School) Laxmisagar	Mob: +91-9040177410, +91-9969506749
Bhubaneswar, Orissa, India	Email: *hemantrath@gmail.com, hemantr@ee.iitb.ac.in*

Current Position

Associate Professor

School of Electronics., KIIT University, Bhubaneswar, India (July 2009 onwards)

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

Academics

PhD, Communication Engg., Dept. of Electrical Engineering, IIT Bombay, CPI: 9.79/10, Feb 2010
MTech, Communication Engg., Dept. of Electrical Engineering, IIT Bombay, CPI: 9.37/10, 2004
BE, Electronics & Telecommunications Engg., UCE Burla, Sambalpur, Orissa, 75.22% (Hons.), 1997

PhD Thesis: *On Channel and Transport Layer aware Scheduling and Congestion Control in Wireless Networks*
Thesis Supervisor: Prof. Abhay Karandikar, Dept. of Electrical Engg. IIT Bombay

Abstract: In this thesis, we consider resource allocation schemes for *infrastructure-based multipoint-to-point wireless networks like IEEE 802.16 networks* and *infrastructure-less ad-hoc networks*. In the multipoint-to-point networks, we propose channel and Transport layer aware uplink scheduling schemes for both *real-time* and *best effort* services, whereas in ad-hoc networks, we propose channel aware congestion control schemes for best effort services. We also evaluate the performance of IEEE 802.16 networks by conducting various experiments in the current deployed IEEE 802.16 networks of a leading telecom operator in India. The results of our experiments motivate us to further investigate scheduling schemes specific to real-time and best effort services.

MTech Project: 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: Computation of Weak Visibility Polygon from a Continuous Convex curve
Project Guide: Prof. Amiya Ranjan Satapathy, Dept. of El & TCE, UCE Burla

Work Experience

Associate Professor, **School of Electronics, KIIT University, Bhubaneswar, July 2009 onwards**
- Teaching UG and PG Students
- Conducting Lab Classes
- Conducting/Evaluating Students' Seminars
- Guiding Final Year BTech Project (2 Groups)
- Independent Research on Scheduling in WiMAX Networks

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,
- Developed CSP: CEERI SPEECH PROCESSOR (A Computer based Speech Analyser)
- 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 Students (Digital Signal Processing)
- Teaching 2nd Semester MCA and PGDCA Students (Digital Circuits & Control Systems)

Papers Published

- 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
- Hemant Kumar Rath, Abhijeet Bhorkar, Vishal Sharma, "*An Opportunistic DRR (O-DRR) Uplink Scheduling Scheme for IEEE 802.16-based Broadband Wireless Networks*", IETE, International Conference on Next Generation Networks (ICNGN), February 9, 2006, Mumbai
- 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
- Harish Ramamurthy, Hemant Kumar Rath, Atit Jain, P Madhusoodhanan and Abhay Karandikar, "*B-Hive: A Cell Planning Tool for Urban Wireless Networks*", AIM - 2003, June 2003, IIT Bombay, Mumbai (Poster Presentation)
- A S S Sarma, R. Verma, Hemant Kumar Rath, A K Dhamija, S S Agrawal, "*Development of Hindi Speech Data Base for Research in Speech Recognition and Analysis*", 30th IETE Midterm Symposium, Pilani, 3-4 April, 1999.
- A S S Sarma, Hemant Kumar Rath, Amita Dev, A K Dhamija, S S Agrawal, "*Data Base for Hindi*", IRIL-99, Hydrabad.

- 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 under Submission/Review

Journals

- H. K. Rath, A. Karandikar and V. Sharma, *" Deadline-based Fair Uplink Scheduling in IEEE 802.16 Networks"* (Manuscript under submission to IEEE Transactions on Wireless Communications)
- H. K. Rath, A. Karandikar and V. Sharma, *TCP-aware Uplink Scheduling 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 TCP and UDP based Applications in a IEEE 802.16 deployed Network",* (Manuscript under Submission)

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 labeling software tool developed using Visual Basic and C++ for Hindi speech, used for training in Hindi speech recognition), CEERI, New Delhi.

Invited Talks

- "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
- "Resource Allocation in Wireless Ad-Hoc Networks: A Cross Layer Approach", 1st IIT Bombay-IIT Madras Communications Workshop, IIT Madras, Jul - 2006
- "On TCP/IP", ISTE Workshop, Somaya Engg College, Mumbai, May – 2005

Tutorials/Workshops Conducted

- On "Network Modeling using NS2 and Trouble shooting in NS2", National Workshop on NS2, Charotar Institute of Technology Changa, Gujarat, India, Mar – 2009 (*10 Hours Interactive Talk + Demo*)
- "On WCDMA", DigiBee Microsystems Inc, Bangalore, 16th and 17th Aug – 2006 (*12 Hours Interactive Talk*)

Teaching Assistantship at IIT Bombay

- EE 764 (Wireless and Mobile Communications) for the year 2003-04, 2005-06, 2006-07
- EE 706 (Communication Networks) for the year 2006-07, 2007-08
- EE 703 (Digital Message Transmissions) for the year 2006-07
- EE 403 (Digital Signal Processing) for the year 2004-05, 2005-06
- EE 004 (Electronics) for the year 2004-05

Teaching Experiences

At the Undergraduate Level:
- Telecom Switching Networks and Protocols (7th Sem BTech, KIIT University, July 2009)
- Wireless and Mobile Communications (8th Sem BTech, KIIT University, Dec 2009)
- Control Systems, Digital Signal Processing (7th Sem, BE, UCE Burla, Sept 1997)
- Digital Circuits, Comp Organizations (2nd Sem PGDCA/MCA, Sambalpur University, Sept 1997)

At the PG Level:
- Telecom Switching and Networks (2nd Sem MTech, KIIT University, Jan 2010)
- Communication Networks, Speech Signal Processing (UACT, IIT Madras, 2001-02)

Laboratory (UG/PG Level)
- Communication Engineering (5th Sem BTech, KIIT University, July 2009)
- Digital Electronics (3rd Sem Btech, KIIT University)
- Networking Lab, Communication Lab (UACT, IIT Madras 2001-02)

Computer Skills

- Operating Systems   Linux, Windows (97, 2000), **RTLinux**
- Languages   **C/C++, Visual C++, Visual Basic**, FORTRAN, HTML
- Software Packages   **Matlab, Scilab, NS-2, Qualnet, Opnet, Omnet**++, Latex, Microsoft Office

Professional Activities

- Advisor, ISTE Student Chapter, KIIT University, Bhubaneswar
- Member, Technical Program Committee, IEEE International Workshop on Unified Communication Networks and services for Nomads (UCNSN), St. Petersburg, Russia, October 12 - 14, 2009
- Reviewer, EURASIP Journal on Wireless Communications and Networking, 2008
- Reviewer, IEEE Globecom, 2007, 2008, 2009
- Reviewer, IEEE International Conference on Communications (ICC 2009)
- Reviewer, 27th IEEE International Performance Computing and Communications Conference (IPCCC 2008)
- Reviewer, IEEE International Conference on Circuits and Systems for Communications (ICCSC 2008)
- Reviewer 10th International Symposium on Wireless Personal Multimedia Communications (WPMPC 2007)
- Reviewer, National Conference on Communications (NCC), 2004, 2005, 2006, 2007
- Member, IARCS (Indian Association for Research in Computing Sciences) since 1997- till date.
- Member IEEE (Institute of Electrical & Electronics Engineers), IEEE COMSOC (Communication Society), 2005 – till date.

Awards and Prizes Received

- Awarded **Person of the Year**, by Research Scholars' Forum (RSF) IIT Bombay (2007-08)
- Awarded **Institute Citation**, IIT Bombay (2007-2008)
- **Philips India Research Fellowship**, IIT Bombay (2007-08)
- Among top 5, Eureka-2004: India's Biggest Business Plan Competition, IIT Bombay
- 3rd prize in "Ideaz: The Business Idea Competition", IIT Bombay (2003-04)
- **Commonwealth Scholarship Fellowship Plan** for the year 2000 (UK) by Min. of HRD, Govt. of India
- Merit-cum-mean Scholarship, UCE, Burla (1993-97)
- National Scholarship (1990-97)
- Selected in INMO (Indian National Mathematics Olympiad, State Level) - 1990
- National Rural Talent Scholarship: **Stood First** (1987-90)

Other Activities

- Member, **Strategic Vision Committee**, IIT Bombay (2007-09)
- Student Adviser, RSF, IIT Bombay (2008 -09)
- **Coordinator, Research Scholars' Forum (RSF)**, IIT Bombay (2007-08)
- Warden's Nominee, Hostel -12, IIT Bombay (2007-08)
- Overall Student Coordinator, 14th National Conference on Communications, IIT Bombay, 01-03 Feb - 2008
- Contributed to McKinsey's Golden Jubilee vision book writing for IIT Bombay, 2007
- Coordinator, COMNET (Communications and Networking Group of all IITs and IISc, 2006-08), IIT Bombay
- **Coordinator and Sys-ad of Research Scholars' facilities**, Department of Electrical Engineering (2005-till-date)

Interests and Hobbies

- Reading and writing Socio-political and Non-Fictional Essays
- Regular Blogs writing: *aamjunta*
- Involved in social upliftment programmes

References

Will be provided on request

Hemant Kumar Rath
Bhubanweswar