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## **Report of the 1st IITM-IITB Communications Research Workshop**

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### **Objective:**

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The 1st IITM-IITB Communications Research Workshop was held in the Dept. of Electrical Engineering, Indian Institute of Technology - Madras, Chennai, from 3rd to 5th July 2006. The workshop consisted of talks on recent research by faculty and research scholars of both IITs, with an ultimate aim to identify 2-3 joint projects.

### **Participants from IIT-Bombay:**

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Ashutosh Deepak Gore  
Hemant Kumar Rath  
Bhushan Jagyasi

### **Participants from IIT-Madras:**

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Prof. K. Giridhar  
Prof. Srikrishna Bhashyam  
Prof. Bhaskar Ramamurthy  
Prof. Devendra Jalihal  
Prof. Andrew Thangaraj  
Prof. David Koilpillai  
R. Laxminarayanan  
S. Sendil Kumar  
Nagarajan (Media Labs Asia)  
Raghavendra  
V. Muralidharan  
Rohit Budhiraja (Midas Communications)  
Bala (Midas Communications)  
K.V. Srinivas  
T.R. Ramya  
Nandita  
Bama

### **Technical Program:**

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Monday, 3rd July 2006

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*(Morning session)*

TeNeT / IITM Research Overview - Prof. K. Giridhar, IIT-Madras

High Spatial Reuse Link Scheduling Algorithms for STDMA Wireless Ad Hoc Networks  
- Ashutosh D. Gore, IIT-Bombay

*(Afternoon session)*

Resource Allocation in Wireless Networks - A Cross-Layer Approach  
- Hemant Kumar Rath, IIT-Bombay

802.16 OFDM - Rohit Budhiraja, Midas Communications

Peer to peer wireless mesh networks for rural connectivity  
- Nagarajan, Media Labs Asia

TeNeT Product Demos - Vardarajan, TeNeT Labs

Tuesday, 4th July 2006  
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*(Morning session)*

Dynamic Resource Allocation for Efficient Wireless Data Communications  
- Prof. B. Srikrishna, IIT-Madras

MMSE-Based Weighted Aggregation Scheme for Event Detection Using Wireless  
Sensor Networks - Bhushan Jagyasi, IIT-Bombay

Parametric Channel Estimation for Pseudo-Random User Allocation in Uplink OFDMA  
- Raghavendra, IIT-Madras

*(Afternoon Session)*

Co-Channel Interference Cancellation for Multipath Fading Channels  
- Muralidharan, IIT-Madras

H<sub>infinity</sub> Estimation - R. Laxminaryanan, IIT-Madras

802.16 simulator - Bala, Midas Communications

Wednesday, 5th July 2006  
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*(Afternoon session)*

Overview of Centre for Excellence in Wireless Technology (CEWiT)  
- Prof. Bhaskar Ramamurthy, IIT-Madras

Trends in Wireless Communications  
- Dr. Kumar Balachandran, Ericsson Research, RTP, North Carolina, USA

Summary of Workshop and Future Work - all participants

## **Workshop Notes:**

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1. Overall, the participants opined that the IITM research group has a lot of expertise in the Physical and MAC layers, while the IITB research group had expertise in MAC, Network and Transport layers. Thus, it would be fruitful to leverage each other's expertise and work jointly on the L1-4 aspects on following projects:

- i) Sensor Networks - build a prototype
- ii) 802.11 / 802.16 Simulator - develop a realistic simulator

With the help of faculty members of both sides, a joint proposal on the above has been targeted by August 1st week.

2. A Google group has been formed for participants to provide useful tips, ask doubts and report recent research results: [iitbmw@googlegroups.com](mailto:iitbmw@googlegroups.com)

3. Summary of recent research work by the communications and networking group of:

### **i) IIT-Madras:**

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1. OFDM (Channel estimation, Tracking, Synchronization)
2. CDMA (HSDPA, FDE)
3. Channel Coding (Turbo, LDPC)
4. EDGE equalizers
5. Precoding
6. MIMO (Closed loop schemes)
7. WiMAX
8. GPS
9. H INF, EVT

### **Activities**

MS-PHD seminar series (Fri)

it++, GSL

Document database

Summarizing books, papers (LaTeX)

Simulation tips & tricks

Lab home URL, links to both IITM (labs) :

Regular updates of slides & presentation, reports

### **ii) IIT-Bombay:**

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1. Cross-layer design of wireless networks (Phy-Mac, Phy-Transport)
2. QoS (Scheduling, Fairness)
3. Sensor Networks (Aggregation, Source Localization, Routing, Landslide Detection, Underwater communications)

4. Downlink scheduling (Markov Decision Process, Stochastic Approximation)
5. Precoding for multiuser detection in CDMA
6. Ultra-wideband communications
7. Effective bandwidth in CDMA

\* Informal lectures on information theory & real analysis (Fri 2 hours, 3 months each)

\* Extensive use of ns-2, Opnet, Qualnet simulators

\* TinyOS on sensor motes (Tossim simulator, coding by NesC)

\* Testbed for sensor networks (20 nodes), WiMax

\* Research Scholars' Room (silence zone + meeting room + recreation lounge)

\* Lab homepages (URL to IITM labs, upload presentation slides)