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2011-12 Activities of the Hyderabad Chapter

By Deergha Rao Korrai, Chair of the Communications and Signal Processing Societies Joint Chapter, Hyderabad, India

The communications and Signal processing societies Joint Chapter of IEEE Hyderabad section has taken initiative for IEEE Comm. Society Distinguished Lecture Tours (DLTs) of Prof. Marco Chiani and Prof. Koichi Asatani, and IEEE SPS DLT of Prof. Sheila Hemami in 2011 and 20112 in India.The chapter has organized the DLs of Prof. Hemami, Prof. Chiani and Prof. Asatani in Hyderabad.

The chapter has also organized three half-day tutorials in 2011. A tutorial on 'Network coding: why, where and how' by Dr. Bikash Kumar Dey, Dept. of EE, IIT, Bombay, was held at CR Rao AIMS, UOH campus, Hyderabad on 25 July 2011. Another tutorial on 'Fundamentals and Advances in MIMO Communication Systems and Networks' by Dr. Marco Chiani, the distinguished lecturer of IEEE Comm. Society was held on 22 October 2011 at Osmania University, Hyderabad.The other tutorial on 'Large MIMO Wireless: Opprtunities,Challenges, and Solutions' by Prof. A. Chocka;ingam, Dept. of ECE, IISc, Bangalore, India, was organized at Osmania University on 26 November 2011. About 140 have participated in these tutorials.The participants include students, research scholars, faculty from colleges, and industry professionals.

In addition to the above DLs and tutorials, the chapter has organized two technical lectures by experts in communications area. A technical lecture on 'Ubiquitous Mobile Computing and Associated Communication Challenges' by Dr. Bharat Doshi, Director(MERC), IEEE Fellow, Johns Hopkins University Applied Physics Laboratory, Maryland, USA was held at IIIT, Gachibowli, Hyderabad on 28 February 2011. Another technical lecture on 'New Advances in Mobile Content Delivery' by Dr. Giridhar D. Mandyam, Vice President of Technology, Qualcomm Internet Services, SanDiego, USA was organized at O.U.Engg. College auditorium, Hyderabad on 18 May 2011. About 100 delegates have participated in the two technical lectures.

The Chapter is organizing a lecture in the broad areas of Communications and Signal Processing by a distinguished scientist every year on 3 March (the birth day of A.G. Bell) in the memory of Alexander Graham Bell,The 2011 A.G.Bell memorial lecture on 'A Look at Some of the Principles of Mobile Communication from an Electrical Engineering Perspective' by Dr.Tapan K Sarkar, Professor, IEEE Fellow, Dept. of ECE, Syracuse University, USA was delivered at CR Rao AIMSCS, University of Hyderabad Campus on 3 March 2011. The IEEE SP society has funded for the international air travel of Prof.Tapan K Sarkar for this memorial lecture.

Mr.MGPL Narayana(Hyderabad section chair, 1st from left), Dr. Giridhar D Mandyam (3rd from left), Dr.Deergha Rao Korrai (chapter chair, 2nd from left), and other IEEE volunteers of the Hyderabad section after the lecture at Osmania University on 18 May 2011.

Dr. U. B. Desai, Director of Indian Institute of Technology Hyderabad has delivered the 2012 A.G.Bell memorial lecture on 'Smarter Societies: Role of Physical Cyber Physical Systems' at Auditorium, CR Rao Advanced Institute of Mathematics,Statistics, and Computer Science, University of Hyderabad Campus on 3 march 2012.

The audience for this lecture are 65 (sixty five) including students, Research scholars, participants from industry, and faculty from universities/colleges.

During the lecture, Prof. Desai has mentioned that Cyber Physical System (CPS) is a system that synergizes communication, computing, control, cognition and sensing. Of these five components, sensing is perhaps the least developed, primarily because all sensors are developed for a very niche application. In order to achieve real smartness and move towards the new age of smarter societies, it is imperative that there is a seamless link between the cyber

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Information Infrastructure in India Takes a Giant Step Forward: TiECon2012 Keynote by Sam Pitroda

By Alan J Weissberger, IEEE ComSoc Volunteer, USA

Introduction

TiECon 2012 -The Indus Entrepreneurs annual conference- was held May 18-19, 2012 in Santa Clara, CA. On May 19th, over 2,000 attendees were priviliged to hear a keynote speech that will be remembered for a lifetime: How governement funded information infrastructure projects will increase innovation, improve the Indian economy and the future of the people of India.

(http://www.tiecon.org/speaker/sam-pitroda)

Most folks are not aware of the breadth, depth and scope of these projects, which have not been widely reported in newspapers or the business press. So it was quite refreshing to hear of the progress, goals and objectives of the many Indian government iniitiatives that use state of the art communications technology to bring power to the people and local governments.

The man behind these programs is Sam Pitroda - a pioneer in digital switching in the U.S. and the telecom revolution in India. Mr. Pitroda is currently Adviser to the Prime Minister of India on Public Information Infrastructure and Innovations. A technologist, inventor and entreprenneur, Sam initiated India's telecom revolution in the 1980s and sparked India's outsourcing boom in the late 90s. In 2007, IEEE ComSoc awarded Mr. Pitroda the award for Public Service in the Field of Telecommunications.

(http://www.comsoc.org/about/memberprograms/comsoc-awards/telecom/bios)

Sam believes that Public Information Infrastructure is critical for driving innovation and entrepreneurship, as well as for improved delivery of public services and accountability. It's very important for India to grow GDP at 8 to 10% per year, in order to meet the needs of its growing population, combat poverty and improve education for all. The increased use of information technologies, especially broadband communications, is essential to achieve that growth. IT willl also help alleviate the huge disparities that now exist in India: between rich and poor, educated and non-educated, urban and village residents.

India must have a solid IT infrastructure to attract the capital, technololgy and talent it needs to continue its high growth trajectory. Such an IT infrastructure will democratize information and innovation, improve government operations, make it more transparent and make education available to poorer people. The Indian government is spending billions of dollars on upgrading technology infrastructure in the country and heavily investing in e-governance.

Massive Buildout of Two Fiber Optic Networks

The first step in modernizing India's IT infrastructure is the National Knowledge Network (NKN). This high speed fiber optic network will interconnect all educational and research institutions in India (including 22,000 colleges) as well as global research networks in the U.S., EU, Singapore and Japan. Its goal is to enable real time collaboration and research. The target users for the NKN are institutions engaged in the generation and dissemination of knowledge in various areas, such as research laboratories, universities and other institutions of higher learning, including professional institutions.

NKN is a significant step which will enable scientists, researchers and students from across the country to work together for advancing human development in critical and emerging areas. Some of its envisioned uses include:

- Enable knowledge and information sharing for education.
- Enabling collaborative research, development and Innovation.
- Facilitating advanced distance education in specialized fields such as engineering, science, medicine etc.
- Facilitating an ultra high speed backbone for e-Governance.
- Facilitating integration of different sectoral networks in the field of research, education, health, commerce and governance.

NKN has already connected 774 institutions (as of 26 May 2012) and aims to connect over 1500 Institutions/ Organizations /Laboratories throughout the country. The network design is based on a proactive approach that takes into account future requirements and new possibilities- in terms of both usage and perceived benefits. The NKN is characterized by a 40G bit/sec fiber optic backbone, multiple 2.5/10G fiber add/drops, and a total of 1500 nodes. It's projected cost is $3B.

Another government funded fiber optic network is being built to connect 250K panchayats (local government bodies) in India. Broadband connectivity to these rural Panchayats will improve delivery of public services and empower village residents (which make up 70% of India's population). It will transform eGovernance, education, health, hospitals, and agriculture. The India government launched this rural broadband program in late October 2011 under the Universal Service Obligation Fund (USOF) to increase broadband penetration in rural and remote areas.

At these Panchayats there will be a cell tower and other related infrastructure for all public and private operators to share facilities for proving last mile wireless services to rural customers. Broadband wireless access will consists of a mix of 3G/4G cellular, mesh WiFi, and WiMAX. Those wireless access networks will be interconnected to India's fiber optic backbone for extended reach and a multiplicity of services.

This fiber optic network to Panchayats has a projected cost of $6B and will be totally operational in two years time.

Other Information Technology Projects by India Government

Other significant government funded IT initiatives in India include:

- Unique Identification (UID) platform to uniquely identify all Indian residents. It is easily verifiable in an online, cost-effective way and is unique and robust enough to eliminate the large number of duplicate and fake identities in government and private databases.
- Geographic Information Systems (GIS) to identify every physical place in India. GIS is unique because it combines location and information about the location. Computerized GIS provides the ability to analyze this information in a powerful way.
- 10,000 software engineers working on eGovernment have made a difference. The government is now using computer (rather than paper) filing systems. The time to decide criminal cases has been reduced from 15 to three years through greater use of ICT in the Justice System.
- Meta University with 30 connected universities is envisioned. A student would be able to take an on-line class from any of them.

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Highlights from the 7th IEEE Broadband Wireless Access Workshop Collocated with GLOBECOM 2011, Houston, USA

By Edmundo Monteiro, University of Coimbra, Portugal,
and Andreas Kassler, Karlstad University, Sweden, General Chairs
Vasilios Siris, Athens University of Economics and Business / FORTH, Greece,
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Internet access is undergoing a fundamental change. More powerful devices and lower cost radio technologies are facilitating the transition to the Mobile Internet where users can access through different devices and access technologies a diverse range of services and applications anytime, anywhere. However, the huge increase in demand that this brings cannot easily be met by current radio access systems. Hence, there is a need for more powerful, more efficient, higher speed, lower cost radio technologies and architectures for Broadband Wireless Access.

The seventh IEEE Broadband Wireless Access Workshop (BWA) (http://www.bwaws.org) was selected as one of the full-day workshops of GLOBECOM 2011, and took place in Houston, Texas, USA, the 9th December 2011. The 7th BWA workshop continued the series of successful workshops, providing a forum for new research results and reports on practical experience working with innovative technologies in the domain of Broadband Wireless Access.

The response to the call for papers from the international research community was extremely positive: a record number of more than 72 papers were submitted from 27 countries. The Technical Program Committee (TPC) selected 16 papers and 5 porter papers for publication in IEEE Xplore. The acceptance ratio was 22.8 percent, retaining the high selectiveness of previous editions of the BWA workshop series.

The papers were organized in six sessions: WiMAX and LTE; Relaying; MIMO and Interference Cancellation; Power Efficiency and Scheduling; Poster session. The topics of these technical sessions covered theoretical as well as practical deployment aspects of various broadband wireless access technologies, including the following subjects: WiMAX Non-Saturated Analysis?; A New Approach for Improving Indoor LTE Coverage?; Generalized Multiplicative Network Coding for the Broadcast Phase of Bidirectional Relaying; Effects of Outdated Channel State Information in Partial Relay Selection Systems with Multiple Antennas At the Destination?; Distributed Beamforming with Relay-Aided Interference Alignment in Fully Connected Interference Network?; Single-Carrier Frequency-Domain Equalization for Multi-Relay Cooperative Systems with Relay Selection?; Time-domain ML Channel Estimation Considering Antenna Switching Time for RF-MIMO-OFDM; On Eigenvalue and Capacity Distributions of Cooperative Multi-Keyhole Propagation; Joint Compressed Estimation of Delay-AOA Information for MIMO Channel; Performance of WH-Spread

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Information Infrastructure in India Takes a Giant Step Forward

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•Modernizing the railways has been difficult to sell, but is moving forward. The goal is to improve the efficiency of transportation by modernizing Indian Railways. However, $200B is needed to fund this huge project.

•Six field trials for Smart Grid have been conducted. The India Smart Grid Task Force is an inter ministerial group that serves as the government focal point for activities related to Smart Grid.

•Setting up a Semiconductor Fabrication Plant in India to jump start electronic manufacturing. India will import $400B in electronic components in coming years, unless there is domestic manufacturing. This initiative is envisioned to be a public-private partnership.

•A $1B Innovation fund will be operational in July 2012. Goals include improving education, health care, food distribution, agricultural production and transportation.

Not all government funded projects succeed. Sam said that for every seven projects started, perhaps only four will be successful.

Perspective and Conclusions

While lots of people say government should get out of the way and let the private sector take over industrialization and information infrastructure in India, Sam believes that most companies won't take on those projects due to uncertain ROI and capital expenses. In sharp contrast, the Indian government now has the political will to move forward with its innovation agenda. Let's hope so.

Attendees were inspired by Mr. Pitroda's keynote speech. It was great to hear about all the good things the Indian government is doing to transition the country to eGovernment, level the playing field for business, reduce income dispartiy and improve the lot of poor people. The audience was equally impressed by Sam's selfless, personal sacrifices (he doesn't get a salary or expenses), dedication and total committment to serving India and improving the quality of life there.

In closing, Sam asked the predominantly Indian audience if they'd consider donating their time and energy to help invigorate India. One suggestion was to visit local schools, talk to students and possibly even teach in high schools or universities (Sam requested TiE to get 100 names of volunteers who'd be willing to teach at least one semester). Those new teachers might have a surprisingly positive effect on young minds, which will better shape the future of the country. Another possibility was to get actively involved in many of the announced government funded projects, such as the Innovation Clusters (e.g. TiE-SV member Samir Mitra has been volunteering in such major projects in India for the last two years).

The IEEE Connection

TiE Silicon Valley (which hosts TiECon each year) is a strong alliance partner of IEEE ComSoc-SCV (Santa Clara Valley). Two of our joint IEEE-TiE events have been described in previous issues of IEEE GCN. Sam told me that "IEEE has played great role in educating a large number of engineers in India. It's also helped set standards, building test facilities and doing local experimentation, prototypes, design, etc in the past."

WIRELESS ACCESS WORKSHOP/*continued from page 3*

CI/MC-CDMA System with Interference Cancellation Receiver; Joint ICI Cancellation and Channel Estimation with Real-Time Channel Adaptation for High-Mobility OFDM Systems?; On Pilot Dimensioning in Multicell Single Input Multiple Output Systems; A Peak Power Efficient Cooperative Diversity Using Star-QAM; Consumption Factor: A Figure of Merit for Power Consumption and Energy Efficiency in Broadband Wireless Communications; An Exact Outage Analysis of Zero-Forcing V-BLAST with Greedy Ordering?; A Reduced Feedback Proportional Fair Multiuser Scheduling Scheme; Blind and Semiblind Detection of OFDM Signals by CIR Model in the Multipath Fading Channel; D-BLAST with Group Zero-Forcing Detection: Diversity and Multiplexing Tradeoff Analysis?; Resource Allocation for Multiuser Cognitive Radio with Primary User's Cooperation; Analysis of the Capacity Enhancement of Cellular Systems Using Multiuser Receivers and Multiple Power Zones; An Analysis of the Received Signal Strength Accuracy in 802.11A Networks Using Atheros Chipsets: A Solution Towards Self Configuration.

The workshop was opened by the keynote speech of Dr. Walid Saad, University of Miami, USA, on the topic "Femtocells and Games: Towards self-organizing small-cell networks". Dr Walid discussed the deployment of small cells serviced by low-cost, low-power femtocell access point is envisioned to significantly improve the performance of next-generation wireless networks. The key to a successful deployment of femtocells lies in the design of novel algorithms and techniques that ensure an efficient co-existence between the femtocell tier and the existing macro-cell wireless infrastructure. In this talk, we study the potential of applying game-theoretic techniques for addressing various challenges in femtocell networks such as interference management and self-organization. In particular, he focused on three important problems:?(i) Noncooperative games for strategic access policies,(ii)- Cooperative games for spectrum leasing and interference management, and (iii)- Matching games for user-to-access point association. For each problem, he presented the key concepts, discuss the proposed solutions, and shed a light on future opportunities.

We are delighted to announce that the 8th IEEE Broadband Wireless Access Workshop will be held in conjunction with IEEE GLOBECOM '2012 in Anaheim, California, USA, in December 2012. It would be our great pleasure to welcome you in Anaheim, as either an author presenting your latest scientific disclosing or an attendee in similarly warm and lively interactive discussions as were found in Beijing. For more information on the upcoming event, please visit our website: http://www.bwaws.org.

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world and the physical world. This is where cyber physical systems (CPS) come in. Prof. Desai's talk has focussed on what is that constitutes a smarter society and what role can CPS play in creating smarter societies. This is a nascent area and much of explication he has made through examples: in the domain of medical and health care technologies, communication technologies, smart buildings and building health care technologies, and vehicular communication. A very brief mention has been made on the kind of mathematics that can be exploited for modeling and analysis of CPS. Most of what has been mentioned in the talk are the part of major multidisciplinary project on CPS at IIT Hyderabad.

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