Global Communications Newsletter

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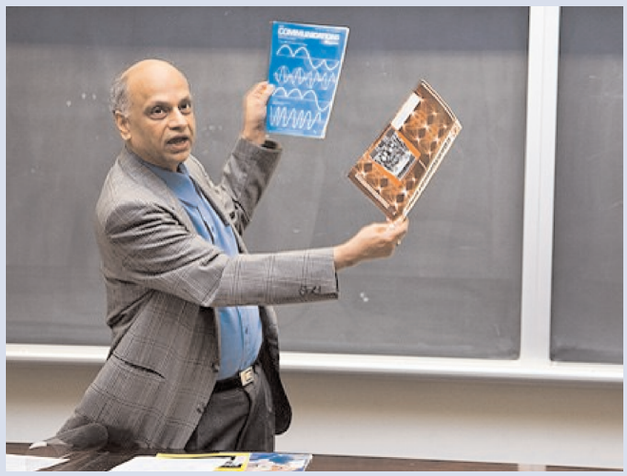
IEEE Communications Society, Toronto Chapter Honors Prof. Pasupathy

By T. J. Lim and Xavier Fernando, University of Toronto, Canada

The ComSoc Toronto Chapter honored Professor Subbarayan Pasupathy (Pas) by holding a special one-day workshop at the University of Toronto on May 11, 2007 as he was officially retiring in 2007.

Dr. Pasupathy is well known to the research community in the signal processing and communications area. He has a long list of achievements that will not fit within the given space. However, these are some highlights. He finished his Ph.D. in 1972 from Yale University, New Haven, Connecticut. In 1973 he joined the faculty of the University of Toronto and became a Professor of Electrical Engineering in 1983. He was the Associate Chairman of the Electrical Engineering Department from 1979 to 1982. He has also served as the Chairman of the Communications Group (1978–1981, 1992–1996). His research interests lie in the areas of communication theory, digital communications, and statistical signal processing.

During 1982–1989, he was an Editor for Data Communications and Modulation for *IEEE Transactions on Communications*. He served as a Technical Associate Editor for *IEEE Communications Magazine* (1979–1982) and an Associate Editor for the *Canadian Electrical Engineering Journal* (1980–1983). He coordinated the Special Issue on Canadian Telecommunications of *IEEE Communications Magazine*, January 1981. From 1984 to 1998, he wrote a regular humour column entitled "Light Traffic" for the *IEEE Communications Magazine*. He was elected a Fellow of the IEEE in 1991 "for contributions to bandwidth efficient coding and modulation schemes in digital communication." He received the 2003 Canadian Award in Telecommunications from the Canadian Society of Information Theory , was elected a Fellow of the Engineering Institute of Canada in 2004 and of the Canadian Academy of Engineering in 2007. He is rated as a "highly cited researcher" in a study conducted by the ISI Web of Knowledge and is listed in the ISIHighlycited Web site (www.comm.utoronto.ca/ ~pas/).



He started writing "Light Traffic" columns in 1984 and the first one appeared in the Centennial issue of *IEEE Communications Magazine*, commemorating 100 years of IEEE. The column was very popular among academics and professionals for its fascinating word play and humor. He is also a poet in Tamil (his first) language and has contributed significantly.

This workshop idea originated with Dr. Teng Jun Lim, a faculty member at the University of Toronto. Dr. Lim spent significant time on this workshop. The idea received overwhelming support from both the Department and the ComSoc Toronto Chapter. It was not difficult to find speakers for the workshop as many of his past students are currently well-known professors and were glad to travel to Toronto to honor him.

A special Web site was designed to post memorable events and photos of Pas at http://paswkshop.comm.utoronto.ca/Home.html.

IST Mobile and Wireless Summit, Budapest, 1-5 July 2007

By Paulo De Sousa, European Union

The IST Mobile Communication Summit 2007 took place in Budapest, Hungary, 1–5 July 2007.

About 600 experts and researchers attended the conference, which has become an annual reference point for the discussion of R&D results and project achievements in the field of mobile and wireless technologies. Attendees at the Summit represent a broad spectrum of the wireless research community in Europe as well the Americas (United States and Canada) and Far East (Japan, China, Korea, and Thailand). Presence from other regions (Australia, Middle East) was also noted.

This 16th edition of the IST Mobile and Wireless Communications Summit was characterized by excellent organization and papers of high quality. The following paragraphs provide some of the main highlights of this year's conference.

Nearly 300 papers were presented at the IST Mobile and Wireless Communication Summit, divided into four parallel streams and poster sessions. This year, the number of submitted papers not originating from an EU funded project represented almost half the presented papers (46 percent). The proportion of demonstration/presentation booths not directly originating from an EU funded project was also an indicator of the reputation of the Summit beyond the strict EU ICT funded research community: 21 demonstration booths were installed at the Summit, with only about half of them (12) organized by an EU IST project (MAGNET, MIDAS, VIVALDI, E2R, e_MOBILITY, AMBIENT NETWORK, SPICE, PULSERS, UNITE, WINNER, EPISTEP, e_SENSE).

The summit papers provided thorough insight into the state of the art on a wide range of mobile/wireless topics, including fixed wireless access, interactive broadcasting, smart antennas, including multiple-input multiple-output (MIMO) techniques, QoS radio protocols, transceiver technologies, system aspects, broadband and satellite mobile, technologies for location-based services, software defined radio, cognitive radio, broadband air interfaces, ultra wideband technologies, wireless and mobile Internet, media-mobile convergence, business and application opportunities, and security aspects for mobile applications.

The opening ceremony was chaired by the organizer, Prof. Istvan Frygies, from the University of Budapest. It featured a welcome address by the Secretary of State representing Mr. Janos Koka (Minister of Economy and Trade), European Commission Director Dr. J. da Silva, and Prof. Joszef Gyulan, President of the Hungarian Academy of SSciences. Three plenary sessions were organized, where CTOs, VPs, and laboratory directors together with senior managers presented their views on three key issues for upcoming research in the fields of mobile and wireless systems. These sessions ("B3G/4G, The Road Ahead," "The Future Internet Will Be Mobile," and "Media in the New Internet Age") were very well attended and triggered a lot of interesting discussion. A couple of key issues outlined in these presentations are hereafter reported.

On 3G, the operator constituency is organizing itself to drive the evolution toward broadband mobile systems under the NGMN initiative. This is in turn having impacts on the evolution toward 3G LTE and 4G systems. The main points of the operators are to see industry developing the technologies enabling massive capital expenditure (capex) and operating expenditure (opex) savings, notably through increased spectrum usage, reduced architectural complexity, and the introduction of reconfigurability. High on the agenda of the operators is reduction of IPR costs, as operators want to avoid a replication of the 3G IPR cost situation (30 percent of reported mobile costs consist of IPR). From that point of view the situation is possibly more promising, considering that industry is prepared to evolve. Motorola announced its intention to put a number of key technologies in the public domain, while the orthogonal frequency-division multiplexing (OFDM) patent situation is considered more scattered than the 3G/code-division multiple access (CDMA) case.

Regarding 4G, Asian speakers confirmed the very ambitious roadmaps of China and Japan toward technological leadership. Both speakers presented the performance of the testbeds existing in Asia and based on increased numbers of relay antennas to optimize spectrum reuse and efficiency. The DoCoMo speaker reported demonstrated rates of about 5 Gb/s over 100 MHz. The target implementation is on the order of 25 b/s/Hz in operational systems, hence demonstrating the advance of Asia in the field. As a matter of comparison, it can be noted that spectral efficiency of GSM/3G is on the order of 2 to 3 b/s/Hz. The existing Asian testbeds have been tested with audio video applications requiring high bandwidth, such as MPEG 2 HDTV. Asia is targeting detailed specifications (out of a standard) around 2010–2011.

It can also be noted that all speakers agreed that 4G should be defined through more bandwidth but also through more spectrum. Current thinking relates to 20 MHz spectrum blocks, while DoCoMo considers up to 100 MHz spectrum blocks. This showed that not only may spectrum designation be a problem, but also the channeling within the spectrum. All speakers nevertheless agreed that the baseline technology for 4G would consist of an optimized combination of MIMO techniques with the OFDM access method.

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IEEE Region 8 to Hold Conference on History of Telecommunications in Paris in September 2008

By Jacob Baal-Schem, Region 8 History Coordinator

A conference with the theme "From Semaphore to Cellular Radio Telecommunications" is being organized by IEEE Region 8 and will be held in Paris, France, on 11–12 September 2008. The Conference intends to include papers on developments in Communication Technologies, History of Military Communications, Communications in the National Context, and History of the Internet. Interested ComSoc members are invited to learn more from histelcon@ieee.org

To enhance activities related to the History of Electrical and Information Technologies, the Region 8 Director has appointed a History Activities Coordinator on its Regional Committee. The activities include proposals for IEEE Milestones, oral interviews with prominent scientists and industry leaders, and organization of sessions and conferences on the history of electrotechnology. The activities are guided by a Regional History Activities Council, and a history network has been formed to share information. The History page at the Region 8 Web site provides contact information.

As a first step, a Special Session was held during EUROCON '07 in Warsaw, Poland, on 10 September 2007. About 30 participants listened to papers dealing with the contributions of Denis Gabor to communication theory, the development of high-tech in Israel, and the use of pigeons by Reuter to transmit information.

Following HISTELCON 2008 to be held in Paris, EUROCON 2009 is already planned for May 2009 in St. Petersburg, Russia, in the framework of the 150th birthday of Alexander Popov, and again will deal heavily with telecommunications history.

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Polish Telecommunications Market: The Next Step

By Artur Lason, Jacek Rzasa, and Andrzej Szymanski
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The main telecommunication operators in Poland have faced, in recent months, a tremendous challenge. There is a risk that their main source of revenue, fixed telephony, may be consumed by alternative operators or services. The position of the main players may suffer despite the fact that the market may be characterized as underdeveloped, with relatively poor competition and high prices. There are several reasons for that.

First, the telecommunication market in Poland, especially fixed telephony, is dominated by the incumbent operator. At the end of the second quarter of 2007, TP had, according to company data, about an 87 percen share of local access lines [1]. Moreover, at the same time it had about an 82 percent share of local connections, about 76 percent of domestic long distance connections, as well as about 69 and 80 percent of international and fixed-to-mobile connections, respectively. The other main operators, Netia SA and Telefonia Dialog SA, offer their services to a limited number of users in a confined area. In 2006, despite its strong position, TP's total revenues from fixed line telephony decreased by 9 percent. At the same time, net profits declined by almost 3.4 percent [1]. The income of TP in this segment is declining due to ongoing tariff reductions and the growing popularity of mobile telephony. Nevertheless, the fixed line income accounts for about 58.8 percent of total company revenues.

Second, prices of services perceived by customers are rather high. According to [2], the cost of calls, accounted for in the OECD basket, for medium and high usage residential fixed-line consumers is the highest among the OECD countries. In the same document it is stated that for low usage residential consumers, the most expensive countries are the Czech Republic, Poland, and Mexico. However, on the basis of the EU methodology with the OECD basket, the price for low usage residential fixed-line consumers in Poland is in the middle of the range [3]. Although the estimated cost of using telecommunication services varies with the methodology of data collection, it can be stated that public switched telephone network (PSTN) services in Poland are rather expensive. It is especially evident for long distance and international connections.

Third, in Poland the penetration of fixed lines is low (i.e., about 32 percent) and will not change soon. Moreover, it is likely that Poland will never achieve fixed telephony penetration comparable to the leading telecommunication markets. In the first half of 2007 the biggest Polish operator, TP, decreased its number of fixed lines by 8.8 percent in comparison to 2006 [1].

Instead of increasing penetration of fixed telephony, Poland may leap to the next step in development of telecommunications. This step is an expansion of voice over Internet Protocol (VoIP) technology and instant messaging (IM) service. Currently, a large number of Internet service providers (ISPs) and cable operators provide VoIP services. Some PSTN operators are starting to enhance their offers wtih this service as well.

VoIP services are often provided in cooperation with Internet portals. For example, the most popular Polish portal, Onet.pl, delivers VoIP service jointly with Skype Technologies SA's IM software, another way to decrease costs of communications; it is delivered by global players as well as local-based companies. An example of successful introduction of IM by a local company can be Gadu-Gadu (Talk-Talk), which is the most popular IM software in Poland. It has about 5.5 million clients.

It is worth noting that there are many Poles who live abroad. After Poland joined the EU, hundreds of thousands of Poles moved to other EU countries. About 800,000 people settled in the United Kingdom and Ireland. With the growing number of Polish citizens rushing abroad, the significance of high prices of the PSTN services increases as well. This is another driver which pushes ahead the development of IM and VoIP services.

In Poland, however, there is a key obstacle for delivering VoIP technology as well as IM services on a large scale. According to statistics published in December 2006 by the OECD, there is a very small penetration of broadband access lines. Broadband penetration in Poland increased substantially from 0.3 subscribers per 100 inhabitants in 2002 to 6.9 in 2006. However, it was still one of the lowest penetrations among OECD countries [2]. We believe that currently the penetration of broadband subscribers in Poland is substantially higher. It seems that the OECD broadband penetration report took into account only customers with access lines of 144 kb/s data rate and higher. In Poland popular broadband connections start from 128 kb/s. This year all 128 kb/s lines operated by TP were upgraded to 256 kb/s at no cost. Taking this into account, it seems that broadband penetration was about 9 percent at the end of 2006. The broadband penetration seems to be far too low to erode circuit-based voice traffic. However, development of the broadband market is robust, and it is expected that penetration and data rate of broadband access lines will be vastly augmented.

The Polish VoIP market is growing. A great number of companies, including CATV operators and small ISPs, have begun to offer VoIP telephony. Many businesses delivering VoIP and IM solutions, in conjunction with the high prices of fixed calls, are vastly increasing the popularity of alternative methods of communication. Poles are highly interested in VoIP services offered by companies operating in neighboring countries as well.

Poland is an important market for VoIP and IM, even though its broadband penetration is one of the lowest among developed countries. In spite of the low broadband penetration there is a good mood among users of VoIP in Poland, and the next step in the evolution of telecommunications may be reached soon.

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High Data Rate Transmission over High-Speed Trains in France (TGV)

By H. Afifi, INT, France; M. Berbineau, INRETS, France;
David Sanz, SNCF R&D, France; and N. Santoro, INT, France

Reducing the impact of transport on the human and economic environment is a great challenge. Today, an average of two hours is spent daily in the public transportation system. The IPSAT project, a French nationally funded collaborative project with INRETS, SNCF, GET, Cisco, and France Télécom, was undertaken to provide means of high-speed communication in the fast trains, called TGV. The challenges of this project were twofold. First, technically, it is known that the Doppler effect has a great impact on radio transmission, especially new coding/modulation techniques involving OFDM. Power, environment, and range limitations introduce additional challenges. Second, the economic model behind such a service is not well mastered as the problem still constitutes a niche market, and this Internet provisioning chain always involves more than a single partner; rather several, including the train operator.

On the technical side, the project came out with several results ranging from a novel robust OFDM transmission system (similar to solutions found in the new mobile 802.11P system) to fast handover techniques switching from one technology to another when physical situations change (e.g., tunnels, urban zones). The project based its solution on rapid handover techniques with a fallover communication system based on a specific adaptive satellite antenna (ACCORDE). The solution is based on protocols such as Mobile IP and IEEE 802.21 for media-independent handover.

Studies showed that satellite communications and WiMAX were good technical choices as the number of handovers is reduced and the throughput is sufficient. Wifi and 3G solutions showed their limitations in either range or throughput. They can, however, be used in some situations where the operator has no roaming agreements with other technologies.

The presence of several operators on the different links (satellite, Internet, and local) showed the difficulty it could bring and raised the advantage of using Mobile IP.

On the economic side, collaborations with American Railways systems in California permitted tuning up a business model that fits the European market and can be exported to different countries. The presence of a railroad operator and a telecommunications operator helped find the best economical solutions to design the financial package. It was shown that a satellite link rented on a yearly basis was a good economic compromise between bandwidth and deployment costs.

The IPSAT project provided a very good understanding of global communications and global handover techniques. Some of its results can be exploited in other domains such as airway Internet provisioning.

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IST MOBILE AND WIRELESS SUMMIT/*continued*

Regarding mobile Internet, it was indicated that the widest adoption of Internet on a mobile still represents a technological challenge. On one hand, cost has to decrease, which supports work toward technologies enabling cheaper spectrum usage, such as cognitive radio. On the other hand, it is indicated that usability factors are dominant factors. This requires work on content presentation, semantics, interfaces, and, more generally, all those technologies that can make content more adapted to and fit for mobile usage.

From the demonstration stands, extensive demos were provided, notably by the E2R and PULSERS projects. Both projects have a similar approach to R&D: project generated results are directly used to feed regulatory and standardization activities beyond the pure R&D perspective. A number of workshops and cluster meetings (and other events) took place in parallel with and after the conference, involving subsets of the participants and effectively attracting additional participation in the event. The "Internet of the Future" session also provided an opportunity to present running initiatives, notably EIFFEL, FIRE, and GENI.

Finally, the parallel paper session showed a good level of participation. The wide variety of addressed subjects made it possible for every attendee to find a session related to his/her direct interests, and it turned out that, in general, speakers had prepared their speeches well.