Global
Communications
Newsletter
January 2010

ITU and Ministerial Seminar on Switchover from Analog to Digital Terrestrial Television Broadcasting in Central and Eastern Europe (Belgrade, Serbia)

By Irini Reljin, Ministry of Telecommunications and Information Society, Republic of Serbia

The International Telecommunication Union (ITU) and the Ministry of Telecommunications and Information Society of the Republic of Serbia co-organized the Sub-Regional Seminar and Ministerial Round Table devoted to the switchover from analog to digital terrestrial television broadcasting in Central and Eastern Europe, held in Belgrade, 27–29 April 2009. The seminar was attended by representatives from the ministries of many European countries, as well as ITU experts in different topics connected to broadcast technology and spectrum planning. The opening ceremony started with welcoming addresses by H.E. Ms. Jasna Matic, Minister of Telecommunications and Information Society, Republic of Serbia, and Dr. Hamadoun Touré, ITU Secretary General.

Ms. Matic pointed out the importance of the Seminar, not only for the host administration, but also for the whole region, as the process of digital transition has just started or is expected to start in European countries.

Dr. Touré gave a brief overview of the possibilities, similarities, and differences in the switchover approaches of particular administrations. He expressed the need for working together, ensuring protection of our future, sharing the best practices and experiences.

As is well known, the document Geneva 2006 (GE-06) Agreement (ITU RRC06) was adopted at the Regional Radiocommunication Conference of the ITU held in June 2006 in Geneva. It cpvers frequency usage regulation in the VHF/UHF bands for digital radio and television services (terrestrial digital audio and video broadcasting, T-DAB and DVB-T) in Europe. One of the main obligations defined in the Agreement is that the transition period (period following the Conference during which the assignments in the analog frequency are protected) shall end on 17 June 2015 at 0001 hours UTC.

The ITU, following its leading role in the regulation of spectrum usage, has launched a debate on spectrum aspects among administrations as its members, trying to encourage efficient and flexible spectrum usage while preserving the service mission of broadcasting. Thus, the digital dividend is supposed to serve as a base for evolving different broadcast services increasing the number of available television programs. Representatives of associations of mobile operators underlined the possibility of allocation of the digital dividend to multimedia broadband services, having in mind the potential impact of broadband penetration. These two counterparts positioned the discussion on the dividend as one of the very hot topics throughout the round table. Based on the facts that new video technology is bringing solutions that need huge bit rates and free spectrum, the opinion that a decision on the digital dividend should be postponed for the very near future predominated.

From the technical standpoint, a few of the most important decisions that any strategy on digital switchover has to make are the compression standard (MPEG-2 or MPEG-4 AVC, i.e. H.264 AVC), the broadcast standard (DVB-T or second generation ones DVB-T2), the type of broadcast network (single-frequency network, SFN, or multifrequency network, MFN), as well as the ownership of multiplexes (should they belong to the network provider or separate from it).

Representatives of different administrations at the Seminar gave brief overviews of the switchover status in their countries. ITU experts prepared insights into different very interesting strategies for transition from analog to digital broadcasting of television programs. It is worth mentioning that countries differs in many aspects: population, dimension, percentage of rural territories, economy and social development, cable penetration, and number of broadcast stations carrying their television and radio programs. Based on such diversities, it was concluded that it is not possible to find the common points in different administrations' strategies, except the fact of a bad economic situation everywhere. In most of the European countries strategies have already been adopted, but very few of them have significantly finished the job. As most of them have the recommendation given by the EU, the analog switchoff is planned for December 2011. With the exception of the Republic of Serbia, as host country, a rather small number of television programs per country are presented in Europe (usually less than 30). It is obvious that most developed countries that started their digital broadcasting among the first have adopted MPEG-2 as a compression standard. Most of them, however, are adding MPEG-4 AVC compression for HDTV now. Having in mind that the new standard (MPEG-4 AVC) is more efficient, needing half the bit rate for the same quality as MPEG-2, countries that are preparing their strategy nowadays are going to adopt MPEG-4 AVC for both SDTV/HDTV applications. Regarding subsidizing the set-top-boxes, there are different solutions, based on population, existing cable penetration, as well as the compres-

(Continued on Newsletter page 4)

Is It Time for Specialized Telecommunication Engineering Education in the United States?

By Tarek S. El-Bawab, Jackson State University, USA

Telecommunications engineering (TE) has witnessed tremendous progress in recent years, and has changed the way we live our lives. This progress calls for special attention to TE education. For along time, and for good reasons, TE education was part of electrical engineering (EE) education worldwide. This situation has changed in many countries over the last two or three decades as TE has gained the status of an independent spinoff from the EE education discipline. Unlike many classical EE programs with emphasis on communications, modern TE programs supplement the study of communication theory, signal processing, and electromagnetics with core courses focusing on a number of other topics. These include transmission, switching and the public switched telephone network (PSTN); synchronous optical network/digital hierarchy (SONET/SDH); cellular technologies; VoIP, IPTV, and next-generation network (NGN); broadband access; copper, wireless, and optical technologies; modern telecom applications/services; telecom economics and regulations; and others. Nevertheless, TE education in the United States is still almost entirely embedded in EE education. Today, progress in the field makes a strong case for specialized TE education in the country.

There are a number of reasons TE programs are not common in U.S. schools of higher education:

1) Engineering education in the United States tends to be focused on a set of fundamental disciplines, such as electrical, computer, mechanical, civil, and chemical engineering. There are, of course, specialized and/or multidisciplinary programs such as biomedical, aerospace, material, industrial, and mechatronics engineering. However, these do not represent the mainstream in our engineering education. There is obviously a well-thought-of philosophy behind the existing U.S. system; undergraduate education should be broad enough to prepare students for several directions. Nevertheless, engineering knowledge and applications have spread today in such a way that some changes in this philosophy may have become necessary.

2) Before 1984, the Bell System was the owner of the U.S. telecom industry and was the country's primary TE educator. It had technical education center(s) for undergraduate-type education, and Bell Labs was the nation's telecommunications engineering graduate school. Semester-based TE courses were taught in the Bell System. Under these conditions, there was little need for nation-wide university-based TE education. Despite the end of the Bell System in 1984, the momentum of its education regime kept things going for sometime.

3) The breadth of the scope of topics involved in TE education may also have been an issue. A significant component of mathematical and physical sciences is involved in TE education. Components of electrical and computer engineering are required before TE topics are introduced. Therefore, some envision that it is not easy to map all these components, and others, into a standard four-year Bachelor's program. The fact of the matter, however, is that an understanding of the academic ingredients that are really required to make up a TE program, vs. those that are not, is necessary to strike the right curricular balance. Unfortunately, the stall of TE education within industrial premises for decades, apart from academic frameworks, made it difficult for some to fully realize this field from a pedagogical perspective.

The colligation of these factors has impeded the recognition of TE as a distinct field of study in U.S. universities. The divestiture of the Bell System in 1984 opened up the telecom industry for competition. Many employees of the Bell System joined new companies. The old industrial education institution lost its status as a central authority. The National Science Foundation (NSF) issued a report in 1992 stating that there was an urgent need for telecommunications education programs. This led to a burst of new technology, mass media, management, and regulatory programs. No progress was made, however, in terms of launching TE programs.

The U.S. telecom industry experienced tremendous growth in the 1990s, but plunged into a sharp downturn by the beginning of the 21st century. During growth, the industry responded to hiring needs by relying on the Bell System expertise, which was still largely available, and also on other professionals, many of whom were international telecom engineers. Since 2000–2001, the industry lost a huge proportion of its workforce by virtue of the downturn. Today, it is still in the post-bubble era, which is exacerbated by the global economic crisis. It appears to be an industry with few opportunities for new engineers. Therefore, many may argue against the need for TE education programs in the United States at this point in time. This argument, however, is shortsighted. In fact, telecommunication services and applications have never ceased to expand, even during the darkest years of the downturn. Global bandwidth consumption is growing and will continue to do so. The industry could be paying a price for the irrationalities of the 1990s, recovering from some bandwidth gluts, in search of new business models, or dealing with other temporary problems. However, it is neither dead nor dying. It will definitely recover. Nevertheless, it will come back into a new era where a lot has changed. The technical foundations of telecommunications engineering themselves have undergone huge paradigm shifts. The field has seen enormous expansion in its technologies and applications. As a result, it is getting harder than ever for any segment of human society to advance, much less lead, in this area of engineering without having a robust academic structure to educate and prepare future telecommunication engineers.

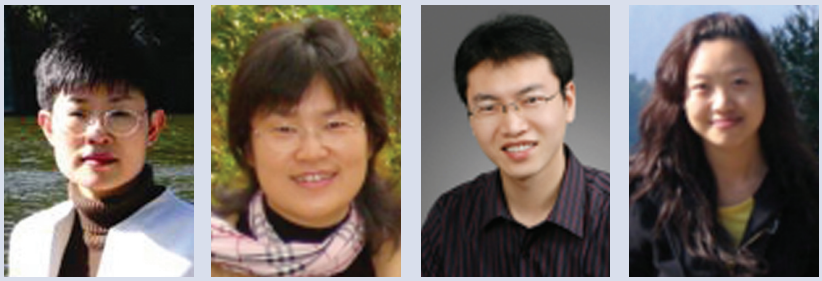
Today, there is a substantial void in the U.S. TE education arena. On one hand, the breadth of the technical scope of modern telecommunications makes it difficult for the industry to self-educate its engineers, or to actually afford the kind of investment the Bell System used to bear. On the other hand, TE is not recognized as a field of university-based education. Indeed, the Accreditation Board for Engineering and Technology (ABET), who accredits the very few existing U.S. TE programs, does not have criteria for TE accreditation. There are community efforts to fill parts of this void, but they are not enough.

The U.S. society, economy, and national security are increasingly dependent on scientific and technological innovations (NSB-07-122, NSF, 2007). Having a new generation of well educated graduates who are ready to lead technological advancement through the 21st century is a critical requirement in all areas of engineering knowledge. In this context, ushering in TE education programs is vital for filling a gap that may be very costly if not attended to now. Only a handful of geographically spread programs would suffice at this point in time. Depending on future market demands, more programs can emerge later. Collaboration between academia and industry is key to fulfilling this goal. Federal support and leadership, by NSF for instance, is also necessary. Now is really a good time to consider university-based TE education in the United States!

IEEE ComSoc Beijing Chapter Newsletter

By Yang Yang, Beijing Chapter Chair, China

We have organized three IEEE Distinguished Lectures and a summer school for the members of the Beijing Chapter of IEEE ComSoc since March 2009. Various advanced and timely topics in wireless communications are covered, such as cross-layer optimization, energy-efficient design, dirty-paper coding, network multiple-input multiple-output (MIMO) in cellular systems, cognitive radio, and wireless sensor networks. The Chapter's activities attracted many attendees from research institutes, industry, and universities. We have also organized a short course on cooperative communication. The details are described as follows.



The Officers of the Beijing Chapter (from left to right): Prof. Chenyang Yang, Beihang University (Chair); Prof. Yuping Zhao, Peking University (Vice Chair); Dr. Yafei Tian, Beihang University (Secretary); Ms. Rong Feng, Beihang University (Treasurer).

On March 18, 2009, we hosted Prof. Geoffrey Li from Georgia Institute of Technology to give a Distinguished Lecture Tour (DLT) with the title "Cross-Layer Optimization for Spectrum and Energy-Efficient Wireless Networks." In his talk, decentralized cross-layer optimization of multichannel random access by exploiting local channel state and traffic information was discussed. Energy-efficient design of wireless networks and the trade-off between spectrum and energy efficiency were also addressed.

On May 19, 2009, we hosted Prof. Andreas F. Molisch from the University of Southern California to give a DLT with the title "Distributed MIMO Systems and Base Station Cooperation." MIMO systems are the method of choice for increasing spectral efficiency for fourth-generation wireless communications systems such as Third Generation Partnership Project Long Term Evolution (3GPP-LTE), WiMAX, and high-throughput WiFi (IEEE 802.11n). It has been shown that for a single link, the capacity increases linearly with the number of antenna elements at transmitter and receiver. However, in a cellular setting the benefits are much smaller, since the interference from neighboring cells tends to limit the capacity. Base station cooperation, where multi-antenna base stations cooperate for communications with users in multiple cells, has the potential to eliminate this bottleneck and recover the full potential of MIMO communications in a cellular setting. This talk first outlined the fundamental principles of MIMO base station cooperation, where the cooperating base stations can be considered a distributed large MIMO system; it discusses the signal processing in uplink and downlink for this case. Professor Molisch then presented some recent research on three practically important aspects of BS cooperation: (i) the inherent asynchronity of multi-user interference

(Continued on Newsletter page 4)

FuturICT 2009 – The First Hungarian-Japanese Joint Conference on Future Information and Communication Technologies

By Gabor Magyar, Attila Vidács, Rolland Vida, Hungary

2009 was definitely a year of anniversaries. The IEEE celebrated its 125 years, while HTE, the Hungarian IEEE ComSoc Sister Society, celebrated 60 years. But 2009 was also a double anniversary for Hungarian-Japanese diplomatic relations. They were established 140 years ago between Japan and the Dual Monarchy of Austria-Hungary, and resumed 50 years ago between Japan and Hungary, after World War II. This double anniversary was thus a good opportunity to strengthen the scientific relations between the two countries, and one good way to do that was to organize a high-quality scientific conference in the field of infocommunications.

The First Hungarian-Japanese Joint Conference on Future Information and Communication Technologies (FuturICT 2009) was held 29–30 June in Budapest, Hungary. FuturICT 2009 was jointly organized by the Department of Telecommunications and Media Informatics of the Budapest University of Technology and Economics (BME), the Yokosuka Research Park (YRP) R&D Promotion Committee, and the National Institute of Information and Communications Technology (NICT), Japan. Interested participants working in the field of ICT from Hungary and Japan were invited. The conference secretariat was provided by the Scientific Association for Infocommunications, Hungary (HTE).

The focus of the conference was on the challenges in the emerging fields of the networks of the future, ubiquitous computing, services and applications, and future wireless communications networks and technologies. The Guest Addresses were given by His Excellency Shinichi Nabekura, Ambassador of Japan to Hungary, Ábel Garamhegyi, State Secretary for International Economic Relations, Hungary, and Akira Terasaki, Vice-Minister for Policy Coordination, Ministry of Internal Affairs and Communications, Japan. Beyond two keynote speeches and over 20 invited and short technical presentations of three thematic sessions, posters and demonstra-

The leaders of the organizing institutions — Gabor Péceli (Rector, BME), Hideo Miyahara (President, NICT), and Akio Motai (President, YRP).

(Continued on Newsletter page 4)

BEIJING CHAPTER/*continued from page 3*

in the downlink, (ii) the design of training signals for coherent reception, and (iii) propagation channel measurements for multiple BSs.

Onn June 12, 2009, we hosted Prof. Zixiang Xiong from Texas A&M University to give a talk with the title "Dirty-Paper Coding: What Is It All About?" Driven by its wide applications, dirty-paper coding has recently become a very active research area. In this talk Prof. Xiong explained what dirty-paper coding is all about: from the capacity results obtained by Gelfand and Pinsker, and Costa to information-theoretic guidelines for practical code designs to applications. In the talk the two latest code designs were highlighted, followed by application examples in image data-hiding, MIMO broadcast, precoding for interference cancellation, and transmitter cooperation in wireless networks.

During July 20–25 we organized a six-day summer school for IEEE Student Members and other interested members. The topics covered included channel capacity in wireless communications MIMO systems: capacity, linear transmitter preprocessing based on limited feedback, space coding-frequency-division multiple access (SC-FDMA), and signal detection in wireless sensor networks and cognitive radios. The short courses were given by Prof. Lieliang Yang from the University of Southampton, United Kingdom.

On October 22, 2009, we hosted Dr. Mischa Dohler from CTTC, Barcelona, to give a Crash Course on Cooperative Wireless Networks. This course will be an in-depth technical treatment of the latest results having emerged in 2008 and 2009 on cooperative wireless systems. The focus will be on the latest results in application scenarios, definitions and taxonomies, realizable hardware and associated costs, transparent, regenerative and distributed channel modeling, and cooperative physical layer algorithms. The aim of this course is to expose the audience to cutting-edge challenges related to the analysis, design, and deployment of such cooperative wireless communication networks.

ITU/MINISTERIAL SEMINAR/*continued from page 1*

sion and broadcast standards proposed in the strategies.

The conclusions of the Seminar, as well as discussions of different scenarios, were invaluable advantages for administrations preparing strategies. Among other benefits, it was an opportunity for the Republic of Serbia to approve its determination to the newest technologies, MPEG-4/DVB-T2. The solution is based on the fact that there is no free spectra and that the licenses for analog broadcasting will expire in the middle of 2014. It is estimated that the suggested standards will be followed by a broad offer of new equipment next year. Such a choice is a good framework for an efficient digital dividen,d which is to be planned in the near future. Being surrounded by EU countries willing to finish the transition to digital terrestrial broadcasting by the end of the 2011, the Republic of Serbia has chosen 4 April 2012 for its analog switchoff. In the meantime, the government of the Republic of Serbia adopted its strategy on transition from analog to digital broadcasting of television and radio programs on 2 July 2009.

As a conclusion, it should be noted that this meeting has fostered bilateral and multilateral cooperation in the field of telecommunications in the entire Central and Eastern European region.

FUTURICT 2009/*continued from page 3*

tions were also displayed. Besides the technical conference program, two VIP lunches and round table discussions were organized for invited participants. A Conference Dinner, with a small concert presented by Hungarian and Japanese students, was also organized. The number of registered participants was 139, from six different countries. The conference was supported by the National Office for Research and Technology (NKTH) Hungary, but it attracted sponsors (NEC, Panasonic, Sony) from the industry as well. NEC Eastern Europe Ltd. was a Gold Sponsor of the event.

The program, abstracts, electronic versions of presentations, and all conference details are available on the conference web site: http://www.futurict.org/. A small photo gallery of the event was also added. Hopefully, FuturICT 2009 can serve as a first step in a series of joint scientific fora to strengthen future collaboration between Hungarian and Japanese academics and industry.

Global Communications Newsletter

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A publication of the
IEEE Communications Society