Global
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Newsletter

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Robert Aaron Receives the 1999 International Telecommunications "Cristoforo Colombo" Award

Maurizio Decina, Italy

On October 12, 1999, in Genoa, Italy, our IEEE Communications Society Life Fellow colleague Robert Aaron received the 1999 International Telecommunications "Cristoforo Colombo" Award. The accompanying photograph shows Senator Taviani presenting the Cristoforo Colombo Medal to Aaron.

This distinguished international award is devoted, in alternate years, to "Marine, Land and Air Transportations" and "Telecommunications." The award is presented in the name of Christopher Columbus "to the person who has contributed to the discovery, research, or initiative in the technical/scientific, as well as in the social and human areas to the advancement of communications in bringing together collaboration among people." In 1999 the award, granted by the City of Genoa, was devoted to telecommunications.

The citation for Robert Aaron follows: "Mr. Aaron has been for 40 years a world wide reference point for engineers, researchers and scientists in the development of telecommunications networks. Mr. Aaron's contributions helped to provide the basis for the growth of digital communication systems in the world. He has also contributed to reduced bit-rate coding and fast packet switching systems, that are at the core of the current evolution of communications."

The award nomination was warmly supported by the Italian community of engineers and scientists that has benefited from Bob's leadership in the development of digital communications.

Robert (Bob) Aaron received his BS and MS in electrical engineering from the University of Pennsylvania in 1949 and 1951, respectively. He joined Bell Laboratories in 1951 where he worked until his retirement in 1989. Since that time he has been an independent consultant. During his career at Bell Laboratories he was associated with many 'firsts.'

Early in his career he worked on a variety of analog transmission systems designing filters, networks, and repeaters. This included equipment for the first color transmission of the Orange Bowl football game, regulating equalizers for the L3 coaxial system, and system concepts and repeaters for the first repeatered transatlantic cable system in 1956. During the course of the above work he developed the first comprhensive computer-aided design technique, which was published in 1956.

In 1956 he found the digital "religion" and has been an evangelist ever since. He was one of the pioneers in the realization of the first digital communication system, T1, introduced into commercial service in 1962. His role and that of his group was to develop analytical methods for both circuit and system design necessary for the quantitative understanding to support successful system deployment. Publications in

these areas followed in the *BSTJ* and elsewhere in the early 1960s. Indeed, the special issue of the *BSTJ* in January 1962 became the "Old Testament" for spreading the digital religion worldwide.

Following the T1 work, he supervised a group responsible for the exploration of new techniques for high-speed digital systems. In 1969 he became head of a department responsible for exploring new digital technology. His department provided support for the first toll digital switch, #4ESS. The first digital echo canceler chip was designed in his department in the late 1970s. New voice coding algorithms were developed that became the basis for the 32Kb/s coding algorithm that was standardized internationally in the early 1980s. He was instrumental in the move to digital signal processing methods for Time Assignment Speech Interpolation systems, and was responsible for a demonstration of these concepts on an exploratory system between Boston and New York in the mid 1970s.

He quickly recognized the importance of fast packet switching and the work of his department in the late 1970s and formed an alliance with the switching group. This led to a field experiment in the mid 1980s in California featuring packet voice, video, and low bit rate TV. This led to the development by his colleagues of Integrated Access Systems that have been deployed in about 50 countries as gateways to worldwide fiber optic submarine cable systems. In addition, the concept of utilizing the packetized approach for all services in a distributed, flat network was explored in his department in the 1980s and is in 'vogue' today.

During his career he has published about 50 papers and

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– Distinguished Article Series –
From Father Landell de Moura Toward the 21st Century

Michel Daoud Yacoub and Helio Waldman

Pedro II, the second and last emperor of Brazil and a highly educated nobleman, was very keenly interested in technical innovations. In 1876, while on a sojourn to the United States, he made a point of visiting a great exhibition in Philadelphia. It is reported that, when allowed to use a telephone for the first time in his life, he burst out: "My God! It speaks Portuguese!"… One can never be sure of the veracity of historical anecdotes. True or not, however, this one illustrates the belief, deeply ingrained in the Latin American outlook, that technology can only be created in English.

This terrible prejudice was to be belied by Father Landell de Moura, who, in the late 1800s, established the pioneering radio transmission experiment, with a transmitter located in downtown Sao Paulo and a receiver placed in one of its suburbs, some eight kilometers apart. Thus wireless communications commenced. To the overwhelming majority of the scientists and even to the not-so-scholarly portion of the population, for whom Gugliemo Marconi is recognized as having conducted the first practical experiment on radio communication, such an assertion sounds rather unusual, eccentric, arrogant, and bizarre. To some other people, however, that is the legitimate version of the story.

Landell de Moura, born in Brazil in 1861 and educated in a Jesuit school, had always demonstrated a profound interest in science, probably influenced by his grandfather, a Scottish medical doctor. He pursued his scientific studies at the Gregorian University, in Italy, where he was ordained as a Priest. Back in Brazil, he deepened his studies of physics and electricity. His investigations led him to perform many successful propagation experiments, many of them in the presence of the authorities and reported by the local press. The successful transmission of voice over a radio link, as initially mentioned in this article, is reported to have occurred as early as 1893, thus two years before Marconi's well publicized trial. A Brazilian patent for his invention (patent number 3.279) was granted only on March 9, 1901. Despite all his achievements no financial support was received from any kind of source but from some friends only. Somewhat disappointed with the lack of interest in his accomplishments in Brazil, he left the country for a spell in the United States where he reproduced his experiments. There, on October 11, 1904, and on November 22, 1904, three patents for his inventions were granted by The Patent Office: for a wave transmitter (patent number 771.917); for a wireless telephone (patent number 775.337); and for a wireless telegraph (patent number 775.846). The *New York Herald* reported his wireless transmission experiments on October 12, 1902, and his life and work were a subject of a long report entitled "Priest Landell de Moura — inventor of the wireless telephone." At that time he also conjectured on the transmission of image over distances. He was certainly talking about what we know today of television. Father Landell de Moura returned to Brazil, where he was designated Monsignor. He then became famous, but for his extraordinary sermons and only in his Parish. He died on July 30, 1928. Marconi's patent application seems to have been filed earlier than de Moura's, but the question as to who carried out the first wireless transmission experiment remains.

The introduction of modern communications in Brazil dates back to the mid 1800s with the installation of the first public telegraphic network. Starting in Rio de Janeiro, such a network soon expanded to connect the whole Brazilian coast, upholding tens of thousands of kilometers of lines. Radio equipment arrived only in the 1920s and, with the market's growth, local radio industries began to take shape. At the same time, the major foreign companies installed their plants to produce not only radio equipment but also switching exchanges, foreseeing the great potential of the market. It must be emphasized, on the other hand, that these companies depended greatly on the import of the parts. With the outbreak of World War II, imports were severely affected, thus creating a market opportunity for the local electronic industries. The war also spurred the military to invest in R&D, with the partnership of academic institutions.

The prosperous postwar economy promoted the expansion of the telecommunications systems in the country with the service franchises being granted in a non-centralized fashion, by means of both local and state authorities. By the 1960s, as a consequence of such a policy, the telephony market became highly segmented with several hundreds concessionaires providing for poor-quality communications services through archaic equipment. Unification, modernization, and the development of a National Telecommunications Plan were then the aim of the Brazilian Telecommunications Code, a law that conferred to the state the monopoly of Telecom operation and regulation. By the beginning of the 1970s, approximately coinciding with the expiration of the telephony service concessions of the old companies, Telebras, the holding company of the Brazilian Telecommunications System, was created. By means of merging and purchasing arrangements, the number of telephone companies was then reduced to approximately one per state, the long-distance services provision being carried out by only one operator. A Research and Development Center was created (not incidentally named after Father Landell de Moura) targeting the Brazilian empowerment in science and technology. The state telephony companies, the long-distance service provider, and the R&D Center comprised the core of the Telebras.

For a long while, the Telebras System had been meeting its targets very successfully, as long as government investments were still on course. Expanding the network, however, in order to accomplish higher penetration of services and in order to make provision for new communications services, such as wireless communications and high data rate transmission, required more investments than what the government was prepared to sustain. The 1990s arrived accompanied by the privatization-deregulation dilemma. The Brazilian Telecommunications System was eventually privatized in 1998. Telebras was then reshaped into a collection of three regional wireline companies, 10 mobile A-band companies, and one long-distance operator. The A-band wireless communications companies are already facing fierce competition from their B-band counterparts, and the mirror telephony and long-distance provider companies are expected to start operation in the beginning of 2000.

Unlike what happened in the United States in the 1970s, competition is starting in Brazil and Latin America before completion of the universalization of the basic telephone service (POTS), which means that a large portion of the population is not wired yet. While this opens exciting opportunities for wireless systems, both for the provision of mobile services and fixed telephone services (WLL), it does also raise some questions as to the real meaning of universalization in the radically changed environment of the coming century, and as to whether universalization will ever be achieved. In the meantime, the recent growth in the number of Brazilian cellular subscribers has exceeded all expectations: from 600,000 in 1995 to 11 million today.

Most other Latin-American countries had already followed

– Distinguished Article Series –
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about the same paths of deregulation and privatization before Brazil. Chile, for example, privatized its Telecom companies in 1987, whereas Argentina did it in 1990 and Bolivia in 1995. Uruguay, on the other hand, decided not to privatize its state operator, but it is opening the market to competition all the same. No other country, however, had invested so much in R&D during the monopolistic phase as Brazil did through its Father Landell de Moura Research and Development Center (CPqD). The fate of this investment is now being challenged: CPqD was cut apart from its parent Telebras system before privatization, became a private foundation, and must now face competition in a "global" environment against global players.

As we approach the 21st century, we must again wonder whether the new communication technologies will ever speak Portuguese, just like Pedro II did with the telephone in 1876. The Internet does speak English most of the time (or most of its Web pages). This does not come from the technology itself, of course, but from the content-generation capabilities of its user population. It is estimated by the Internet Society that more than 80 percent of Web pages must be read in English. On the other hand, but perhaps partly for this very reason, only 1.6 percent of all Internet hosts in the world are located in Latin America and the Caribbean.

Paradoxically, the language barrier is further compounded by the seamlessness of the global network, as opposed to the old national telephone networks, which were only loosely interconnected on a global scale. On the other hand, the region languages — Portuguese and Spanish — are spoken by much more than one hundred million people each. This is a huge potential, but currently constrained by the lack of content produced in these languages. Tapping this potential is therefore a "chicken-and-egg" type problem with cultural overtones. Poor infrastructure is also a big hurdle for Internet dissemination, but this is expected to improve with new investments in the wake of privatization. The price of Internet access is also a major constraint, which is associated with very low income levels and bad income distribution. Although this is a much more difficult problem to tackle, it may be somewhat circumvented by a larger use of public and institutional accesses.

In spite of these difficulties, there is a general feeling that new communications technologies may have a key role in meeting some of the toughest public policy issues in Brazil and Latin America. The foremost challenge is, of course, education. There is now a strong demand and need to strengthen, improve, update, and expand the educational opportunities offered to the population of Brazil. How and to what degree can the new technologies help in this endeavor? Finding the best possible answer to this question implies the identification of the appropriate technology for each educational challenge, training teachers and students alike in the proper use of the technology, and stimulating the production of educational content.

Other public policy issues that may benefit from new communication technologies are health care, security, and transportation. In the private sector, the banking industry has long been a very strong investor in information technologies, and home banking no longer constitutes any novelty. There is also a great potential for the use of new technologies in security applications.

Of course, the dissemination of these technologies has a negative impact on the employment rate. It is estimated that the automatic teller machines have already eliminated one half of all bank clerk jobs in Brazil. Automatic pay machines now menace fare-collecting jobs in the huge bus transportation system of Sao Paulo.

In developed countries, the loss of jobs to information-processing machines is, at least partly, offset by the jobs created for the development of new technologies. Developing countries, however, tend to keep only the negative terms of this equation, as globalization compels them to receive technology from abroad in a ready-made fashion. The danger of this approach is, of course, that the general public may come to see technology in a negative way only.

In order to avoid this, it is most important that Brazil and Latin America have a larger, more active participation in the construction of the Knowledge Society. Today, multinational corporations that are coming to this region to do business would like to be seen as truly "global," and not just "foreign." This will be possible only if and when Latin American societies feel that they are receiving the full benefits of what technology has to offer mankind. As a truly international organization committed to the promotion of information technologies, IEEE should have an important role in this undertaking.

Local governments must also act. For this purpose, Brazilian General Telecommunications Law dictates that two special funds be created: a Fund for Technological Development in Telecommunications, and a Fund for the Universalization of Telecommunications Services. These funds are expected to become operational before the end of 2000. They should be able to restore some of the government capacity to formulate and carry out a social policy for telecommunications in Brazil. In a country blessed with a common language and culture, but beset with so much geographical and economic isolation, this is amply needed.

Region 9 Chapters Meeting in Rio

By Jose Antonio de la O, Chapter Chair, Monterrey Section and Carole Swaim, Sr. Administrator, Executive & Volunteer Services

Rio de Janeiro, the "marvelous city" surrounded by mountains, touched by sea, and warmed by tropical weather, turned into the host city of GLOBECOM '99, "Seamless Interconnection for Universal Services," from December 5 to 9, 1999. This was the first time a GLOBECOM was held in Latin America, and provided a perfect opportunity for chairs and representatives of ComSoc's Latin America Chapters to get together. The "Region 9 Meeting" (as we called it) allowed us to discuss (among other topics) our operating plan and budget for year 2000. The initiative was supported by our Board of Governors and especially by Ron Horn, our 1998-99 Vice President/Membership Development.

We met on Monday afternoon (December 6) in a sunlit room of the Inter-Continental Hotel; light refreshments were served. Among the chapter chairs (or their representatives) who attended were Tania L. Quiel (Panama), Edita Hernandez (CapituloEstudiantil, UNAM, Mexico), Eduardo S. Vera (Chile), Jorge Pardias (Guadalajara), Armando A. Meja Gonzalez (Peru), and Jose Antonio de la O (Monterrey). Other volunteers from Latin America included Bruno Vianna, Chair of the Latin America Conference Board, Pablo Omonte from our Membership Programs Young Members Committee, Nelson Fonseca, Editor of *Glob-*

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REGION 9 CHAPTERS MEETING/*(Continued from page 3)*

al Communications Newsletter, and Abraham Alcain. (Leonor Wilches-Chaux, our Director/Latin America, was unable to be present.) Several of our Board of Governors and ComSoc staff attended as well, bringing our total to nearly 20 attendees.

Ron Horn welcomed everyone and reviewed the agenda. We then listened as Carole Swaim discussed the benefits that ComSoc offers its chapters. Her presentation was followed by personal presentations from every attendee, which included descriptions of the activities and events of each individual chapter in 1999. This experience was wonderful because we learned a lot about ourselves, and especially that we are not alone and that we have many things in common. Most of our Latin American chapters are young, not more than three years old. The particular situation our Latin American countries face at the present time concerning telecommunications currently is of vital interest to all of us. Finally (and perhaps mostly) we all felt that personal contact with each other is still necessary and still very important — it cannot be replaced by electronic links.

Our Region 9 Meeting was followed by a Local Member Reception, hosted by Ron Horn and attended by around 75 people. It was held in the same multi-windowed room, treating us to a wonderful view of a sunset over Sao Conrado Beach. A primary topic of the Local Member Reception was the importance of the "will" of communicating, which is the "motor" of communication. Another essential part of communicating is the "possession" of an idea, or a project, or a new initiative. The integration of members of a chapter can serve as an example: chapters are small social cells that need more than a means of communications (i.e., the Internet), but need also a plan or initiative, and then the ability to execute the plan. The Internet serves only as a vehicle for providing information, which then needs to be utilized. Without a plan we cannot make things happen.

ComSoc chapters within and throughout each of our 10 Regions must try to set up a means of communication, begin "talking" to each other, and then keep the lines of communication open by "staying in touch."

AARON GIVEN INTERNATIONAL AWARD/*(Continued from page 1)*

has been issued more than a dozen patents in the fields of circuit theory, computer-aided design, information theory, and communications circuits and systems. Several of his papers have been reprinted in benchmark and tutorial collections and some of his poems have "crept into" technical journals. He has participated in many conferences, as a speaker, session chair, conference chair, and banquet speaker. He has been guest editor or co-guest editor of three issues of the *IEEE Transactions on Communications* and three issues of the *IEEE Communications Magazine.*

His activities in the IEEE began as an undergraduate when he was President of the Student Chapter of the IEEE forerunner societies — IRE and AIEE — at the University of Pennsylvania. He helped start what is now the Automatic Control Systems Society and was its first Papers Review chairman and Secretary. He was active in the Circuits and Systems Society in many roles culminating with its Presidency in 1973. His activities in the Communications Society have been broadly based for about four decades. In the parent IEEE he has served on TAB, the Finance and Publications committees, and various Awards Boards.

He has received several awards during his career. He was elected a Fellow of the IEEE in 1968. In 1978 he was a co-recipient of the IEEE Alexander Graham Bell Medal and he was elected to the National Academy of Engineering in 1979. In 1984 he received an IEEE Centennial Medal and in 1985 he was awarded the Communications Society McLellan Award. In 1988, the C&C Foundation in Japan awarded him a C&C prize. In 1997, his colleagues in the Communications Society presented him with a Lifetime Service Award with the inscription, "Bob Aaron, our Mentor, With Affection and Respect." His present interests include broadband communications, technology forecasting, strategic planning, and digital signal processing.

He has been involved in many community activities over the years. When his children were in elementary school he served on an Advisory Council to the local school board in the 1960s. In the 1970s he served as a tutor under the aegis of the NAACP. He has an interest through the Union of Concerned Scientists in the preservation of the environment. Presently he is involved in The International Myeloma Foundation, a group aimed at education and support of those afflicted with this form of cancer. He has volunteered at the local Cancer Institute helping patients to understand and cope with their disease.

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