
Global Communications Newsletter

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A New Structure to Strengthen ICT Research in Northern Italy

By Giancarlo Pirani, Italy

Torino is the Italian city that combines a significant presence in telecommunications with the automotive sector. It is witnessing the birth of a number of initiatives devoted to promoting and sustaining R&D in the field of ICT and mobility. In this growing wireless ICT District, an excellence center for R&D in telecommunications and information technology was built and given a name that celebrates an outstanding Italian scientist in electromagnetic fields theory, Professor Mario Boella.

The Istituto Superiore Mario Boella (ISMB) was established in July 2000 with founding members Compagnia di San Paolo and Politecnico di Torino, joined in April 2001 by other industrial partners (see <http://ict.polito.it>).

The mission of the Institute includes strengthening ICT research, high-level education, and technology and research intelligence in business and society.

The most relevant goals of ISMB are:

- Building an European ICT pole of excellence
- Promoting growing integration among subjects operating in ICT in highly innovative projects and programmes
- Enhancing synergy between universities and the socio-economic system
- Promoting new entrepreneurial activities in the ICT area
- Reinforcing the growth and diffusion of ICT culture

The creation of the ISMB is the result of a joint strategy of one of the most significant bank foundations in Italy, the Compagnia di San Paolo, and one of the most renowned technical universities in Europe, the Politecnico di Torino. This innovative union led founding members to establish a set of goals and research strategies based on tight cooperation with industrial partners. Thanks to the Institute's growing capability to support and create highly innovative initiatives, STMicroelectronics, Motorola, Telecom Italia Lab (TILAB), and Cerved decided in April 2001 to become regular members of the Institute in order to develop industrial strategies.

Research and Development

Research activities are developed in cooperation with Politecnico di Torino and other industrial partners to become a well-known R&D centre at the European level (among Europe's top five).

Initially, ISMB promoted integration between academia and the socio-economic system through innovative research. Then it promoted great strengthening of research laboratories in partnership with Politecnico di Torino, creating a cluster of laboratories in ICT (particularly focused on wireless and e-security areas).

The configuration of the laboratory cluster (in a new dedicated 4000 m² area) includes Wireless Lab, Antennas and EMC Lab, e-Security Lab, and Photonic Lab.

The Wireless Laboratory will host the Center of Excellence in Multimedia Wireless Communications in partnership with Politecnico di Torino. The Center was founded in 2001 with funding from the Italian Ministry of Education and Research, and has the aim of developing medium- to long-term research in strict cooperation with industry. It gathers together all the skills and excellence in research on wireless systems bred by the traditional long-lasting activity of the Politecnico itself.

The Antennas and Electromagnetic Compatibility Laboratory (LACE) deals with experimental research on antennas, passive and active microwave circuits, and electromagnetic compatibility. Tests, calibrations, and certifications are also carried out in such areas.

In particular, LACE will carry out the activity of analysis, design, construction, and measurements of antenna prototypes, in particular for the new applications in the area of telecommunications; in EMC research, modern structures of stirring rooms will be tested, as well as methods of measurement to characterize the EMC behavior of active and passive integrated components and printed boards and electronic systems for both emission and immunity problems.

The e-Security Laboratory supports the cluster by providing the required knowledge in the area of network security, a fundamental component in every network architecture. Network security is especially relevant in the design of wireless networks, where several specific topics have to be addressed (authentication of wireless devices, dynamic IP address assignment, etc.).

The ISMB e-Security Laboratory, as well as the other laboratories of the cluster, is expected to work in tight cooperation with the security group of Politecnico di Torino and other research centers (e.g., TILAB) in the field of telecommunications, security assessment of wireline and wireless networks, user authentication, and so on.

The Optical Communications Laboratory pulls together top-level expertise from four university research groups, covering the following fields in optical communications: materials, active and passive components, transmission systems, and communication networks. It is a large facility (about 300 m²) in clean air, equipped with a clean room, separate machine shop, and electronics workroom, plus a large optical experiment room whose floor is entirely built on large springs. The laboratory has state-of-the-art equipment and is staffed by 15 people. The four member groups are already involved in a number of national and European research projects and work on several research contracts with leading companies. The ambitious goal of this initiative is that of vertically integrating knowledge in the broad field of optical communications, through the close interaction of interdisciplinary groups. This

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11th IST Mobile and Wireless Communications Summit 2002

By N. Pavlidou, E. Papapetrou, and G. Dimitriadis, Greece, and
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In the context of the EU Research and Development Programs, the European Commission has always considered the domain of wireless and mobile communications [1] a key priority research area, whose results are made public through a series of annual conferences going back to 1992. The 11th Information Society Technologies (IST) Mobile and Wireless Communications Summit took place June 17–19, 2002 in Thessaloniki, Greece. Today it is the largest European conference dedicated to R&D issues in the context of mobile and wireless communications, attracting large participation from R&D experts in mobile communications from more than 80 IST projects and beyond, representing major telecommunications operators, service providers, equipment manufacturers, universities, and research centers. This year the conference was dedicated to the expansion of the wireless universe, and addressed the technologies, services, and applications to anticipate the next generation of wireless systems and networks.

2002 is considered an important year for the IST program of EU funded R&D [1] since many projects are reaching their final phase. As a result, a number of prototypes were demonstrated at the Summit. Summit attendees represented a broad spectrum of the wireless research community from more than 20 European countries (including states newly associated to the EU), North America (United States and Canada), and the Far East (Japan, Korea, and Thailand).

The response to the Call for Papers (CFP) was very encouraging with more than 200 papers submitted to the peer review process (three reviewers per paper). Among them, 160 papers were accepted and constituted the main body of the conference in 25 state-of-the-art technical sessions (three parallel tracks and one poster session). The papers presented the latest achievements and developments in mobile, wireless, and satellite communication worldwide. The main topics addressed in the summit are briefly presented next.

Cellular systems (e.g. GSM/GPRS, UMTS), with more than 1 billion users worldwide, are evolving in the wake of GSM's success. Operators, manufacturers, and service providers are currently deploying third-generation (3G) systems.

Digital broadcasting systems based on DVB (DVB-S available worldwide and DVB-T currently deployed in Europe) and DAB are well established. The foreseen evolution path of these systems includes optimized Internet transport and interactivity, mobility support, and development of overlay networks coupled with cache and content delivery networks to optimize distribution of contents.

Wireless local area networks (WLANs) are rapidly being deployed. Research carried out in Europe has significantly supported the development of the HiperLAN/2 standard. Activities targeting the development of WLANs in bands ranging from 17 to 60 GHz are picking up. The use of ultra wideband (UWB) technologies for such purposes is now also being considered.

Satellite systems are successfully addressing the broadcasting and niche markets for fixed and mobile services. Ongoing and jointly sponsored ESA and IST activities have identified the provision of mobile or fixed interactive broadband services as a promising evolution path, building on the competitive edge of satellite systems for broadcasting and multicasting.

Fixed wireless access systems have been recognized by the e-Europe action plan as a potential alternative for broadband access networks, stimulating access to broadband for all people. R&D has aimed at achieving a low-cost radio access system for the mass market in the 40 GHz band, where harmonized spectrum has been identified by CEPT/ERC. Innovative solutions based on advanced technologies and/or

innovative architectural concepts, such as base station remoting, optical beamforming, and the integration of different broadcast and mobile systems are also being studied.

With the ever increasing microprocessor cost/performance ratios, the availability of efficient smart power sources and low-power displays, wearable multimedia devices, onboard computing systems, nano sensors, and the miniaturization of body implants, wireless connectivity will be extended and will foster the emergence of body and personal area networks. This also opens new perspectives for seamless interconnection with health, transport, and home automation information systems through terrestrial or satellite-based infrastructures, with significant social and economic benefits.

Reconfigurability is and will continue to be a key enabler for the evolution of the wireless landscape. It has notably been researched in the context of the ACTS and IST programs, where pioneering work has placed European researchers and industry in a position of uncontested leadership. Reconfigurability cuts across all types of radio systems enabling the integration on demand of many systems in the same platform and will provide increasing flexibility, reducing deployment as well as operation and maintenance (O&M) costs, creating new business opportunities, and facilitating soft upgrades and personalization.

Because of the dominant role of the Internet and the foreseen proliferation of IP-enabled devices, optimized support of IP is on the critical path for the evolution (and integration) of a variety of wireless systems. Many aspects of the wireless Internet have been addressed in the context of the IST Program. However, many new challenges were identified, notably in resource management, mobile IP, QoS, security/privacy, and IPv6.

The program of the Mobile and Wireless Communications Summit was designed to allow participants to gain an understanding of the key research results generated by a large number of EU-funded research projects participating in the event. As the current phase of R&D ends and preparations for the Sixth Framework Program [2] are ongoing, it is now essential to set the scene for the next generation of mobile and wireless technologies and applications. Europe has taken the commitment to create a competitive and dynamic knowledge-based economy able to offer its citizens better and lower-cost access to information infrastructures and knowledge-based services. Wireless technologies will be instrumental to achieving this goal.

In addition to the main technical discussions, a lot of special events strengthened the quality of the conference. The plenary session on June 17 was opened by Dr. Iacovos Vasalos, director of the Centre for Research and Technology Hellas (CERTH), who welcomed the participants. Four keynote speakers addressed, respectively, the status and development perspectives of the wireless communications market in South Eastern Europe (Dr. Konstantinos Tsoukalidis, vice chair, Intracom S.A.), mobile applications in Japan (Dr. Takeshi Natsuno, managing director, NTT DoCoMo Inc), mobile connectivity vs. content (Prof. Andrew Odlyzko, Univ. of Minnesota-Digital Technology Center), and WWRF findings (Dr. Ralf Tonjes, Ericsson Eurolab Deutschland).

A panel session on ubiquitous communications followed by a roundtable was organized on June 18 addressing critical technological aspects of wireless systems beyond 3G. The session was chaired by Dr. Giovanni Colombo (vice president, Research & Innovation of Telecom Italia Lab) who offered the introductory lecture on research challenges for systems beyond 3G. Dr. Colombo's introductory speech was then followed by presentations by Dr. Peter Karlsson (Telia Research

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Telecommunications Market Consolidation: A New Competitor at Polish Market?

By Artur Iason, Poland

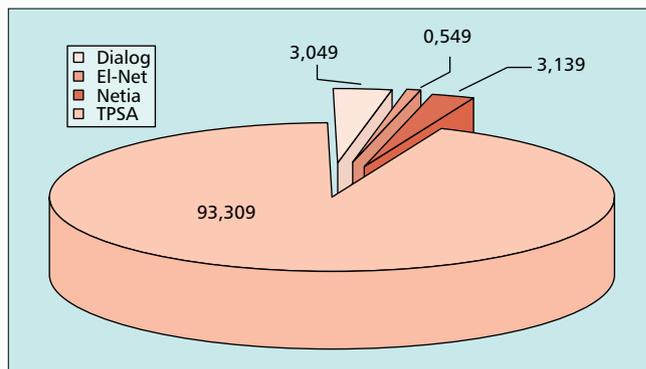
The Polish market in telecommunications services is one of the biggest in Central Europe; with a population of about 38 million and a noteworthy telecommunications services growth rate, it is considered an interesting opportunity for investors. The dominant telecommunications operator in Poland, Telekomunikacja Polska SA, is already controlled by a group of investors led by France Telecom that acquired 47.5 percent of stock, and it is widely expected that in 2002 the Ministry of Treasury will sell the next 2.5 percent plus one share.

The market for telecommunication services in Poland has grown significantly in the last few years, from a fixed line density of about 15 percent in 1995 to 26 percent in 1999 and almost 30 percent by the end of 2001. Optimistic prognoses assume continued growth of the fixed line market up to a density rate of about 40–42 percent in 2004. Some other sources are more skeptical and estimate that the scale of new telephone line development will decrease due to the overall economic slowdown. Taking this into account, fixed line density in 2004 is forecast at the level of 35 percent.

The number of mobile subscribers was estimated to be 3.9 million in 1999 (10 percent penetration); it rose up to 6.6 million subscribers in 2000 (17 percent penetration) and up to almost 10 million by the end of 2001 (25.8 percent). In March 2002, the total number of mobile telephony subscribers exceeded the number of fixed telephone lines operated by the incumbent telecom operator in Poland Telekomunikacja Polska S.A. It is expected that by the end of 2002 the number of mobile subscribers will reach 13.5 million and a penetration rate of 35 percent.

On the basis of data provided by the Public Opinion Poll Centre, it is estimated that approximately 4.9 million people in Poland use the Internet; three fourths of this group do it on a regular basis.

The Polish telecom market is still underdeveloped, and the possible demand for telephone lines, Internet access, and data transmission services still justifies investments in telecommunications infrastructure in Poland. The Polish Ministry of Treasury is planning the consolidation of the Polish telecom market around the telecommunications service provider Tel-Energo SA to breach the dominant position of the incumbent telecommunications operator. Tel-Energo mainly offers services based on the lease of domestic high-data-rate digital cir-



■ Figure 1. The structure of the Polish fixed line telephony market based on number of subscribers.

cuits and IP/MPLS data communications. The next potential members of the new National Telecom Group (NTG) are Telefonía Dialog, Netia Telekom, and the telecommunications group of Elektrim.

The new telecom group is expected to stimulate competition in the market dominated by TPSA. However, the total share in the fixed line market in Poland of all new telecom operators is evidently low; their ability to successfully compete with TPSA is under question. The position of NTG would be much stronger in data transmission and Internet services due to the reasonable market share taken by Tel-Energo and other partners in NTG. According to data provided by Teleinfo, Tel-Energo reached a 16 percent share of the Polish data transmission market.

NTG, operating the network constituted on a base of the telecommunications infrastructure of all NTG members, is the only potential competitor of TPSA. The need for enhanced competition in the Polish telecom market is obvious, and was also noted in the strategy of development of an information society approved by the government of Poland, ePoland. Is it possible to reach this goal only through the merging or close cooperation of local exchange carriers? The answer will be known very soon.

Mobile & Wireless Communications Summit (cont'd)

AB) on the integration of WLAN and cellular networks, and Dr. Alastair John Angwin (IBM UK) providing an overview on future developments in ubiquitous computing applications. Mr. Gary Clemo (Toshiba Research Labs) completed the series of presentations with a talk on the future role of ad hoc and peer-to-peer networking. On the same day, a brokerage event was organized, providing the participants with an unparalleled opportunity to understand the principles and instruments underpinning the 6th Framework Program of EU funded R&D, as well as to discuss and shape what will become the major research topics in mobile and wireless communications for the next four years.

Thanks to the conference sponsors, Vodafone, Cosmote, OTEnet, OTE, INTRACOM, and others, participants were offered free Internet access (including access to the Summit Web server, containing proceedings and presentations) using their PCs via WLAN. Moreover, colleagues who could not attend the conference had the opportunity to view the June 17 opening plenary session broadcast on the Internet.

The conference attracted the attention of other EU domains, research resulting in a number of meetings also taking place in Thessaloniki prior to or following the Summit, such as the meeting of the Technical Committee on Telecommunications and Informatics of the European COST framework of cooperation [3]. These adjunct activities led to better dissemination of similar research trials in Europe and paved the way for more stable collaboration.

In light of the above, we can conclude that the 11th IST Mobile and Wireless Communications Summit fulfilled its objectives. The conference was well attended, and participants provided useful feedback to improve the event, once again reaffirming the need to continue this annual event. All papers and presentations of the panel sessions are available in the publications area of the European Commission DG Information Society [4].

Preparations for the next Summit have already started, and the 12th IST Mobile and Wireless Communications Summit (Continued on next page)

is believed to improve the quality of the research carried out and to create a substantial competitive advantage with respect to other research groups, both national and international.

Torino Wireless

The tight link of ISMB with industrial and social/economic environment was the background of the first wireless technological district, which is being developed in 2002.

ISMB has been selected as the dedicated and strategic structure for the Torino Wireless District.

Torino Wireless is a project for the creation of the first technological district as the result of relevant participation of the Italian government, Piedmont government bodies, and important ICT companies.

The mission of Torino Wireless is to create an area of excellence in Turin. Wireless technology competencies already existing in some local R&D centers are the backbone of the initiative, covering about 30 percent of total research.

Three main action lines have been identified:

The improvement of an excellent wireless R&D center together with wireless higher education competencies that will hopefully attract the best international talents and generate innovative high tech ideas

The launch of initiatives to accelerate the economic impact of innovative ICT ideas by

Creating startups

- Accelerating the growth of SMEs focused on ICT
- Facilitating talent tracking for innovative companies
- Supporting startups during initial operations

The creation of a venture capital fund for investments in ICT, based on public and private money

A financial investment of €130 million in five years is required to launch and sustain Torino Wireless; this invest-

ICT Research in Northern Italy (cont'd)

ment is being provided by both national and local public institutions, by some outstanding ICT companies and financial institutions; all these parties have signed a preliminary Memorandum of Understanding (MoU) on December 11, 2001.

The parties interested in the MoU are Fiat, Telecom Italia, Alenia, Motorola, STMicroelectronics, Chambers of Commerce of Torino, Politecnico of Torino, University of Torino, Compagnia di San Paolo, Fondazione CRT, Unione Industriale, San Paolo IMI, Unicredito, Piedmont Regional Government, City Council of Torino, Country Council of Torino, and the Ministry of University and Research.

Istituto Superiore Mario Boella has the role of reinforcing the vision skills to better strengthen capabilities to produce innovative research in the wireless sector.

The most important objectives defined by the committee that steers Torino Wireless are:

- To double in 10 years the ratio between ICT and GNP
- To triple the number of researchers
- To stimulate the birth of innovative companies known internationally (by giving birth to 50 companies at least)

The above-mentioned budget is likely to be divided among the three action lines as follows:

- R&D: €35 million
- Acceleration: €25 million
- Venture capital: €70 million

High-Level Education

The know-how acquired in R&D is used to support high-level education activities by creating a virtuous circle of research, technology transfer, and education.

A significant importance is given to education review related to market evolution, new professional skills, and R&D requirements: ISMB has promoted a Master's degree in e-business (3rd ed.) and has evaluated multimedia technologies for innovative training. It has also supported educational initiatives with foreign universities for Politecnico of Torino, such as ALPIP Technological Master (in cooperation with universities in Latin America), Eurecom (an education center in Sophia Antipolis, France), and TOP UIC (Master of Science degree of the University of Illinois, Chicago at Politecnico di Torino).

Technology and Research Intelligence for Business and Society

To promote new entrepreneurs in ICT and create enterprise innovation, ISMB has focused on research activities and education on high innovation themes and on socio-economic aspects.

In 2001, ISMB has particularly investigated e-business and new economy topics in some projects: REGIONAL (an EU Information Science Technology R&D project on the use and diffusion of new technologies in Europe), NINEVEH (a project that settles a knowledge base to support university decision makers in introducing ICT in education processes), and the Global Access Program in partnership with the Anderson School of Management at UCLA to support international growth of startups.

MOBILE AND WIRELESS SUMMIT/(Cont'd from page 3)

will take place in Aveiro, Portugal, June 15–18, 2003. The Call for Papers is already published at the Summit home page [5].

References

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