

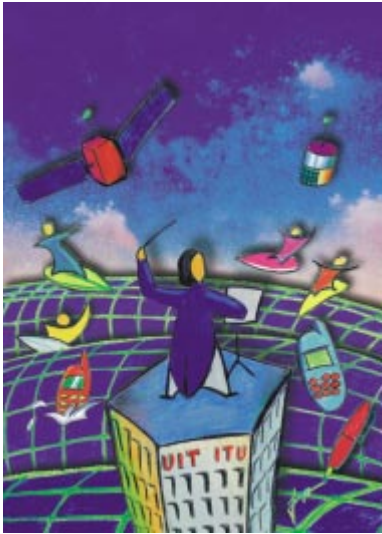


ITU NEWS

APRIL 2000

INTERNATIONAL TELECOMMUNICATION UNION - Issue No. 3/2000 - ISSN 1020-4148 - <http://www.itu.int/itu-news/>





Cover: Design: Nicolas Stäuble (ITU)

ITU News: ISSN 1020-4148
<http://www.itu.int/itu-news/>
10 issues per year

Editor-in-Chief (ad interim):
Patricia Lusweti
Production Editor (English):
David Gray
Production Editor (French):
Christiane Beudet
Production Editor (Spanish):
Alfredo Ponce
Art Editor:
Dominique de Ferron

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Editorial Office:

Tel.: +41 22 730 52 34
Fax: +41 22 730 53 21
Telex: 421 000 uit ch
X.400: S=itunews, P=itu,
A=400net, C=ch
Internet: itunews@itu.int

Subscriptions:

Tel.: +41 22 730 52 34
Fax: +41 22 730 53 21

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ITU NEWS

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TELECOM AMERICAS 2000

and the future of the region



It is a great honour for us, as Brazilians, to host ITU AMERICAS TELECOM 2000, the first ITU regional event to be held in the new millennium. I am sure that Rio de Janeiro, the stage of our meeting and hometown of ITU's Deputy Secretary-General, Roberto Blois, will be more beautiful than ever, offering its best to all the decision-makers, exhibitors, delegates and visitors who will be joining us from all over the world.

As Brazil's Minister of Communications, I am proud to announce the success and achievements of the telecommunications sector since our last gathering in Rio in 1996. I am assured that this success will inspire TELECOM AMERICAS 2000 as a landmark of an even more promising phase to come.

Indeed, telecommunications are changing dramatically the face of the world, laying the foundations of the information society. Over the last years, telecommunications have become the source of several changes in the way people get information, do business, research, or interact with each other.

This ever-growing strategic importance of telecommunications has made it perhaps the most wanted good by nations and people alike. It is, therefore, not surprising that the Rio

exhibition is likely to display an unprecedented set of telecommunications-related products and services meant to feed an immense and fast-growing technology-hungry market.

Alongside the exhibition, TELECOM AMERICAS 2000 will also host a Forum that is always an opportunity for the sector's leaders and experts to discuss new ideas and trends so that the world can reap the full benefits of telecommunication breakthroughs.

We, in Latin America in general, and in Brazil in particular, are undergoing a series of transformations aimed at modernizing our countries and improving the quality of life of our people. The privatization process that swept across the continent has brought about some already noticeable good results: lower prices through competition and better services through technical innovations.

In Brazil, the privatization of the then State-run holding called *Telebrás* resulted in the biggest bid ever carried out on the planet. Of course, the Brazilian Government counted on ITU's technical support to render the privatization process possible. Besides, this process created our Regulatory Agency, *Agência Nacional de Telecomunicações* (ANATEL), which now makes sure that the companies operating in the Brazilian telecommunications market are meeting the goals of competition, universal or global access, and quality of service with low prices.

So far, our experience is proving to be successful. By year-end 2000, we will have installed 25 million fixed terminals. Operators will have to install at least one public telephone in every locality with more than 100 inhabitants. From December 2003 onwards, this plan will reach localities with over 300 inhabitants.

All of these developments and much more, clearly show that the continent's developing countries are on the right path. I am delighted to invite you all to come and see the region's recent achievements in the telecommunications sector and the great opportunities it offers.

João Pimenta da Veiga Filho
Brazil's Minister of Communications

Focus on the Americas



Since the International Telecommunication Union last staged the AMERICAS TELECOM event in Rio de Janeiro in 1996, enormous changes have been taking place right across the region's telecommunications landscape.

In spite of real GDP growth being flat or down in most economies in Latin America over the 1998–1999 period, as well as there having been widespread currency devaluations, telecommunications growth is strong throughout the region.

Evidence of this will be dramatically on show at ITU's fourth event for the Americas region, ITU TELECOM AMERICAS 2000, which is being held in Rio de Janeiro from 10 to 15 April. It will be

one of the biggest telecommunication events in the Americas in the year 2000, and will highlight the great changes affecting the industry.

Privatization, liberalization and deregulation have been continuing steadily since 1996, and have contributed — along with the introduction of competition in many of the region's markets — to a rapid increase in the number of people with access to telecommunication services.

Most spectacular has been the boom in cellular telephony — in Latin America and the Caribbean as elsewhere around the world. Equally spectacular has been the sudden growth in usage of the Internet in the region.

With new, cheaper technology coming on stream and competition taking an ever firmer



Most spectacular has been the boom in cellular telephony — in Latin America and the Caribbean as elsewhere around the world

Anthropologist at Machu Picchu (Peru) Photo: Lars Ålström (ITU 980148)

hold, the prospects for the region's telecommunications sector remain excellent.

Fixed-line connections

By the end of 1998, the 800 million people of the Americas region as a whole were served by some 258 million main telephone lines, giving an impressive overall teledensity for the

2000, fixed-line teledensity in Latin America and the Caribbean is forecast to top 15 per cent, giving the region more than 80 million fixed telephone lines.

Cellular subscribers

Perhaps the most dramatic telecommunications success story in the region has been the extraordinary uptake of cellular telephony. With full mobile competition now having been introduced in the region's largest markets (Brazil, Mexico and Argentina), ITU predicts that the number of mobile subscribers will have overtaken the number of fixed-line subscribers in these markets by the year 2005, and probably earlier.

In the United States and Canada, the number of subscribers more than doubled from 36 million at the end of 1995 to 74 million by the end of 1998. In Latin America and the Caribbean, the growth rates continue to be even more impressive — the number of subscribers there grew more than fivefold in the same period, from just 4 million in 1995 to over 22 million by the end of 1998. By September 1999 that number had grown to 28.6 million, and is forecast to surpass 40 million in the year 2000. This would give Latin America and the Caribbean more subscribers than there were in the United States and Canada just five years earlier.

One of the biggest drivers for new growth in the region is pre-paid subscriptions. These allow consumers to manage their consumption in a controlled way. At the same time they offer operators a simple means of providing services to lower income users without the need for expensive and time-consuming credit checks. Pre-paid subscriptions also secure payments from customers in advance of the service being provided, which greatly facilitates the collection of charges.

In Brazil — where 40 per cent of the region's cellular subscribers are to be found — pre-paid subscriptions are now being integrated with banks so that phones can be recharged from automatic telling machines.

Rushing onto the Internet

As impressive as the uptake of mobile cellular has been the region's rush onto the Internet. At the end of 1995, there were just 56 400 Internet hosts in the whole of Latin America and the Caribbean. Three years later, that figure had grown



During 1999 more than 5 million new main lines were added in Brazil alone, bringing the total there to 27 million Sao Luis do Maranhao (Brazil) Photo: Jean-Marie Micaud (ITU 950088)

region of 32.3 per cent. That figure, however, is skewed by the fact that 198 of those 258 million lines are in the United States and Canada. While this leaves half a billion people in Latin America and the Caribbean with just 60 million main lines between them for a teledensity of only 12 per cent, that is where growth has been strongest, averaging over 10 per cent per year, compared to under 3 per cent per year in the United States and Canada. During 1999 more than 5 million new main lines were added in Brazil alone, bringing the total there to 27 million. By year-end

nearly tenfold to 489 200 hosts. By the time you read this article the region's millionth Internet host will be online; with two million forecast to be up and running by the end of the year 2000.

By the end of 1999, it was estimated that the number of Internet users in Latin America and the Caribbean had nearly doubled from a year earlier to over 12 million.

Returns on investment

Telecommunication operators in Latin America and the Caribbean invested more than USD 50 billion in their networks in the four years to 1998. Telecommunication revenues were up 59 per cent during the period, from USD 29 billion in 1995 to 46 billion in 1998. Continuous and increased investment now depends on the policies governments are putting in place to foster development.

The region represents an excellent telecommunication investment opportunity, with huge

unmet demand for telecommunication services and a regulatory regime in place in many countries that now favours investment as well as competition in some if not all sectors, thus driving down costs of services to consumers and improving access.

However, pricing will continue to be a determining factor in telecommunications development. The rapid further increase in the number of people able to access telecommunication services in the region will therefore depend on governments and regulators adopting policies that will encourage carriers to make services affordable for the masses and not just the privileged few.

The shape of the future

More competition in most market-places in the region looks set to continue to help drive growth over the coming years. This will likely be enhanced further by new developments in mobile cellular technology, and in particular by the transition to third generation systems.

Third generation standards, made possible by ITU's groundbreaking work in IMT-2000 (see <http://www.itu.int/imt/>), will enable mobile users to harness the full power of the Internet through efficient high-speed wireless transmission optimized for multimedia communications. With the ever-increasing demand for mobile data, ITU predicts that in the next few years (certainly by the year 2010 and probably much earlier) the number of mobile subscribers worldwide will overtake the number of fixed-line subscribers.

If the region continues its spectacular uptake of mobile telephony and continues to rush onto the Internet, then it seems probable that cellular subscribers will overtake their fixed-line counterparts in Latin America and the Caribbean even earlier than in many other parts of the world.

For further information, please contact the TELECOM Secretariat (Tel.: +41 22 730 6161. Fax: +41 22 730 6444) or visit the TELECOM website (<http://www.itu.int/ITUTELECOM>).

For media representatives, please contact the TELECOM AMERICAS 2000 Press Service (Tel.: +41 22 730 5599. Fax: +41 22 730 6444).



By year-end 2000, fixed-line teledensity in Latin America and the Caribbean is forecast to top 15 per cent, giving the region more than 80 million fixed telephone lines

Buenos Aires (Argentina)
Photo:
Lars Ålström
(ITU 980161)

Dark fibre

key in race to link Latin American markets

A new study by The Phillips Group*, the international telecommunications consultancy, has found that dark fibre is the key in the race to link countries in Latin America. Dark fibre refers to optical fibre infrastructure (cable and repeaters) that is in place but not being used. Optical fibre conveys information in the form of light pulses. "Dark" means that no light pulses are being sent.

Much of the fibre currently available is controlled by utilities in the region, who could collectively move to establish a pan-American network. Main utility companies, such as electricity, gas and water, own telecommunications infrastructure along their routes. For example, electricity companies roll fibre-optic cable on pylons, originally for their own use. With deregulation they have been "invited" to participate in the telecommunications market by means of leasing these fibres. As a result, a good number of them have become either carriers, carrier's carrier or even carrier service providers — depending on how deregulated the market is in which they operate.

Latin American utilities own a good bulk of fibre and are active participants in the telecommunications market. Results of an extensive survey across nine countries, re-

veals significant reserves of dark fibre of varying quality (see Figure 1). In common with developments noted in other regional studies by The Phillips Group, utility companies often control

large segments of dark fibre networks. Latin America is no exception, but the study found evidence of a significant volume of fibre lay planned by new players particularly in metropolitan zones.

However, regulation and availability of rights of way from country to country reveal marked differences that

sometimes militate against new entrants. Applications to build new networks were often subject to convoluted approval procedures — Chile and Argentina were the exception. The study identifies the process and governance of these procedures in each of the countries surveyed (Argentina, Brazil, Colombia, Chile, Dominican Republic, Mexico, Panama, Peru, and Venezuela).

"Fibre-optic network deployment driven by deregulation taking place across the continent will precipitate the evolution of a wholesale market and create enormous opportunities for

new market entrants", commented Pablo Diantina, Research Consultant for Latin American Markets and lead consultant for the study at The Phillips Group.

Further new capacity will become available

Much of the fibre currently available is controlled by utilities in the region, who could collectively move to establish a pan-American network

* For more information, please contact: Tel.: +44 20 7423 4500. Fax +44 20 7423 4501. E-mail: consult@the-phillips-group.com. <http://www.tarifica.com>.

through new submarine fibre-optic cables now under construction (see Figure 1) and network expansion by the utility sector. For example, *Telefónica*, *Tyco* and *Global Crossing* cable projects are expected to be completed by April 2001. The first phase of the *Tele Globe* cable is running on schedule and is expected to be ready by September this year. Other cables have been announced too, such as *New World Network*, *Project Oxygen* and *Poseidon Intermodal Cable*. However, there is uncertainty about the current state of development of some of the projects.

The study suggests that the scale of fibre expansion will have an impact on the "controlled and extremely inflated prices for international connections" and predicts that this will change significantly the way companies in the region use telecommunications. A fall in monopoly tariffs will support economic expansion and Internet growth.

The study projects very substantial dark fibre expansion over the next three years, particularly in Brazil.

Telehousing is another area of significant growth examined in the study. But what is a telehouse? A telehouse provides a convenient and secure environment in which to

locate switching equipment. It is a central and unmanned facility for carriers to interconnect with each other (and is therefore a key component of the wholesale carrier market). Telehousing can either be a stand-alone business or an adjunct

to a carrier's mainstream business. However, it is more akin to real estate than to the telecommunications business. Plans exist to build carrier neutral telehouse facilities in Mexico, Argentina, Chile and Venezuela.

The study warns that for overseas incumbents in the region, including *Telefónica*, *France Télécom* and *SBC*, new dark fibre markets will lead to a significant weakening of their position. Through linking cross-border dark fibre, the study projects that players controlling a pan-American network will be able to leverage competitive advantages not available to owners of purely national networks. Growth is occurring in interregional telecommunications

**A fall in
monopoly tariffs
will support
economic expansion
and Internet
growth**

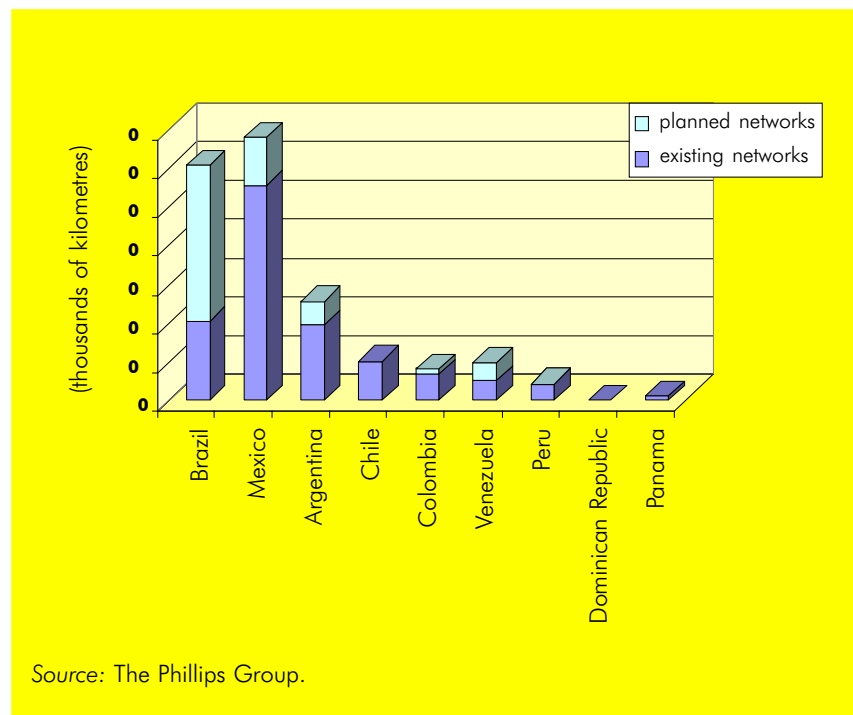


Figure 1 — Total existing and planned fibre-optic networks in Latin America (based on information obtained from study participants)

and Internet traffic, and dependency on United States-based Internet hosts will gradually decline, a pattern already noted by The Phillips Group in Europe and Asia. — *The Phillips Group*.

High-Level Reform Panel advocates major changes to revamp ITU

A 27-member Reform Advisory Panel (RAP), made up of ministers and other senior government officials, industry chief executive officers (CEO), regulators and operators, met in Geneva on 10 March 2000 to agree on key principles that should guide the reform of ITU. Set up by ITU Secretary-General, Yoshio Utsumi, to advise him on how to chart the future of ITU, the group put forward a series of wide-ranging recommendations (see pages 9–12).

Seeking the views of top level representatives from a cross-section of converging industries

of Commerce (ICC), had the mandate to provide clear guidance and recommendations for ITU's reform.

Members, participating in their personal capacity, agreed that ITU had played a useful role in the past in laying the foundation of what has become today a USD 1 trillion industry. They also agreed that ITU still has a key role to play in the future, if it is prepared to fundamentally transform itself. "Given its overall legitimacy on a global scale, it is important that it be not condemned to irrelevance", Ms Cattai said.



"Achieving the goal of transforming our organization into one which can serve the membership well in the changing telecommunications environment is our aim", Mr Utsumi said

Photo: Alain de Ferron (ITU 000014)

(the Internet, entertainment and media, telecommunications and information technology) marked a radical departure from traditional approaches. "Achieving the goal of transforming our organization into one which can serve the membership well in the changing telecommunications environment is our aim", Mr Utsumi said.

The Reform Advisory Panel, placed under the able chairmanship of Maria Livanos Cattai, Secretary-General of the International Chamber

The discussions focused on eight areas on which the Panel made broad recommendations for change. The areas range from public and private sector partnership, radiocommunications and the stewardship of scarce resources, standardization, development, policy issues, dispute settlement mechanisms, ITU working methods and management, to TELECOM events.

RAP's recommendations will be submitted to the next meeting of ITU Working Group on Reform, which will take place in Geneva from 3 to 7 April 2000.

Observations and recommendations for **reform***

Public and private sector partnership

The reform of ITU requires a common vision of its future as a public and private partnership in order to preserve and strengthen its international credibility. The respective roles in this partnership need to be better defined, so that both parties have rights and carry obligations.

The decision-making functions of ITU should reflect the modern, competitive telecommunications environment in which the private sector plays the lead role while the regulatory agencies act as an arbitrator for the wider public interest. It is suggested that decision-making in the Council should be reviewed in light of possible private sector inclusion. Once the decision-making balance in ITU between the public and private sectors has been revised, the financing balance should also be changed accordingly.

Radiocommunications and the stewardship of scarce resources

ITU should continue to play an effective harmonization role at the global level, including its treaty function; however, ITU could take on a stronger role in facilitating regional, interregional and bilateral harmonization of spectrum use and orbital slots, including dispute resolution. The reform process should review the problems involved with "paper satellites". Processes should be simplified, where possible, to reduce the backlog in satellite coordination.

Standardization

The strength of the Telecommunication Standardization Sector (ITU-T) lies in the fact that it is a global standards body in which all countries can participate. Its role in the future will depend on how quickly it can act and whether it can add value or enhance quality, for instance by adding global legitimacy and transparency to standards developed elsewhere.

ITU-T could become a facilitator for collaboration, convening meetings among different standards bodies and industry forums, in par-



"Given ITU's overall legitimacy on a global scale, it is important that it be not condemned to irrelevance", Ms Cattai said

Photo: Alain de Ferron (ITU 000015)

* These observations and recommendations were drawn up by members of the Reform Advisory Panel at their second meeting, on 10 March 2000. The members of RAP participated in a private capacity and offered their views on the direction that reform should take. This report will be submitted to ITU Council and its Working Group on Reform as part of the report of the Secretary-General. The individual contributions of RAP members will also be made available.

ticular on interworking between the Internet and telecommunication networks, both fixed and mobile.

This new role would not require so many study groups, but ITU's standards development activities would instead concentrate on areas where ITU-T has a position of leadership, such as optical transmission, voice services, numbering, signalling and network management. ITU-T's work should be project-oriented in nature, involving the private sector and its working methods that have fostered the development of the Internet.

Development

The aims of the work of the Telecommunication Development Sector (ITU-D) are highly important. Due to the rapidly changing paradigm for the regulation of telecommunication markets, scarcity of regulatory expertise and human resources has become a widespread phenomenon.

ITU should expand its focus from technical assistance towards helping developing countries establish pro-market regulatory frameworks and close the digital divide. This will require greater participation by the private sec-

tor and closer cooperation with development banks, especially the World Bank. To this end, the function of regional offices should be strengthened.

Policy issues

Policy-related areas

ITU can serve as an international focal point for the discussion of telecommunication policy and regulatory affairs. ITU needs to provide a forum where national regulatory authorities from around the world can discuss key issues and obtain input from those to be regulated. Bringing together policy work within the Secretariat could create a centre for regulatory expertise, which would serve as a proactive "knowledge centre". It could collect and collate best practice regulatory policies from different countries and act as a repository for benchmarking statistics in its area of expertise.

Internet and convergence

ITU may play a useful role in the future by serving as a global coordinator or umbrella, in its areas of competence, to act as a facilitator towards the resolution of different



ITU should take a more active role in cooperating closely with other regional and international organizations involved in telecommunications

Photo: Alain de Ferron (ITU 000016)

Members of the Reform Advisory Panel

C. Michael Armstrong, Chairman and CEO, AT&T (United States)
 John T. Chambers, President and CEO, Cisco Systems, Inc. (United States)
 Roberto Colaninno, President and CEO, *Telecom Italia* (Italy)
 Robert J. Dombkowski, Chairman Emeritus of the Board, European Competitive Telecommunications Association (ECTA)
 Katsuji Ebisawa, President, *Nippon Hoso Kyokai* — NHK (Japan)
 Marc Furrer, Director, OFCOM (Switzerland)
 Chris Galvin, Chief Executive Officer, Motorola (United States)
 Pius Griffiths, Deputy Minister of Trade and Industry (Ghana)
 Donald M. Heath, President and CEO, Internet Society — ISOC (United States)
 Nobuyuki Idei, President and Representative Director, CEO, *Sony Corporation* (Japan)
 Alexander A. Ivanov, President and CEO, *Komet Telecommunications* (Russia)
 Volker Jung, President, German Association for Information Technology, Telecommunications and New Media and Executive Vice-President, Member of the Managing Board, *Siemens AG* (Germany)
 Maria Livanos Cattau, Secretary-General, International Chamber of Commerce
 Francis Lyall, Professor of Public Law, University of Aberdeen (United Kingdom)
 Bow Tan Mah, Former Minister for National Development (Singapore)
 George Moose, Ambassador, Permanent Mission of the United States of America (Geneva)
 Jorge Nicolín, Chairman, *Comisión Federal de Telecomunicaciones* (Mexico)
 Makram Obeid, Chairman and Director-General, *Syrian Telecommunications Establishment* — STE (Syria)
 Savio Pinheiro, President, *SP Communications* (Brazil)
 Leonid Reyman, Minister for Communications and Informatization (Russia)
 John Roth, Vice-Chairman and CEO, Nortel Networks (Canada)
 Diana Sharpe, Chairman, International Telecommunications Users Group (INTUG)
 Lyndall Shope-Mafole, Minister Plenipotentiary, Embassy of South Africa (Paris)
 Serge Tchuruk, Chairman, *Alcatel* (France)
 Cheikh Tidiane Mbaye, Director-General, *SONATEL* (Senegal)
 Robert Verrue, Director-General, Directorate General, Information Society (European Commission)
 Jichuan Wu, Minister of Information Industry (China)

national policies and rules that might hamper the growth of the Internet and e-commerce. ITU can also provide international credibility to initiatives developed by the private sector and other bodies, but should avoid intervening on issues, such as content, which are not within its core expertise.

Cooperation

ITU should take a more active role in cooperating closely with other regional and international organizations involved in telecommunications (for

example, the World Trade Organization — WTO) and investment finance (for example, the World Bank) and should become the focal point for cooperation among different bodies, in order to promote international consistency and avoid duplication.

Dispute settlement mechanism

Governments and the private sector would welcome a review of the existing Union procedures governing dispute settlement to see if they might be expanded in scope. This would pro-

vide governments and the private sector with a neutral and effective mechanism to resolve disputes which are international in nature.

ITU working methods and management

Where applicable, more emphasis should be placed on advance consensus-building among the membership and carefully planned agendas. This will require different types of meetings, such as regional coordination meetings and expert groups, ahead of major decision-making conferences and assemblies.

The powers of the Council should be revamped so that it can take decisions on rapidly evolving policy issues, if necessary by majority voting.

gest that the Secretary-General could propose a slate of candidates to be appointed by appropriate bodies — taking into consideration the need for a high level of skills and for geographic balance.

ITU requires more flexible management tools, such as performance excellence and cost-effective management. A horizontal approach towards key issues and alignment of goals would facilitate better coordination between Sectors.

The Secretariat should be given a more proactive role. In some areas, such as the backlog in satellite notifications, process re-engineering could bring quick results.

Some members of RAP feel that it might be possible to take English as the working language,



The powers of the Council should be revamped so that it can take decisions on rapidly evolving policy issues

Photo: Alain de Ferron (ITU 000017)

ITU should make greater use of ad hoc expert groups with a specific mandate and finite duration for handling urgent policy issues. Electronic working methods should be embraced to the maximum extent possible.

Accountability for running ITU should rest with the Secretary-General who should be given greater authority and responsibility for the operation of the Union. The current method of electing officials is lengthy and inefficient. A new process for the efficient nomination and approval of officials needs to be put into place.

The private sector members of RAP, supported by some of their other colleagues, sug-

with translation paid by language groups. This would greatly reduce costs and increase efficiency.

To push forward the reform process, a specialized external group should be appointed to produce concrete recommendations against fixed deadlines for deliverables.

TELECOM events

A reassessment of TELECOM events should be an important part of the reform process. In particular, private industry would seek a review of the management, periodicity and oversight of TELECOM and its events.

Young women and the future of telecommunications

This year, ITU chose to celebrate International Women's Day (8 March) under the theme: "Young women and the future of telecommunications".

Why this theme? ITU Deputy Secretary-General, Roberto Blois, explained the choice in his opening remarks to a panel session organized to mark the occasion.



(ITU 000018)

"As we all know, the telecommunications sector is one where, until recently, only few women have been represented. This is in the process of changing with the changes in the sector itself. We wanted to give a particular voice to women who have experience in the sector, which could enlighten our perception of how the sector will develop in the future."



Photo: Alain de Ferron (ITU 000019)

Voices of women

Are we engendered?

We know that in the world today, inequalities already exist and have existed for many years. These inequalities are based, to a large extent, on the divide between rich and poor, the divide between North and South, the divide between women and men and lately, the divide between information "haves" and information "have-nots".



(ITU 000020)

Hanne T. Laugesen, Chief of the Conferences Department and Focal Point for Gender Issues in ITU, who served as moderator of the panel discussion, spoke on gender mainstreaming.

What has not been apparent, until recently, is that the information and communication technology sector has the potential to aggravate the gap

between rich and poor, in particular in the manifestations that this gap has an unequal treatment between women and men. We are only now beginning to see how activities going on in the sector can influence women and men differently and how we may be able to counter-balance this seemingly natural tendency.

Women as users of information and communication technologies are much fewer than men. This was illustrated in the Human Development Report 1999, which listed the percentage of women users in various countries. For example, 38 per cent are in the United States, 25 in Brazil, 17 in Japan and in South Africa, 16 in Russia, 7 in China, and 4 in the Arab States. From these figures, it is apparent that inequalities exist not only in the developing world, but also in the developed one.

These inequalities also exist in terms of participation of women in decision-making in the sector. In the decision-making bodies, which ITU is one, few women have been recruited as staff and even fewer women seem to participate in the decision-making organs. In terms of ITU for instance, women constituted 23 per cent of all

professional staff at the end of 1999, with only 10 per cent at the decision-making level.

In most of ITU study groups and advisory groups, women constitute between 6 and 14 per cent of all government and private sector participants. We should here point out that in 1999, the ITU Council was presided over for the first time by a woman, Lyndall Shope-Mafole of South Africa, as a deliberate effort to redress the imbalance. The situation in ITU is not much different from that existing in the sector as a whole for which the Group on Gender Issues conducted a mini-survey during TELECOM 99. This survey showed that in most of the companies which responded, women constituted at best 25 per cent of all staff and more often than not, less! The percentage in the technical categories was less than 15.

With this background in mind, it becomes all the more urgent to look at how young women entering the sector feel and what advice they would give us to try to facilitate this entrance not only in ITU but also, in many other areas of the sector, if progress is to be made in terms of gender equality in the sector as a whole.

Virtual humans in a virtual world

MIRALab works with researchers and science students in the field of virtual humans and virtual worlds. Even those without a technical background participate in the creative work of the laboratory. This is particularly important for women from all fields, as this emerging technology needs not only disciplines such as computer science, electrical

engineering, physics, mathematics, but creative and imaginative content for applications in medicine, art, culture, architecture, design and many more. The range of possibilities is endless.

General research areas at MIRALab include the design of networked virtual worlds, real-time recognition of emotions and interactive reactions of virtual humans through emotional models,



(ITU 000021)

Nadia Magnenat-Thalmann, Professor, Department of Information Systems, Faculty of Social and Economic Sciences at the University of Geneva, was the keynote speaker. As founder of MIRALab at the University of Geneva, she explained the scope of the laboratory's activities and how women can participate in them.

rapid photograph-based cloning techniques which allow simulation of facial expressions, and direct communication between real and virtual humans using speech, emotions and facial expressions.

With this broad mix, MIRALab creates virtual interactive shows where the audience is entertained while being brought up to date on

technical innovations and applications. Participants at the panel session enjoyed an example of a virtual show through a video presentation of Marilyn Monroe brought back to life virtually,

not in the stereotyped role of model, actress and singer, but rather as an important person, calling to order the General Assembly of the United Nations.

Empowering women through the Internet

If telecommunication services are so critical for sustainable and equitable development, then it is necessary to analyse the general situation of connectivity in Africa, especially in rural areas where the majority of women live. This helps us understand the dilemma which young women, in particular, face in their efforts to reach out for, and use, Internet services for their empowerment.

A recent survey indicates that 70 per cent of the South African population who live in the rural setting have access to about 11 main telephone lines, giving a rural teledensity of about 0.04 lines per 100 inhabitants. This is a better picture compared to the situation in Uganda, where 1999 estimates from Telecom Uganda indicate that 72 per cent of the country's connectivity is based in Kampala (the capital city) alone. The statistics further show that the number of main lines per 10 000 inhabitants in rural Uganda is 0.2. This situation is common to most African countries.

Educational facilities

The introduction of distance education through the Internet in Uganda, has not only increased the programmes available, but also the opportunity for young women to get education. This can be seen from the increase in the number of female students enrolling for the African Virtual University (AVU), a World Bank project. In 1997, out of 321 AVU students from a polytechnic, 61 (19 per cent) were female. Figures for 1998 and 1999 rose to 39 and 42 per cent, respectively. Similarly, at Makerere University, out of 52 students who took an AVU course in electric circuits 15 (29 per cent) were girls. But by the end of 1999, the number of female students enrolling for the course had



(ITU 000022)

Ruth Ojambo Ochieng, Director of Isis-WICCE (Women's International Cross-Cultural Exchange), gave examples of how information and communication technologies were being used to empower women in Africa.

dropped — there was no more subsidy from the World Bank.

Another initiative is SchoolNet, a world link, which aims to provide Internet connectivity to teachers and students alike in developing countries. This initiative has seen young women enter new careers which, for a long time, were the preserve of men perceived to be the only ones that "could understand science and technology".

Internet café at Isis-WICCE

Isis-WICCE, having realized these gaps, is looking for opportunities to open doors for young women to have access to the Internet. The dream is to set up an Internet café, which would assist young women with skills in using information technology to access appropriate information and share ideas and strategies. This would strengthen their solidarity to participate in development activities. It would also demystify the myth that computers are only associated with word processing or that they are a male domain.

Affordability

The cost of the technology is beyond the means of many women in Africa, let alone the high tariffs charged by Internet service providers. In Uganda, the number of qualified personnel to provide technical (maintenance) services is still

small. Therefore, costs for their services are high. This was very evident during December 1999 when an unknown virus hit computers in Kampala. It took days for organizations such as Isis-WICCE to find technicians to resolve the problem.

Women in Africa call upon ITU to further strengthen its Gender Task Force, in terms of budget allocation and human resources, so that it can come up with appropriate and relevant strategies to help these women enhance their use of information communication technologies.

Expectations of young women in telecommunications

Young women in telecommunications in my country are like a breath of fresh air in a stale room, bringing an end to the conservative thinking that dominates this field. They are very hard-working and imaginative. They are willing to give without the assurance that they will make an adequate profit or be rewarded in any way for their work. Work well done is reward enough for them. When they are faced with the choice of being able to be creative and express new ideas in a small company with low pay, or working in a larger company with no room for expression but higher pay, without a doubt they will choose to be faithful to themselves and to the creativity that flows from their inner being.

Observing my young female colleagues and from my own experience, I know that young women are ambitious, daring and willing to prove themselves and must be all of these things to be accepted in the working world. Therefore, the contribution of young women in telecommunications can only be partly understood; but not completely comprehended because of its greatness and outstanding effect on the future.

Being a very young engineer, I am still at the front door of the vast warehouse of telecommunications, hoping that one day I shall walk through that door and become a contributing member of the telecommunications family. This is not an easy thing to do, as there are many obstacles to overcome. Obstacles which at this moment seem insurmountable.

If you are wondering why, I will tell you. The reason is that I am young and I am a woman.



(ITU 000023)

Aleksandra Zagorac, Teacher and Research Assistant, University of Banja Luka (Republica Srpska, Bosnia and Herzegovina), presented the hopes, wishes and expectations of many young women who see their future in telecommunications.

In my country, as I stand in front of the door of telecommunication companies waiting to be admitted, I am faced with the following conditions:

Condition number one: a solid knowledge in telecommunications (which I have and the door cracked open a little).

Condition number two: high grades (being the best student in my graduating class, I have that too, so the door was opened even more).

Condition number three: a knowledge of English (which I proved with my fluent English, and the door opened so that I could almost see the inside. My heart started beating madly, filled with joy. I am in, I thought!)

Then comes the last and most difficult condition: **required gender, male.** Obviously, I do not fulfill this one; which is not really my fault. So, the door slammed in my face.

This is what happened to me at a job interview, and what happens every day to some young female engineers who are trying to get a job in a respectable telecommunications company. The more respectable the company is, the harder it gets to get in, as if this fourth condition grows with the growth of the company.

What is left for me is to anxiously question the existence of that last condition. How have women passed through that door before me? Who locked the door after they entered? Unfortunately, I do not have the answer to these questions. However, they do affect my expectations and hopes for the future. I want the opportunity to prove myself, to show that I am capable of doing the work for which I have been trained to do. If that is to be fulfilled I will have the audacity and courage to expect much more.

It is not that I do not expect great things even now. Quite the contrary! I expect and plan to contribute to the development and implementation of the telecommunication management network (TMN) or better still, to manage an ATM (asynchronous transfer mode) network in my country.

With my knowledge in ATM management I hope to help establish a solid network. This is the field of telecommunications that has become my passion, thanks to one extraordinary woman who was my mentor and my inspiration, Natasa Gospic. Because of her, I know that some great women have passed through that “scary” door and climbed up the stairs of telecommunications, preparing the way for my generation. This fills me with joy, because I know that no matter how hard it is, it can be done and that one day if I work hard enough, step by step I will climb up. This gives me courage and arms me with patience and persistence.

I want to succeed, and know I can. But most of all *when*, not *if*, because I will fight every step of the way. As an old Latin saying goes: *Per aspera ad astra* (through thorns to the stars). I expect no less.

The experience of a young woman engineer

I took the decision to become an engineer during secondary school. In Turkey, to be able to attend university, one must take an entrance examination. Students who score the highest grade normally choose to study electrical and electronics engineering. I thought to myself that there must be a very good reason for this choice. So, as I was good in mathematics I decided to study engineering.

I attended the Middle East Technical University, one of the best universities in Turkey. The number of women students was very low, approximately 10 per cent. Electrical and electronics engineering studies are very difficult, so I had to study day and night. There was very little time for social activities.

In our last year of study, we had to select courses of interest to our future work. For example, software, telecommunication or high power engineering. I selected telecommunications-related courses. Firstly, because I like telecommu-



(ITU 000024)

Mehtap Muluk, who joined ITU's Radiocommunication Bureau in February 1999, recounted her path to becoming an engineer.

nications and secondly, because I am a woman. I could have chosen to be a high power engineer, but I did not, because I would have had to work at dams located far away from the cities. Also, as all the workers were men, I did not feel that it would be a suitable place for a woman to work.

After graduation I started looking for a job. As a woman engineer, it is difficult to find a job easily, especially in private companies where most of the technicians and other employees are men. Government companies attach more importance to gender equality than private ones.

I applied to *Turk Telecommunication Company* and was offered a job. In my early days at this company, a high-level officer asked me to choose a subject for my work. When I replied that I wanted to be a radiolink engineer, he told me that as a woman it would be a very difficult subject. I insisted on my choice and it was approved in the end. I was the first woman engineer to work as a radiolink engineer. My boss introduced me to the technicians who were all men. At the beginning, they did not want to work with me.

In Turkish culture men are considered at a higher level than women. But times are changing. Women also have rights. I tried to approach the technicians in a more friendly manner rather than as an authoritative boss. By sharing my university knowledge with them, they felt better about their own jobs. As a result, we started to work as a real good team. It was a great

feeling to have broken some meaningless taboos.

Later, a high-level committee in the company was looking for 25 well-qualified engineers to work on the Turkish satellite (*Turksat*) project. They appointed me to be responsible for *Turksat*, where I started working as a satellite communications engineer. I found the subject easy because the working principle is very similar to that for radiolink communications. Satellite communications is really an excellent technology.

Today, I work in the Space Systems Department of ITU's Radiocommunication Bureau and deal with satellite notifications. I now know all the satellites around the world in more detail. I expected to find many women engineers in ITU, but was very surprised to find that they are so few. This is the age of telecommunications and more women should be encouraged to be a part of this important field.

Geneva, 8 March 2000: "World March for Women..."



(ITU 000025)

... against poverty, against violence directed towards women, and for the respect of their physical and psychological integrity

Photos: Romina Pontil

PUBLICATIONS

The following letters indicate the languages in which documents are published:

- F for French
- E for English
- S for Spanish
- R for Russian
- C for Chinese
- A for Arabic

Prices (indicative only) are in Swiss francs (CHF).

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(92-61-07991-1)

Separate editions in F, E, S (CHF 20)

Resolutions and Decisions of the Council of the International Telecommunication Union (General revision, 1999)

(92-61-08241-6)

Separate editions in F, E, S (CHF 39)

ITU Global Directory (2000)

(92-61-08237-8)

Multilingual edition F, E, S (CHF 39)

Telecommunication Development Sector

Manual on Mobile Communication Development (Geneva, June 1997)

(92-61-06631-3)

Separate editions in F, E, S (CHF 40)

Telecommunication Standardization Sector

ITU-T Recommendation F.700 Amendment 1 (05/99)

Framework Recommendation for audiovisual/multimedia services
Separate editions in F, E, S (CHF 9)

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Coding of speech at 16 kbit/s using low-delay code excited linear prediction

Annex 1: Frame or packet loss concealment for the LD-CELP decoder
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From official sources

VACANCY NOTICE

A circular letter (via facsimile) which has been sent to all Member States and Sector Members of the Union announces the following vacancy:

one post of **Senior Adviser for Arab States, grade P.5**, to be filled in the Telecommunication Development Bureau (BDT), Regional Office, Cairo, as soon as possible for one year with possibility of extension (circular letter No. 45 of 24 February 2000;

vacancy notice No. 2–2000 ITU; final date for submission of applications: 24 April 2000).

Detailed applications with ITU personal history form should be submitted to the General Secretariat of the ITU, Place des Nations, CH–1211 Geneva 20 (Switzerland), no later than the final dates mentioned above.

Vacancy notices and personal history forms are available on the ITU website, under the "ITU General Secretariat" section: <http://www.itu.int/>.



The following missions have recently been undertaken by ITU experts:

Bhutan (Thimphu)

Dannecker R. (Australia)
Consultant in rural telecommunication planning (10.1.00–14.1.00)

Bosnia and Herzegovina (Sarajevo)

Erlevent A. (Turkey)
Senior expert in frequency management (16.1.00–29.1.00)

Brazil (Brasilia)

Rebouças A. (Brazil)
National consultant in project administration (14.2.00–31.7.00)

Burkina Faso (Ouagadougou)

Diwara A. (Senegal)
Senior expert in cost accounting (5.2.00–19.2.00)

Costa Rica (San José)

Peralta Monge D. (Costa Rica)
National consultant in telecommunication management (14.2.00–19.2.00)

Ecuador (Quito)

Mayher R. (United States)
Senior expert in automated radio frequency spectrum management monitoring and control systems (9.1.00–15.1.00)

Mazzei I. (Chile)
Consultant in new telecommunication services (30.1.00–26.2.00)

Ethiopia (Addis Ababa)

Sanou B. (Burkina Faso)
Head of the ITU Regional Office for Africa (1.1.00–31.12.00)

Indonesia (Djakarta)

Behdad E. (Iran (Islamic Republic of))
Senior Adviser for Asia and the Pacific (24.1.00–23.1.01)

Nepal (Kathmandu)

Goodman S. (United States)
Senior expert in information and communication technology (14.1.00–22.1.00)

Press L. (United States)
Senior expert in information and communication technology (14.1.00–22.1.00)

Peru (Lima)

Door R. (Argentina)
Consultant in frequency channelling plans (19.1.00–25.3.00)

Saint Vincent and the Grenadines (Kingstown)

Mayher R. (United States)
Consultant in spectrum management (24.1.00–27.1.00)

Winkler C. (United States)
Consultant in spectrum management (24.1.00–29.1.00)

Senegal (Dakar)

Akouete B. (Benin)
Management consultant/Expert in the operation of cost accounting systems (15.2.00–25.2.00)

Ogoussan C. (Benin)
Management consultant/Expert in cost accounting systems (15.2.00–25.2.00)

South Africa (Johannesburg)

Moshiro S. (Tanzania)
Programme Manager (1.1.00–30.6.00)

Switzerland (Geneva)

Gospic N. (Yugoslavia)
Senior expert for the handbook (editor) (20.2.00–26.2.00)

Diez A. (Canada)
Consultant in LAN/WAN (26.2.00–4.3.00)

Carrier C. (France)
National training consultant/Strategic planning expert (28.2.00–2.3.00)

Thailand (Bangkok)

Short G. (Australia)
Consultant in multipurpose community telecentres (9.2.00–2.3.00)

Togo (Lomé)

Diakhate A. (Senegal)
Senior expert in fibre-optic transmission (12.2.00–26.2.00)

Uganda (Kampala)

Brown W. (Zimbabwe)
Senior expert in information and communication technology (21.2.00–26.2.00)

United States (New York)

Nasser A. (Jordan)
Senior telecommunication expert (5.2.00–10.2.00)

Zimbabwe (Harare)

Haile M. (Ethiopia)
Senior expert in management, tariff and international accounting (3.2.00–2.4.00)

ITU leads work on new Voice over IP standards

The Standardization Sector of the International Telecommunication Union, better known as ITU-T, recently appointed Jerry Skene, Tellabs' Standards Director, to the position of Rapporteur of a new question responsible for developing an international standard for Voice over Internet Protocol (VoIP) gateways.

The VoIP gateways have become a hot topic recently, and Tellabs' new role here will help contribute their considerable experience in speech quality issues to this important new area of telecommunications technology.

In the past, international telephone calls typically were placed over circuit-switched networks that assign a fixed amount of transmission capacity in each direction for each telephone call for the full duration of the call.

Recently, packet-based networks using IP increasingly are being used to carry international voice traffic. IP-based networks allow efficient sharing of transmission capacity amongst multiple calls, and transmit information only as needed. This minimizes the transmission requirements compared to circuit switched networks and can lead to potential cost savings.

In addition, voice and silent intervals are often compressed in IP networks, further increasing bandwidth efficiency. Interconnection between the legacy circuit-switched networks and these new VoIP networks is performed using a Voice-over-IP gateway.

The ITU-T is developing, in Question 21 of Study Group 15 (Transport networks, systems and equipment), a new Recommendation (G.799.1), that will specify certain functions and characteristics of these VoIP gateways. This will help ensure a level of speech performance of such gateways and will preserve the high quality of international voice services. It will also make

it easier for VoIP carriers to determine whether new gateways fully meet new requirement specifications.



Jerry Skene

(ITU 000012)

Key areas in which performance requirements are being defined include switched circuit bearer interfaces, IP bearer interfaces, signalling protocols, echo cancellation, end to end delay, handling of voice-band data such as fax and data modems, effects of cell loss, methods of

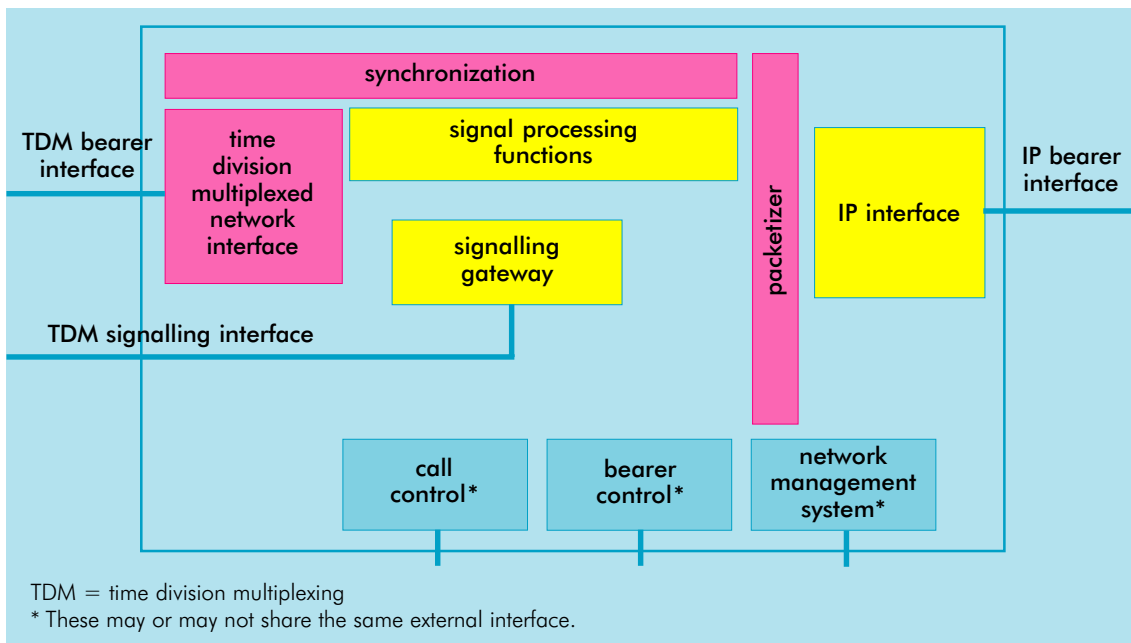


Figure 1 — VoIP gateway block diagram

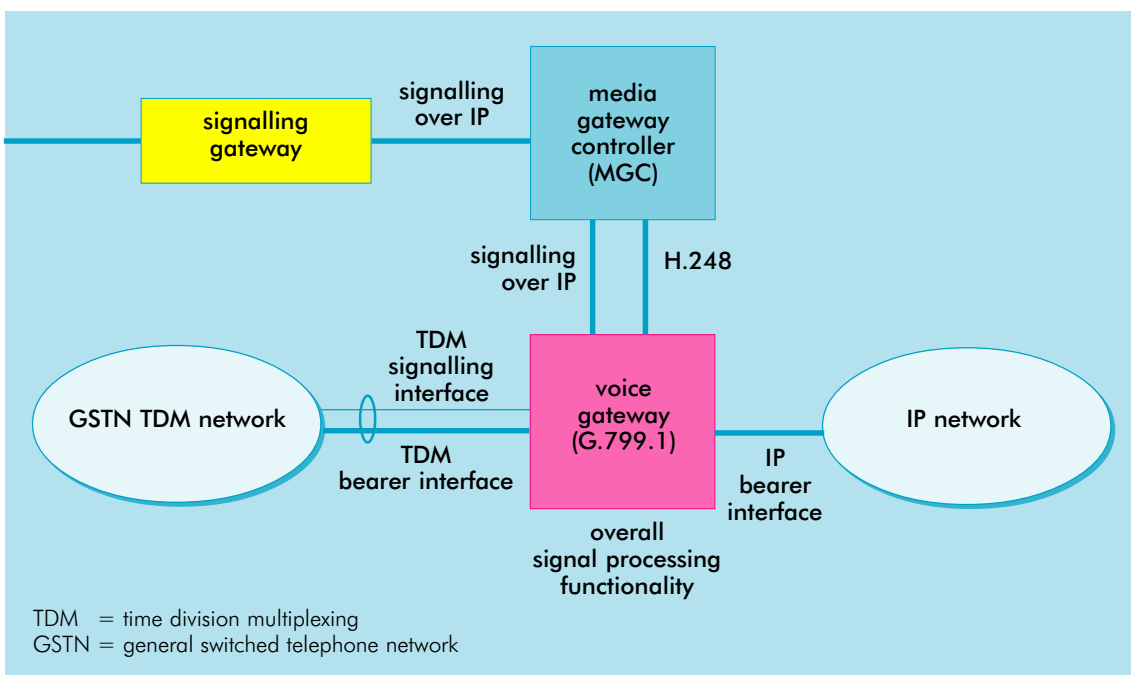


Figure 2 — Location of G.799.1 VoIP gateway in overall network

avoiding tandem speech coding, and control and configuration interfaces.

VoIP gateways contain several specialized functions, for example, signalling interfaces, speech compression/decompression, and packetization. The recommendation being developed specifies which functions, such as echo cancellation and speech coding are required,

and which other key ITU-T Internet Protocol recommendations need to be supported, such as H.248 and H.323. Figure 1 illustrates some of these functions.

Figure 2 illustrates where the VoIP gateway fits into the overall network model.

The new Recommendation G.799.1 is expected to be completed by April 2000.

Deutsche Telekom pays working visit to TSB

A high-level delegation from *Deutsche Telekom* recently paid a working visit to ITU's Telecommunication Standardization Bureau.

Among the guests were Messrs H. Hultzsch, Member of the Board of Management, Technology and Services; J. Claus, Executive Vice-President, Innovation Management; N. Knoppik, Chairman and Managing Director, *T-Nova*; D. Schulz, Director, Multinational Organizations; A. Sarma, Director, Engineering and Methods Management; W. Staudinger, Director, Standardization Strategy, Frequency Management; B. Beltz, Assistant Director, Standardization Strategy.

The delegation was welcomed by TSB Director, Houlin Zhao. Also from TSB were Fabio Bigi,

communications environment and the ongoing preparations for the forthcoming World Telecommunication Standardization Assembly (WTSA-2000).

Deutsche Telekom is an active Member of ITU's Telecommunication Standardization Sector (ITU-T) and supports the efforts under way to define a work programme which is more attuned to the new market-place and an approval procedure (for standards) that satisfies the demands and pace of progress within the industry.

At present, the company provides two chairpersons and a number of rapporteurs to support the technical activities of ITU-T study groups and the Telecommunication Standardization Advisory



From left to right: D. Schulz, N. Knoppik, F. Bigi, H. Hultzsch, J. Claus, H. Zhao, A. Sarma, J. Tar, B. Beltz, F. Cantero and W. Staudinger

Photo: Alain de Ferron (000026)

Deputy Director, John Tar, Head of the Support, Administration and Operations Department, and Francisco Cantero, Head of Promotion, Editing and Publication Department. The delegation was also met by ITU Deputy Secretary-General, Roberto Blois.

The one-day meeting provided a unique opportunity to exchange views on issues of common interest, notably the changes occurring in the tele-

Group (TSAG). In particular, the two chairpersons lead studies on the characteristics of telematic systems (facsimile), as well as on languages and general software aspects for telecommunication systems.

Deutsche Telekom recently made a voluntary contribution of CHF 155 000 and is determined to help propel ITU-T further forward in its pre-eminent role of global telecommunication standardization.

Telecommunications in India

India, the seventh largest country in the world, is today being driven by a new spirit of transformation to become an information technology (IT) super power. This spirit is bringing sweeping changes in its wake and unleashing the vast potential of the Indian economy. The government's policies are now relatively simple, transparent and geared towards creating a world-class information infrastructure.

The country's 24.3 million-line telephone network is one of the largest in the world and the third largest among emerging economies. Given the low telephone penetration rate of 2.4 lines per 100 inhabitants, India plans to achieve a teledensity of 9 lines per 100 inhabitants by the year 2007, offering a vast scope for growth and investment. A demand of additional direct exchange lines of 67.4 million is foreseen in the period 1997–2007.

The telecommunications initiative in the country is being steered by the Ministry of Communications through the Department of Telecommunications (DoT) and the Department of Telecom Services (DTS).

Switching network

DTS operates one of Asia's second largest telecommunication networks, with net switching capacity of 29 438 405 lines of which 24 303 030 represent connections in service. There are 25 093 telephone exchanges in the country and the network is growing at a rate of more than 20 per cent per annum, using switches designed by the Centre for Development of Telematics (C-DOT), *Siemens*, *Alcatel*, *Fujitsu* and *Ericsson*.

Transmission systems

The transmission systems for interconnecting exchanges throughout the country are built on the latest state-of-the-art technologies. The transmission media available for interconnecting these exchanges include a 91 397-km route of microwave, a 122 124-km route of OFC cable and a

30 957-km route of coaxial cable, as well as satellite Earth stations working via Indian National Satellites (INSAT).

Participation of the private sector

Until 1994, DTS along with its undertakings, *Mahanagar Telephone Nigam Limited* and *Videsh Sanchar Nigam Limited*, were the sole providers of telecommunication services in the country. The National Telecom Policy of 1994 paved the way for the private sector to join in the provision of these services and for the introduction of cellular and value-added services.

Basic telephone services

Private operators are allowed to operate basic telephone services to supplement DoT's efforts in providing telephone connections. Indian registered companies with a maximum foreign equity of up to 49 per cent are allowed to operate basic telephone services.

Following bids, nine companies were issued with a Letter of Intent to operate basic telephone services in 30 telecommunication "circles". So far, six companies have signed licences and interconnect agreements for six of the circles. Two companies have already started operations. Incentives, such as a five-year tax break (or tax holiday), have been introduced to encourage private sector participation in telecommunications.

Value-added services

Private sector entrepreneurs have been permitted to provide value-added services. These include electronic mail, voice mail/audiotex, closed user-group domestic 64 kbit/s data network services via INSAT, videotex, videoconferencing, credit card authorization and the Internet.

Cellular mobile telephone services

Licences have been awarded to 13 Indian companies for the operation of cellular mobile

telephone and radio paging services. These services are already being provided to some 1 650 000 subscribers in selected cities of the country.

Internet services

The Government of India, as part of the information technology policy, is encouraging private entrepreneurs to provide Internet services. So far, 60 Internet service providers (ISP) have already started operations. DTS and its public sector companies, Mahanagar Telephone Nigam Limited and Videsh Sanchar Nigam Limited, are the major ISPs. The companies are also being allowed to install gateways.

Regulation

The *Telecom Regulatory Authority of India (TRAI)*, which was established through an Act of Parliament in early 1997 to regulate telecommunication services, was reconstituted at the beginning of 2000. TRAI now has three full-time members and several part-time members. An appellate authority for settlement of disputes is also to be established, and is expected to generate confidence and bring transparency to the companies operating in India.

Human resources development

DoT has put in place a training infrastructure to cater for the needs of human resources development in telecommunications. At present, there are 44 telecommunication training centres, two of which are apex institutions: the *Advanced Level Telecommunication Training*

ITU Secretary-General visits India

In February 2000, ITU Secretary-General, Yoshio Utsumi, visited India at the invitation of the Department of Telecommunications. During the visit, he held high-level talks with the Minister of State for Communications, the Secretary of DoT, the Secretary of the Department of Telecom Services, and Members of the Telecom Commission. Discussions were centred around India's participation in ITU activities, the establishment of the Asia-Pacific Telecommunication Standards Institute (ATSI), Indian Foreign Investment Policy and Incentives, pilot projects in progress and in the pipeline with the assistance of ITU.

In a panel session, telecast nationwide, the Secretary-General and Indian officials discussed the convergence

of telecommunications, IT and broadcasting services, IMT-2000 systems and services and ITU's future plans to protect the interests of developing and least developed countries, as well as policy aspects of Internet-related services and e-commerce.

Mr Utsumi visited the *Institution of Elec-*

tronics and Telecommunication Engineers, where he found the Institution's efforts in electronics development and IT and telecommunication engineering laudable.

He was particularly impressed with the 256-line capacity C-DOT exchange at Runukat on the Agra Delhi Highway. He noted that the locally made system can work in a rough environment without air-conditioning and commended the Centre for Development of Telematics for developing technology that is specially suited for developing countries like India.



Yoshio Utsumi (in the centre), accompanied by his wife Masako, admires the 256-line capacity exchange at Runukat, which can work in rough environments without air-conditioning

(ITU 000013)

Centre (ALTTC) in Ghaziabad, and the *Bharat Ratna Bhim Rao Ambedkar Institute of Telecommunication Training* (BRBRAITT) in Jabalpur. These two centres provide training to foreign participants upon the request of governments, as well as through fellowships from the Asia-Pacific Telecommunity (APT), or fellowships jointly sponsored by the Ministry of External Affairs and DTS.

Rural communications

A large population of India lives in the villages. There are about 600 000 villages in the country, with 358 538 of them already equipped with telecommunication facilities. The equipment for rural telecommunications is mostly built in India using indigenous technology from C-DOT. Plans are under way to provide access to each village by March 2002 and should help increase the teledensity in rural areas from 0.4 to 4 by 2010.

Research and development (R&D)

India has been engaged in the development of switching and transmission systems which can cater for the specific requirements of developing countries with diverse climatic conditions and needs. C-DOT was set up to concentrate on R&D and has developed switches with a capacity ranging from 128 to 40 000 lines. Switches of 128 and 256 lines are developed to meet the requirements of rural areas. Exchanges equipped with these switches can work without air-conditioning in remote and rural areas.

C-DOT has also developed medium capacity (1500 lines) and large capacity main automatic exchanges (up to 40 000 lines), intelligent network services, remote switching units, asynchronous transfer mode (ATM) switches and wireless local loop (WLL), fibre access systems, 64 kbit/s integrated voice and data VSAT (very small aperture terminal) in Ku-band, photonic amplifiers and products of the synchronous digital hierarchy (SDH) family.

At present, 90 per cent of the total exchanges in service in the country are designed by C-DOT. Other institutions engaged in R&D of state-of-the-art technology include: the *Indian Institute of Science* in Bangalore, *Indian Institute of Technology*, *Tata Institute of Fundamental Research* and *In-house R&D Labs of Indian Telephone Industries*, *Hindustan Teleprinter Ltd.*, and *Center Electronics Ltd.*

The National Telecom Policy of 1999, which was announced by the government, is a culmination of major reforms and restructuring of the Indian telecommunications sector which were set in motion by the National Telecom Policy of 1994. This new policy is seen as a resolute effort to remove the bottlenecks faced by the Indian telecommunications industry and investors in telecommunication services.

The policy envisages a rapid growth in the telecommunication sector and aims to achieve a target teledensity of 7 by 2005 and 15 by 2010. This implies that some 75 million telephone connections have to be provided by 2005 and 175 million by 2010.

The policy marks a significant shift from the fixed licence fee regime to a licence fee based on revenue-sharing mechanisms. According to the policy, licensed telecommunication service providers are required to pay a one-time entry fee and a licence fee based on revenue sharing.

Licences for basic, cellular, radio paging and radio trunking services shall be issued on an initial period of twenty years, extendable by ten years.

Licences for basic services shall be granted on a non-exclusive basis. The issue of licences on a non-exclusive basis, besides promoting efficiency, is expected to strengthen market forces, which will ultimately determine the number of players in the market.

In addition to the present duopoly in each telecommunication circle, the Department of Telecommunications is the third operator for cellular services. Depending on the availability of spectrum, more operators may be inducted on the recommendations of TRAI.

Cable operators are permitted to provide last-mile linkages and switched services within their service areas of operation. Subject to obtaining a basic services licence, they will be permitted to provide two-way communications including voice, data and information services.

Cellular and basic service providers will be allowed to provide long-distance services within their respective service areas.

National long-distance services beyond the service area of private service providers were opened up for competition in January 2000. The opening up of international long-distance telephone services will be reviewed by 2004.

Electronic commerce

Where are we today?

From clothes to cars and from housing to holidays, electronic commerce is increasingly taking hold. In 1999, Members of the International Telecommunication Union celebrated World Telecommunication Day under the theme of "electronic commerce".

In February this year, European and United States policy-makers, business leaders and representatives of trade associations met in Brussels to discuss and assess the current e-commerce climate with specific reference to those sectors that are so far having the most success online. This one-day conference was organized by Forum Europe and World Online, with the support of the European Commission and the European Internet Industry Association.

It is clear from the topics discussed at this conference, that e-commerce will dominate the headlines for some time to come. Among the hot topics, according to the organizers, were: the extent to which European Union (EU) regulators are caught in the crossfire between consumer bodies demanding more protection for customers who buy on the Internet and business lobbies concerned that their investment could be under threat from too much regulation, the outlook for the approval and implementation of the EU's e-commerce directive, the role of Europe's national postal services in the online revolution — are they helping or hindering the development of e-commerce? With the Internet share-dealing and online banking growing fast, how are Europe's traditional financial institutions coping with the new challenges posed by the spread of e-banking? Can Europe now reach a clear-cut regulatory pact with the United States

that would open the way to global e-commerce rules?

This article highlights trends in business-to-business and mobile e-commerce. It is compiled from summaries of two major reports by Analysys, a consultancy in telecommunications strategy (<http://www.analysys.com>).

Business-to-business e-commerce

According to the report *Business-to-Business Ecommerce: Opportunities for Network Operators*, network operators have been slow to enter a market predicted to be worth USD 1 trillion by 2002. Telecommunication operators (TO)

Network operators have been slow to enter a market predicted to be worth USD 1 trillion by 2002

have been held back by their general uncertainty about the Internet, and Internet service providers (ISP) have been too busy building out their basic networks to take decisive steps. Meanwhile, all operators' core business of supplying connectivity and transport services is

becoming rapidly commoditized, threatening their future prosperity.

Network operators need to act now, and act decisively, if they are to enter the business-to-business e-commerce market and compete with the established early entrants such as Cisco, IBM and Oracle.

There is an urgent need to diversify into areas where margins are higher, where there is more scope for service differentiation, and where customers can be more deeply engaged. Business-to-business e-commerce offers network operators a major opportunity to achieve this. Indeed, it has become necessary for their survival,

claims the report. But there is a dilemma for network operators. As their current business models become less and less applicable, how can they leverage their core assets to maintain growth and profitability?

The application service provider (ASP) business model is said to offer the most attractive approach to network operators. This model places network provisioning in a central role in the e-commerce world, promising operators a powerful position from which they can launch into other areas as the need and opportunity arises.

Besides, the ASP model enables operators to enter the e-commerce market on an incremental basis, beginning with the provision of basic services, such as database and server hosting, that are already close to their core business offerings. Operators can then develop more complex services as their experience grows and the requirements of clients become more sophisticated.

However, the report warns that there are dangers in embracing the ASP model — because of the breadth of possible service offerings, there is scope for loss of focus, brand dilution, de-alignment of sales channels, and investment in unwanted services and technologies. To avoid these pitfalls, network operators must acquire a deep knowledge of their target markets and develop a consistent vision of what role they intend to play.

The report points out that the ASP business model is governed by achieving economies of scale and so all players will ultimately be looking to maximize their market share. As a result, it is likely that rapid consolidation will take place over the next two to four years, significantly raising barriers to entry. The future of e-commerce is happening now. The technologies and strategies that will ultimately become the dominant forces shaping industry structure are already in their infancy. If network operators are to be part of the e-commerce future, they will need to work hard to assemble the necessary competencies.

The report examines all the issues facing TOs and ISPs as they take on their rivals in the business-to-business e-commerce market. It analyses the overall market drivers and business trends, and assesses other business models which TOs and ISPs might adopt. It contains real profiles (covering financial details, services offered and infrastructure) of leading e-commerce players: Automotive Network eXchange (ANX), BT, Cisco Systems, Inc., Energis plc, Futurelink Distribution Corp., IBM and PSINet Inc.

Mobile e-commerce

Mobile portals, the route to riches?

The emerging mobile e-commerce market offers mobile operators a valuable opportunity to increase their revenues profitably by moving into new areas of the value chain and by expanding usage of mobile communications. However, many other types of players — banks, portals and brand-based companies — are keen to establish a dominant role in this rapidly developing market.

According to the report *Mobile Ecommerce*, released in February 2000, the likely

winners in the battle to dominate the mobile e-commerce market will be those that can quickly develop strongly branded mobile portals.

The report highlights that it is not just the mobile operators which are competing for control. Established Internet portals such as *Yahoo!*, *AOL* and *MSN*, together with start-ups such as *AirFlash*, *Indiqu* and *Saraide*, are also positioning themselves to take advantage of mobile e-commerce. These are being joined by banks and equipment manufacturers, which also see establishing a mobile portal as a route to riches.

Different approaches are being taken to portal development. For example, *Telia Mobile* and *NTT DoCoMo* are developing mobile portals independently, while most other operators are forging partnerships with existing portal specialists. Such partnerships are producing a variety of agreements on branding, co-branding

Global mobile subscribers are expected to top one billion by 2003 — a staggering one in six of the world's total population!

and developing different revenue sharing models.

With global mobile subscribers expected to top one billion by 2003 — a staggering one in six of the world's total population, it is clear why this market is attracting so much interest. If you can bring together a range of mobile e-commerce services under one brand umbrella, then you establish a very powerful position. Figure 1 supports this assertion, showing that mobile subscribers easily outstrip Internet users.

Of course mobile operators would prefer to be the sole brand, the sole portal, that users of mobile e-commerce services see. But they need partnerships with Internet portals or specialist start-ups in order to build a strong portal quickly. Speed to market is critical in determining who will dominate.

The most successful mobile portals will be those that attract the largest number of users. To achieve this, they will not just have to add most value, but will need to have a strong brand themselves and be seen to attract a range of services from strongly branded merchants, says the report.

One of the greatest attractions for advertisers and merchants will be a portal's ability to offer location-based services that tailor responses to information requests according to where the subscriber is using the service.

The report "Mobile Ecommerce" answers key questions, such as:

How will the market for mobile e-commerce differ from the market for fixed e-commerce?

How big will the market for mobile e-commerce be?

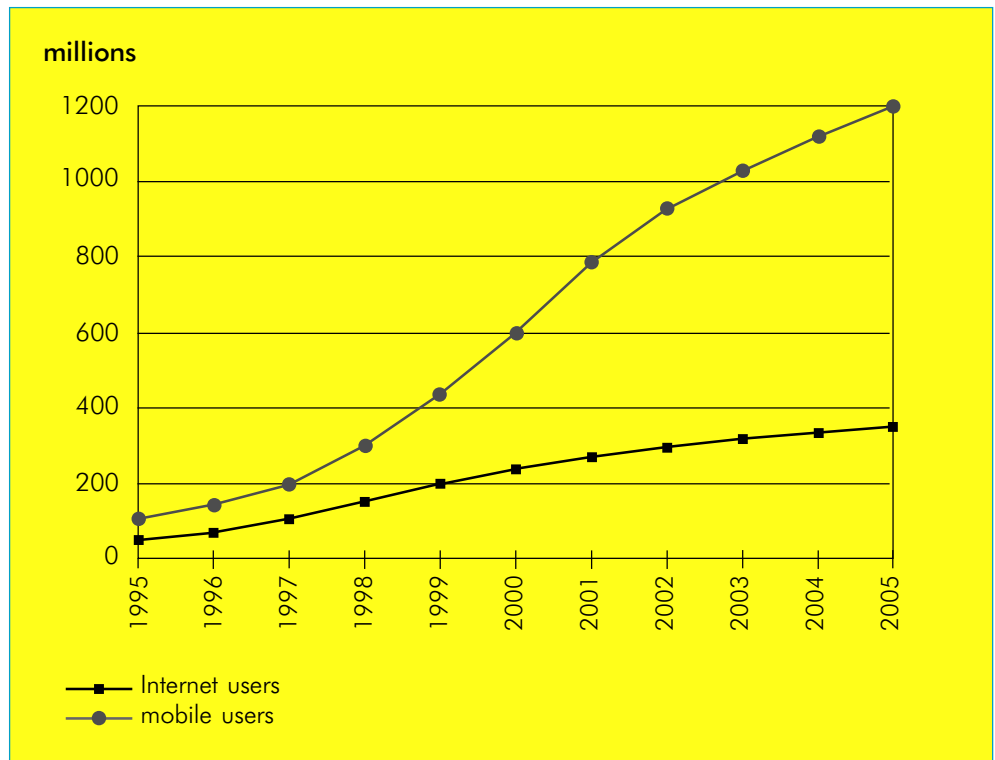


Figure 1 — Mobile subscribers and Internet users

How can mobile operators sustain a key role in the provision of mobile e-commerce services in the long term?

What competition will mobile operators face and what partnerships can they form?

How will mobile e-commerce services be priced, and who will pay whom?

It examines the various business strategies and revenue models being adopted in the mobile e-commerce market, particularly in Europe, East Asia and North America. The strengths and weaknesses of the various types of players are evaluated against the functions required to deliver mobile e-commerce, including portal services, content provision, payment processing and security services. Detailed case studies of the strategies of leading players are featured, including: AirFlash, Citigroup, AOL (Netscape Communications), NTT DoCoMo, SmartTone, Sonera and Visa International. — *Analysys*.

Singapore

Towards full market competition in telecommunications



The Government of Singapore has announced that it is bringing forward by two years the date (starting 1 April 2000 instead of 1 April 2002) at which full market competition in the telecommunications sector would be introduced in the country. Direct and indirect foreign equity limits for all public telecommunications service licences, have been lifted with immediate effect.

As a result of this anticipated liberalization, the government will compensate *StarHub* and *SingTel* for any potential loss and the Infocommunications Development Authority (IDA) of Singapore will engage an international consultant to advise on the amounts payable to the two companies.

StarHub was awarded the second public basic telecommunication services (PBTS) licence in March 1998, to start operations on 1 April 2000, on the basis that there would only be two PBTS licensees, i.e. *StarHub* and *SingTel*, until 31 March 2002. *SingTel*, as the incumbent, has likewise made investment decisions based on the government's announcements that there would be a duopoly up to 31 March 2002.

Singapore aims to be a leading infocommunications hub in the Asia-Pacific region and to achieve this, the telecommunications market must be globally competitive

The government is also prepared to review *StarHub*'s capital expenditure commitments.

Singapore aims to be a leading infocommunications hub in the Asia-Pacific region and to achieve this, the telecommunications market must be globally competitive, with many players offering innovative, high quality and cost effective services.

The openness of the regulatory environment is a major factor in attracting new investments and players. The government is formulating the Information and Communications Technology 21 Masterplan.

New entrants are free to decide on the type of networks, systems and facilities they wish to build and own, and the type of services they wish to offer. Parties interested in entering the telecommunications market can contact IDA, which has released the licensing framework and licence application guidelines for the provision of telecommunication networks and services in Singapore, following the government's announcement. — *Ministry of Communications and Information Technology, Singapore/IDA.*

EUTELSAT buys a new satellite. The European Telecommunications Satellite Organization has begun the millennium by ordering a new satellite with the dual purpose of satisfying standby requirements and allowing the growth of digital services in existing and new markets. The satellite, provisionally baptized *NewBird*, will be equipped with 26 Ku-band transponders operating in the fixed-satellite service band and capable of being switched between three coverage areas — a broad beam on Europe, a beam covering North and South America and a steerable beam. The satellite is scheduled to be delivered to EUTELSAT by Alcatel Space within sixteen months and will be available in orbit by mid-2001.

Subject to successful launching of the next EUTELSAT satellites (*W1*, *EuroBird* and *Sesat*), *NewBird* will come into commercial service at 8° W and will then be called *Atlantic Bird-2*. — EUTELSAT.

Sun equips Turkey's first high-performance computing centre. Sun has donated an *HPC 4500* server and management systems training facility to establish the national High Performance Computing (HPC) Centre at Ankara, the first of its type in Turkey. The Centre will operate in the framework of Bilkent University. It will be used for seismic research, earthquake simulation and modelling and any other high-performance computing activities carried out by universities, research institutes and industry throughout Turkey. — *Agence téléphonique suisse SA*.

diAx offers WAP services. From the first quarter of this year, *diAx*, the new generation telecommunication enterprise, should offer its customers mobile telephone Internet access through the

wireless application protocol (WAP). In collaboration with the global computing and Internet technology companies CMG, Compaq and SignalSoft, *diAx* presents a WAP solution on the Swiss market.

The *diAx* strategy is to let users themselves choose the information that is important to them from a wide range of content, which is updated dynamically according to the user's domicile, making targeted information searches much easier.

Apart from easy Internet access, *diAx* offers its customers a portal for worldwide access to information in WAP format from various independent providers. On the *diAx* open platform, information services may also offer their own WAP-format content. — *diAx*.

HP and Alcatel join in a strategic alliance for Internet portals. Alcatel and Hewlett Packard have announced the conclusion of a commercial partnership for distribution of advanced Internet services to fixed and mobile terminal users. The agreement provides that HP will market and distribute on the *HP/UX* WAP platform a specially adapted version of the Alcatel *HomeTop* software suite allowing telecommunication operators, Internet service providers and companies to integrate products such as unified messaging and electronic commerce applications. — *Alcatel*.

The Canadian Academy of Engineering calls for changes to engineering education. This Academy has released a report calling for changes in engineering education across Canada. The report, titled *Evolution of engineering in Canada*, is the work of a task force established by the Academy in 1998 to consider how engineer-

ing education should respond to the changes in sciences and technology, international business, the environment, safety and other issues.

The report calls for dialogue with respect to changes that would encourage: a broadening of learning for engineering students; greater interaction between industry, faculty and students; increased focus on life-long learning and self-directed instruction; research with greater relevance to industry; the promotion of enhanced technological literacy among the general public.

The Academy is calling for a detailed discussion of the report's content among faculty, students, business and government to make the changes necessary to meet the future needs of the engineering sector. — *The Canadian Academy of Engineering*.

Bull and EDS launch Civita in the United Kingdom. These two companies are entering into an innovative partnership in the United Kingdom called *Civita*, to satisfy the requirements of local communities to put all public administrative services online by 2008. The two companies' resources and expertise in the provision of computer services to the public sector promise *Civita* a possible turnover of around GBP 3 billion by 2006.

Civita will exploit multiple media — such as telephone, Internet, smart cards, interactive television and terminals, direct dialogue — so as to deliver information in a structured way, rather than making it available in fragments as has been the case hitherto. This will give the public a single point of access facilitating administrative formalities and the consultation of information on municipal services related to, for example, housing allowances, training assistance,

job hunting and day nurseries. — *Bull.*

Hongkong's mobile operator selects Siemens and Phone.com to supply commercial WAP platform. *Siemens and Phone.com, Inc.* have announced that Hong Kong's mobile operator *Hutchison Telecommunications (Hong Kong) Limited* has selected *Siemens Information and Communication Networks Group* to implement the wireless application protocol platform for innovative wireless Internet-based services.

Under the terms of the agreement, Siemens has provided Hutchison with a complete WAP solution, including the Phone.com URLink server suite, allowing it to provide innovative wireless Internet services to its mobile customers. Already, more than 20 GSM operators in Europe and Asia are using the complete WAP solution from Siemens and Phone.com.

Through WAP, the user not only has access to typical public information such as sports, news and e-mail, but also can get protected access to corporate applications delivering user-specific information over the mobile network. — *Siemens.*

Motorola and T-Mobile sign GPRS network deal. Germany's GSM mobile network operator *T-Mobile* and *Motorola, Inc.* have signed a multi-million dollar contract to bring high-speed data services to all subscribers on T-Mobile's T-D1 network by mid-2000.

Under the terms of the contract, Motorola will provide its complete general packet radio service (GPRS) core network system solution to be implemented on the countrywide GSM network. GPRS enables high-speed access to Internet-based content and ser-

vices via a mobile terminal, and opens up the mobile market to a wealth of data applications, including e-commerce, e-mail, and data transfer. — *Motorola.*

BT receives ISO environmental registration. BT's active involvement in environmental management has won it an ISO 14001 certification award.

ISO 14001 is an international environmental standard that details how an environmental management system should be defined and implemented. The certificate was presented to Sir Peter Bonfield, Chief executive of BT, by the two joint registrars, Lloyd's Register Quality Assurance (LRQA), and the British Standards Institution (BSI).

The certificate, which covers BT's United Kingdom-based operations, endorses a commitment from BT to continually improve the way in which environmental issues will be managed. — *BT.*

EXFO launches test kit for fibre installers. EXFO Electro-Optical Engineering Inc. has created the *FIKIT-200* test kit especially for fibre installers. This kit enables technicians to manually check assembled field connectors before installing high-bandwidth synchronous digital hierarchy/synchronous optical network transmission (SDH/SONET) systems. The kit includes laser source, power meter, visual fault locator, live fibre detector, end face connector cleaner, fibre-optic microscope and a carrying case with space for accessories. — *EXFO.*

Convergys signs contract with Telesp of Brazil. Convergys Corporation has announced that it has signed a six-year contract with *Telesp Celular, S.A.* to provide a comprehensive

billing and customer care solution. Telesp serves over 2.7 million subscribers and operates in the entire State of São Paulo, a large cellular market in Brazil.

Under the terms of the contract, Convergys will customize, manage, and operate its comprehensive new *Atlys* billing and customer care solution in a state-of-the-art data centre in São Paulo staffed and equipped by Telesp. — *Convergys.*

NetSat28 selects Space Systems/Loral to build satellite. NetSat28 Company LLC has announced that it has selected Space Systems/Loral (SS/L) as the prime contractor to design and build a Ka-band communications satellite for the *NetSat28* system.

The system is scheduled to be fully operational by October 2002 and should provide high-capacity broadband-on-demand data services to small businesses and residential users in the United States. In particular, the NetSat28 system will provide Internet access up to 20 times faster than a T-1 line or about 30 Mbit/s and enable new Internet-based applications in e-commerce, info/entertainment and data multicasting. — *NetSat28.*

Motorola wins contract to deploy GSM system in Ghana. *Ghana Telecommunication Company Limited* has awarded a USD 41.5 million contract to *Motorola, Inc.* for the supply and deployment of its GSM digital cellular network.

Motorola's Network Solutions Sector will deploy its latest GSM infrastructure at 900 MHz to provide a system capacity for up to 70 000 cellular subscribers. The equipment will be deployed to provide capacity and coverage in the country's major cities and along major roadways. Country-

wide coverage is planned for 2001. — *Motorola.*

BT enters third generation mobile auction. BT has announced that it has applied to enter the auction for a third generation (3G) mobile licence in the United Kingdom. BT will bid through a wholly-owned subsidiary, BT3G Ltd. which will operate seamlessly with BT Cellnet and BT's fixed business.

By the middle of this year, BT Cellnet will launch the general packet radio service (GPRS) which allows data to be transmitted between five and ten times faster than today's services. — *BT.*

INTELSAT launches Internet satellite link. The International Telecommunications Satel-

lite Organization has announced that it has implemented the first 155 Mbit/s Internet satellite link between the United States and Latin America (Brazil) over the *Intelsat-805* satellite at 304.5° E. The return link, from Brazil to the United States, is a 34 Mbit/s carrier. This hybrid, high-bandwidth link to the Internet backbone will assist *Empresa Brasileira de Telecomunicações S.A. (EMBRATEL)* in supporting the dramatically growing demand for Internet services in Brazil. INTELSAT currently provides Internet backbone connections to more than 140 countries in the world. — *INTELSAT.*

NTT-WT to launch clearinghouse. *NTT Worldwide Telecommunications Corporation*

has announced the launch of *NTT Communications Clearinghouse* to serve the rapidly expanding IP telephony market. This is the first IP telephony clearinghouse in Asia with its hub in Japan.

The clearinghouse will function as an IP telephony routing and settlement service. Members (Internet telephony service providers, Internet service providers, telecommunication carriers, etc.) will connect to NTT-WT's routers and gateway devices via a leased circuit, frame relay or the Internet.

By joining *NTT Communications Clearinghouse*, IP telephony providers can offer promptly their services to more than 220 countries around the world without having to enter contracts with other IP telephony providers in each country. — *NTT.*



The calendar for all ITU conferences and meetings can be found on the Web at: <http://www7.itu.int/events-public>

2000

10–15 April (Rio de Janeiro)
ITU TELECOM AMERICAS 2000

1–5 May (Istanbul, Turkey)
Radiocommunication Assembly (RA-2000)

8 May–2 June (Istanbul)
World Radiocommunication Conference (WRC-2000)

19–28 July (Geneva)
Council 2000 (C-2000)

27 September–6 October (Montreal, Canada)
World Telecommunication Standardization Assembly (WTSA-2000)

4–9 December (Hong Kong)
ITU TELECOM ASIA 2000

General Secretariat

19–28 July (Geneva)
Council 2000 (C-2000)

6–10 November (Geneva)
Working Group on ITU Reform (third meeting)

Telecommunication Development Sector

25–29 April (Banjul)
Workshop on cost calculation for English-speaking West African countries

9–12 May (Budapest)
Regional seminar for Europe on the regulation of telecommunication markets (optimal solutions in privatization)

22–26 May (Russia)
Subregional workshop on tariffs for CIS countries

21–23 June (Bridgetown)
CBU/ITU/FES/UNESCO seminar on challenges to broadcasting in the Caribbean

21–27 June (Ouagadougou)
Regional meeting on HRD for French-, Spanish- and Portuguese-speaking countries of Africa

5–9 September (Bishkek, Kyrgyzstan)
Subregional seminar on international telecommunication law for the CIS

11–15 September (Geneva)
Third meeting of Study Group 1

18–22 September (Geneva)
Third meeting of Study Group 2

9–13 October (Geneva)
Fourth meeting of the Telecommunication Development Advisory Group (TDAG) and related subgroups

23–27 October (Armenia)
Pricing for frequency usage

Radiocommunication Sector

1–5 May (Istanbul)
Radiocommunication Assembly (RA-2000)



ITU Conferences (continued)

8 May–2 June (Istanbul)
World Radiocommunication
Conference (WRC-2000)

5–9 June (Istanbul)*
Conference Preparatory Meeting
(CPM)

5–9 June (Istanbul)*
Radiocommunication Study Group
Chairmen and Vice-Chairmen
Meeting (CVC)

28 June–11 July (Geneva)
Working Party 3K (Point-to-area
propagation)

28 June–11 July (Geneva)
Working Party 3M (Point-to-point
and Earth-space propagation)

29 June–11 July (Geneva)
Working Party 3J (Propagation
fundamentals)

4–10 July (Geneva)
Working Party 3L (Ionospheric
propagation)

12–13 July (Geneva)
Study Group 3 (Radiowave propa-
gation)

1 August (Canada)
Working Party 7B (Space radio
systems)

1 August (Canada)
Working Party 7C (Earth exploration
satellite systems and meteorological
elements)

1 August (Canada)
Working Party 7D (Radio astronomy)

21–26 August (Atlanta, GA)
Working Party 8F (IMT-2000 and
systems beyond IMT-2000)

11–15 September (Geneva)
Radio Regulations Board (RRB)

13–19 September (Geneva)
Working Party 10B (Terrestrial
sound broadcasting at frequencies
above 30 MHz)

13–19 September (Geneva)
Joint Working Party 10-11Q (Audio
and video quality assessment)

13–19 September (Geneva)
Joint Working Party 10-11R
(Recording for broadcasting)

* CPM together with CVC meeting.

13–21 September (Geneva)
Working Party 11C (Terrestrial
television (emission and planning
parameters))

13–22 September (Geneva)
Joint Working Party 10-11S
(Satellite broadcasting)

14–22 September (Geneva)
Working Party 11A (Television
systems and data broadcasting)

18–21 September (Geneva)
Working Party 10C (Audio-
frequency characteristics of sound
broadcasting signals)

18–21 September (Geneva)
Task Group 11/5 (Interactive
television broadcasting system)

18–21 September (Geneva)
Joint Task Group 10-11 (Multi-
media broadcast evolution and
common content format)

18–22 September (Geneva)
Working Party 10A (Sound
broadcasting at frequencies below
30 MHz and antennas for sound
broadcasting)

18–22 September (Geneva)
Working Party 11B (Digital
television (source coding))

18–25 September (Geneva)
Working Party 9A (Performance and
availability, interference objectives
and analysis, effects of propaga-
tion, and terminology)

18–26 September (Geneva)
Working Party 9B (Radio-frequency
channel arrangements, radio system
characteristics, interconnection,
maintenance and various appli-
cations)

18–26 September (Geneva)
Working Party 9D (Sharing with
other services (except for the fixed-
satellite service))

20–22 September (Geneva)
Working Party 4SNG (Satellite news
gathering (SNG), outside broadcast
via satellite)

20–26 September (Geneva)
Working Party 4B (Systems, perform-
ance, availability and maintenance)

25–26 September (Geneva)
Working Party 9C (HF systems)

25–27 September (Geneva)
Study Group 10 (Broadcasting
service (sound))

25–27 September (Geneva)
Study Group 11 (Broadcasting
service (television))

25 September–3 October
(Geneva)
Working Party 4A (Efficient orbit/
spectrum utilization)

27 September (Geneva)
Study Group 9 (Fixed service)

27 September–4 October
(Geneva)
Working Party 4-9S (Frequency
sharing between the fixed-satellite
service and the fixed service)

4 October (Geneva)
Study Group 4 (Fixed-satellite
service)

5 October (Geneva)
Joint Study Groups 4 and 9
meeting

9–17 October (Geneva)
Working Party 7A (Time signals and
frequency standard emissions)

9–17 October (Geneva)
Working Party 7B (Space radio
systems)

9–17 October (Geneva)
Working Party 7C (Earth exploration
satellite systems and meteorological
elements)

9–17 October (Geneva)
Working Party 7D (Radio
astronomy)

9–18 October (Geneva)
Working Party 8A (Land mobile
service excluding IMT-2000,
amateur and amateur-satellite
services)

17–27 October (Geneva)
Working Party 8D (All mobile
satellite services and radio-
determination satellite service)

18–19 October (Geneva)
Study Group 7 (Science services)



ITU Conferences (continued)

18–27 October (Geneva)
Working Party 8B (Maritime mobile service including Global Maritime Distress and Safety System (GMDSS); aeronautical mobile service and radiodetermination service)

23–27 October (Geneva)
Working Party 8F (IMT-2000 and systems beyond IMT-2000)

23–31 October (Geneva)
Working Party 1A (Spectrum engineering techniques)

23–31 October (Geneva)
Working Party 1B (Spectrum management methodologies)

23–31 October (Geneva)
Working Party 1C (Monitoring spectrum)

23–31 October (Geneva)
Task Group 1/5 (Unwanted emissions and the modification of Recommendation ITU-R SM.328-8 concerning out-of-band emissions)

24–25 October (Geneva)
Task Group 10/6 (Digital sound

broadcasting at frequencies below 30 MHz)

26 October (Geneva)
Study Group 10 (Broadcasting service (sound))

30–31 October (Geneva)
Study Group 8 (Mobile radiodetermination amateur and related satellite services)

1–2 November (Geneva)
Study Group 1 (Spectrum management)

6–10 November (Geneva)
Radiocommunication Seminar

20–24 November (Geneva)
Radio Regulations Board (RRB)

Telecommunication Standardization Sector

3–14 April (Geneva)
Study Group 15 (Transport networks, systems and equipment) and its Working Parties

12–18 April (Geneva)
Study Group 3 (Tariff and accounting principles including related telecommunications economic and policy issues) and its Working Parties

8–12 May (Geneva)
Study Group 6 (Outside plant) and its Working Parties

9–18 May (Geneva)
Study Group 12 (End-to-end transmission performance of networks and terminals) and its Working Parties

15–19 May (Geneva)
Study Group 9 (Television and sound transmission) and its Working Parties

7–14 June (Geneva)
Telecommunication Standardization Advisory Group (TSAG)

27 September–6 October (Montreal, Canada)
World Telecommunication Standardization Assembly (WTSA-2000)



Conferences external to the ITU

2000

10–14 April (Honolulu, HI)
NOMS 2000 — Network Operations and Management Symposium (IEEE/IFIP)
Tel.: +1 212 705 8941
Fax: +1 212 705 8999
E-mail: noms2000@comsoc.org
<http://www.noms.org/2000>

11–12 April (London)
IP Telephony 2000
Tel.: +44 171 453 5495
Fax: +44 171 636 1976
E-mail: cust.serv@ibcuk.co.uk
<http://www.ibctelecoms.com/ip2000>

12–13 April (London)
Customer Relationship Management in Telecoms
Tel.: +44 207 252 2222
Fax: +44 207 252 2272
<http://www.smiconferences.co.uk>

25–28 April (Helsinki)
Mobile Communications 2000 Conference
Tel.: +358 9 4315 5333
Fax: +358 9 4315 5300
E-mail: kurssit@tieturi.fi
<http://www.tieturi.fi/>

16–17 May (London)
Broadband wireless access
Tel.: +44 171 453 5495
Fax: +44 171 636 1976
E-mail: cust.serv@ibcuk.co.uk
<http://www.ibctelecoms.com/bwa>

28–31 May (Rabat)
Challenges for public broadcasting in Africa
Tel.: +1 514 524 8223
Fax: +1 514 524 8858
E-mail: CMRTV@courriel.qc.ca
<http://www.orbicom.uqam.ca>

27–30 June (Wroclaw, Poland)
15th International Wroclaw Symposium on Electromagnetic Compatibility
E-mail: emc@il.wroc.pl
<http://www.emc.wroc.pl>

10–13 July (Guildford, United Kingdom)
Eighth International Conference on HF radio systems and techniques
Tel.: +44 171 344 5471
Fax: +44 171 240 8830
E-mail: hf2000@iee.org.uk
<http://www.iee.org.uk/Conf/>

23–25 October (Sarajevo)
BIHTEL 2000 — Telecommunication networks
Tel./fax: +387 71 654 972
E-mail: bihtel@eff.unsa.ba