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ITU NEWS

www.itu.int/itunews

Council 2007

- ▶ *High-Level Segment to focus on cybersecurity and ICT infrastructure*
- ▶ *Shaping ITU's future*



Rethinking universal access



International
Telecommunication
Union



Communication has always been a human need.



We believe it is also a human right.

At the International Telecommunication Union (ITU), we believe that no human right, including the right to communicate, can survive unless it is made real and relevant. As the United Nations specialized agency for telecommunications, it is our mission to bring the benefits of information and communication technologies to as many of the world's people as possible. This is why our 191 Member States and 650 private sector members work together to set universal telecommunication standards, establish international agreements and promote global development. Everyone has the right to communicate. We help give them the means. www.itu.int

Helping the world communicate



**International
Telecommunication
Union**



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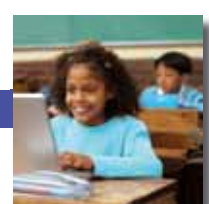
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New trends, new opportunities



Dr Hamadoun I. Touré, ITU Secretary-General

■ This issue of *ITU News* looks at the 2007 session of the Council, universal access, and the latest trends in telecommunications. One of these trends is the move to next-generation networks

(NGN), which heralds the shift from a “one network, one service” approach, to the delivery of many services over a single network based on the Internet protocol (IP). Migration to NGN is building on the expansion of broadband networks, the rise of voice over IP (VoIP), convergence of fixed and mobile telephony, and IP television (IPTV).

In developed countries, fixed-line phone operators are deploying optical fibre closer and closer to the end user, in the search for new revenue streams from IPTV and video services. For similar reasons, mobile operators are investing in third, or even fourth-generation mobile networks and broadband wireless access.

But many of the new services and applications, such as VoIP, are calling into question business models and regulatory frameworks designed for an earlier era. To help regulators, policy-makers and businesses better understand the transformation sweeping the sector, ITU has published its latest edition of *Trends in Telecommunication Reform: The Road to Next-Generation Networks* to coincide with this year’s

Council session. As well as the challenges, the report highlights the opportunities for operators and benefits for consumers that NGN can bring.

Since 2003, in fact, ITU’s Telecommunication Standardization Sector (ITU-T) has been carrying out intensive studies under the NGN-Global Standards Initiative. And the Plenipotentiary Conference in Antalya last November stressed, through its Resolution 137, that “NGN deployment and standards development activities are essential for developing countries, especially for their rural areas where the majority of the population live.” In keeping with this, ITU is consolidating its work on NGN.

NGN are one of the tools for achieving the goals of the World Summit on the Information Society (WSIS). They are expected to facilitate a full range of public services, such as e-government and e-health. For this reason, policy-makers are increasingly asking not whether they should promote this evolution, but how they can hasten it.

Reorganizing ITU

Change is also under way at ITU. The Antalya Conference, as well as WSIS, took decisions that have broadened ITU’s mandate. After consulting Council Member States, we instituted a change in the structure of the General Secretariat. Our Telecommunication Development Bureau (BDT)



and the Telecommunication Standardization Bureau (TSB) have also been reorganized. These changes should eliminate duplication in the work of the secretariat, provide more cost-effective services, and produce savings for the Union.

Guidelines from Decision 5 of the Plenipotentiary Conference have helped us to come up with a balanced budget. Indeed, since taking office in January this year, ITU's team of elected officials has been making every effort, together with staff, to find further efficiencies. We are also working to increase our membership base and encourage our Member States to support us in this endeavour.

High-Level Segment of Council 2007

This year, for the first time, a High-Level Segment will take place on the opening day of the Council session. It will provide a forum for government ministers to share their perspectives on cybersecurity, as well as on ICT infrastructure (see pages 6–8).

Establishing a foundation for cybersecurity is one of ITU's most critical goals. Attacks on networks are growing every day. Cybercrime causes billions of dollars in damage every year. ITU's Global Cybersecurity Agenda, launched in May, should help combat these problems.

When it comes to ICT infrastructure, our figures show that there were nearly 4 billion mobile and fixed-line subscribers and over 1 billion Internet users worldwide at the end

of 2006. Nevertheless, some of the "missing link" disparities seen 20 years ago persist. Many places still lack even basic communication infrastructure, particularly in rural communities. ITU is leading a coalition to accelerate affordable broadband connectivity in Africa that will be launched at the *Connect Africa Summit* on 29–30 October 2007. The meeting in Kigali, Rwanda, will gather high-level representatives from government, the private sector and civil society. The aim is to match projects with financing to ensure a digital future for Africa. And we plan to undertake similar actions in Latin America, the Caribbean, Asia-Pacific, the Arab region and parts of Europe.

Today, the prospects are good in Africa, with the leadership committed to putting in place the necessary regulatory framework for further growth in ICT.

This year, ITU is 142 years old and the Council in its present form marks its 60th anniversary. Since it was established, the rate of change in telecommunications has accelerated and new services are being offered that it would have been hard to imagine in 1947. But, while in some countries children post their own video clips onto YouTube, in other parts of the world people have little or no access to ICT. The ITU management will work with the Council to ensure that the Union has the necessary strategies and resources to become the centrepiece for building an information society that guarantees digital opportunities for everyone. ▀



The Council turns 60

Sixty years ago, the period following the end of the Second World War was a time when many new institutions were created. The United Nations, for example, was formed in 1945. Modernization was the aim, alongside the fundamental goals of maintaining peace and promoting prosperity.

In 1947, ITU held a Plenipotentiary Conference in Atlantic City, New Jersey, United States, with the aim of developing and modernizing the organization. Following decisions of the conference, ITU became a specialized agency of the United Nations on 15 October that year, and the ITU Council was established under the name Administrative Council.

In between plenipotentiary conferences that are held every four years, ITU is governed by the Council, which normally meets annually. The Council's role is to consider broad telecommunication policy issues so that ITU's activities and strategies fully respond to the dynamic world of today's in-

formation and communication technologies (ICT). In addition, the Council is responsible for the very important task of approving budgets for ITU's work and controlling finances and expenditure.

Representing the world

The Council comprises up to 25 per cent of ITU's Member States. Currently, the Council has 46 Member States (or 46 seats). Because the Council must reflect ITU's global reach, Member States that serve on it are elected at each Plenipotentiary Conference with due regard to the need for equitable distribution of seats among all regions of the world (Americas, Western Europe, Eastern Europe, Africa, Asia and Australasia).

At the Plenipotentiary Conference in Antalya, Turkey, held in November 2006, a new Council was elected for the period 2006–2010. It will hold its first ordinary session in Geneva on 4–14 September 2007. Council Member States are listed below.

Americas (8 seats)

 Argentina  Brazil  Canada  Cuba  Mexico  Trinidad and Tobago  United States  Venezuela

Western Europe (8 seats)

 France  Germany  Italy  Portugal  Spain  Sweden  Switzerland  Turkey

Eastern Europe (5 seats)

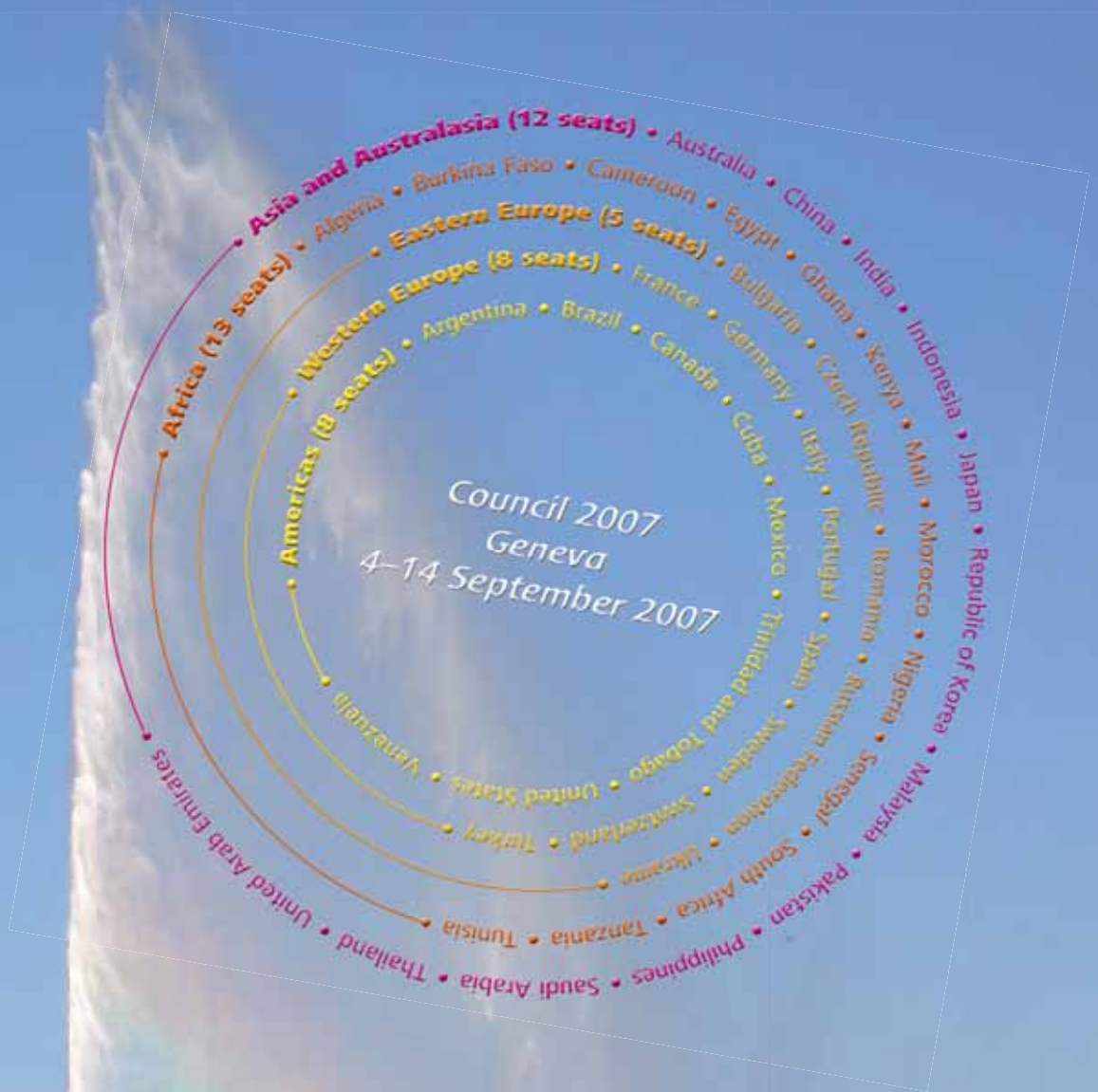
 Bulgaria  Czech Republic  Romania  Russian Federation  Ukraine

Africa (13 seats)

 Algeria  Burkina Faso  Cameroon  Egypt  Ghana  Kenya  Mali  Morocco  Nigeria  Senegal  South Africa

Asia and Australasia (12 seats)

 Australia  China  India  Indonesia  Japan  Republic of Korea  Malaysia  Pakistan  Philippines  Saudi Arabia



Africa  Tanzania  Tunisia

Arabia  Thailand  United Arab Emirates

Paul Monson



Cybersecurity

The High-Level Segment will address these questions:

- ▶ What are the greatest cyberthreats currently faced by your country?
- ▶ What are the key elements to be considered in formulating a national strategy for cybersecurity and for preventing cybercrime?
- ▶ What role should be played by governments in promoting a culture of cybersecurity at the national, regional and international levels?
- ▶ What does your government consider to be the highest priority activities for addressing current and emerging cyberthreats at the national, regional and international levels?

High-Level Segment to focus on cybersecurity and ICT infrastructure

/// The ITU Council meets at the Union's headquarters in Geneva on 4–14 September 2007, amid rapid change in information and communication technologies (ICT). An important innovation this year is the “High-Level Segment”, to be held on the opening day. It will give ministers from more than 15 countries and councillors an opportunity to exchange views on issues of strategic importance to ITU and on emerging trends in the sector.

The focus of the High-Level Segment will be cybersecurity and ICT infrastructure, including new developments in these areas and the main obstacles to progress. These two topics have been chosen to reflect the key outcomes of the World Summit on the Information Society (WSIS), where ITU is asked to lead the multistakeholder efforts in the areas of “information and communication infrastructure” and “building confidence and security in the use of ICT”. Speakers will share their perspectives on challenges, solutions and key measures undertaken by their governments.

Cybersecurity

ITU's background paper for the High-Level Segment says that cybersecurity is growing in importance around the world for reasons that range from the inherited architecture of the Internet and anonymity online, to society's growing dependence on ICT.

Inherited architecture of the Internet:

The Internet began as a closed network with a limited number of trusted users, meaning that authentication was not an issue. The original design philosophy of the Internet is now several generations behind the latest technological challenges. (Consider, for example, the issue with inherited architecture posed by the “millennium bug”.) The challenge now is how to replace or modify the inherited architecture of the Internet to build a safe and secure information and communication infrastructure.

Anonymity online: The lack of user authentication on the Internet means that it is easy to be anonymous or to falsify identity information in order to act without fear of reprisal. Conversely, anonymity may be one way in which users may feel more protected, by not giving away personal information and guarding against invasions of privacy.



Society's growing dependence on ICT:

Modern lifestyles are becoming more and more dependent on ICT at work and at home, in the storage, processing and transmission of electronic data for everything from bank accounts and financial assets to health records. In some countries, the Internet has become such a vital part of society that it is often difficult to remember how people lived without it. Loss of connectivity, data or information or the ability to communicate, can have profound consequences on a country's economy and society.

Cybercrime takes many forms, from breaches in network security, financial fraud, identity theft and invasion of privacy to malware attacks, spam and online child pornography. Few organizations have the capabilities to prevent, respond to, and recover from such incidents.

To address these problems, countries need coordinated national strategies and action plans, combined with regional and international cooperation. Key activities include the development of international standards, the coordination of legal systems, information sharing, cross-border prosecution of cybercriminals and the provision of

assistance to developing countries (see Cybersecurity Watch on pages 27–29).

To promote this cooperation, ITU has launched a Global Cybersecurity Agenda. The goal is to foster a common understanding of the importance of cybersecurity and to bring together all stakeholders (governments, intergovernmental organizations, the private sector and civil society) to find ways of dealing with threats, from fraud, identity theft and invasion of privacy, to attacks on critical resources and infrastructure.

ICT infrastructure

ITU is organizing a series of multi-stakeholder initiatives in different parts of the world with the key objective of accelerating ICT investment in underserved areas, as well as supporting broader social and economic development. The first of these initiatives is Connect Africa. Launched in July this year, it will result in a summit to be held in Kigali, Rwanda, on 29–30 October 2007.

Investment in ICT infrastructure in Africa has improved dramatically in recent years, representing a total of USD 8 billion in 2005, up from USD 3.5 billion in 2000. These figures reflect an increasingly vibrant

ICT infrastructure

The High-Level Segment will address these questions:

- *What are the key success factors necessary to advance overall ICT investment and growth in Africa and other regions?*
- *What are the best policy principles to create a business-friendly, attractive policy and regulatory environment that fosters innovation, competition and investment?*
- *How can the right balance be struck between private and public investment as well as ownership and management of networks?*
- *What national success stories can be used for best practice in building out ICT infrastructure and literacy?*



(Rodolfo Clix)

private sector investment environment, which has been stimulated by the opening of most African telecommunication markets to competition, coupled with the establishment of independent regulators in almost 90 per cent of countries in the region.

The mobile market in Africa is growing fast, with a leap from 16 million to 136 million subscribers between 2000 and 2005. Mobile now outnumbers fixed line penetration by nearly five to one in Africa.

ITU's background paper for the High-Level Segment underlines that "despite this very encouraging trend in mobile access, effective high-speed Internet services in Africa, needed for businesses, government and consumer applications, continue to be either very expensive (especially when compared to average local incomes) or not available". This, the paper says, is due to limited broadband infrastructure investment in many places. Where available, the cost of broadband Internet access in Africa is on average three times higher than in Asia, for example, where such infrastructure investments have been made. It is not surprising, then, that broadband penetration is below 1 per cent in Africa, compared to nearly 30 per cent in some high-income countries.

And while urban areas are benefiting from increasing access to mobile telephone and Internet services (albeit at dial-up speeds), many smaller towns and rural communities remain without any ICT access. These market gaps present challenges, but they also reveal new opportunities for private investors and innovative "win-win" public-private partnerships to complement

the successful experience of mobile telephony in Africa.

Ways to improve connectivity around the world are covered in ITU's latest report *Trends in Telecommunications Reform: The Road to Next-Generation Networks*, published to coincide with Council 2007 (see article on pages 14–16). For example, the report says that "fibre-optic cables are regarded as vital to ensuring the availability of abundant international Internet capacity at lower access prices". It adds that "the deployment of international fibre networks, together with national fibre backbones, is increasingly viewed as a main policy objective for developing countries".

Fibre-optic projects are being undertaken throughout the developing world, by both incumbents and a whole range of other players. New undersea projects include the East African Submarine Cable System (EASSy) and the South East Asia-Middle East-West Europe 4 (SEA-ME-WE 4) project. In 2006, Bangladesh launched its first, 2000-km undersea fibre-optic cable. It will provide a data-transfer capacity of 10 Gbit/s, compared with the current 150 Mbit/s bandwidth. Numerous terrestrial projects have also been launched, such as the Trans-Kalahari fibre-optic link in Botswana. To be operational in 2008, it will connect Botswana with Zambia and Namibia. Mobile operators are also starting to invest in fibre networks. To meet growing demand in Latin America, for example, two regional operators, América Móvil (CTI Móvil) and Telmex Argentina, are planning to deploy their own fibre-optic network. ▀

Shaping ITU's future

/// The 2007 session of the ITU Council will take action to implement decisions of the ITU Plenipotentiary Conference held in Antalya in November 2006. It will consider reports from the ITU General Secretariat, the Bureaux, and from its own working groups that are considering specific issues of policy and strategy.

At the top of the agenda is the World Summit on the Information Society (WSIS). ITU has an overall facilitation role in the multi-stakeholder implementation of the Geneva Plan of Action and the Tunis Agenda for the Information Society that resulted from WSIS, alongside the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the United Nations Development Programme (UNDP).

WSIS implementation

The role of the Council Working Group on WSIS (WG-WSIS) is "to facilitate membership input and guidance on the ITU implementation of relevant WSIS outcomes" and "to elaborate proposals to the Council that may be necessary for adapting ITU to its role in building the information society". Of course, this means considering resources. At its meeting on 13–14 June 2007, WG-WSIS decided to recommend that the Council should "consider the possibility of identifying extra-budgetary resources" to implement the WSIS outcomes.

In 2015, the United Nations General Assembly will review how WSIS outcomes are being implemented. In readiness, WG-WSIS says that ITU should develop a road map for its work in this area up to 2015, to be presented to the 2008 Council session. It also recommends that ITU should prepare a report on its "activities that have advanced the achievement of internationally agreed WSIS goals," taking into account the results of such events as the World Radiocommunication Conference, the World Telecommunication Standardization Assembly and the World Telecommunication Development Conference.

WG-WSIS will propose that the United Nations Group on the Information Society (UNGIS) should also develop a road map to give an overview of the implementation of WSIS outcomes throughout the UN system up to 2015.

With the phasing out of the WSIS Executive Secretariat, in January this year, ITU established a WSIS Task Force, chaired by Deputy Secretary-General Houlin Zhao.

Broadening participation in WSIS activities

A working group of the Council has been established to study the participation of "all relevant stakeholders" in the activities of ITU related to WSIS. Its job is to consider not only the spheres in which other relevant

"The WSIS Task Force that we have established will be instrumental in coordinating ITU activities in the run-up to 2015."



ITU/J. M. Ferré

ITU Deputy Secretary-General Houlin Zhao.



The budget in a nutshell

The draft budget has been compiled according to Decision 5 of the Antalya Plenipotentiary Conference on zero nominal growth in the Contributory Unit of CHF 318 000. ITU's total income is expected to reach CHF 322.2 million over the 2008–2009 budget period, including a withdrawal of CHF 12.9 million from the Reserve Account.

Expenditure is forecast also to be at CHF 322.2 million, with all possible cost reductions considered. This is CHF 19.7 million lower than the 2006–2007 budget, after factoring in cost increases and programme growth. The draft budget points out that "the scope for reducing the level of expenditure is limited (as) the major part of the budget consists in fixed costs".

stakeholders may participate, but also those in which they may not.

The working group's first meeting was on 15 June 2007 at ITU headquarters in Geneva. It highlighted the need for a better understanding of the historical background and current mechanisms for stakeholder participation in ITU activities. It agreed that the term "relevant stakeholders" should include not only civil society bodies, but also other entities and organizations not participating in the activities of ITU. The group also underlined that "enhanced participation in WSIS-related ITU activities must always represent added value to the work of ITU as a whole". And it said that the inter-governmental nature of ITU should be preserved.

The working group's next meeting takes place during the 2007 Council session. It will consider a paper prepared by the ITU General Secretariat on the Union's existing practice regarding stakeholder participation. (It has also asked the secretariat to complete a study by the end of this year on the practices at other intergovernmental organizations and UN agencies.)

The group is also developing a framework for the first round of open consultations with interested stakeholders. If approved by the 2007 Council, views will be shared on the following questions:

- ▶ What areas should remain within the exclusive sphere of competence of ITU Member States?
- ▶ What criteria should define stakeholders that are "relevant" to ITU's activities on WSIS?
- ▶ What "added value", including financial, might stakeholders bring to the work of the ITU?

- ▶ How can existing mechanisms for participation be used more effectively, and what others could be considered?
- ▶ What specific efforts might be needed to mobilize effective participation of all relevant stakeholders from developing countries, and stakeholders in the development field?

Deciding the budget for 2008–2009

The Management and Budget Group (MBG) of the Council was established by the Antalya Plenipotentiary Conference. It has the important task of presenting a draft budget for ITU covering the period 2008–2009. At the group's meeting in June 2007, it noted that despite noteworthy efforts to increase revenue and reduce expenditure, the draft budget can only be balanced with a withdrawal from the reserve account. It says that "although ITU can still finance budget deficits, the draft budget shows economic problems that imply further cost reductions in the future".

Efficiency measures have been identified to cut costs further and ITU has "received indications from some Member States, pending final approval, that they will increase their contributions," says the MBG. However, it will not be easy to balance the books, given the increased workload of the Union. Demand from the membership is growing, but financial resources are falling in real terms.

The successful implementation of ITU's programme depends on the level of committed funds. It might become necessary to raise the maximum level of the Contributory Unit in the 2010–2011 budgetary period.

Operational plans

The draft budget for 2008–2009 has been compiled within the framework of the *Strategic Plan for the Union for 2008–2011*, determined at Antalya. The budget has a similar structure to the Strategic Plan, focusing on a set of final products or services to be delivered by ITU. In this way, the budget is closely linked with the operational plans for each of ITU's Sectors and for the General Secretariat, which will be presented to the Council.

Radiocommunication Bureau



The draft operational plan for the Radiocommunication Bureau says that it "has succeeded in fully implementing the programme that was outlined four years ago," including eliminating the backlog in processing the filings of satellite and terrestrial frequency assignments, and holding major conferences in 2003 and 2006. It foresees that much of its work from now and through the 2008–2009 budgetary period will be focused on the World Radiocommunication Conference to be held in Geneva from 22 October to 16 November 2007, and in implementing its results.

Like the other parts of ITU, the problem for the Radiocommunication Sector (ITU-R) is insufficient resources. "The large financial shortfall under which the Union will have to operate could render the implementation of the objectives and outputs of the Sector difficult and sometimes uncertain, requiring strict and optimum forecasting and management of the resources available," according

to the draft plan. It says that "clear setting of priorities, as well as very innovative, effective and bold management measures and tools, will have to be introduced so as not to jeopardize too severely ITU-R activities."

Telecommunication Standardization Bureau



All 191 Member States of ITU participate in the Telecommunication Standardization Sector (ITU-T). Through such mechanisms as regional organizations and outreach programmes to share expertise, "ITU-T must become relevant to all the Members of the Union," the draft plan says.

The plan points out that "ITU-T has greatly increased the speed of its processes and procedures" and has an excellent product, but the Sector needs to market this product and put more resources into this activity. At the same time it stresses that ITU-T will place increasing emphasis on collaborating with other standardization bodies.

Next-generation networks (NGN) are seen as an important focus of ITU-T's work. Also, activities are planned to help bridge "the standardization gap" and encourage greater participation by developing countries in the standardization process. In addition, strong emphasis is placed on targeting tomorrow's engineers and decision makers, through contacts and events with academic institutions. Meanwhile, considerable effort will be put into organizing the World Telecommunication Standardization Assembly (WTSA-08) in October 2008, and its preparatory meetings.

"The forthcoming period will be highly challenging for the Union and even more so for the Radiocommunication Sector."



ITU/J. M. Ferré

Valery Timofeev,
Director of BR

"ITU-T has a uniquely diverse membership. This is its unique strength, and it must be capitalized on by encouraging greater participation in the work of the Sector."



ITU/J. M. Ferré

Malcolm Johnson,
Director of TSB

“ We face a heavy schedule of activities, and demands for assistance still need to be addressed, in spite of limited resources. ”



ITU/L. M. Ferré
Sami Al Basheer
Al Morshid,
Director of BDT

Telecommunication Development Bureau



Restructuring of the Telecommunication Development Bureau (BDT) earlier this year was in line with the more coordinated approach to operational planning across ITU. It introduced new working methods, strengthened BDT's planning capacity and put new emphasis on the role of ITU's Regional Offices. Nevertheless, the 2008–2009 budgetary period will be challenging for the Telecommunication Development Sector (ITU-D), which has limited resources to meet demand.

The draft plan says the 2008 Global Symposium for Regulators will be held in Thailand, and ITU-D will continue to produce such key products as *Trends in Telecommunications* and the *World Telecommunication/ICT Indicators*. The plan also highlights work by BDT on implementing the outcomes of WSIS and of the Doha Action Plan that was adopted at the 2006 World Telecommunication development Conference (WTDC).

Other important work will include implementation of the Regional Initiative Project, which has a provisional allocation of some CHF 4.5 million from 2008 onwards; however, full implementation will require financial and human resources from the current ITU-D budget, as well contributions through partnerships with the private sector, and from other potential donors from the regional and international arenas.

General Secretariat

The draft operational plan for the General Secretariat says that it will continue to play an essential part, both in direct activities and in support of ITU's Sectors, in meet-

ing the goals of the *Strategic Plan for the Union for 2008–2011*. In fulfilling this role of support, coordination and information, the General Secretariat “is constantly striving to improve its services and to organize its operations in the most efficient and cost-effective manner”.

The plan also reflects the restructuring that has taken place in the General Secretariat, notably the establishment of a Department of Administration and Finance (combining the former Finance and Personnel Departments), the new Strategic Planning and Membership Department, and the elimination of the Common Services Department. It describes how this restructuring is designed to meet those objectives, through streamlining and by increasing the use of management tools to help monitor outputs, measure costs and evaluate results.

Internet issues

The Council will consider ITU's role with regard to international public policy on the Internet and the management of Internet resources, including domain names and addresses. The role of Member States in managing multilingual domain names will be discussed, as well as management of networks based on the Internet protocol (IP).

In its report to the Council, WG-WSIS stresses that ITU has an important role to play in Internet governance, as recognized in the WSIS outcome documents. The report also says that ITU should collaborate with relevant UN organizations involved in Internet governance, such as UNESCO and the World Intellectual Property Organization (WIPO), as well as with institutions such as the Internet Corporation for Assigned

Names and Numbers (ICANN) and the Internet Governance Forum (IGF).

Such cooperation should be in keeping with the *Tunis Agenda for the Information Society*, which states that “each UN agency should act according to its mandate and competencies and pursuant to decisions of their respective governing bodies, and within existing approved resources”. It should also be based on WSIS principles, which require that “the international management of the Internet should be multilateral, transparent, and democratic with the full involvement of governments, the private sector, civil society and international organizations”.

The Internet Governance Forum

ITU presented a series of information papers covering its mandate in Internet governance to the first meeting of the Internet Governance Forum (IGF) in Athens on 30 October–2 November 2006. The second IGF meeting will take place in Rio de Janeiro, Brazil, on 12–15 November 2007. To decide its programme, an open consultation meeting was held on 23 May, hosted by ITU and attended by more than 300 representatives of governments, the private sector, civil society and international organizations.


Participants stressed the importance for ITU (as a major international organization with a mandate in Internet governance) to play an active role at the IGF in Rio, and at other international forums where Internet governance is discussed. The government of Canada announced a contribution of CHF 105 000 to ITU to help developing countries take part in this meeting.

ITU has submitted two proposals to IGF for its second meeting: to hold an ITU fo-

rum on the topic of cybersecurity, open to all stakeholders, and a thematic workshop under the theme “Diversity — access for marginalized and vulnerable groups of society, including older persons and persons with disabilities”.

Preparing for the World Telecommunication Policy Forum

ITU’s World Telecommunication Policy Forum (WTPF) provides a unique venue for considering emerging telecommunication policy and regulatory issues. At Antalya, it was proposed that the fourth WTPF be held in Geneva in 2009, on dates to be decided by Council 2007. Topics cited at Antalya as being of high interest to the ITU membership, and that could be discussed at the next WTPF, include continuing technological convergence, the development of NGN, and the Internet and its implications for capacity building, particularly in developing countries.

In order to ensure that the discussions at the Forum are well focused, they “shall be based on a report by the Secretary-General prepared in accordance with a procedure adopted by the Council and based on the views of Member States and Sector Members”. To this end, a letter was circulated to the membership on 9 March, soliciting materials for the first draft of the Secretary-General’s report. The deadline for comments is 15 December 2007, and also for nominations to a group of experts who will advise the Secretary-General on elaborating the report. More information can be seen on the WTPF website (www.itu.int/wtpf/). 



Fotosearch



www.itu.int/pub/D-REG-TTR.9-2007

“Technology is not kind. It does not wait. It does not say please. It slams into existing systems. Often destroying them, while creating new ones.”

*American economist
Joseph Alois Schumpeter
(1883–1950)
said in 1937.*

Global trends in telecommunications

/// The latest edition of the ITU report *Trends in Telecommunication Reform: The Road to Next-Generation Networks*, released in September 2007, gives an overall picture of how more and more people around the world are being connected to information and communication technologies (ICT). It says that by the end of 2006, there was a total of nearly 4 billion mobile and fixed-line phone subscribers, plus over 1 billion Internet users worldwide.

“By the end of 2006, there was a total of nearly 4 billion mobile and fixed line phone subscribers, plus over 1 billion Internet users worldwide.”

ing from the launch of a new national operator and significant expansion of existing networks. Ukraine continued to record the strongest mobile annual growth rate in Eastern Europe, at over

60 per cent between 2005–2006, followed by Kazakhstan.

In Latin America the countries enjoying the most significant rates of growth were the smaller markets, such as Paraguay, Uruguay and Venezuela, where the number of mobile customers grew by over 50 per

Mobile surge

It is impressive that 61 per cent of the 2.68 billion subscribers to mobile telephony are in developing countries. And in the first quarter of 2007, two of the fastest growing markets, China and India, reported nearly 200 million more mobile subscribers between them — 87 million in China and about 110 million in India. In fact, India has announced the goal of attaining 250 million mobile users by the end of 2007 and 500 million by 2010.

Other large countries, such as Brazil and the Russian Federation, are also big contributors to this growth, which is expected to continue. The number of mobile subscribers in the Islamic Republic of Iran, for example, doubled over the past year to reach 16.7 million in March 2007, mainly result-



Alamy



Alamy

cent in 2006. In Africa, the number of mobile subscribers in Nigeria rose between 2005–2006 by some 74 per cent to reach over 32 million at the end of December 2006. At current rates of growth, Nigeria is expected to overtake South Africa during 2007 to become the continent's largest mobile market.

During the ten years from 1996 to 2006, developing countries saw a compound annual growth rate of 53 per cent in mobile subscribers, while least developed countries (LDC) saw an amazing 90 per cent rate. Mobile subscribers outnumber those for fixed lines in LDC by almost nine to one. But although these advances have led to a penetration level of 54 per cent for developing countries, it is still only 10 per cent in LDC.

While a growing number of people have access to phones and other ICT services, many others around the world have limited access, or none at all.

Internet and broadband

The picture for Internet and broadband subscribers in developing countries is far from rosy. Internet penetration rates among the developing countries in 2006 were around 17 per cent. But there is also good news. In 2006, nearly one-and-a-half

times as many new Internet users were added in developing economies and LDC as in countries belonging to the Organisation for Economic Co-operation and Development (OECD). As the world's richer economies approach saturation at around 75 Internet users per 100 people, the potential for fresh Internet growth will come mainly from the developing world.

Developing countries not only aim to add Internet users, they also seek to ensure

higher quality Internet access and to improve broadband penetration. Nevertheless, this is still dominated by wealthy countries. The top 25 broadband economies (in terms of subscribers) represent over 92 per cent of the

total worldwide. In 2006, some 70 per cent of broadband subscribers worldwide were located in high-income countries, which accounted for about 16 per cent of the world's population (see table on page 16).

Furthermore, the overall figures disguise the uneven distribution of broadband access among developing countries. Two economies — India and Viet Nam — accounted for more than 95 per cent of all broadband subscribers in low-income countries in 2006, while China alone represented 94 per cent of broadband subscribers in the lower-middle income group.

“Of the world's 2.68 billion subscribers to mobile telephony, 61 per cent are in developing countries.”



Faced with growing competitive pressure on all fronts, traditional telecommunication operators are re-examining their voice-centred business models and making substantial investments in next-generation networks (NGN). The *Trends in Telecommunication Reform* report highlights the opportunities and the challenges that arise amid the shift from circuit-switched, voice-based, single service networks to packet-based, broadband, multi-service networks — or NGN. The change means policy-makers and regulators must update licensing, interconnection and consumer protection measures that were designed for yesterday's technology and market conditions.

Although much of the work on NGN is taking place in developed countries that have large sums of capital to invest, in developing countries too, NGN-related technologies are now being deployed. They allow infrastructure (such as wireless broadband) to be provided cost-effectively, and the lower pricing of services, such as voice over Internet protocol (VoIP). This provides opportunity for expanding access to a multitude of services that are delivered online, whether through mobile phone or at communal telecentres.

The good news is that a number of developing countries are experiencing broadband growth. In Peru, for example, the number of broadband subscribers rose by over 80 per cent annually between 2001 and 2006, when it reached 484 899. But in sharp contrast, there was a total of merely 46 000 broadband subscribers in 22 of the 50 least developed countries with broadband service in 2006. Moreover, users in LDC are asked to pay very high rates for relatively low-speed broadband access.

In Cape Verde, for example, the charge is more than USD 2000 per 100 kbit/s per month. In at least 12 other LDC where broadband is available, users pay over USD 100 per 100 kbit/s per month. In comparison, users in Japan and the Republic of Korea pay less than USD 0.10 per 100 kbit/s per month.

Progress is being made in connectivity across the world, but there is still a long way to go before a majority have access to all the benefits of ICT. //

Broadband Market Data, 2006: the top 25 countries

World rank	Economy	Total fixed broadband subscribers (000s)	Broadband subscribers (per 100 inhabitants)	Price per 100 kbit/s per month, in USD, 2006	As a % of monthly income (GNI)
1	United States	58 137	19.3	0.49	0.01%
2	China	50 916	3.8	1.47	1.01%
3	Japan	25 755	20.1	0.06	0.00%
4	Germany	14 085	17.0	0.52	0.02%
5	Korea (Rep. of)	14 043	29.3	0.08	0.01%
6	United Kingdom	12 995	21.7	0.63	0.02%
7	France	12 699	20.9	0.37	0.01%
8	Italy	8 639	14.9	0.31	0.01%
9	Canada	7 676	23.6	1.08	0.04%
10	Spain	6 655	15.3	4.89	0.23%
11	Brazil	5 922	3.1	1.20	0.42%
12	Netherlands	5 192	31.7	0.14	0.00%
13	Taiwan, China	4 506	19.8	0.18	0.02%
14	Australia	3 900	19.1	3.41	0.13%
15	Mexico	3 728	3.4	6.24	1.03%
16	Russian Federation	2 900	2.0	28.13	7.57%
17	Turkey	2 774	3.7	9.85	2.51%
18	Poland	2 640	6.9	1.27	0.21%
19	Belgium	2 354	22.6	1.22	0.04%
20	Sweden	2 346	25.9	0.24	0.01%
21	India	2 300	0.2	3.56	5.93%
22	Switzerland	2 140	29.5	1.57	0.03%
23	Hong Kong, China	1 796	25.2	0.83	0.04%
24	Denmark	1 728	31.7	3.28	0.08%
25	Argentina	1 568	4.0	2.46	0.66%
	Top 25	257 394	16.6	2.94	0.80%
	World	279 678	4.3	76.01	194.56%

Note: Broadband is ≥ 256 kbit/s in one or both directions.

Source: ITU World Telecommunication/ICT Indicators Database, 2006.

Rethinking universal access

New technologies offer new ways to connect

The ten WSIS targets to be achieved by 2015

Connect villages and establish community access points

Connect universities, colleges, secondary schools and primary schools

Connect scientific and research institutions

Connect all public libraries, archives, museums, cultural centres and post offices

Connect health centres and hospitals

Connect all local and central government departments and establish websites and e-mail addresses for them

Adapt all primary and secondary school curricula to meet the challenges of the information society, taking into account national circumstances

Ensure that the entire world population has access to television and radio services

Encourage the development of content and put in place technical conditions in order to facilitate the presence, and use, of all world languages on the Internet

Ensure that more than half the world's inhabitants have personal use of ICT.





Definitions

Universal access

This usually means that everyone in a population has access to publicly available communication network facilities and services. Typically, it is provided through such means as pay telephones, community telecentres and community Internet access terminals.

Universal service

Policies in this area generally focus on promoting or maintaining universal connectivity of all households to public network facilities and services, and at affordable prices.

Either or both

While universal service and universal access policies may differ, the concepts are closely related and the two terms are sometimes used interchangeably. For simplicity, the term universal access is used in this article to also include universal service.

It is a timely moment for regulators to review the mechanisms they rely on to reach their universal access goals, given the transition to next-generation networks (NGN). This is a conclusion of ITU's latest report, *Trends in Telecommunication Reform: The Road to Next-Generation Networks* (see also pages 14–16). It says that both developed and developing countries must reconsider their policies and regulations on universal access if they are to meet the connectivity targets of the World Summit on the Information Society (WSIS) by 2015.

According to ITU indicators, the global telephone penetration rate (fixed and mobile combined) was some 60 per cent at the end of 2006. Internet usage was around 17 per cent. The new report stresses that regulators "should focus first and foremost on sector reforms that allow market forces to play a greater role in achieving universal access". It says that NGN should be seen as a tool for meeting the WSIS goals (see box on page 17), because they can provide a wide range of services essential for development, including e-government, e-health and e-education. NGN promise "to reduce poverty and promote socio-economic growth by integrating more communities into the global economy," provided that appropriate policies are in place, says the report.

What is included?

While there is a common understanding of the underlying aims of universal access programmes, there is no single definition of what commitments they should include. Beyond the general goals of promoting availability, affordability and accessibility to information and communication technologies (ICT), universal access definitions vary from country to country.

In the European Union (EU), for example, Member States should provide basic telecommunication services at a defined quality and an affordable price. These services include connection to the public phone network at a fixed location, supporting speech and data communications at rates sufficient for access to online services, directory enquiries, provision of public payphones, and facilities for people with disabilities.

India's policy is supported by a "Universal Service Obligation Fund" and provides for:

- ▶ Installation, operation and maintenance of "village public telephones," and provision of additional phones after reaching the target of one per village
- ▶ In villages with more than 2000 inhabitants, upgrading public telecentres to include data transmission facilities, and phased installation of high-speed Internet connections



Since the end of April 2007, some 13 million people in eleven German cities and regions can pay for their bus and train tickets via mobile phone using standardized software. The system will be tested over a two-year period

- Provision of household telephones in rural areas, in line with government targets.

The inclusion of data services in definitions of universal access is relatively new. A decade ago, the definition in most countries covered only fixed-line infrastructure. Today, there are many means of communication and various types of infrastructure must be deployed in the most effective way to reach target populations.

Malaysia provides an example of this process. The Malaysian Communications and Multimedia Commission specifies the number of residential or public phone connections that are required — but not which technology should provide them. Under this technology-neutral framework, companies bid to offer the service using various solutions, ranging from the provision of mobile satellite phones to the deployment of CDMA wireless local loop networks.

The role of mobile

Because of its availability, affordability and convenience, mobile telephony has produced in less than a decade the same impact that fixed-line phones achieved in a century. It is estimated that mobile coverage extends to more than 80 per cent of the world's population (see article on pages 23–26). The new ITU report underlines

that “universal access programmes that are concerned with voice services should bear in mind these market realities and avoid investing scarce resources in alternative network deployments where mobile services can be expected to serve the market without subsidy”.

The introduction of 3G CDMA450 technology offers a new way to use mobile technology to provide universal access. By transmitting at a lower frequency, the technology allows for large cell sizes. In turn, this means reductions in installation costs as fewer base stations are required. It also supports the high-speed transmission of data.

A number of countries have already deployed CDMA450 as part of their universal access programmes. One of them is Peru, where rural operator Valtron became the first commercial CDMA450 network operator in Latin America in June 2006. Operating under the name *Televis de Huarochirí*, Valtron will provide fixed, mobile, public telephone, Internet access and cable television services to 127 low-income towns in the province of Huarochirí in the Andes. The 10-year project has a goal of reaching 38 000 direct, and 59 000 indirect, subscribers.



Hilary Quinn



Alamy



Siemens



OLPC

Wi-fi around the world

Technological innovations associated with the transition to NGN are already transforming the way universal access is being extended to rural and remote areas in both developed and developing countries. To a large extent, this transformation is being fuelled by new broadband wireless access technologies, such as WiMAX and Wi-Fi.

Mesh networking in the Amazon basin

Wi-Fi networks can be deployed even in the most isolated areas, using mesh network architecture. For example, Yachana in the Amazonian region of Ecuador is 2.5 hours by motorized canoe from the nearest town. The Foundation for Integrated Education and Development (Funedesin), a non-governmental organization dedicated to community development, has deployed a wireless mesh network to connect a school to an ecotourism centre and a bioscience centre. The Wi-Fi mesh is connected to the Internet via a very small aperture terminal (VSAT) link, and meshboxes and laptops employ solar power. Voice over Internet protocol (VoIP) is used within the network and to link users to the PSTN. Supported by the revenue it gains from tourists, Funedesin is setting up a college nearby to train others in mesh networking.

Citywide networks

Citywide Wi-Fi networks are becoming more common. But while Wi-Fi access equipment is affordable for end users, it is costly to deploy, operate and maintain large Wi-Fi networks. Philadelphia in the United States, for example, estimates that it will spend USD 10 million on its citywide Wi-Fi network over the next several years. In 2006 alone, local governments around the world were estimated to have spent USD 235 million to build and operate these networks. By 2010, it is estimated that more than USD 3 billion will be spent. Although still expensive, these systems can quickly expand Internet access in urban areas.

Surfing for free in Singapore

Since the start of 2007, Singaporeans have been enjoying free wireless connectivity at speeds of up to 512 kbit/s almost everywhere in the country, under a programme known as "Wireless@SG". The programme was initiated by the Infocomm Development Authority of Singapore (IDA) and is run by three private local operators. It aims to increase the number of public Wi-Fi "hotspots" in the country from 900 to about 5000 by September 2007. Users do not have to be subscribers of these operators to enjoy the free access. The three operators are investing around USD 65 million to extend the network, with IDA defraying around USD 19 million of that amount.



Lady Mary Wilson, widow of UK Prime Minister Harold Wilson, launches in 2005 a broadband connection between island schools in Shetland and the Scillies, at the extremes of the British Isles

BT/Visimedia

Should broadband be universal?

Global broadband penetration rates seem to indicate that broadband Internet access is not yet so widespread that people without it could be considered “excluded”. At the end of 2006, only 4.3 per cent of the world’s population had broadband. Even in countries that lead the field, such as the Republic of Korea, penetration rates only just exceed a quarter of the population.

However, the question of whether broadband connections should be included in universal access obligations assumes greater importance with the advent of NGN. Services such as high-quality VoIP and streaming video can only be delivered through broadband networks. Several developed countries are considering making it compulsory to provide broadband access to all households as part of universal access, to avoid excluding people from its social and economic benefits.

Already, in Switzerland, the Federal Communications Commission (ComCom) has designated Swisscom as the universal service licensee from 1 January 2008. The new licence obliges Swisscom to provide a broadband Internet connection, in addition to analogue and digital telephone connections, as part of universal service obligations (see box). All sections of the population must be covered and all regions of the country.

Better management of spectrum

The ITU report on *Trends in Telecommunication Reform* says that while universal access programmes are useful in providing ICT services to the underserved, they are not a substitute for continuing reform. “Liberalization and competition have brought far greater benefits over the past few years than decades of universal access efforts channeled through monopolies. As such, regulators and policy-makers have to look at other areas of regulation that play a vital role in supporting the expansion of ICT access”, the report says.

Allowing licence-free spectrum use

The growing popularity of mobile services and the introduction of new wireless technologies have dramatically increased the demand for spectrum. As a result, countries are looking at new ways to manage spectrum use more efficiently. Growing amounts of spectrum are being allocated to licence-free use worldwide, in order to exploit the potential of technologies such as Wi-Fi and WiMAX to propel the rapid expansion of affordable high-speed access in rural and urban areas.

But not all countries have embraced the idea of allocating spectrum for licence-free uses, due to fears of revenue losses or congestion. “These fears, however, do not appear significant when compared to the potential of Wi-Fi and WiMAX to provide

Broadband Switzerland

The Swiss Federal Council adapted its universal service order in September 2006 to mandate the provision of broadband access to the country’s entire population from 1 January 2008. The connections already available as part of universal service are to be supplemented by new ones, permitting Internet access at a minimum transmission speed of 600 kbit/s downstream and 100 kbit/s upstream. An upper price limit of USD 55 per month was set for this service, which includes not only the broadband connection but also a voice channel, a telephone number and an entry in the public telephone directory. The upper price limit will be re-examined in 2010.



Universal Access Module of ICT Regulation Toolkit

ITU and infoDev are to release at the end of 2007 a module on universal access as part of the online ICT Regulation Toolkit. The module will cover the gamut from traditional telephony and mobile phones, to shared facilities such as payphones, telecentres and Internet access points, and to broadband and next-generation networks. It will also encompass the provision of access to underserved groups, as well as coverage in urban and rural environments. The module will provide regulators with an array of tools they can use in formulating policy in such areas as universal access funds, infrastructure sharing, and authorization and interconnection for local operators. More information is available at: www.ictregulationtoolkit.org

cheaper access," says the report. Any losses from foregoing licence fees would be offset by substantial savings in subsidies for universal access programmes. In addition, options such as attaching a small fee to the cost of buying equipment used in unlicensed spectrum (such as Wi-Fi routers) could obviate the need for a licence to operate in a particular frequency band while still providing revenue to the government.

Issuing rural spectrum licences

As a general principle, regulations should reflect the differences between urban and rural markets. With spectrum congestion being less of a concern in rural areas, spectrum licences should be awarded more cheaply, or even licence-free in certain bands. This would substantially reduce the cost of building wireless networks in rural areas.

In many countries, spectrum management leaves many rural providers with mediocre spectrum while frequencies with much better propagation characteristics remain idle because they are allocated to urban areas. This shows the shortcomings of a uniform approach and the need for spectrum managers to recognize the differing conditions for city and countryside.

Burdensome licensing

The report also notes that high licence fees are a significant barrier to investment, particularly for small operators and those serving rural areas. A simplification of the licensing process and a reduction in fees would alleviate the situation. For example, regulators could designate specific areas where operators would face minimal regulation, apart from obtaining authorization and ensuring against interference with other users.

Market mechanism

The ITU report concludes that greater reliance should be placed on market forces in the provision of universal access. It recommends that "a systematic review of a country's universal access policies should first and foremost include a revision of its sector policies and regulations concerning licensing, spectrum management, interconnection, VoIP and price regulation, with a view towards lowering barriers to market entry in rural and remote areas". It adds that "intervention by regulators and policy-makers in the form of universal access funding should only be attempted where there has been a clear failure of market forces in meeting universal access goals".

Source: Adapted from Trends in Telecommunication Reform 2007: The Road to Next-Generation Networks (NGN), Chapter 7, «Universal Access». Produced by ITU/BDT Regulatory and Market Environment Division (www.itu.int/pub/D-REG-TTR.9-2007).

Connecting everyone by mobile phone

A booming market

More than 5 billion people are expected to have access to mobile voice, data, and Internet services by 2015. A report released last October by the GSM Association (GSMA), a partner in the ITU *Connect the World* initiative, says that the cost of mobile networks and devices will continue to fall, enabling affordable mobile services to be offered to people on very low incomes. The report predicts that around 80 per cent of new subscribers will come from developing markets, primarily in Africa, the Asia-Pacific region and the Americas. It estimates the annual value of the mobile market to be around USD 700 billion, growing at 10 per cent year on year.

Mobile penetration is strongly correlated with economic growth and social benefits in many developing countries. To help achieve universal access, the GSMA report encourages governments and other stakeholders to lower mobile-specific consumer taxes and remove regulatory bottlenecks. It says that removing sales and customs taxes on mobile handsets and services could, for example, boost mobile penetration by up to 20 per cent in areas that already have network coverage.

Today, more than 80 per cent of the world's population is covered by at least one mobile network — double the amount

in 2000, according to GSMA (see Figure 1 on page 24). In developing countries, mobile has eclipsed the fixed networks. Mobile operators have been able to meet demand for basic voice services more rapidly and flexibly than fixed-line operators, “eliminating many of the barriers for people on low incomes to subscribe and use communication services”. Such barriers included long waiting lists, credit checks and installation charges.

Access to mobile services in rural areas — whether via public phones, village phones run by “phone ladies” or franchise outlets — are emerging fast in developing markets. These services may include simplified electronic payments, reverse-charge calling, and applications based on the short message service (SMS). Mobile banking is providing many millions of people with access to financial services for the first time. In the Philippines, for example, it allows people to receive money from Filipino workers abroad. Agriculture is helped too. The Kenya Agricultural Commodity Exchange provides real-time market prices to farmers, as does the “FOODNET Livestock Market Information System” in Uganda. Other services aimed at the agricultural and fishing industries are provided in such countries as Senegal and South Africa.



GSMA



Futuretel.com



GSMA



Siemens

The “three-gap model”

The GSMA report recommends that governments “continue to encourage the industry to deliver commercial solutions that will achieve universal access and service goals on a sustainable basis”. It says governments should intervene only when the market has already been given a chance to work, but has failed. It outlines a “three-gap model” to help decide when such intervention is needed and to design successful universal access strategies. This model allows them to distinguish the “market efficiency gap” from the “true access gap” (see Figure 2).

The “market efficiency gap”

This is the difference between what markets are actually achieving under existing conditions, and what they could achieve. This gap, the report says, can be bridged commercially if “the regulator removes barriers and creates a level playing field among all market participants”. The only questions are how far and how fast the market can actually be reached commercially, and how

best to implement pro-market measures. Such measures include open and competitive markets, spectrum harmonization, minimal tariff regulation, procedures for settling disputes over interconnection, geographically asymmetric termination rates, lower taxation, calling-party-pays systems and cost-based licence and spectrum fees.

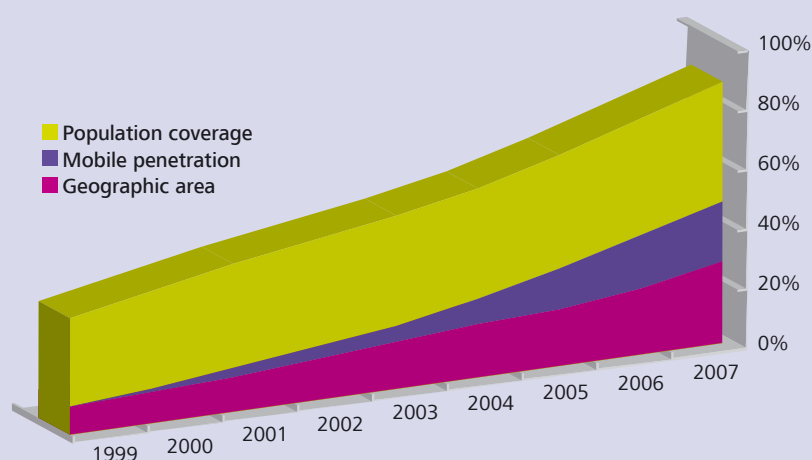
The “smart subsidy zone”

This refers mainly to rural areas, population groups and types of service that the market alone might not reach for some time, but that will become commercially viable after an initial subsidy. Targeted financial interventions beyond normal regulatory measures (typically from universal service funds) can motivate or accelerate service provision.

The smart subsidy is, therefore, intended to help “kick start” a project or service with the ultimate objective of it becoming commercially viable. However, according to the report, “the smart subsidy zone is shrinking in most markets, as mobile operators are

Figure 1 — World coverage of mobile networks and penetration rate

Source: GSMA Report: “Universal Access — How mobile can bring communications to all”



reaching new areas, previously thought to require subsidy, through normal commercial expansion”.

The “true access gap”

This refers to areas or population groups that will not be served even in the most efficient and liberalized market conditions, and so financial support is required. In this case, additional investments must be mobilized through government intervention, in the form of subsidies or other special incentives, to encourage service providers to operate in these areas and provide affordable services. According to the report, this gap typically applies to between 2 and 5 per cent of a country’s population, or 20 to 30 per cent of its territory.

Universal service funds

To expand access to telecommunications, governments in several developing countries have established universal service funds. The earliest funds concentrated on subsidizing fixed-network expansion in

remote, high-cost areas; however, this was before mobile networks offered lower cost and commercial solutions for such regions.

The GSMA report examines how universal service funds are meeting their connectivity objectives and what role mobile communications play in delivering universal service and access. It surveyed 92 developing countries, of which 32 have set up universal service funds (and 57 plan to do so). These funds are financed by contributions levied from operators of mobile and fixed services, typically at a level of between 1 and 2 per cent of gross or net revenues. In some countries, however, the levy reaches 5 per cent.

The report says that 15 of the 32 universal service funds have collected more than USD 6 billion in total from the industry, of which USD 2.1 billion is from mobile operators. However, only USD 1.6 billion (or 26 per cent) has been redistributed to aid network expansion. The remaining USD 4.4 billion (or 73 per cent) is unallocated and unspent.

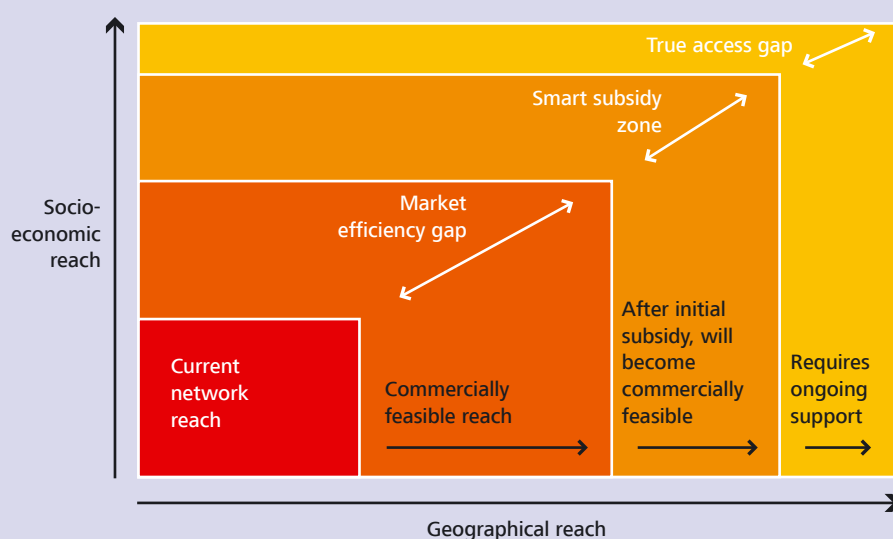


Figure 2 — The three-gap model

Source: GSMA Report: “Universal Access — How mobile can bring communications to all”



Latin America has had the most experience of this type of funding. Funds have been established and subsidy competitions held in Bolivia, Chile, Colombia, El Salvador, Guatemala, Nicaragua and Peru. In almost all cases, the operational funds have been used for fixed-line public payphone services, though it is now intended to include mobile network expansion in several programmes.

The GSMA report says that the universal service funds which have been distributed have not had much impact on improving mobile market expansion or penetration, except in Uganda (see box) and Colombia, mainly because 93 per cent of the USD 1.6 billion spent so far has been used to extend fixed-line networks, which are relatively expensive.

Market forces and government action

According to the GSMA report, governments should regard market forces as the primary means for expanding access. It says that universal service funds should play a "last resort" role in providing access to telecommunications in very remote or high-cost areas where it is not commercially viable to build networks. In addition, these funds should only be used as a short to medium-term policy tool, and should be phased out over time. Meanwhile, the report recommends that universal service funds should be subject to a strategic policy and management review at least every three years. ▀

A case study: Uganda

In Uganda, one of the countries surveyed by GSMA, the universal service fund has had a significant effect on the mobile sector. Uganda's coordinated universal access policy and universal service fund have helped to deliver accessible voice and data services countrywide. With 96 per cent of the country's population covered by mobile networks, the Uganda Communications Commission (UCC) has demonstrated how an auction strategy can stimulate network expansion. UCC made available a study of what communication services were needed in rural areas, where 88 per cent of the people live. The two main operators were

districts they could serve, and to relinquish their exclusivity rights in areas they did not intend to serve. Some 154 districts were identified and least cost subsidy tenders were won by MTN Uganda, a member of the South African group, in 2005 and 2006. Alongside its normal services, MTN also established more than 4000 shared-access village phones in previously unserved areas.

The reasons why mobile has been able to aid universal access in Uganda include:

▸ *the introduction of competition using technology-neutral licensing in 1998, prior to the privatization of incumbent operators;*

- *the presence of a trusted, independent regulator, which created a stable and competitive environment;*
- *100 per cent of the universal service fund allocated to mobile communications;*
- *the fund's focus on reaching the last remaining unserved areas, boosting national access to data communications;*
- *the requirement for operators to nominate the places they would not serve, enabling the government to then issue tenders to serve these areas with subsidies from the universal service fund.*



Cybersecurity work programme for developing countries

/// The integration of information and communication technologies (ICT) into almost every sphere of daily economic and social activity has increased the dependence of individuals, organizations and governments on globally interconnected networks. At the same time, new cyberthreats have emerged that have an impact on confidence and security in the use of ICT.

In order to protect networked infrastructure and address these threats, coordinated national action is required to prevent, respond to and recover from incidents. National frameworks and strategies are needed that allow stakeholders (end users, industry and governments) to use all the technical, legal and regulatory tools available to promote a culture of cybersecurity.

Among ITU Member States, while some are advanced in the formulation of national cybersecurity strategies, others are only just starting to consider the measures necessary to protect infrastructure that is now of fundamental social and economic importance. Developing countries with limited human, institutional and financial resources face particular challenges in formulating effective security policies. The *ITU Cybersecurity Work Programme for Developing Countries* sets out how the Telecommunication Development Sector (ITU-D) plans to assist those countries in practical ways during the 2007–2009 time-frame.

New toolkit to assess national cybersecurity

A toolkit is under development to assist governments to improve cybersecurity and formulate critical information infrastructure protection (CIIP) programmes. The *ITU National Cybersecurity/CIIP Readiness Self-Assessment Toolkit* examines necessary elements in formulating national security policies in an ever-changing ICT environment.

The draft toolkit is building upon work currently under way in ITU-D Study Group 1 on Question 22/1 “Securing information and communication networks: best practices for developing a culture of cybersecurity.” The work includes a survey and raising awareness of:

- ▶ principal issues facing national policy-makers in working with stakeholders to build a culture of cybersecurity;
- ▶ principal sources of information and assistance;
- ▶ best practice employed by national policy-makers;
- ▶ unique challenges faced by developing countries and best practice for addressing them.



“Gaps in access to, and the use of, ICT do not only hinder countries’ socio-economic development, but can also diminish the effectiveness of cooperation in building confidence and security in the use of ICT and promoting a global culture of cybersecurity. Our developing and least developed countries are increasingly at risk.”

Sami Al Basheer Al Morshid
Director, ITU
Telecommunication
Development Bureau (BDT)



Getty Images



The purpose of this column "Cybersecurity Watch" is to share information on ITU activities and initiatives related to cybersecurity and countering spam. It is published once every quarter.

ITU welcomes contributions from its membership for publication in Cybersecurity Watch. For more information, contact

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The toolkit aims to help governments better understand their existing systems, identify gaps that require attention, and prioritize national response efforts. It addresses political and management layers and necessary institutions, as well as relationships among government, industry and other private-sector entities.

The self-assessment toolkit is being designed to be used by government officials responsible for CIIP and formulating national cybersecurity policies. Input will be received from relevant ministries, as well as the private sector and other groups involved in promoting public awareness of a safer cyberspace. By using the toolkit, authorities will be provided with a snapshot of national policy, legislation and enforcement; institutions and institutional responsibility; personnel and expertise, and relationships among government entities and institutions.

As work progresses on the toolkit, information will be shared through the ITU-D website. Pilot country projects to test the toolkit are being run in conjunction with a number of workshops organized by ITU-D in cooperation with ITU Regional and Area Offices and the Telecommunication Standardization Sector (ITU-T).

The botnet battle

Botnets are networks of several thousand computers that have been infected with a virus which turns each of them into a "zombie" or "robot" without the owner's knowledge. This allows criminals to use the

resulting collective computing power and aggregated Internet connectivity to perform tasks such as generating spam e-mails, launching distributed denial of service attacks (to blackmail companies, for example), destroying or amending data, and identity theft.

A growing underground economy has sprung up around botnet activities, involving authors of computer viruses or malware, controllers of botnets, and clients who commission illegal activity by renting botnets. These groups include organized crime gangs who communicate internationally through secure means such as restricted Internet Relay Chat channels. Stolen proceeds are transferred rapidly using online services to quickly move money between countries.

The problem is worldwide. However, emerging Internet economies are often particularly ill-equipped to deal with the catastrophic effects of botnets, resulting in a loss of confidence in the secure use of ICT.

ITU Botnet Mitigation Toolkit

ITU is developing a *Botnet Mitigation Toolkit* to assist developing countries in particular to deal with the growing problem of computers that are hijacked for criminal purposes. The toolkit draws on existing resources on the subject, identifies relevant local and international stakeholders, and takes into consideration the particular constraints of developing economies. The first edition of the toolkit will be made available to the ITU membership in December 2007.



The toolkit's aim is to combine government and grassroots initiatives, and to involve stakeholders to make best use of existing resources and infrastructure. It will incorporate the policy, technical and social aspects of mitigating the effects of botnets.

Policy aspects

In the policy domain, preventive measures involve setting up effective laws and regulations, as well as frameworks for efficient local and cross-border enforcement. Botnets often begin causing damage within minutes of being created, and the worst effects happen within the first 24 hours. Therefore, early detection is critical. However, this can only be done through a working system of responsible entities and contact points. The toolkit examines requirements for setting up such systems nationally and internationally.

Technical aspects

In the technical domain, alerts can be sent to public databases of Internet protocol (IP) assignment and routing, such as the autonomous system numbers (ASN) and IP "WHOIS" databases maintained by Regional Internet Registries such as APNIC for the Asia Pacific region, AFRINIC for Africa and LACNIC for Latin America. (WHOIS is a protocol used for querying a database to determine the owner of a domain name, an IP address or an autonomous system number on the Internet.)

However, Internet service providers (ISP), especially in developing economies, might not always update ASN and other information accurately to reflect the true and current state of their networks. In addition, larger ISPs might allocate smaller blocks of IP space to customer ISPs or other networks without simultaneously updating information, so that querying "who is the owner of the address" could show space owned by a large ISP, while the actual provider is a customer ISP, or even a customer of a customer. It is clear that developing countries need substantial investment in training to deal with such technical issues.

Social aspects

The effects of botnets (such as spam, phishing and malware) are often felt most by a public that lacks awareness of Internet safety. There is a need for sustained and widespread education campaigns, including resources available in local languages. When working on extending access to ICT to people who have no previous experience in this area, it is clearly essential to include the promotion of best practice in cybersecurity. As botnets are typically created through users inadvertently installing malware on their personal computers, mitigating botnet-related threats is no exception to this rule. ▀

More information on ITU activities in the domain of cybersecurity can be found at:
www.itu.int/cybersecurity/

ITU-D's ICT Applications and Cybersecurity Division has information on its ongoing projects, resources and publications to assist ITU Member States, including an overview of the ITU Cybersecurity Work Programme for Developing Countries, as well as information on the toolkits mentioned in this article, at:
www.itu.int/ITU-D/cyb/

Details of related workshops and other events can be found at:
www.itu.int/ITU-D/cyb/events/

How do we know that electricity, magnetism and light are all part of one electromagnetic spectrum, and can be considered as travelling in waves?

It is mainly due to the work of scientists in the 19th century, whose discoveries became the basis for the invention of practical radio sets.



Did David Edward Hughes use radio to receive the world's first mobile phone call?

Who discovered radio?

The fruitful year of 1831

■ In 1802, Gian Domenico Romagnosi was the first to publish the suggestion that electricity and magnetism are related. In 1820, Hans Christian Ørsted found that an electric current produces a magnetic field as it flows through a wire. In the 1830s, American scientist Joseph Henry wound wire around iron cores to make electromagnets and experimented with using electricity to induce magnetism remotely. He was working at about the same time as Michael Faraday (1791–1867), the British scientist who described the phenomenon of electromagnetic induction in 1831.

Induction occurs when an electric field is produced by a changing magnetic field, or vice versa. Faraday also established that magnetism can affect rays of light, demonstrating the relationship between the two phenomena. Importantly, he suggested that lines of electromagnetic force extend from charged bodies into their surroundings — an essential concept on the way to radio. In the year that Faraday formulated his law of induction, a Scottish physicist was born who consolidated it into a set of mathematical laws on electromagnetism: James Clerk Maxwell (1831–1879).

Albert Einstein described Maxwell's work as "the most profound and the most fruitful that physics has experienced since the

time of Newton". In 1864, he incorporated Faraday's law into a comprehensive model known as Maxwell's Equations. These predicted that electric and magnetic fields travel through space in waves at the speed of light. Maxwell concluded that light is indeed an electromagnetic wave, and said that other types of phenomena at different wavelengths should also exist. In other words, he predicted the existence of radio.

But who first observed radio waves in reality? A number of investigators noticed "electricity at a distance" including Thomas Alva Edison, who in 1875 said he had encountered "aetheric force" while working on telegraphy. But to answer the question posed in the previous *Pioneers' Page*, it was another scientist born in Britain in 1831, David Edward Hughes, who was the first person to definitely record sending and receiving a radio signal.

Microphone and "mobile phone"

Hughes (1831–1900) was best known for his inventions in telegraphy (see *Pioneers' Page for July/August 2007*). In 1876 the telephone was invented and, like others, Hughes began experiments to improve its transmission of sound. His system comprised a tube containing two carbon rods in loose contact, included in an electrical circuit with a battery. When the tube was

Question for next time

Who was “the man who brought silicon to Silicon Valley”?


subjected to sound vibrations, the electrical resistance varied to match the sound waves’ form. In 1878, Hughes announced his invention, which he called a “microphone”.

Continuing his research, Hughes discovered that the carbon-filled tubes were also sensitive to “sudden electric impulses”. To test at what distance this effect could act, Hughes set up a source of regular electric sparks in his house and then walked out into the street carrying a tube in circuit with a battery and a telephone. He found that, as the sparks were generated, he could hear corresponding clicks in the telephone from up to 500 yards (457 metres) away. It was not a modulated signal — let alone words — that he heard; however, in a sense, in 1878 Hughes had received the world’s first mobile phone call.

Hughes suggested that this wireless transmission of signals in the super low frequency range was accomplished through “electric waves” that could travel through buildings and the air. He demonstrated his results to the Royal Society in 1880, but they were considered to be due to induction rather than electricity acting at a distance. He finally received credit for his work many years later, after a sound experimental framework for radio had been laid by the German scientist Heinrich Rudolf Hertz (1857–1894).

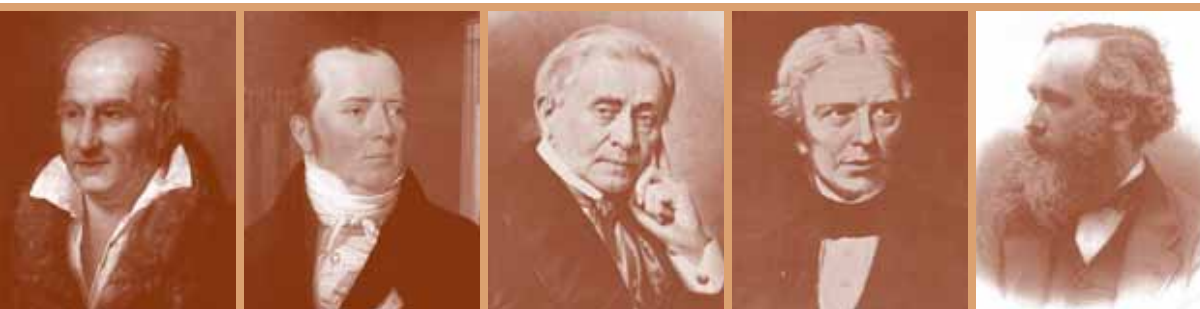
Action at a distance

Hertz validated Maxwell’s theory through experimentally proving the existence of electromagnetic waves. He confirmed that light is a form of radiation and, using a spark-gap transmitter, in 1888 produced ultra high frequency (UHF) radio waves at around 100 MHz in the shortwave band. He also found that radio waves could be transmitted through, or stopped by, various materials and could be focused by parabolic reflectors. “Action at a distance is for the first time proved,” said Hertz in the 1893 English edition of his work (published in German in 1891). “Electric forces can disentangle themselves from material bodies, and can continue to subsist as conditions or changes in the state of space.”

We now measure radio frequencies in a unit called “Hertz”. But despite the triumph of his research, the scientist did not envisage any useful applications of his experiments. He died at the early age of 37 at about the same time that such figures as Tesla, Popov and Marconi began work that led to practical radio systems — more than a decade after Hughes’s original observations. 



Heinrich Rudolf Hertz established the experimental framework for radio



From left to right: Gian Domenico Romagnosi, Hans Christian Ørsted, Joseph Henry, Michael Faraday and James Clerk Maxwell



OLPC

Emerging markets

An increasing number of firms are recognizing the potential of emerging markets for computers — to be used by everyone, not only in schools. For example, in March this year Dell Inc. of the United States announced plans to market a basic desktop computer in China, priced at around USD 225 to 500. Chasing the same potential customers, on 3 August 2007 computer maker Lenovo said it intends to sell a basic personal computer in China's rural market for some USD 200–400. The race is on to provide emerging markets with ways to connect.



Intel

Low-cost laptops set to take off

Universal access to communications requires access to equipment. For the millions of people and enterprises around the world that cannot afford typical computers, low-cost models could be the answer. Non-commercial bodies and a growing number of companies are gearing up to supply those machines.

One Laptop Per Child

A partner in ITU's *Connect the World* initiative, One Laptop per Child (OLPC) is a non-profit organization that aims to provide connected, low-cost and rugged laptops to all children, wherever they live. The machines use open source Linux software and are energy efficient. Batteries last at least 8 hours and can be charged by hand. Through WiFi mesh networking, a large number of machines can have Internet access from one connection.

Demonstrated at the Tunis phase of the World Summit on the Information Society, the green "\$100 Laptop" has seen a number of refinements. Now called the "XO", its distinctive feature is the pair of "rabbit ears" enclosing mesh network antennas. In November 2006, the pilot version of the laptop was produced by Quanta in Shanghai, China. During 2007, improved versions have been created and OLPC says that the first XO laptops will be ready to ship in October this year.

The laptops are to be sold to governments and issued to children by schools. The machines are already on test in a number of developing countries. At present, each computer costs around USD 175, but the aim is to make that USD 100 through economies of scale. Another move that could accelerate the production of such low-cost machines is the recent agreement between OLPC and chip maker Intel Corporation, another *Connect the World* partner.

Intel's "Classmate"

On 13 July 2007, Intel and OLPC announced that they will collaborate on technology, product development, educational content and sales. Intel will also join the board of OLPC. Both parties say they will continue to develop a family of laptops that meet the needs of children and teachers.

For Intel, the focus is on its "Classmate" computer for children in emerging markets. This is a rugged machine with features similar to those of mainstream laptops, and which operates Microsoft Windows or Linux software. It has a battery life of around four hours, and a 7 inch (18 cm) screen.

At present, each laptop costs USD 200–300. Intel says that, since shipments began in March 2007, it has received orders from several developing countries and plans to hold pilot tests in many more.

Connect Africa Summit



Investing in Africa's Future

connectafricasummit.org

Kigali, Rwanda – 29 and 30 October 2007



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