ICT and climate change

▶ *From videoconferencing to telepresence*

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Telecommunication
Union

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ITU NEWS

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Dr Hamadoun I. Touré
ITU Secretary-General

ITU/J.M. Ferré

A productive 2007

▌ The year 2007 was eventful and productive. It started with the inauguration of ITU's new team of elected officials in January. Since then, my colleagues and I have taken on the primary task of implementing the strategic goals of the Union for 2008–2011. These are to enhance international cooperation, bridge the digital divide, widen the ITU membership, safeguard networks, improve ITU's efficiency and effectiveness, disseminate information, and promote an enabling environment. Some of the goals reflect my top priorities for ITU, namely bridging the digital divide, promoting a global culture of cybersecurity, and emergency telecommunications. One year on, I am pleased with the tremendous progress made in all these areas.

Since the successful conclusion of the World Summit on the Information Society (WSIS) in Geneva in 2003, and in Tunis in 2005, United Nations agencies have been working together to implement its outcomes in their areas of competence. It is also vital to involve the private sector in this effort. This was the aim of my visit in February to Silicon Valley in California, United States. "UN Meets Silicon Valley" was an important opportunity to identify areas where the United Nations and Silicon Valley can work together to expand the benefits of information and communication technologies (ICT) in the developing world. I urged industry to join ITU through Sector membership or other partnerships, so that we can together respond to the challenge of connecting the world.

The 7th ITU Global Symposium for Regulators that took place in February in Dubai, United Arab Emirates,

focused on the theme *The road to next-generation networks (NGN): can regulators promote investment and achieve open access?* It issued best practice guidelines on investment, competition, consumer protection, universal access and international Internet interconnection.

On the occasion of World Telecommunication and Information Society Day, on 17 May, I launched the *ITU Global Cybersecurity Agenda* to curb cybercrime, and announced *Connect Africa*, the first in a series of regional initiatives to help achieve the WSIS goals of connecting all the world's villages, towns and cities. The two projects complement ITU's ongoing work on ICT infrastructure (WSIS Action Line C2) and building confidence and security in the use of ICT (WSIS Action Line C5).

Cyberthreats and cybercrime have become an international problem, requiring a coordinated international response. ITU is uniquely positioned to coordinate this response, with its 191 Member States and more than 700 Sector Members and Associates. In October, I convened a meeting of world-renowned specialists to act as an independent advisory board on cybersecurity. This High-Level Experts Group will meet again in May 2008 and should come up with a road map on how best to achieve the goals of the *Global Cybersecurity Agenda*.

Leading the celebrations on 17 May for the first time as Secretary-General, I was delighted to present the 2007 ITU World Information Society Award to three laureates: the First Lady of the Dominican Republic, Dr Margarita Cedeño de Fernández; Professor Mark I. Krivocheev of the
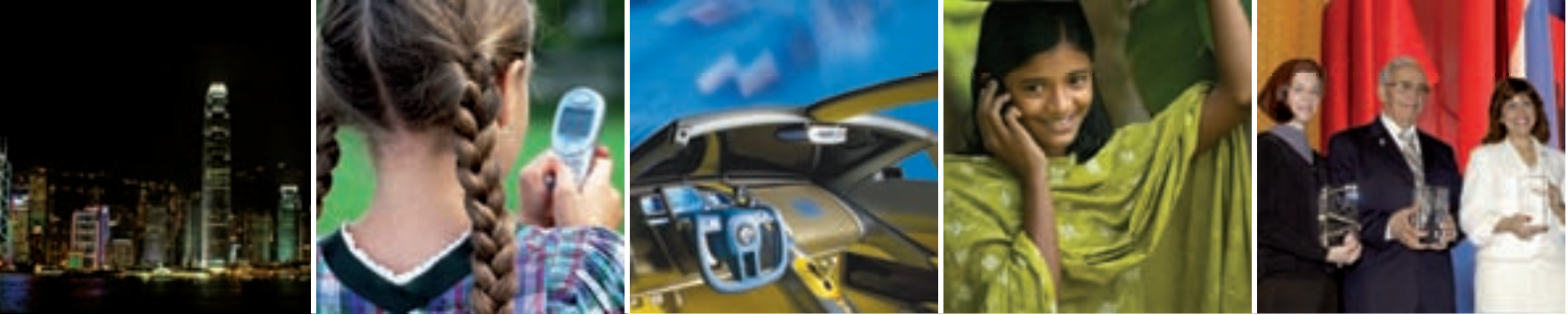
Russian Federation; and Mozilla Corporation of the United States, represented by its Chief Executive Officer Mitchell Baker. The Award honours individuals or institutions for such achievements as creating key technical innovations, mobilizing public opinion or improving people's quality of life through the use of ICT.

The Day was celebrated under the theme, "Connecting the young". In an increasingly networked world, the young are not only the beneficiaries, but also often the driving force behind the latest innovations. It is clearly our duty to enable them to join the ongoing digital revolution.

July will be remembered for the historic visit of United Nations Secretary-General Ban Ki-moon to our Geneva headquarters. It was deeply inspiring to hear Mr Ban's words to ITU staff concerning our work. He clearly expressed his support for our mission, and his appreciation of the importance of ICT in achieving the broader objectives of the UN Millennium Development Goals. Mr Ban also noted that "ITU is one of the most important stakeholders in terms of climate change." ICT and climate change is certainly on the ITU agenda (see article on pages 6–12).

In September, ministers at the High-Level Segment of the ITU Council set the tone for debates on cybersecurity and ICT infrastructure. They welcomed the *Global Cybersecurity Agenda* as an important initiative for building international cooperation to develop technical and regulatory solutions that protect users in cyberspace. They also gave their full backing to the *Connect Africa Summit*. Meanwhile, the Council approved CHF 322 603 000 as the budget for ITU for 2008 and 2009. It also decided that ITU standards produced by the Telecommunication Standardization Sector (ITU–T) will continue to be available online free of charge, following a successful trial conducted since 1 January, during which some 2 million Recommendations were downloaded worldwide.

At the *Connect Africa Summit*, in Kigali, Rwanda, on 29–30 October, governments, industry, development banks and international and regional organizations pledged to mobilize the human, financial and technical resources needed to expand access to ICT across Africa. A commitment was made at the summit to connect all African capitals and major cities with broadband infrastructure and improve links with the rest of the world by 2012. Plans were also announced to invest some USD 55 billion in ICT infrastructure development in Africa over the next five years, largely from the private sector. Encouraged by this first event, which was held successfully under the patronage of Rwanda's President Paul Kagame, we are planning a *Connect Asia-Pacific Summit* during 2008.

The Radiocommunication Assembly, held in Geneva on 15–19 October, took the momentous decision to add a WiMAX-derived technology to the IMT-2000 (or 3G) set of standards. This opens the door to mobile Internet access, in both urban and rural markets. "IMT-Advanced" was also agreed as the name of the future generation of "4G" radio technologies that could be commercially available around 2011, subject to market demand.

Immediately after the Assembly, the World Radiocommunication Conference (WRC-07) met in Geneva from 22 October to 16 November. It revised and updated the Radio Regulations — the international treaty governing the use of the radio-frequency spectrum and satellite orbits. Access to these finite resources is critical in providing the infrastructure needed to achieve our mission of connecting people everywhere. I am pleased with the decisions of WRC-07, as they will give a boost to International Mobile Telecommunications (IMT), the fixed-satellite service, broadcasting-satellite service, civil aviation, space science, meteorology, maritime services, digital broadcasting and emergency telecommunications, among other services.

In December, I launched the ITU Framework for Cooperation in Emergencies (IFCE) on the occasion of the Global Forum on the "Effective Use of Telecommunications/ICT for Disaster Management: Saving Lives". IFCE will help

deliver and deploy telecommunication resources to countries, humanitarian organizations and victims of disasters in a timely manner (see article on pages 13–15).

Key events in 2008

As we start the new year, our focus is on the World Economic Forum in Davos, Switzerland. At this event, I will highlight ITU's pioneering work in cybersecurity at a Global Leaders Meeting on "Cybersecurity: Common Threats and Common Solutions", on 26 January.

Our efforts to develop an enabling environment through modern regulation and policy harmonization in ICT will continue at the 8th Global Symposium for Regulators (GSR) that will take place in Pattaya, Thailand, on 11–13 March. GSR is an annual event bringing together heads of national regulatory authorities from both developed and developing countries. It fosters an open dialogue between regulators and key ICT stakeholders: the private sector, investors and consumers.

This year, we will celebrate World Telecommunication and Information Society Day on 17 May under the theme "Connecting people with disabilities: ICT Opportunities for All". I invite the entire ITU membership to start reflecting on this theme and organizing activities to draw attention to its importance.

In April, ITU will hold an international symposium in Kyoto, Japan, on ICT and climate change. As well as raising awareness, the symposium will assist in developing an ITU strategy in this field and in identifying new areas for standardization work.

ITU Telecom Africa 2008, to be held in Cairo, Egypt, on 12–15 May, will be a critical milestone for the region. Africa's ICT sector has grown steadily, especially in mobile telephony, where the number of subscribers soared from 16 million in 2000 to 198 million in 2006, and was expected to reach 278 million at the end of 2007. Broadband, although still in its infancy, is expected to take off across Africa, leading to increased convergence and migration to next-generation networks.

ITU Telecom Asia 2008 will take place in Bangkok, Thailand on 2–5 September. The event will be a major networking platform for players from across the Asia-Pacific region, which includes some of the world's most sophisticated telecommunication markets, mainly in broadband and mobile multimedia services.

For the first time, the World Telecommunication Standardization Assembly (WTSA-08) will take place in Africa. The event will be held in Johannesburg, South Africa, on 21–30 October. It will be preceded by a Global Standardization Symposium on 20 October at the same venue. ITU is committed to bridging the standardization gap between countries with resources to pursue standardization issues, and those without. This gap contributes to the persistence of the wider digital divide in ICT.

Finally, the ITU Council will convene in Geneva on 12–21 November. It will, among other things, discuss issues of strategic importance for the future of the Union.

One ITU

A year ago, the United Nations launched a "One UN" initiative to test ways of improving coordination of its agencies' work at the country level. The aim is to ensure faster and more effective development operations, and accelerate progress towards the Millennium Development Goals. To make a more effective contribution to the vision of "One UN", ITU must itself move forward as "One ITU". In 2007, ITU management established a team culture for such a stronger Union, and we remain committed to ensuring access to communications for all, at any time, anywhere, and at an affordable price. In 2008, we count on the support of all our members, partners and staff in our mission to connect the world.

Alamy

ICT and climate change

The challenge

◢ The changes taking place in Earth's climate, and the effects they will cause, are high on the agenda of every major international organization — including ITU. At the United Nations Conference on Climate Change in Bali, Indonesia, on 3–14 December 2007, ITU highlighted the role of information and communication technologies (ICT) as both a cause of climate change, and as an important element in tackling the challenge.

There are several natural causes of climate change, such as variations in solar radiation, and volcanic activity. However, it is man-made climate change that is of major concern because it appears to be leading to a progressive and accelerating warming of the planet as a result of the release of greenhouse gases, primarily carbon-based emissions.

In early 2007, the United Nations Intergovernmental Panel on Climate Change (IPCC) issued a finding that, if left unchecked, the world's average temperature could rise by as much as 6 degrees Celsius by the end of the 21st century, causing serious harm to economies, societies and ecosystems worldwide. "Climate Change 2007", the IPCC Fourth Assessment Report, says that global greenhouse gas emissions have risen by 70 per cent since 1970. It explains that an increasing rate of warming has taken place over the last quarter-century, and underlines that 11 of the years between 1995 and 2006 rank among the warmest on record. The report adds that confirmation of global warming comes from "warming of the oceans, rising sea levels, glaciers melting, sea ice retreating in the Arctic and diminished snow cover in the northern hemisphere".

UNFCC

*The United Nations
Conference on Climate Change
in Bali, Indonesia,
on 3–14 December 2007*

The Nobel Peace Prize was awarded in October 2007 jointly to IPCC and to former United States Vice President Al Gore. The award recognizes that climate change represents a threat to humankind, and can lead to a breakdown of peace because of the increased competition for the Earth's resources.

The Bali road map

The international community met in Bali to address this growing problem, with around 11 000 participants attending the conference. After difficult and protracted negotiations, on 15 December 2007, an agreement was reached by 187 countries to launch negotiations towards a strengthened international climate change deal. The decision includes an agenda for key issues to be negotiated up to 2009, which will ensure that the new agreement can enter into force by 2013, following the expiry of the first phase of the Kyoto Protocol.

The key issues on the agenda are action and financing for adapting to, and mitigating, the negative consequences of climate change; ways to reduce greenhouse gas emissions, and ways to widely deploy climate-friendly technologies. In most of these areas, and especially the last, ITU has an important role to play.

"This is a real breakthrough, a real opportunity for the international community to successfully fight climate change," said Yvo de Boer, Executive Secretary of the United Nations Framework Convention on Climate Change, after agreement was reached at Bali. "Parties have recognized the urgency of action on climate change and have now provided the political response to what scientists have been telling us is needed," he added. Indonesian Environment Minister and President of the conference, Rachmat Witoelar said "we now have a Bali road map, we have an agenda and we have a deadline. But we also have a huge task ahead of us and time to reach agreement is extremely short, so we need to move quickly."

Promoting ICT for climate change

During his visit to ITU in July 2007, the United Nations Secretary-General Ban Ki-moon emphasized the importance of ITU's work in supporting ICT as the basis for activities of the international community and its global efforts. Mr Ban, who has made action on climate change one of the cornerstones of his mandate, described ITU as "one of the very important stakeholders in the area of climate change". He underlined that with "ITU's efforts to connect the world, improve ICT and bridge the digital divide, it will contribute significantly to this long-term agenda, which will have serious implications for the future of humankind."

UNDP-UNEP

The 2007 Nobel Peace Prize was awarded to Al Gore and to IPCC, recognizing that climate change represents a threat to humankind

7

Morguefile

High-tech lifestyles create increasing energy demands that contribute to raising carbon emissions

As part of a unified effort of the United Nations system, ITU can contribute in its areas of expertise to support Member States and to foster partnerships with the private sector to develop more energy-efficient technologies.

Energy consumed, and energy saved

ICT equipment uses energy, and its worldwide proliferation is consuming more. In addition, "always-on" services use more electricity than before. High-tech lifestyles create increasing energy demands that contribute to raising carbon emissions.

But at the same time, ICT is a strong force in combating climate change. New technologies are likely to usher in a new generation of energy-efficient products, notably in next-generation networks (NGN). Also, the increasing availability and sophistication of communications reduces people's need to travel, and makes distribution of goods more efficient. Both save fuel.

The power demands of ICT

The ICT sector contributes around 2.5 per cent of annual greenhouse gases, a much smaller amount than its share of global gross domestic product (GDP). Its major contribution comes from the proliferation of user devices, all of which need power and radiate heat. For instance, in the decade between 1996 and 2006, the worldwide number of mobile phones rose from some

145 million to 2.7 billion. Over the same period, the estimated number of Internet users grew from 50 million to 1.1 billion. In 1996, virtually all residential Internet users were using dial-up connections, whereas by 2006 about 280 million people had "always-on" broadband connections, further increasing power demand.

In addition, each individual user might own many more devices. Twenty years ago, a single television might have provided entertainment for a household; now, a typical family in a developed country might own several television sets, as well as a video recorder, a DVD player, one or more set-top box decoders, game consoles and computers — many of which are routinely left on standby overnight. As these ICT devices acquire more processing capabilities, their requirements for energy and for cooling also rise. For instance, third-generation (3G) mobile phones operate at higher frequencies and need more power than earlier ones.

ICT use will keep on growing, and so it is important that the industry takes steps now to curb, and ultimately reduce, its carbon emissions.

Standardization cuts consumption

ITU is already very active in standardization work and other studies that are relevant to climate change, in particular in the areas of energy efficiency, reduced power consumption, mitigation of the ef-

Jeff van Rossum

fects of climate change and technologies for reducing carbon emissions. In ITU's Telecommunication Standardization Sector (ITU–T), work is being carried out on reducing the power requirements of telecommunication equipment, including terminal devices and networking equipment, which will help to reduce the production of greenhouse gases.

In December 2007, the Telecommunication Standardization Advisory Group (TSAG) strongly backed the future hosting by ITU of an international symposium to systematically review all ITU–T Recommendations in the light of climate change. A checklist will be drawn up to ensure that climate change mitigation is taken into account at an early stage of standards development.

Among the technologies under the standardization spotlight are radio-frequency identification (RFID) and electronic sensors, which can be combined to form ubiquitous sensor networks. These can help reduce consumption of fossil fuels by, for example, switching on lights only when necessary, or by automatically adjusting heating requirements in buildings. RFID tags can also be used to track goods, thus improving transport efficiency and stock control. This cuts wastage in fuel and manufacturing. ITU–T has established a "Joint Coordination Activity on Network Aspects of Identification Systems (including RFID)" to coordinate work in this area.

Next-generation networks can save energy

ITU–T is also developing standards for next-generation networks that should bring about a 40-per-cent saving in energy consumption compared with today's telecommunication networks. For example, the recent standard VDSL2 (ITU–T Recommendation G.993.2) specifies three power modes (full, low, and standby), whereas VDSL has only a single, full power mode.

There are several other advantages to NGN technology, which creates a single network based on the Internet protocol (IP) that is capable of carrying many services simultaneously. Significantly fewer switching centres are required. For instance, BT's "21st Century Network" will require only between 100 and 120 metropolitan nodes for NGN, compared to its current 3000. In addition, NGN switching locations can tolerate a wider range of temperatures: 50 degrees Celsius (between −5 and 45°C), up from the previous range of 35 degrees (between 5 and 40°C). As a result, the switching sites can be cooled by fresh air in most countries, rather than requiring powered air conditioning.

Reducing travel

From the telegraph onwards, every use of telecommunications could be considered as replacing the need for a physical journey. This is also an added benefit of such

ITU symposium
ITU will hold an international symposium in Kyoto, Japan, in April 2008, on the topic of ICT and climate change. As well as raising awareness, it will assist in developing an ITU strategy in this field and in identifying new areas for standardization work.

Retreat of the Trift Glacier in Switzerland, which shrank by around 200 metres between 2004 and 2005. The change can be monitored using GPS technology

socially important services as telemedicine and e-education.

The work of ITU–T's Study Group 16, on multimedia, is of particular importance in this area, such as with the "H" series of ITU–T Recommendations on audiovisual and multimedia systems, including videoconferencing, or "telepresence" (see article on pages 17–20). ITU is also active in the field of intelligent transport systems, which can help to curb carbon emissions, for instance by reducing congestion and improving fuel efficiency in vehicles.

The need for workers to commute can also be reduced through the flexible working patterns that are facilitated by ICT. A study by the European Telecommunication Network Operators' association (ETNO) and the World Wide Fund for Nature (WWF) says that one million tonnes of CO_2 emissions would be saved every year for each million telecommuters in the European Union. A similar study in the United States, where commuting distances tend to be longer, found that today's 3.9 million telecommuters save the equivalent of between 10 and 14 million tonnes of CO_2 emissions.

Meanwhile, the members of ETNO have been taking action themselves. They signed an environmental charter in 1996 on sustainability, and between 2001 and 2003, twenty-five member companies succeeded in reducing their overall carbon emissions by 7 per cent and their carbon intensity (per unit of turnover) by 14 per cent.

Monitoring the climate

During the past several decades, sciences related to climate change have benefited greatly from the parallel development of ICT, used in gathering and analysing data.

The typical locations for climate research — such as the polar ice caps, glaciers, volcanoes, the ocean bed or the upper layers of the atmosphere — are inhospitable, making it essential to use remote monitoring and data collection using ICT-equipped sensors, known as telemetry (see article on remote sensing in *ITU News* of December 2007).

Also extremely useful has been the development of aerial photography, satellite imagery, grid technology and in particular the use of global positioning by satellite (GPS) for tracking slow, long-term movement, for instance of glaciers or ice floes (see photographs on the left). In research over many years, the World Glacier Monitoring Service uses a multi-level approach to document changes in glaciers, integrating satellite remote sensing and GPS data with aerial photography, in-situ measurements and computer modelling of glacial mass.

In addition to monitoring the effects of climate change, ICT have also proved invaluable in computer modelling of the Earth's atmosphere. Meteorological services are among the most demanding users of the world's fastest supercomputers, and produce progressively more sophisticated models of the climate. For instance, the Hadley Centre for Climate Change in the United

Kingdom runs a variety of climate models on a suite of supercomputers which have processing power equivalent to 1000 times that of a top-of-the-range desktop computer. The climate models are linked via one of 15 regional and three global telecommunication hubs to the World Weather Watch Global Climate Observing System (GCOS), operated by the World Meteorological Organization (WMO).

Systems such as these (see Figure 1) are vital in not only monitoring climate change, but also in predicting severe weather and natural disasters (see articles in the December 2007 issue of *ITU News*).

ITU's Radiocommunication Sector (ITU–R) in particular has a pivotal role in helping these services to be maintained, through, for example, coordination of the orbital and radio-frequency resources for Earth-observation satellites.

Environmental management and sustainable development

In ITU's Telecommunication Development Sector (ITU–D), work includes high-level policy review and guidelines to help developing countries take full advantage of ICT applications for environmental management and sustainable development.

Figure 1 — WMO Global Climate Observing System
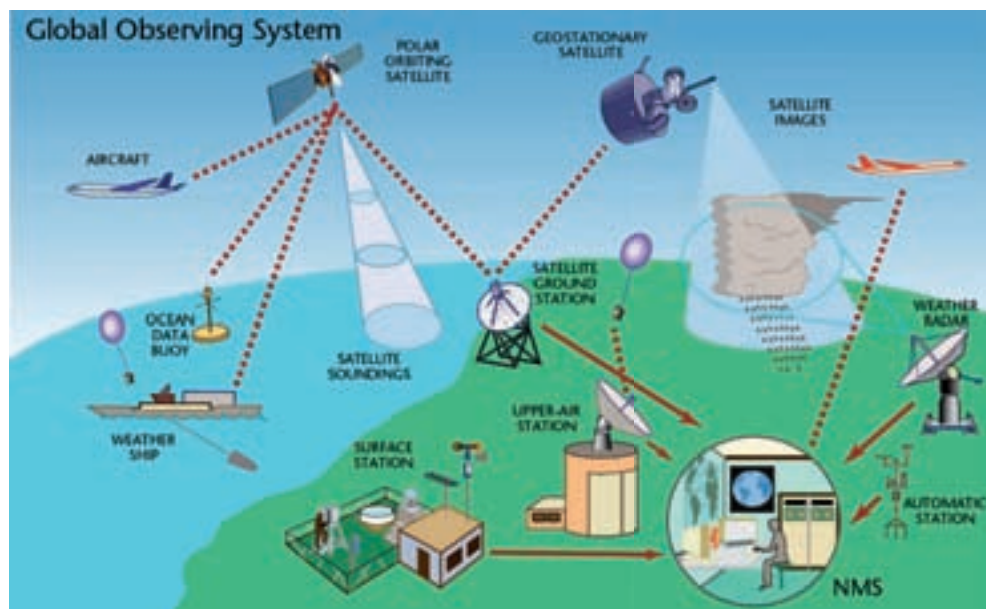
Note — NMS stands for national meteorological service
Source: World Meteorological Organization

Jack Kuzuian
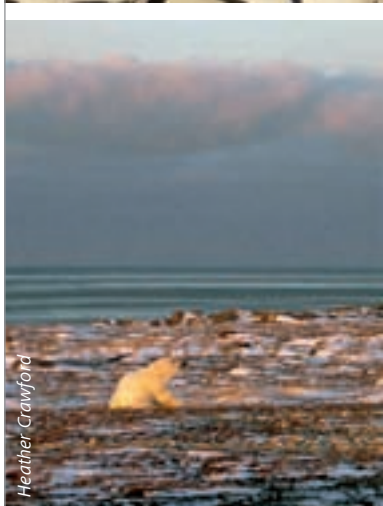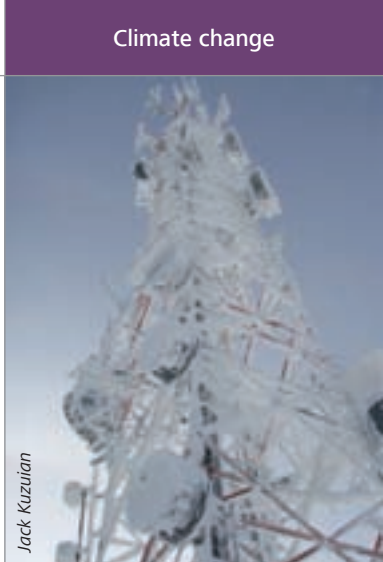
Elvis Santana

io fob

Heather Crawford

Satellite imagery shows rain and floods on the island of Sulawesi, Indonesia
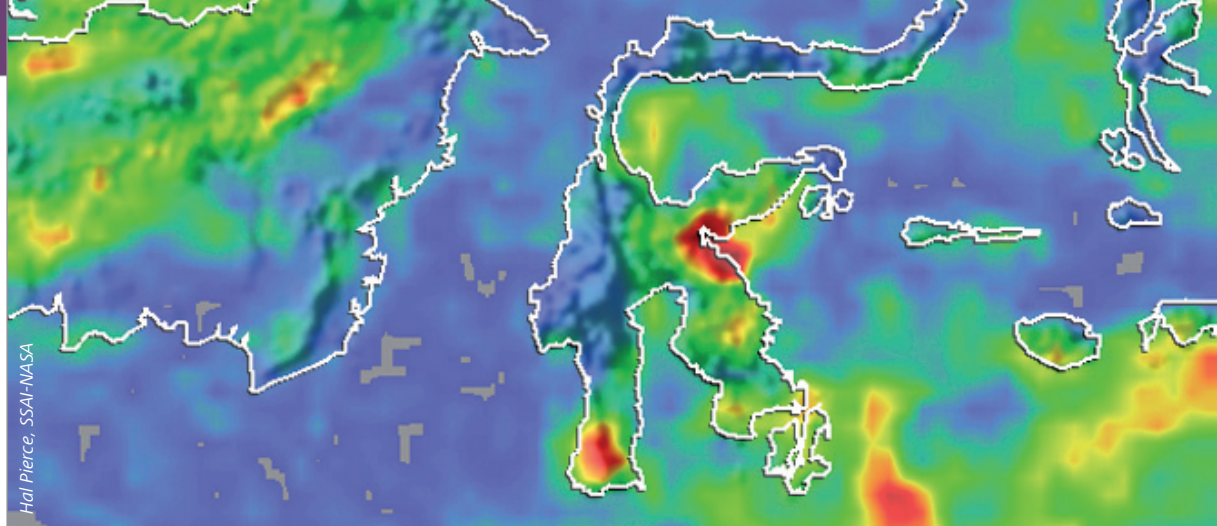
Hal Pierce, SSAI-NASA

The impact of global warming on the world's climate to date is relatively small compared with what can be expected in the future, even if the increase in greenhouse gas emissions is stabilized. IPCC, in its Fourth Assessment Report, predicts a rise in average temperatures of 1.4–5.8°C and a 3-per-cent reduction in global GDP by 2030. However, the results are likely to be highly uneven in their distribution, with low-lying coastal areas (such as small island developing States, the Bangladesh delta, and the Netherlands) at risk because of rising sea levels; sub-Saharan Africa at risk due to desertification; a growing number of environmental refugees, and increased pressure on sources of fresh water and on vulnerable ecosystems such as coral reefs, tundra and coastal wetlands.

ICT can play a role in environmental protection, waste management and in environmentally-friendly supply chain management. These applications fall under Programme 3 of the Doha Action Plan of ITU–D (notably Resolution 52) adopted by the World Telecommunication Development Conference in March 2006.

Dealing with the likely effects of climate change also includes using ICT in the prediction of natural disasters, such as droughts, floods, and hurricanes, and in mitigating the damage they cause. This was the subject of ITU's "Global Forum on the Effective Use of Telecommunications/ICT for disaster management," held in Geneva on 10–12 December 2007 (see article on pages 13–15).

Going forward

The key to combating global warming is to stabilize, and eventually reduce, the emission of greenhouse gases. International success has already been achieved with a reduction in ozone depleting substances (such as chlorofluorocarbons, or CFC) to 20 per cent of their 1990 levels by 2004, thanks to the 1987 Montreal Protocol. However, emissions of carbon dioxide have grown since 1970, despite the 1997 Kyoto Protocol, which set targets for a reduction by 5 per cent of 1990 levels by 2008–2012.

It is clear that any mitigation strategy must have multiple elements and ICT can help with this. Its contribution can come either directly, by reducing the sector's own energy requirements; indirectly, through using ICT to promote sustainable consumption and development, for example, or to reduce travel; and in a systemic way, by providing the technology to implement and monitor carbon reductions in other sectors of the economy.

ITU maintains an active commitment to promoting the use of ICT as a positive force to reduce greenhouse emissions and to mitigate the effects of climate change. ▰

Global Forum adopts new initiatives to strengthen response in emergencies

▌ The Global Forum on "Effective Use of Telecommunications/ICT for Disaster Management: Saving Lives", took place in Geneva on 10–12 December 2007, chaired by Professor Muhammad Nuh, DEA, Minister of Communications and Information Technology, Indonesia. It attracted representatives of 174 governments, (including ministers), 18 international organizations, 27 private-sector entities and 53 non-governmental organizations.

"We have seen through first-hand experience the power and potential of telecommunications to save lives in times of disaster," said Sami Al Basheer Al Morshid, Director of ITU's Telecommunication Development Bureau (BDT). "I was pleased to meet so many dedicated men and women during this forum who are united in the common belief that much more can, and must, be done."

Framework for cooperation in emergencies

The forum saw the launch of the *ITU Framework for Cooperation in Emergencies* (IFCE). This is a worldwide initiative designed to make telecommunication resources available for use by government agencies responsible for disaster relief, by humanitarian personnel, and by victims of disasters. Through the programme, ITU will ensure that reliable, easily transportable and technology-neutral systems are deployed in a timely manner when disasters occur. IFCE is an integral part of ITU's other activities in this area, such as disaster preparedness, early warning, and rehabilitation of telecommunication networks.

IFCE is built on three pillars: technology, finance and logistics. It will be steered by a High-Level Panel on Emergency Telecommunications, established during the forum by ITU Secretary-General Hamadoun I. Touré. The panel comprises Eui Koh, President of ProtoStar Asia (Technology); Jay Naidoo, Chairman of J & J Group Development Trust, (Finance), and Olof Lundberg, former Director General and CEO of Inmarsat and former Chairman and CEO of ICO Global Communications (Logistics).

Network of volunteers

The *ITU Network of Volunteers for Emergency Telecommunications* (VET) was also launched at the forum. It is intended to mobilize volunteers with technical expertise to help to deploy information and communication technologies (ICT) and set up telecommunication services immediately after disasters. ITU will create a database of these experts to facilitate their participa-

> " *I was pleased to meet so many dedicated men and women during this forum who are united in the common belief that much more can, and must, be done.* "

ITU/I. M. Ferré

Sami Al Basheer Al Morshid, Director of BDT

ITU Secretary-General Hamadoun I. Touré presents the Compendium of ITU's work on Emergency Telecommunications which was launched at the forum

tion in emergency telecommunications, especially during disaster relief activities. The volunteers could include such personnel as retired specialists from ITU Member States, Sector Members, and ITU itself.

New publications

Two new ITU publications were launched during the Global Forum:

▸ *Compendium of ITU's Work in Emergency Telecommunications*, covering the work of the three ITU Sectors: Telecommunication Standardization, Radiocommunication, and Telecommunication Development;

▸ *ITU Handbook on Best Practice on Emergency Telecommunications*, based on a study of 12 countries.

Partnerships forged

In addition, a number of partnerships were formalized with ITU. These included agreements with global satellite service providers, such as Iridium, Vizada and ICO Global, to contribute equipment and satellite airtime to support first responders following disasters. Other partnerships covered such areas as training and capacity building. Financial contributions were announced to support the IFCE and related activities, including from TerreStar and ICO Global.

Announcing a contribution to the IFCE initiative of USD 25 000, Chief Executive Officer (CEO) of **ICO Global**, Tim Bryan, said everyone must take responsibility for saving lives. "In a very real sense, none of us is doing enough, and each of us needs to

do more," he said. ICO will provide up to 22 million minutes of free airtime annually in support of emergency telecommunications.

TerreStar Global's next-generation mobile satellite, with its complementary ground component network, is designed to meet the needs of emergency services when responding to natural or man-made disasters. "Emerging new technologies such as next-generation networks make an invaluable contribution to emergency telecommunications," said Dr Touré.

Iridium Satellite also announced its contribution of equipment and airtime. "In the last several years, Hurricane Katrina and the Southeast Asian tsunami taught us that, in emergency response missions, the availability of rapid communications has the power to diminish loss of life in some of the most needy and desperate situations on Earth," said Matt Desch, Chairman and CEO of Iridium. Mr Desch explained that "through this agreement, ITU will provide first responders with reliable Iridium voice and data services so that they can more effectively help a greater number of people in the early days of an emergency." Iridium's network operates independently of terrestrial infrastructure.

The **Group on Earth Observations** (GEO) and ITU signed a Memorandum of Understanding to strengthen cooperation on remote sensing, particularly in the field of disaster preparedness and response. This collaboration will help protect the dedicated radio frequencies used by remote-sensing satellites and Earth-based monitors for

gathering high-quality data on the environment. Another benefit will be increased capacity building in developing countries for the effective use of Earth observations in decision-making.

"Efficient telecommunication services are fundamentally important to both the collection and dissemination of Earth observation data and information," said José Achache, Director of the GEO secretariat. "The observation and telecommunication communities are natural partners, and by working more closely together we can strengthen the international response to disasters, environmental degradation and other global risks."

GEO referred to the decision of the World Radiocommunication Conference (WRC-07), held in Geneva on 22 October–16 November 2007, to maintain the existing bandwidth allocated to Earth observations, thus preventing unintentional interference from other users of radio frequencies. A Ministerial Summit organized by GEO on 30 November 2007 in South Africa adopted the Cape Town Declaration, which welcomes "the resolution of WRC-07 on radiocommunication use for Earth observation applications and the support it provides for the international protection and long-term availability of frequencies for terrestrial, oceanic, air-borne and space-based observations".

"Reducing the impact of disasters requires strong coordination between telecommunications and Earth observations along the full chain of action, from disaster preparedness to forecasts, warnings, crisis management, and recovery," Mr Achache commented. Lives can be saved by rapid access to weather forecasts, data on land and ocean conditions, and maps of transport links and hospitals. Observations can also help planners to reduce vulnerability, strengthen preparedness and early-warning measures and, after disaster strikes, rebuild housing and infrastructure in ways that limit future risks.

Declaration of ongoing commitment

Praising ITU for organizing the Global Forum, participants ended the event by issuing a Declaration. This stated that "ITU and partners, through telecommunications and information and communication technologies (ICT), should help reduce the impact of natural disasters through monitoring, detection, and prediction of hazards and impending disasters, including limiting the impact of global warming and climate change."

Participants also requested that the forum be held every two years, and that BDT "should sustain the current momentum of promoting and enhancing the participation of multi-stakeholders in emergency telecommunications, and should continue to coordinate and facilitate the creation of partnerships between governments and private enterprise, and between all other stakeholders involved in the deployment and use of telecommunications in humanitarian work."

Siemens

New global standards for Internet protocol television

"Standards are crucial for IPTV to reach its market potential and global audience. They are necessary in order to give service providers — whether traditional broadcasters, Internet service providers, cable operators or telecommunication service providers — control over their platforms and their offerings," said Malcolm Johnson, Director of ITU's Telecommunication Standardization Bureau. He added that the new standards will "encourage innovation, help mask the complexity of services, guarantee quality of service, ensure interoperability and, ultimately, help players remain competitive".

/ On 18 December 2007, ITU announced its first set of global standards for providing television services over the Internet. They are expected to fuel innovation and competition in the emerging field of Internet protocol television (IPTV).

The new standards were developed by the Focus Group on IPTV in ITU's Telecommunication Standardization Sector (ITU–T), with technical contributions from leading service providers and manufacturers from the information and communication technologies (ICT) sector. They cement ITU's role as the global leader in IPTV standards development.

IPTV is one of the most highly visible services to emerge as part of the development of next-generation networks (NGN). It is seen as the principal driver for accelerating deployment of NGN, which allow many services to be delivered over a single network. Operators consider IPTV as a key element of a triple-play package of voice, video and data services. But standardization is imperative if service providers are to offer high-quality products with features such as video-on-demand that are likely to drive the market.

Work continues

The announcement of new standards followed the seventh and final meeting of the Focus Group on IPTV, hosted in Malta on 11–18 December 2007 by the Maltese Ministry for Competitiveness and Communications. At the event, Minister Censu Galea described the huge potential of the technology. "Some predict IPTV could attract up to 100 million subscribers in the next three years," he said. "It is easy to see why so many of the world's key ICT companies have been keen to progress this work in ITU."

Over the 2006–2007 period, the Focus Group produced documents containing high-level architecture and frameworks needed by service providers to roll out IPTV services. ITU's next phase of work in this area will be carried out by the IPTV-GSI (global standards initiative), which held its first meeting in Seoul, Republic of Korea, on 15–22 January 2008. IPTV-GSI will centre its work on the speedy development of standards based on the Focus Group's documents. It will build on the momentum generated in the last two years, during which work on IPTV has progressed around the world. /

From videoconferencing to telepresence

Cisco

⁄ The technology of videotelephony made its debut in 1964 at the New York World's Fair in the United States, when AT&T tested its *Picturephone* service on members of the public. However, attempts to create a commercial market for videotelephony services have not been very successful. This is partly as a result of high costs and lack of bandwidth, poor picture quality, and because of consumer resistance to interacting on camera.

It was not until the early 1980s that integrated services digital networks (ISDN) standards allowed digital signals, such as compressed video and audio, to be transmitted over long distances. This allowed the equipment market for videoconference products to begin expanding. Videotelephony has since developed in two different directions: at the personal level and for business use.

For individual consumers, many personal computers come equipped with webcams to transmit images, and mobile phones have cameras. Generally speaking, these represent applications rather than services, and the level of commercialization is based mainly on sales of equipment and bandwidth rather than minutes of use. But, with the phenomenal success of user-recorded short videos on such Internet sites as YouTube, and with the rapid increase in broadband speeds, wider use of real-time video is expected to follow.

For business users, videoconferencing has been growing as a means of encouraging collaborative work among offices spread around the globe and as a substitute for travel, but needs a boost in quality to see real progress. As an ITU Technology Watch Briefing Report puts it, "after the laborious setup of cameras and microphones, you seem to spend more time worrying about technical problems than talking about the topic at hand, with repeated loss of connection. As frustration grows, and attention wanders, it is difficult to avoid the feeling that you should have arranged a face-to-face meeting instead."

Making the virtual experience more real

The good news is that advances in network technologies, conference hardware and software should provide users with a more real experience of "being there without going there". This could be achieved with "telepresence", the name given to new, high-performance, studio-based videoconferencing. In a telepresence studio, the aim is to give users the illusion of sitting on the opposite side of a remote party's conference table. High-definition (HD) video images and

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A business meeting uses a telepresence studio

Cisco

audio are transmitted via a packet-based next-generation network (NGN), connecting multiple conference rooms around the world, and covering thousands of kilometres with almost zero latency. Telepresence systems are already available, and vendors see the technology as a potential billion-dollar market.

With telepresence, participants may now appear life-size on large HD plasma or LCD displays of one metre and above. ITU standards for high-definition television (HDTV) have been essential in supporting this, especially Recommendation BT.709 of the Radiocommunication Sector (ITU–R). With the HDTV standard, live video resolutions can go up to 1080p at 30 frames per second, where "1080" represents the number of lines of vertical resolution and "p" the progressive, non-interlaced mode of scanning. The 1080p high-definition video means that every expression and gesture is now clearly visible, whether you are meeting across town or across time zones. Future technologies will be based upon Recommendations from ITU–R and from the Telecommunication Standardization Sector (ITU–T) on large-screen digital imagery (LSDI). They will define how images can be delivered that are up to four times the quality of standard HDTV.

The photograph above shows a typical telepresence conference. It features three plasma screens (each of 165 cm), and a specially designed table that gives the illusion of seats for twelve people in the same room. Multiple HD cameras can be deployed closely above the screens, although ideally, cameras should be embedded in the screens themselves to simulate true eye contact among participants. In telepresence, spatial, CD-quality audio is directed to the conversation partner, simulating the acoustics of face-to-face talks.

Software now focuses on usability, simplicity and interoperability, allowing the user to easily set up conferences between two or more offices. Presentations and documents can be shared and made available on an additional display, improving collaboration and interactivity.

The demand for telepresence

Demand for telepresence exists in such areas as distance education, telemedicine and entertainment. However, its main market lies in the business sector, where it can be used for not only meetings, but also remote interviewing for recruitment, for example, technical consultations, or virtual "face-to-face" customer support. Nowadays, the environmental benefits of videoconferencing are also increasingly emphasized. A significant reduction in carbon dioxide emissions can be achieved, compared with flying participants to a central conference venue (see article on pages 6–12).

A question of bandwidth and networks

Transmitting video and audio in HD quality demands high-bandwidth connections. To achieve a life-like experience, transmission delays must be negligible for the human eye and ear. Bandwidth requirements for 1080p conferences are specified as 15 Mbit/s. In relative terms, telepresence requires around 150 times more bandwidth than traditional voice conference calls.

Demand for bandwidth is rocketing. According to ITU's annual survey of broadband services and prices, by the end of 2006, two-thirds of the world total of Internet subscribers had broadband access, or some 280 million people in 166 countries. Furthermore, available bandwidth has been increasing by 66 per cent per year, while the median price has been falling by 41 per cent per year since 2003. This makes high performance videoconferencing more available and affordable.

However, as well as more bandwidth, providing the telepresence experience could also require dedicated networks. The guaranteed availability of bandwidth on demand is essential, as rescheduling meetings due to network unavailability is not an acceptable option for businesses or remote surgery, for instance. Before starting a session, participants should be able to reserve bandwidth (via call admission control). Telepresence traffic should be detected automatically by network operators and be given high priority in return for a higher price, as well as comply with strict service-level agreements to safeguard quality of service. It is also essential to ensure end-to-end security, so as to protect networks from denial-of-service attacks or unauthorized access.

Standardization work at ITU

Telepresence has implications for ITU as a potential user organization, and in its leading work in developing global standards in the field of information and communication technologies (ICT).

ITU–T, for example, is experimenting with ways to facilitate remote participation in its meetings, especially from developing countries. A first trial was carried out in November 2007 with a link between ITU's headquarters in Geneva and its Cairo Regional Office. Such remote collaboration tools, which can include additive video transmission, require only a conventional Internet connection.

In contrast, telepresence requirements cannot be met on today's public Internet, but are implicit in the specifications for next-generation networks (NGN), which are a major focus of ITU–T work. The deployment of NGN in a new era of multimedia communications will bring with it a need to consider updating or replacing the current multimedia protocols, such as H.323 (developed in ITU–T Study Group 16) and the session initiation protocol (SIP) developed by the Internet Engineering Task Force SIP Working Group. Interoperability is a key requirement of telepresence to ensure broad connectivity with traditional and emerging video environments. Today, most
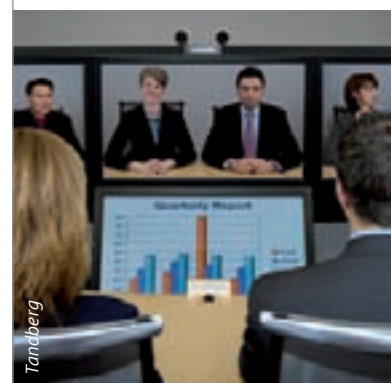
Tandberg

Tandberg

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How the future could look

With the help of high-definition displays, NGN, and improvements in usability, telepresence should be able to resolve some of the disadvantages associated with today's videoconferencing. Globalization, the increasing need for international collaboration, and a desire to reduce carbon emissions will drive demand. HD video communication can raise interactivity and productivity in business, as well as enhance applications in education and medicine. In future, high-performance videoconferencing can also be expected to arrive in personal and mobile video communications, giving millions of people the experience of telepresence.

of the available products support both H.323 and SIP.

A workshop held in May 2006, jointly by ITU–T and the International Multimedia Telecommunications Consortium (IMTC), identified strong and weak points in both protocols, and proposed that H.323 and SIP should be migrated into a new generation of multimedia protocols, called H.325 or advanced multimedia systems (AMS), that take account of special aspects of security, flexibility and quality of service.

Work on AMS also addresses the current lack of multimedia support for mobile systems. Standards require low complexity codices for mobile use, and must focus on low power consumption as well as interoperability among devices and different systems. Today's standards for video compression, such as ITU–T H.264, are appropriate for high-motion video content. But in order to obtain quality beyond HD, existing standards have to be enhanced in matters of resolution, frame rate, colour accuracy and efficiency.

Market players

Members of ITU that are actively involved in standardization activities include telepresence vendors, such as Cisco, HP, Polycom and Tandberg, and network service providers such as NTT and Verizon. New providers with different service models are expected to emerge.

Cisco expects its solutions to generate USD 1 billion annually in revenue from hardware sales by 2013. Its research suggests that network services from the full range of providers will represent a USD-4-billion opportunity by 2010.

Developing countries can benefit

For developing countries, the success of videoconferencing in general, and telepresence in particular, is tightly linked to the deployment of NGN infrastructure and the higher bandwidth required for high-performance services. If more powerful networks are made available, many benefits could result.

For example, ICT vendors and service providers with global operations could establish branches and research centres in emerging economies, and use telepresence to collaborate with head office or other research units. Already, universities and institutions of higher education in developing countries have been cooperating with universities in developed ones to share knowledge via distance learning and to make it available in remote regions. Telepresence will help to enhance the degree of interactivity and collaboration between students and educators.

In addition to communication in high definition, personal video communication on mobile devices will also play a major role in developing countries, once the infrastructure is provided. This is because it is likely to be more affordable and more available, given the important and growing role of mobile communications in developing countries.

Mobile phones for half the world's population

ITU expects the global mobile penetration rate to reach 50 per cent in early 2008

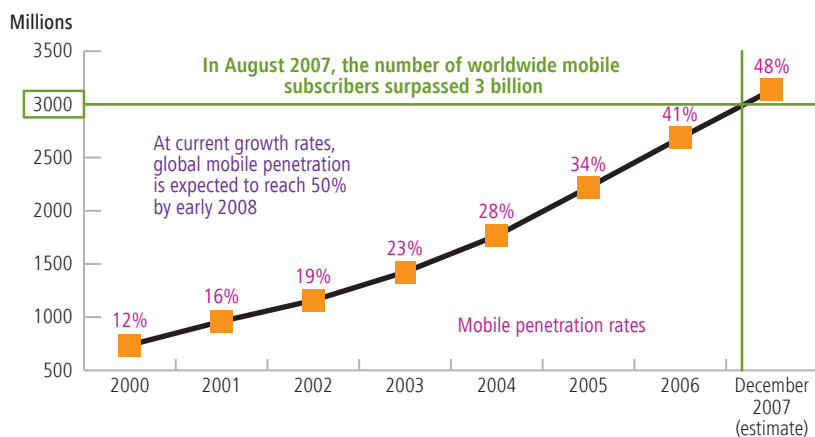At current growth rates, global mobile penetration is expected to reach 50 per cent by early 2008. ITU data suggest that the number of mobile subscribers surpassed the 3 billion mark in August 2007 (see Figure 1). Mobile growth rates have been high across almost all regions and the number of subscribers has grown by between 20 and 30 per cent globally since 2000, when worldwide penetration stood at 12 per cent. In many developing regions, including Africa, where fixed lines remain very limited, the mobile success story has been critical for enhancing access to telecommunications. During 2006 alone, Africa added over 60 million mobile subscribers to its subscriber base and the continent's mobile growth rate has been close to 50 per cent annually over recent years.

As the global mobile penetration reaches 50 per cent, in theory this implies that every second person owns or uses a mobile phone. However, the statistic needs some clarification. Double counting takes place when individual consumers subscribe to more than one service.

Also, operators' methods for counting active prepaid subscribers vary, often inflating the actual number of people that use a mobile phone. On the other hand, some subscribers, particularly in developing countries, share their mobile phone with others, thus spreading its benefits. Finally, and despite high growth rates in the mobile sector, major differences in mobile penetration rates still exist between regions and within countries, particularly urban versus rural areas.

These contrasts are demonstrated by four economies that are expected to have an increasingly important impact in terms of population, resources and global share of GDP (gross domestic product) — Brazil, the Russian Federation, India and China. These countries alone accounted for almost one billion mobile subscribers in 2007, or nearly one third of the world's total. Add the mobile subscribers in the United States, Japan and Indonesia, and the number of subscribers in these seven countries comes to half of the world's total.

Figure 1 — Worldwide mobile subscribers

Millions

In August 2007, the number of worldwide mobile subscribers surpassed 3 billion

At current growth rates, global mobile penetration is expected to reach 50% by early 2008

Mobile penetration rates

12% (2000), 16% (2001), 19% (2002), 23% (2003), 28% (2004), 34% (2005), 41% (2006), 48% (December 2007 (estimate))

ITU

Irum Shahid

Gathering and analysing data is essential for measuring progress in narrowing the digital divide

World Telecommunication/ ICT Indicators Meeting

/ On 13–15 December 2007, ITU hosted its 6th World Telecommunication/ICT Indicators (WTI) Meeting. Its main purpose was to review the state of ITU's statistics, define indicators, and discuss the collection, dissemination and use of data.

The meeting, which has been taking place regularly since 1996, was organized by the Telecommunication Development Bureau (BDT). It was attended by 171 participants from 78 countries and by a number of regional and international organizations. The meeting was chaired by Anchalaporn Siriwan from the Ministry of Information and Communication Technology of Thailand. WTI meetings represent ITU's main forum in the area of telecommunication and information and communication technology statistics.

In his opening speech, BDT Director Sami Al Basheer Al Morshid highlighted the importance of the Union's work in measuring progress towards the information society. ITU is recognized as the main source of internationally comparable statistics in the area of telecommunications and information and communication technologies (ICT). It also plays an important role in identifying appropriate indicators to measure the progress countries are making. This year's WTI meeting focused on the topics of com-

munity access, new and revised indicators and definitions, and the creation of a single ITU index.

Community access indicators

The vast majority of households in developing countries still do not have access to ICT, such as computers and the Internet. Community access, therefore, plays an important role in connecting the unconnected. The recognition that traditional indicators (such as fixed telephone lines and mobile subscribers) alone are not sufficient to determine the extent of the digital divide has highlighted the need to measure community or public access to ICT. The meeting suggested a number of indicators to measure community access, including tracking the percentage of communities (in villages and towns) connected to the public telephone network (fixed and/or mobile), and those with a public Internet access centre.

This information will also help track the targets set by the World Summit on the Information Society (WSIS), including its call to "ensure that more than half the world's inhabitants have access to ICT within their reach". The meeting encouraged developing countries especially to carry out surveys to find out how many people are making use of public access facilities.
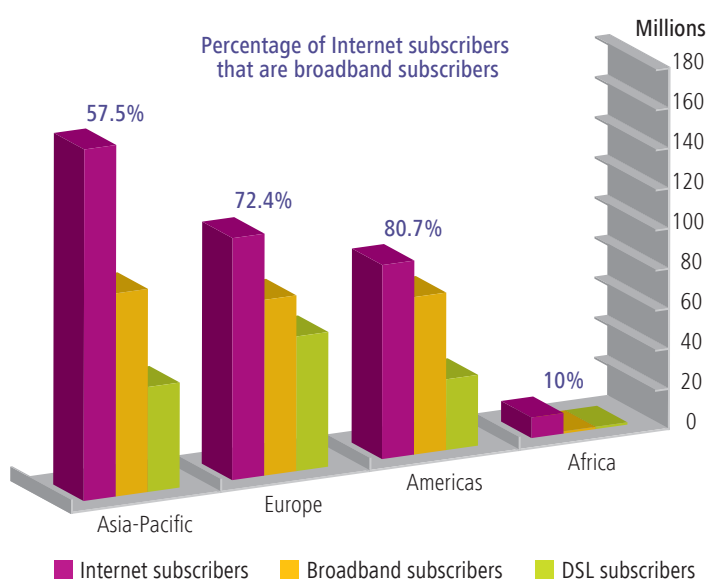
Tracking the information society

As the United Nations specialized agency for telecommunications, ITU is responsible for producing statistics covering its sector. BDT collects and disseminates data on the markets for fixed, mobile and Internet services. Its data collection includes comparable statistics on tariffs, telecommunication revenues and investment, and traffic. These supply-side statistics come directly from ITU Member States, through the World Telecommunication/ICT Indicators questionnaire. They are used to measure ICT developments across the world, analyse the digital divide, and identify market trends, for example in the area of broadband uptake (see Figure 1). Recently, ITU has begun also to cover demand-side statistics, including household and individual data collected through household surveys. These are particularly useful in tracking ICT usage. Household (and individual) data are collected through a questionnaire that is sent to National Statistical Offices (NSO).

The data collected by ITU cover around 100 indicators for more than 200 economies. ITU provides definitions to help guide countries in their data collection efforts and is preparing a household survey manual, which will be used for capacity building and as training material for NSOs in developing countries. As well as being used to analyse ICT developments, ITU data are published in a number of reports such as the *Yearbook of Statistics* and the *World Telecommunication/ICT Development Report*.

For more information on the BDT's Market, Information and Statistics Division, which is responsible for this work, see: www.itu.int/ITU-D/ict/

Figure 1 — Internet subscribers by region and access type, 2006

Figure 2 — What should be included when measuring wireless broadband uptake?

OECD's proposal

256 kbit/s

(Included)	
WiMAX	
Satellite	
Other FWA	

IMT-2000 (3G) and beyond	Not active?	Limited coverage?
	Bit cap too low?	Contention ratios?
	Device type? Mobile/Data card	Other?

Future wireless standards

Wi-Fi

BT Openzone

Mobile/wireless broadband

Given the rapidly changing nature of the telecommunication/ICT sector, there is a constant need to update and review existing indicators. As part of the meeting's session on new indicators, developments in the area of mobile/wireless broadband were discussed. The Organisation for Economic Co-operation and Development (OECD), which is working on a harmonized definition to measure wireless broadband uptake, was invited to share its experience. OECD suggested that the technologies under this definition should include WiMAX, other fixed wireless access technologies and those that fall under the ITU's IMT-2000 standard and beyond (see Figure 2).

A number of measurement issues were pointed out, including the distinction between potential and active mobile broadband subscribers. Even though mobile broadband access, particularly through third-generation (3G) networks, remains limited in many developing countries, it is important to start tracking this development at an early stage.

Current trends suggest that mobile broadband will be an important means of access in developing countries. ITU will continue to cooperate with the OECD to maximize international comparability of data.

A single ITU index

ITU's work in the area of statistics and international benchmarking has led to the development of two main benchmarking tools, or indices: the *ICT Opportunity Index* and the *Digital Opportunity Index*. The Plenipotentiary Conference held in Antalya, Turkey, in November 2006 called for the development of a single ITU index to measure countries' progress towards becoming information societies. In this regard, the WTI meeting made a number of recommendations regarding a single ITU index, including on methodology and the choice of indicators. It was proposed that the technical and methodological aspects of the index should be finalized by a group of experts, including those from ITU Member States.

ITU and Europe boost investment environment for ICT

Harmonizing regulatory policies in Africa, Asia-Pacific and the Caribbean

ITU and the European Commission (EC) have concluded an agreement on creating an environment to attract investment in infrastructure and applications for information and communication technologies (ICT). It targets three regions across the world: Africa, the Asia-Pacific and the Caribbean.

Most countries in these regions have reformed the telecommunication sector by establishing national regulatory bodies, introducing competition and at least partially privatizing operators. However, large sections of their populations remain without access to basic services. Many countries have yet to undertake the key reforms that would provide regulators with the tools and authority needed to boost investment, promote innovation and build confidence in ICT markets.

A fundamental shift in policy and regulatory frameworks is considered essential to reach, by 2015, the connectivity targets of the World Summit on the Information Society (WSIS) and the United Nations Millennium Development Goals. WSIS recognized that "to maximize the social, economic and environmental benefits of the information society, governments need to create a trustworthy, transparent and non-discriminatory legal, regulatory and policy environment".

The ITU-EC agreement's aims are to:
▶ develop and promote ICT market policies and guidelines for individual countries
▶ support regional organizations and sub-regional economic groupings to develop and promote the use of harmonized ICT market policies and regulations
▶ build human and institutional capacity in ICT, through targeted training, education and knowledge sharing.

To help achieve these aims, EUR 8 million has been donated from the European Development Fund, to which ITU will add USD 500 000 of its own resources. The work will be managed and implemented by ITU.
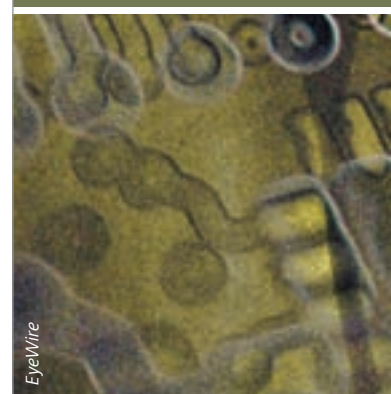
The agreement was signed in December 2007 by the Director of ITU's Telecommunication Development Bureau Sami Al Basheer Al Morshid and by Raul Mateus Paula, Head of Unit of the European Commission's EuropeAid Cooperation Office. Mr Al Basheer stressed that "the creation of an enabling environment is one of the key building blocks in the establishment of the information society".

The agreement is expected to raise awareness at the highest political level within developing countries of the need to move to a knowledge-based economy, and help them to maximize economic and social benefits that serve national priorities.

EyeWire

The ITU-EC agreement marks a step forward in ITU's Connect the World *initiative. It is a follow-up to commitments made at the* Connect Africa Summit *in Kigali, Rwanda, in October 2007, when the European Commission announced its support for ITU's regulatory reform initiatives in Africa. It also follows the successful implementation of an earlier ITU–EC cooperation project on establishing harmonized regulatory frameworks for ICT in West Africa.*

EyeWire

ITU–D Study Group 1

Halfway to the WTDC in 2010

Audrey Loridan-Baudrier, Chairman of Study Group 1

Mrs Loridan-Baudrier takes a look at what has been accomplished in the Study Group since the start of its fourth study period in 2006

The second annual meeting for Study Group 1 was held on 17–21 September 2007 in Geneva. It was noteworthy for the increased number of countries (56), contributions (80) and participants (118). Midway towards WTDC-10, work in the Study Group is advancing steadily, with encouraging levels of cooperation with BDT and its programmes, and with the Telecommunication Standardization Bureau (TSB). A number of initiatives involving BDT have been launched, in order to strengthen the results achieved by Study Group 1 and increase its momentum.

/ The current study period of Study Group 1 of ITU's Telecommunication Development Sector (ITU–D) is proceeding smoothly. There have been positive developments, thanks to some high-quality contributions to our discussions from Member States and Sector Members. Study Group 1 is more finely attuned than ever to the Doha Action Plan, which was issued by the World Telecommunication Development Conference (WTDC) in 2006. It is also closely involved in the implementation of Action Line C5, concerning confidence and security in the use of information and communication technologies (ICT), and Action Line C2, on ICT infrastructure, that resulted from the World Summit on the Information Society (WSIS).

Assessment at the halfway mark

By way of a preliminary observation, attention must be drawn to the good cooperation between the Study Group and the Telecommunication Development Bureau (BDT). Cooperation is driven by the management team and programmes, and takes the concrete form of jointly organized workshops. For example, we organized two workshops on 17 September 2007, on best practice in cybersecurity and on access to ICT for people with disabilities. We will repeat this successful experiment in 2008 with a workshop on universal access to broadband services, and another on tariff and cost models, including for next-generation networks (NGN). These are being organized in co-ordination with BDT programmes.
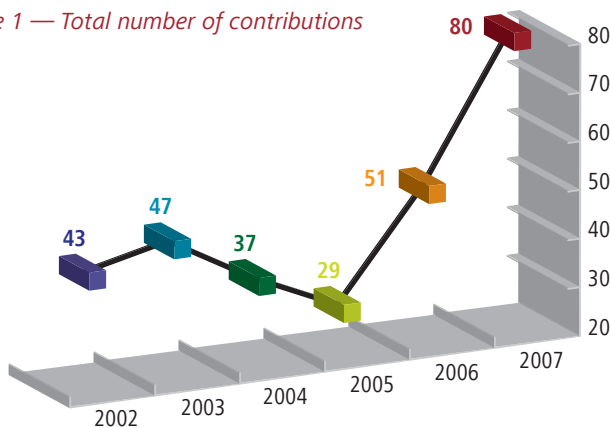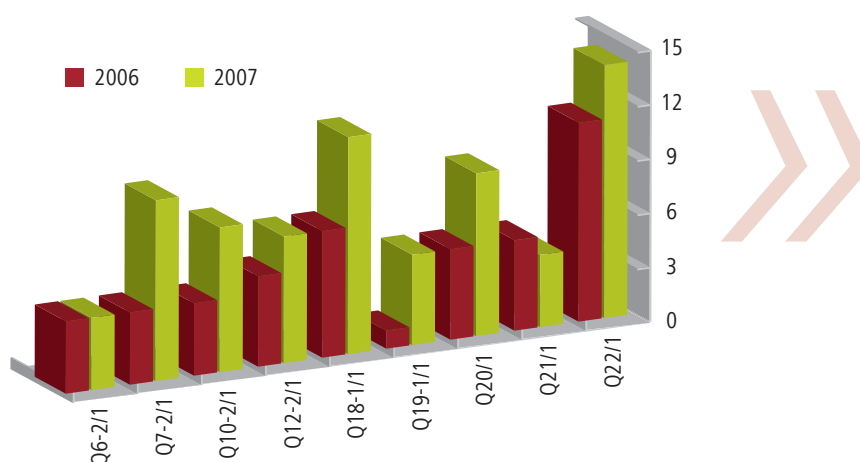
Figure 1 — Total number of contributions

Figure 2 — Number of contributions per Question

Study Questions

Q6-2/1	*NGN*
Q7-2/1	*Universal access*
Q10-2/1	*Convergence*
Q12-2/1	*Tariffs*
Q18-1/1	*National regulatory authorities*
Q19-1/1	*VoIP*
Q20/1	*Access for disabled*
Q21/1	*ICT and employment*
Q22/1	*Cybersecurity*

Also, thanks to the action of BDT Director Sami Al Basheer Al Morshid, Study Group 1 has received the resources it needs to do its work, allowing it to be re-invigorated with a view to stimulating the sharing of information and experience.

The beneficiaries are developing countries. Since 2004, the number of contributions to the Study Group's work has grown significantly, with a 56-per-cent increase since 2006, or 70 per cent since 2003 (as shown in Figure 1).

Since 2006, progress has been made on all of the Questions being studied (see Figure 2). For Questions 18-1/1 (domestic enforcement of telecommunication laws, rules, and regulations by national telecommunications regulatory authorities) and 22/1 (best practice for developing a culture of cybersecurity), draft reports have already been produced for consideration and comment, thanks to the hard work of the rapporteurs. In addition, questionnaires have been sent out for three other Questions. Also, the BDT Secretariat finalized a new system for responding to questionnaires online. Member States and Sector Members are encouraged to make use of this system

in future, and further details can be found at www.itu.int/ITU-D/study_groups/SGP_2006-2010/questionnaires/index.html.

The next steps to be taken

Study Group 1 is conducting a top-to-bottom renewal of its processes so as to achieve a better fit between its work and the expectations and needs of the Member States and Sector Members. Several milestones have been set up as targets, marking a new roadmap towards WTDC-10.

Annual operational report from the Study Group

Study Group 1 will produce an annual operational report for the Telecommunication Development Advisory Group (TDAG). The report will describe the work accomplished, with indicators for the number of participants and contributions, broken down by meeting and Question, and the number of documents downloaded from the group's website. Its purpose will be to show the state of progress and give the forthcoming WTDC a complete overview of the Study Group's achievements and participation in its work.

News from Study Group 1

Maria Dolores Peña, the director general for international affairs at ANATEL in Venezuela, has joined the management team as the new vice-chairman for the Americas region.

Aboubakar Haman, the engineering and planning director at ART in Cameroon and a vice-chairman of the Study Group, has been designated as the new rapporteur for Question 21/1 (the impact of telecommunication development on the creation of employment).
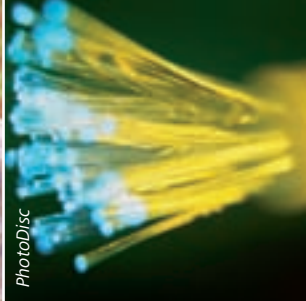
Fotosearch

PhotoDisc

Bill Davenport

PhotoDisc

Foster synergies with BDT programmes

Rapporteurs must maintain constant contact with BDT coordinators, and take part in the Sector's programme events, workshops and meetings as much as possible. In the months to come, Study Group 1 will set up an action plan, in close cooperation with those units within BDT that are involved in the group's work. To this end, the website will be updated in cooperation with the unit responsible for the BDT website, to create electronic resources and web-based discussion groups.

Optimize the way work is organized

All of the rapporteur groups will hold meetings in the period between February and May 2008. The meetings will be scheduled together as much as possible, and coordinated with the rapporteur groups of Study Group 2. In addition, at the start of each new study period, a workshop should be held at which rapporteurs will have an opportunity to share their observations and discuss their role and working methods in accordance with their terms of reference.

Interaction with the rest of ITU

The 2008 World Telecommunication and Information Society Day, on 17 May, has as its theme the issue of access to ICT for people with disabilities, which is also the topic of the Study Group's Question 20/1.

Therefore, it is envisaged that a working group of experts on Questions 7-2/1, 20/1 and 21/1 could be set up to work on the subject of disabled people's access to ICT and employment.

The rapporteurs (at least those who work for their national administrations) will be able to use G-REX, a powerful information sharing tool, to provide support on demand. It can also be used to provide information for their studies on the various Questions. This cooperation promises to be of benefit to BDT and the study groups.

Interaction with other international players

The profile of the work done by Study Group 1 needs to be raised. One of the ways in which this could be achieved is by sending printed or CD-ROM copies of all reports on the Questions being studied to such international bodies as the World Bank, the European Commission and the Organisation for Economic Co-operation and Development (OECD). Alternatively, e-mail alerts could be sent out to announce forthcoming meetings and workshops of the rapporteur groups.

Internet Governance Forum meets in Brazil

ITU emphasizes action and cooperation

/ The second meeting of the Internet Governance Forum (IGF) took place in Rio de Janeiro, Brazil, on 12–15 November 2007. Its themes were critical Internet resources, access, diversity, openness, and security, as well as a session on emerging issues and the way forward.

ITU Secretary-General Hamadoun I. Touré was the first keynote speaker at the forum's opening session. Emphasizing the importance of the Internet for economic and social development, he referred to the origin of the IGF as an outcome of the Tunis phase of the World Summit on the Information Society (WSIS) in 2005.

Dr Touré went on to describe how continuing innovation in the Internet will "lead to a change in the landscape, a shifting of roles, of key players, and the introduction of a new type of competition". This change must be embraced, the Secretary-General said. "What is needed is next-generation Internet governance: the development of an enabling environment that assists governments to foster supportive, transparent, pro-competitive policies, as well as a legal and regulatory framework to provide appropriate incentives for investment and community development in the information society."

Promoting cybersecurity

During the IGF, an ITU open forum was held on the theme: "Can we win the war against cyberthreats?" As well as Dr Touré, speakers included Malcolm Johnson, Director of ITU's Telecommunication Standardization Bureau; Art Reilly, Senior Director for Strategic Technology Policy, Cisco Systems; Maud de Boer-Buquicchio, Deputy Secretary General, Council of Europe, and Shamsul Jafni Shafie, Director of the Security, Trust and Governance Department, Malaysian Communications and Multimedia Commission.

Mr Johnson said that the role of standardization in cybersecurity is "vital". He explained that ITU has carried out pioneering work in establishing authentication standards as the basis for most electronic transactions over public networks, including the Internet. The challenge is for security standards to keep up with fast-evolving information and communication technologies (ICT).

Developing countries, with limited resources, face particular challenges in protecting cybersecurity and critical information infrastructure. The workshop heard how ITU's Telecommunication Development Bureau is developing a best-practice framework for national cybersecurity efforts and a related *Cybersecurity Work Programme for Developing Countries*.

Fotosearch

Winning the war against cyberthreats was the topic of an ITU open forum at the IGF

Philippe Ramakers

ITU jointly hosted a workshop on efforts to promote a multilingual Internet

Also presented at the workshop was the *Global Cybersecurity Agenda*, launched by ITU in May 2007, which addresses the far-reaching legal, technical and institutional effects of cyberattacks and cybercrime. It provides a framework for the international cooperation that is required to combat these growing problems.

Multilingual Internet

There is growing concern that hundreds of local languages may be sidestepped as the Internet expands. WSIS recognized the importance of linguistic diversity and local content, as did the ITU Plenipotentiary Conference in Antalya in 2006.

ITU, together with the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the Internet Corporation for Assigned Names and Numbers (ICANN) hosted a workshop on global efforts to forge a multilingual cyberspace. This covers the question of internationalized domain names (IDN), as well as such issues as standards for character sets, text encoding, languages in major computer operating systems, content development tools, automatic translation software, and search engines that can operate across languages.

"ITU is fully committed to assisting its membership in promoting the diversity of language scripts for domain names," said Dr Touré. ICANN's President and CEO Paul Twomey said the corporation was in the midst of the largest ever evaluation of top-level domain names. "The discussions at this multilingualism workshop — combined with our current evaluation of IDN — are going to help ICANN keep moving toward full implementation of IDN," he said.

Improving access through standards

Another workshop organized at the forum by ITU looked at "Making accessibility a reality in emerging technologies and the Web". Its aim was to examine the advantages of designing with accessibility in mind, and to share examples of activities to ensure that emerging technologies meet accessibility requirements.

Mr Johnson opened the workshop by saying "I believe that standards have an enormously important role to play in making ICT more accessible." He pointed out that, in 1991, ITU's Telecommunication Standardization Sector (ITU–T) was the first international standards body to address this issue. "Since then, ITU–T's experts have helped to incorporate accessibility needs into standards for multimedia, network interoperability, multimedia service descriptions and multimedia conferencing," said Mr Johnson.

He also mentioned ITU–T's recently published *Accessibility Checklist*, which he described as "an excellent tool, helping to ensure that accessibility needs are included at an early stage of standardization, rather than industry having to retrofit products and services at a later date." /

Elephants help connect remote villages in Thailand

NTC Thailand

It was in 1881 when the first telephone line was installed in Thailand, providing services between Bangkok and Samutprakarn. However, it was not until 125 years later that people in the village of Koh Saderng, in Kanchanaburi Province, had their first telephone link. And in pursuing the goal of universal access to telecommunications for all communities in Thailand, an unusual means of transport was used: elephants.

Four-wheeled and four-legged transport

Kanchanaburi Province is in the west of Thailand. Located in dense forests on the banks of a small river, the village of Koh Saderng has some 300 inhabitants and has been settled for centuries. But as well as lacking phones, residents had no electricity or a clinic. Children in the community are educated by a single teacher. The village is in a mountainous area, and although it is only 37 kilometres from its district town of Sangklaburi, during the four months of the dry season it takes 3 or 4 hours to get there, using four-wheel-drive vehicles to travel through steep and muddy tracks and cross

14 streams without bridges. The village is even more isolated during the rainy season, when the only way to reach it is to walk through the forest for more than 6 hours or ride on the back of an elephant.

Thailand's National Telecommunications Commission (NTC) announced that telephone services would be provided to Koh Saderng and to two other unserved villages in the district: Lai Voh and Viangkadee. It was to be a pilot project to gather data on technical and social factors for formulating the provisions of Thailand's universal service obligation for telecommunications.

In February 2006, equipment was installed at Koh Saderng that enabled phone connections via a satellite link, as well as connection to the Internet. Much of that equipment was carried through the forest by elephant — and now the villagers have another means of contacting the outside world. The first telephone services have proved to be very useful for trading the community's agricultural produce, for giving warnings of wildfires or natural disasters, and for promoting tourism.

NTC Thailand

NTC Thailand

Telemedicine for Pan Yee

A favourite tourist spot in Thailand's southern Phang Nga Province is the island of Pan Yee, in the Andaman Sea. It is about 20–30 minutes by boat to the mainland. However, when island residents cannot make the crossing due to storms or other severe conditions, it is difficult for them to consult a doctor. To solve this problem, NTC has launched a telemedicine project for the island, in co-operation with the Ministry of Public Health. It uses a CDMA 2000 1X EV-DO system provided by CAT Telecom, medical equipment from Qualcomm, and a D800 EV-DO wireless modem from Axesstel.

Medical staff at Phang Nga hospital on the mainland can communicate with patients on Pan Yee and examine symptoms. A doctor can listen to a heartbeat remotely, for example, or look inside a patient's ears or mouth. The doctor can then give advice about treatment to an assistant at Pan Yee health station. A similar project is operated between the mainland and the island of Korkao, in the Takaupa district of Phang Nga Province.

Telemedicine

At the same time that a public phone was installed at Koh Saderng, a telemedicine service was inaugurated between the village and a hospital in Sangklaburi. This helps save people's lives through providing access to medical assistance, including via the Internet. On the first day of the service, a doctor in the town provided a patient in the village with an initial diagnosis online, before referring him to the hospital.

According to Benchamas Choomwora-theyee, the teacher in Koh Saderng, the phone is used for consulting hospital doctors about first aid treatment and for advice in treating such diseases as malaria. She added that access to the Internet also helps her keep her knowledge up to date, in order to better teach local children.

Universal service

NTC launched the project in cooperation with Thai companies CAT Telecom, TOT Corporation, Shin Satellite Corporation, and Samart Telecom, as well as Asia Cellular Satellite (ACeS) International, and QUALCOMM. In Koh Saderng and in future projects, services from a public telephone are free for emergency calls, while other uses are available at affordable charges.

Although Thailand has a reasonably high teledensity, services are available only in larger communities and along main roads. There are some 6000 villages in remote rural and mountainous areas that do not even have one telephone, because they are far away from the coverage area of either mobile or fixed telephone services.

NTC Commissioner Artorn Chandavimolt explained that the initiative in Kanchanaburi Province is in line with Thailand's Telecommunication Business Act of 2001, which stipulates that NTC must provide a basic universal service in telecommunications and regulate its licensees to provide services in rural and underserved areas. He said that NTC had decided to carry out the pilot project in some of the country's most isolated areas in order to identify suitable methods of providing a universal service elsewhere too. Similar projects will be implemented throughout Thailand, so that everyone will be on an equal footing in accessing basic telecommunication services at affordable prices.

In this regard, NTC has selected 6000 villages and 4000 clinics all over the country as targets for universal service, mostly situated in remote, rural, mountainous or island areas. The goal is to provide each village with at least two public telephone lines and each rural clinic with a fixed telephone line and a public telephone. This is expected to be an 18-month project, ending around April 2009, and will be carried out by telecommunication operators TOT Corporation and CAT Telecom.

"The more hardship people have in their lives, the more priority should be given to them in rendering assistance," Commissioner Artorn said. "Thai people who have settled in the most isolated rural areas shall be treated as a first priority for public telecommunication services, no matter how far the distance is and how high the costs of setting up and operating a telecommunication network."

Education via elephant

Elephants are also being used to carry communications equipment and educational materials to remote villages in Thailand's northern provinces of Chiang Mai, Chiang Rai and Mae Hong. It is part of the "Bringing schools to children" project launched in 2001 by the country's Non-Formal Education Department.

Books, writing boards, video and audio players are provided, as well as televisions and the satellite equipment needed to receive a signal. Electricity generators are essential too. Teams comprising two elephants, their mahouts, two teachers and two health workers travel through the target areas, stopping at a village for three or four days. The main task is teaching literacy, but the teams also impart knowledge about such topics as hygiene, nutrition and agricultural methods. Videos of cultural entertainments are shown too. Every few weeks, the team returns to each village for follow-up work.

In these conditions, elephants are the cheapest and most effective means of transport. According to the Non-Formal Education Department, for the cost of buying and maintaining a vehicle, 3000 people can be taught basic reading and writing skills with the help of equipment brought by elephant. Each animal carries several hundred kilogrammes of supplies in specially designed aluminium cases. They are able to negotiate any kind of terrain, including slippery hillsides and swamps.

The arrival of the elephants is greeted with joy when they arrive at a village. They are essential in the task of bringing entertainment, knowledge and literacy to remote areas and connecting them to the outside world.
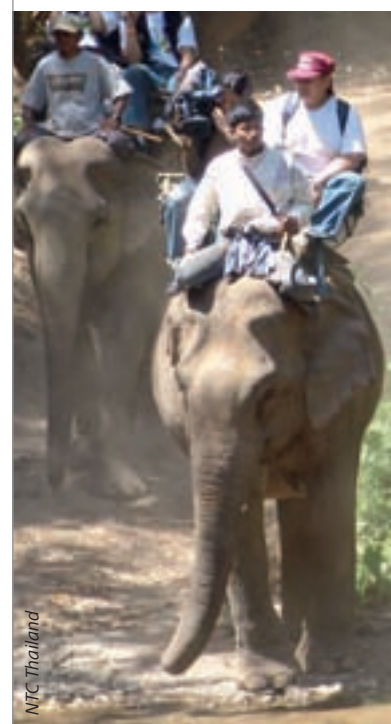
NTC Thailand

NTC Thailand

Making a difference

The 19th century origins of the computer

⁄ When was the computer invented? Among possible answers to this question, the credit for designing the earliest precursor to modern machines goes to 19th-century British mathematician and engineer Charles Babbage (1791–1871).

Babbage and railways

Babbage took a keen interest in one of the age's most important developments, the railway. He contributed several inventions and was present at the opening ceremony of the Manchester and Liverpool line, in north-west England on 15 September 1830. The day also saw the death of parliamentarian William Huskisson, who was run over by George Stephenson's locomotive "Rocket" — the world's first railway passenger fatality. "I feared... the people madly attempting to stop by their feeble arms the momentum of our enormous train," wrote Babbage later.

Perhaps the accident spurred Babbage to concern himself with railway safety, as, in 1838, he invented the cowcatcher (also known as a "pilot") that could be attached to the front of locomotives to clear obstacles from the track. In answer to the question in *Pioneers' Page* of December 2007, it is Babbage who connects the cowcatcher with computing.

From human to mechanical computers

Thousands of years ago, the first device to help people manipulate long series of numbers was the abacus. In the 17th century, as the pace of scientific observations increased, the slide rule was invented by Englishman William Oughtred in 1622. The following year Wilhelm Schickard, of Germany, made the first mechanical calculator. Philosopher and mathematician Blaise Pascal came up with the *Pascaline* in 1645, to help his father's work in the French tax system. In the 1670s, Gottfried von Leibniz invented a *Stepped Reckoner.*

There were important reasons for achieving correct figures. Navigation of ships, for example, required precise tables in nautical almanacs to discover a vessel's position. New inventions aimed not only to make calculating faster; they were also meant to remove the risks of human error.

Such errors greatly annoyed Babbage. In 1821, he and his friend John Herschel (son of the astronomer William Herschel) found numerous faults in tables they were revising for the Royal Astronomical Society. Correcting the tables was painstaking work, leading Babbage to exclaim "I wish to God these calculations could be executed by steam!" He decided to automate a process

Question for next time

▼

that, until then, was performed by people called "computers." In so doing, he took important steps towards creating what we know as computers today.

The Difference Engine

With the aim of reducing labour and guaranteeing accuracy, Babbage's "Difference Engine" was to comprise thousands of cogs called "figure wheels". Its name derived from use of the mathematical "method of differences," by which calculations are achieved through repeated additions of the differences between successive terms in a series. This allows difficult multiplications to be replaced with simple additions. Teeth on each cog stood for numbers, with the wheel at the bottom of a column showing units, the second showing tens, and so on. Babbage constructed a demonstration model of the Difference Engine and announced his invention at the Royal Astronomical Society in 1822.

A revolutionary aspect of the engine was that it was entirely automatic. Previous calculators required each mathematical operation to be entered by hand, and so expertise in arithmetic was needed to achieve a correct result. In contrast, the Difference Engine could be used by anyone. It was the world's first device to incorporate mathematical rules into mechanisms. "The marvellous pulp and fibre of a brain had been substituted by brass and iron, (Babbage) had taught wheelwork to think," wrote his biographer Harry Wilmot Buxton.

By 1849, Babbage had designed his more efficient "Difference Engine Number 2." It was to contain eight columns, each with 31 figure wheels — meaning it could generate a 31-digit calculation. Half the engine's parts were dedicated to a printer, so that no human hand could introduce mistakes into the results. It not only printed these, but also could be programmed to give various formats (such as the grouping of data sets) to the print-out.

However, aside from partial models, neither version of the Difference Engine was completed. It was left to Swedish inventor Per Georg Scheutz to finish a device in 1853, based on Babbage's design, which he showed at the *Exposition Universelle* in Paris in 1855. Then, in 1991, at the Science Museum in London, a full-scale Difference Engine was constructed according to Babbage's plans. The work was supervised by the museum's curator of computing, Doron Swade, who later wrote "we had built the first Babbage Engine, complete and working perfectly, 27 days before Babbage's 200th birthday."

Advancing further

One reason for Babbage not finishing the Difference Engine was that he turned his attention to creating an even more advanced machine: a general-purpose, programmable computer. This will be the topic of the next *Pioneer's Page*. ▬
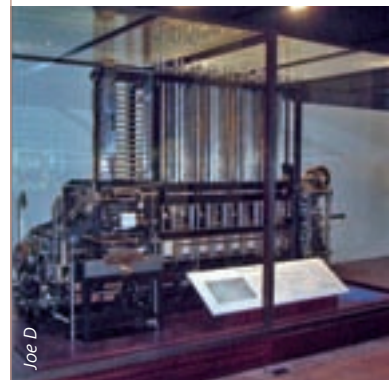
Joe D

The Difference Engine constructed to Babbage's design at the Science Museum, London

Carsten Ullrich

Close-up view of the Difference Engine, showing the figure wheels arranged in columns

From official sources

Instruments amending the Constitution and the Convention of ITU (Antalya, 2006)

The Government of the **State of Qatar** has ratified the above instruments. The instrument of ratification was deposited with the Secretary-General on 4 October 2007. The amendments entered into force on 1 January 2008.

Final Acts of the World Radiocommunication Conference (Geneva, 2003)

The Government of **Malaysia** has acceded to the above Final Acts. The instrument of accession was deposited with the Secretary-General on 15 October 2007.

The Government of the **Principality of Monaco** has acceded to the above Final Acts. The instrument of accession was deposited with the Secretary-General on 25 October 2007.

Final Acts of the World Radiocommunication Conference (Istanbul, 2000)

The Government of the **Principality of Monaco** has approved the above Final Acts. The instrument of approval was deposited with the Secretary-General on 25 October 2007.

Change of name

The Ministry of Transport and Communications of **Sierra Leone** has changed its name to *Ministry of Communications*.

RADIOKOMUNIKACE a.s., a Sector Member of ITU–R, has changed its name to *Ceské Radiokomunikace a.s. (Prague, Czech Republic)*.

New Sector Members

Telecommunication Standardization Sector

Telecommunications Regulatory Authority (Beirut, Lebanon) has been admitted to take part in the work of this Sector.

Radiocommunication Sector

Delphi (Kokomo, Indiana, United States), Elektrobit Corporation (Oulu, Finland), Mobile Satellite Ventures LP (Reston, Virginia, United States), Telecommunications Regulatory Authority (Beirut, Lebanon) and *TerreStar Networks (Reston, Virginia, United States)* have been admitted to take part in the work of this Sector.

Telecommunication Development Sector

BCI Communications and Advanced Technology (Ramallah, Palestine), Optelian (London, United Kingdom) and *Telecommunications Regulatory Authority (Beirut, Lebanon)* have been admitted to take part in the work of this Sector.

New Associates

Telecommunication Standardization Sector

Infinera Corporation (Sunnyvale, California, United States) has been admitted to take part in the work of Study Group 15.

Institute for Infocomm Research (Singapore, Republic of Singapore) has been admitted to take part in the work of Study Group 19.

Radiocommunication Sector

Institute for Infocomm Research (Singapore, Republic of Singapore) has been admitted to take part in the work of Study Group 8.

Diary of ITU events

Up-to-date details of forthcoming ITU meetings and conferences can be viewed on the ITU website at

www.itu.int/events/index.asp

MAKE THE RIGHT CONNECTIONS

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