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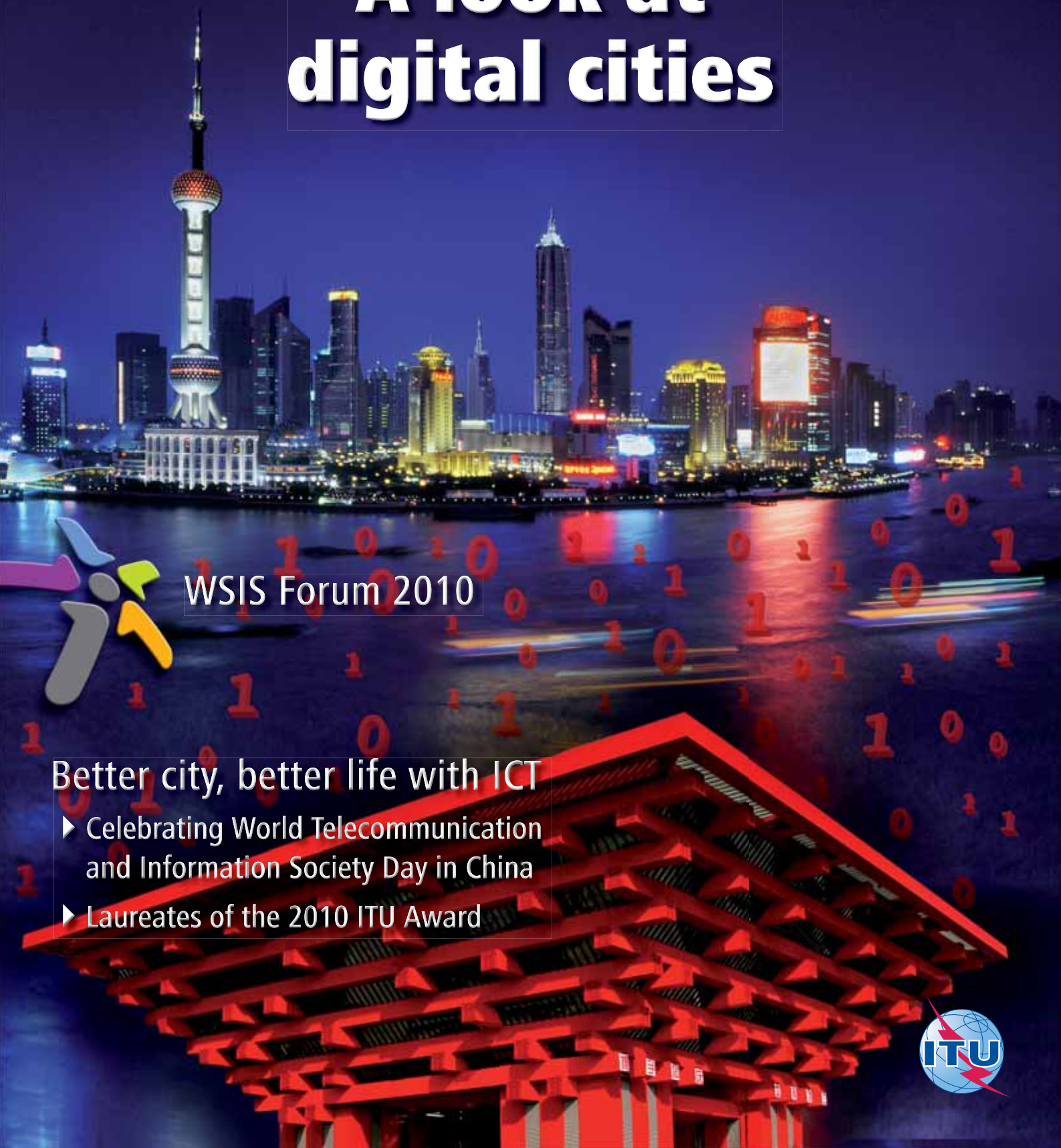
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# ITU NEWS

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## A look at digital cities



WSIS Forum 2010

**Better city, better life with ICT**

- ▶ Celebrating World Telecommunication and Information Society Day in China
- ▶ Laureates of the 2010 ITU Award



# WTISD

World Telecommunication &  
Information Society Day

Better City,  
Better Life with ICTs



# Editorial

*World Telecommunication and Information Society Day*

**Dr Hamadoun I. Touré**  
ITU Secretary-General



■ This year marks the 145th anniversary of the establishment of ITU. I am proud to be leading this dynamic organization, the specialized United Nations agency which defines the cutting edge of information and communication technologies (ICT) and is steadfastly committed to connecting the world so that people everywhere can enjoy the benefits of the ongoing digital revolution.

ICT provide solutions to many of the problems facing cities even as they become magnets for migrating populations as well as contribute to making them more eco-friendly and economically viable. That is why our governing body, the Council, chose the theme “Better city, better life with ICT” to mark this year’s World Telecommunication and Information Society Day (17 May). This theme is in keeping with the overarching theme — Better City, Better Life — of the World Expo 2010 in Shanghai, China, which is also the venue for the global observance of the Day.

For many city dwellers, it is nearly impossible to imagine life without ICT. From television to mobile phones and the Internet, ICT have reshaped the world, helping billions of people to live, work and play in the most creative ways. ICT present innovative ways of managing our cities — smart buildings, intelligent traffic management, new efficiencies in energy consumption and waste management, and not least exchanging information and knowledge and communicating on the move in an increasingly converged information society.

On the 145th anniversary of ITU, it is my pleasure to honour those who have made this possible

through their foresight and commitment to harnessing the potential of ICT to make the world a better place. Malaysia’s Prime Minister Dato’ Sri Mohd Najib bin Tun Abdul Razak; Wang Jianzhou, Chairman and CEO of China Mobile; and Robert E. Kahn, Chairman, CEO and President of the Corporation for National Research Initiatives, are the eminent winners of the 2010 ITU World Telecommunication and Information Society Award.

While the world’s cities are undoubtedly endowed with many advantages, the disparities between the “haves” and the “have-nots” among urban populations are often a vivid reminder that the vast majority is left out of the reach of development. It is ironic that even in densely populated urban centres, countless millions are deprived of access to the means of communication and information that are taken for granted by others. Along with this growing digital divide, the lack of safe drinking water, sanitation, food, shelter, health care and education are basic needs that are addressed by the Millennium Development Goals, which call for the significant improvement in the lives of at least 100 million slum dwellers by 2020.

By tapping into the huge potential of ICT to improve the lives of people, and by providing affordable and equitable access to information and knowledge to empower everyone to achieve their aspirations, countries can contribute towards meeting the rising expectations of an ever-growing population in the world’s cities. For its part, ITU is committed to connecting the world, including the millions who remain unconnected in our teeming cities. ■



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# A look at digital cities

## Laureates of the 2010 ITU Award

### World Telecommunication and Information Society Day

Better city, better life with information and communication technologies

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## Message from United Nations Secretary-General Ban Ki-moon

■ In today's world, telecommunications are more than just a basic service — they are a means to promote development, improve society and save lives. This will be all the more true in the world of tomorrow.

The importance of telecommunications was on display in the wake of the earthquake which devastated Haiti earlier this year. Communications technologies were used to coordinate aid, optimize resources and provide desperately sought information about the victims. ITU and its commercial partners contributed scores of satellite terminals and helped to provide wireless communications to help disaster relief and clean-up efforts.

I welcome those efforts and, more broadly, the work of ITU and others to promote broadband access in rural and remote areas around the world.

Greater access can mean faster progress toward the Millennium Development Goals (MDGs). The Internet drives trade, commerce and even education.

Telemedicine is improving health care. Earth monitoring satellites are being used to address climate change. And green technologies are promoting cleaner cities.

As these innovations grow in importance, so, too, does the need to bridge the digital divide.

The theme of this year's observance, "Better Cities, Better Life with ICTs," is a reminder that communications technologies must be em-

ployed — and disposed of — in a manner that raises living standards while protecting the environment.

The United Nations is committed to ensuring that people everywhere have equitable access to information and communication technologies. On this International Day, let us resolve to fully harness the great potential of the digital revolution in the service of life-saving relief operations, sustainable development and lasting peace.

*“ In today's world,  
telecommunications are more than  
just a basic service — they are a  
means to promote development,  
improve society and save lives. ”*

# ITU World Telecommunication and Information Society Award 2010

## Meet the laureates

The ITU World Telecommunication and Information Society Award is presented on World Telecommunication and Information Society Day (17 May). This year, it focuses on three eminent personalities, who have contributed to promoting ICT as a means of providing a better life for humanity. The Award winners were announced during Council 2010 (Geneva, 13–22 April) by ITU Secretary-General Dr Hamadoun I. Touré.



Malaysia's Prime Minister Dato' Sri Mohd Najib bin Tun Abdul Razak has made connectivity one of his priorities. As part of the New Economic Model for Malaysia, he has placed high priority on strengthening broadband infrastructure. He has also played a big part in building a world-class education system in Malaysia, turning the country into a regional education hub and centre of excellence.



Wang Jianzhou, Chairman and CEO of China Mobile, is connecting the world via mobile phones. Under Mr Wang's leadership, China Mobile has attained the largest market capitalization among global telecommunication companies, with a subscriber base of 530 million. The mobile network covers more than 99 per cent of China's national population.



Robert E. Kahn, Chairman, CEO and President of the Corporation for National Research Initiatives (CNRI), conceived the idea of open-architecture networking. He is a co-inventor of the Internet. In 1973, the initial work on Internet protocol development began, and, by the mid-1970s, a nascent Internet was created within the research community. Today, the Internet is used by an estimated 1.7 billion people.



*World Expo 2010 in Shanghai is this year's venue to mark the 145th anniversary of ITU and to honour the three eminent laureates of the 2010 Award*



## Dato' Sri Mohd Najib bin Tun Abdul Razak

### Prime Minister of Malaysia

Dato' Sri Mohd Najib bin Tun Abdul Razak became Malaysia's 6th Prime Minister on 3 April 2009. He is the eldest son of Malaysia's second Prime Minister, Abdul Razak Hussein. In 1974, he graduated from the University of Nottingham, United Kingdom, with a degree in industrial economics.

Returning to Malaysia, he joined the national oil company, Petronas as an executive, where he served until his plunge into politics following the sudden death of his father in 1976. He served as Deputy Minister of Energy, Telecommunications and Posts, as well as Deputy Minister of Education and Deputy Minister of Finance.

Following the general elections of 1986, he was appointed Minister of Culture, Youth and Sports. In 1990, he was appointed Minister of Defence and then, in 1995, Minister of Education. He played a big part in building a world-class education system in Malaysia, turning the country into a regional education hub and centre of excellence.

Following the 1999 elections, he was again appointed Defence Minister, a position he held until September 2008 when he took over as Finance Minister. The 2004 general elections, which came a few months after his appointment as Deputy Prime Minister, saw him winning his parliamentary seat with a whopping majority. In March 2009, he was elected as Umno President and in April he was sworn in as Prime Minister. He still holds the Finance Ministry post.

## Malaysia's New Economic Model and high-speed broadband

### Building an inclusive society

#### ■ The New Economic Model

In the months after he became Prime Minister, Dato' Sri Mohd Najib bin Tun Abdul Razak set up an independent National Economic Advisory Council, and tasked it to carry out a thorough review of Malaysia's economy. He asked the Council to make bold, yet practical recommendations for a new economic model to transform the country's economy.

At the end of March 2010, the Prime Minister unveiled the Council's preliminary report on the country's future economic direction. The report sets out the state of the nation's economy — its strengths and its shortcomings — and assesses current policies as well as potential areas of future focus for Malaysia. The New Economic Model, to be achieved through an Economic Transformation Programme, constitutes a key pillar for Malaysia to join the ranks of the high-income economies, in line with the goals of the country's Vision 2020.

The growth process, which the country will embark on, needs to be both inclusive and sustainable. As the report points out, inclusive growth enables the benefits to be broadly shared across all communities. And sustainable growth should increase the wealth of current generations in a way that does not come at the expense of future generations.

A number of strategic reform initiatives are proposed. These are aimed at greater private initiative, better skills, more competition, a leaner public sector, pro-growth affirmative action, a better knowledge base and infrastructure, the selective promotion of sectors, and environmental as well as fiscal sustainability.

The next step in the process will be a public consultation to gather feedback on the key principles of the New Economic Model. The key recommendations will then be translated into actionable policies.

Unveiling the report, the Prime Minister explained: "The New Economic Model is a vital part of the Malaysia we are building, the structure that will serve our people for the future. As a metaphor, think of a house under the Malaysian sun. We need a roof — an overarching philosophy that encompasses all parts of the building. In our case, Malaysia is the roof that we gather under. The Government Transformation Programme — a programme of delivery on six key areas — is one pillar of this home. A second pillar is the Economic Transformation Plan that will deliver the New Economic Model. And the floor, the basis on which all Malaysians will move forward are the 10th and 11th Malaysian Plans."

The report will be published and made available to the general public to gather their input and provide them with an opportunity to be part of the decision-making process. As the Prime Minister said, "It is only through consultation with the Rakyat and all the other stakeholders that we can achieve a strong, convincing and effective plan to implement our New Economic Model. The rakyat — and groups such as business leaders and investors — want and deserve input into the policy-making process. We must develop a

more consultative approach to engaging our most important stakeholders. Only through such a process can we broaden our viewpoints, challenge conventional wisdom, and help build transparent and open consensus for the right way forward. This is the path we will follow. People will come first."

### Broadband on the front burner

Through a public-private partnership, a high-speed broadband network is being deployed in Malaysia and is capable of offering 10 Mbit/s to 100 Mbit/s. The government decided to launch this public-private partnership with an allocation of RM 2.4 billion over three and half years, while Telekom Malaysia will provide RM 8.9 billion more over 10 years. The first part of phase one is to connect 1.3 million premises with fibre-to-the-home (FTTH) which can reach an individual household or to the building (FTTB) by the end of 2010.



Malaysia is divided into three zones and this first roll-out is targeted for zone 1, which has a high population density, as well as being economically well off. This network will be open access and with fair access pricing and competition among all service providers. All subscribers will receive a minimum of 20 Mbit/s. After phase one it would begin — broadband for the general public, which will deliver 2 Mbit/s and will consist of both wired and wireless networks.

In March 2010, the Prime Minister launched a high-speed broadband service at Merdeka (Independence) Square in Kuala Lumpur. Recognizing high-speed broadband as a key enabler to change Malaysia from a medium-income to a high-income country, he said: "Definitely, high-speed broadband will make Malaysia a 21st century nation." The new service is expected to stimulate the economy, enhance competitiveness, reinforce local and foreign investor confidence, enrich creative and innovative minds, and act as a conduit to disseminate information and knowledge to the people.

"It cannot be denied that high-speed broadband will make our lifestyle more sophisticated, making it easier for us to communicate with one another. For example, I have been using this service when I invited 300 of my Facebook friends to have tea with me recently. From 138 000, who have registered as my Facebook friends, I invited 300 of them for a tea reception. I feel this is my way of communicating with the people directly," the Prime Minister said.

In a bid to drive the social and economic transformation towards achieving high-income nation status, the Prime Minister went on to announce the following national broadband initiatives:

- ▶ The setting up of some 246 community broadband centres for 615 000 people.
- ▶ The establishment of people's Internet centres at 138 Information Department premises nationwide for 400 000 users.
- ▶ Providing e-kiosks at community centres nationwide.





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## ICT and the Multimedia Super Corridor

*The Multimedia Super Corridor (MSC), created thanks to heavy investment by the Malaysian government to attract domestic and foreign investors to its ICT industry, now serves as the backbone of the ICT infrastructure in the country. It is supported by high-speed links that to Japan, the Association of Southeast Asian Nations (ASEAN), the United States and Europe.*

*The development and widespread use of ICT are central to the realization of a knowledge-based economy. ICT usage has improved efficiencies among Malaysian enterprises and increased Malaysia's competitiveness in the global economy.*

*The computing segment is the largest application segment for semiconductor consumption in Asia while communications and consumer applications are the fastest growing segments, according to the International Data Corporation. Globally, Malaysia is ranked as the third most favoured location for outsourcing of business processes. Malaysian ICT companies are capable of providing a wide range of services, including:*

- ▶ *mobile and wireless communication;*
- ▶ *business application software development;*
- ▶ *Internet-based business applications in the financial sector;*
- ▶ *digital content development;*
- ▶ *networking and outsourcing for e-commerce;*
- ▶ *bio-informatics;*
- ▶ *e-government.*

*Malaysia is a top choice among companies in West Asia for ICT off-shoring. Progressive government policies, a world-class environment and attractive incentives will continue to attract business from around the globe.*

- ▶ Building a total of 873 telecommunication towers, including 278 in Sabah and 257 in Sarawak.
- ▶ Allocation of funds from the universal service provision (UPS), with the providers agreeing to hand out laptops to needy students nationwide.
- ▶ The agreement of Telekom Malaysia to reduce broadband packages with netbooks from RM 50 to RM 38 — in the UPS areas, this would be further reduced to RM 20.

## Pekan leads the digital transformation

Meanwhile, the citizens of Pekan in Pahang will be experiencing the latest digital technology in a new programme announced at the end of January 2010. The Digital Pekan programme aims to ensure that the benefits of digital technology are accessible to all within the district.

The launching of Digital Pekan marks the determination of the government to incorporate information and communication technologies (ICT) and broadband into the digital district strategy, in line with the national agenda. The digital district programme is a key contributor to achieving the national target of 50 per cent broadband penetration by end of 2010. The launch of Digital Pekan was organized by the Ministry of Information, Communications and Culture,



together with the Malaysian Communications and Multimedia Commission (SKMM).

The Prime Minister stated that "In our outreach to the rakyat wherever they may be, bridging the digital divide through the delivery of modern facilities and services to various parts of the country via the approach in creating digital districts is a step in the right direction. Everyone everywhere should and will be able to enjoy the benefits of ICT and broadband so that Malaysia can move towards becoming a high-income nation... The digital district strategy employs a 'building block' approach — working on the smallest units. And with the integration of these units, we get to build up 'digital states' and thereon towards a 'digital nation'."

The Digital Pekan programme will set the pace for the development of other districts in the country. Through smart collaboration with various stakeholders from the government, the private sector and academia, the initiative will include the drive to own a personal computer and will provide services such as wireless hot spots, free e-mail accounts and e-government services to the rakyat in Pekan.

Innovative partnerships between the public and private sectors are needed to create opportunities and solutions to realize the vision of a digital district. Apart from the Ministry of Information, Communications and Culture, and SKMM, the Pekan project has been developed through the support and collaboration of many partners and sponsors, including Wi-Net Technology Sdn Bhd, Telekom

Malaysia Berhad, Intel Malaysia Sdn Bhd, HeiTech Padu Berhad, Astro, Hewlett-Packard Malaysia, Danawa Resources Sdn Bhd, Maxis Communications Berhad, DiGi Telecommunications Sdn Bhd, Celcom Axiata Berhad, U Mobile Sdn Bhd, the Malaysian Administrative Modernization and Management Planning Unit and the Ministry of Education.

The broadband experience centre within the Pekan Resource Centre will provide a good opportunity for the rakyat to experience new broadband services and applications. This opportunity will be organized as part of an education and awareness programme relating to broadband services. Initiatives to create more local content will help increase literacy and digital inclusion among the rakyat of Pekan. The project reflects the message that broadband and going digital, with innovation as a way of life, will pave the way to creating a better quality of life and a brighter future for future generations of Malaysians.





## Wang Jianzhou

### Chairman and CEO, China Mobile

Wang Jianzhou is the President of China Mobile Communications Corporation, and the Chairman and CEO of China Mobile Limited. He formerly served as the Director General of the Department of General Planning of the Ministry of Information Industry, and Chairman and President of China United Telecommunications Corporation Limited.

Under Mr Wang's leadership, China Mobile has attained the largest market capitalization among global telecommunication companies, with a subscriber base of 530 million. The mobile network covers more than 99 per cent of China's national population. The brand value of China Mobile is estimated at USD 39.2 billion. Mr Wang was chosen as a *Business Week* Best Leader for 2006, and in 2008 he co-chaired the World Economic Forum Annual Meeting in Davos, Switzerland.

Mr Wang is one of the three winners of the 2010 ITU World Telecommunication and Information Society Award. In this article, he tells us how the company he runs is promoting information and communication technologies to improve people's lives throughout China and highlights its future outlook.

## Connecting the world via mobile phones

### Company profile

In terms of subscriber base and network coverage, China Mobile Communications Corporation (China Mobile) is the world's largest mobile operator. Established on 20 April 2000, it is the majority shareholder of China Mobile Limited, a company that went public on the Hong Kong and New York Stock Exchanges in 1997. Currently, China Mobile Limited is the largest telecommunication company by market value. The company has been selected by the Financial Times as one of the "FT Global 500" and by Forbes magazine as one of "The World's 2000 Biggest Public Companies".

The China Mobile Group's business grew steadily in 2009, despite facing multiple challenges. We successfully competed to win higher market share by attracting new customers, while maintaining a low customer churn rate. The Group preserved its

existing customer base and kept average minutes of usage per user per month stable. The total customer base at the end of 2009 reached 522 million, of which more than 65 million were net additions. The contribution to total revenue from value-added business increased substantially, including revenue generated from mobile music, which again exceeded USD 1.5 billion. And the Group's total voice usage volume was around 2919 billion minutes, with average minutes of usage per user per month at 494 minutes and average revenue per user per month at USD 11.

We maintained our world-class network quality and continued to widen our international roaming service coverage. The number of base stations exceeded 460 000, with a population coverage rate of 99 per cent, while the fibre-optic base station access rate surpassed 96 per cent, putting our services in the near vicinity of most office and commercial buildings. We completed the upgrading of our core network to

be fully IP-based, hence laying a solid foundation for a full-service network that is geared to future needs and capable of providing integrated services.

### Bridging the digital divide

China mobile plays a key role in bridging the digital divide through the construction and operation of a reliable telecommunication network. The company has been instrumental in bringing telecommunication access to more than 77 000 remote rural villages, as well as in launching an array of products and services to promote rural development and the creation of a "New Countryside".

To ensure that mobile telecommunication is affordable to rural residents, China Mobile promotes several specially-priced local calling packages in rural markets. For example, there are special pricing packages for rural users who primarily use their phones within limited geographic areas, allowing for





significant cost savings. This is in line with three major principles that the company applies in rural markets: lower average revenue per user per month; lower average minutes of usage per month; and lower cost.

While upgrading the rural information network, the company has worked alongside national and local governments to promote the spread of information technology. By offering a suite of new products and services, the company has helped to drive development in rural business and trade. This, in turn, has increased financial service capabilities and gone some way towards addressing employment challenges in rural areas.

### Reducing emissions and green actions

As the leading operator, China Mobile is strongly committed to conserving energy and reducing emissions. Since initiating its Green Action Plan in 2007, the company has worked to improve network efficiency; compared to 2005 levels, energy use per unit of telecommunication traffic has decreased by 49 per cent. By the end of 2009, our "Green Boxes" environmental protection campaign was active in all of our proprietary sales outlets, and more than 5 million mobile phones and accessories had been recycled.

China Mobile cooperates with telecommunication vendors, promotes seven energy-efficiency standards for telecommunication equipment, and has built a green industry value chain. This has led to an overall decrease in the energy and space required for telecommunication equipment in China. This year, the company has already saved 1.8 billion kilowatt-hours of electricity. By 2012, it will reduce energy use by 20 per cent per unit of telecommunication traffic, as compared to 2008 levels — equivalent to a reduction of 11.8 billion kilowatt-hours of electricity during that period.

### Beijing Olympics partner

As the mobile telecommunication services partner for the 2008 Beijing Summer Olympic Games, China Mobile ensured uninterrupted communications support and services throughout the event. We were with the Olympic Torch Relay team every step of the way, as it ascended the icy heights of Mount Everest, passed through the tropics of Hainan Island, and finally went along the streets of old Beijing to the ultra modern Olympic Stadium, the "Bird's Nest". We won praise from industry peers and games organizers alike. As the International Olympic Committee



President Jacques Rogge said, "China Mobile's innovative technology brought the world a hi-tech Olympics." Success at the Olympics improved our business and service levels and greatly enhanced our company's brand value.

To ensure the best service for the Beijing Olympic Games, the company provided:

- ▶ Three base stations on the peak of Mount Everest. The highest, at an altitude of 6500 metres, enabled full coverage for the Olympic torch relay via Everest.
- ▶ The fastest photo transmission for the Olympics — with data cards embedded in cameras, photographers could send off their photos directly after taking them.
- ▶ Network coverage with the largest capacity — during the opening ceremony, 260 000 subscribers registered on China Mobile network in and around the Bird's Nest, generating 220 000 calls per hour. Some five million China Mobile subscribers downloaded the Olympic theme song "You and Me" in the 24 hours after it was performed at the dazzling opening ceremony, breaking the record for the fastest publishing of a single song.

During the Olympics, China Mobile signed roaming agreements with 26 mobile carriers, including Vodafone, AT&T, T-Mobile, NTT DoCoMo, Telstra and Telenor.

### 3G development

In 2009, with the second and third phases of network construction completed, 3G network coverage fanned out to include 238 cities across the country, including a 70 per cent coverage rate of prefecture-level cities. Technological innovations helped solve critical network challenges, enabling the quality of the 3G network to be close to that of our 2G network.

We are participating in the development of TD-SCDMA (TD) technology throughout the entire supply chain, and the Group's parent company has set up a joint research and development incentive fund to promote TD terminals. The aim of the fund is to attract additional participation and investment from major terminal manufacturers. As a result of such collective efforts, there are already 266 different designs of TD terminals on the market, ranging from high-end series with improved features, to models for the mass market priced below USD 150.

China Mobile has promoted the international standardization of TD-LTE in several international organizations, paving the way for the continuous and healthy development of the TD industry. The group will debut the first TD-LTE showcase network at World Expo 2010 in Shanghai.





*Fireworks illuminate country flags at World Expo 2010 in Shanghai during the opening ceremony*

## Future outlook

The effect of the global financial crisis on the Chinese economy, changes in the competitive landscape, the increasing mobile penetration rate, along with convergence across telecommunications, Internet, and radio and television broadcasting networks, all pose fresh challenges for the future development of China Mobile.

Fortunately, the Chinese government has pursued policies aimed at boosting domestic consumption and strengthening economic growth. The resulting economic development and growing consumer purchasing power will lead to increased demand for telecommunication and information services throughout all sectors, particularly from individuals and families. We also expect to see growth in the corporate sector, driven by accelerating demand from enterprises and industry.

The government attaches great importance to home-grown innovation, which gives us confidence to move ahead with our 3G development. In addition, the flourishing mobile Internet and the “Internet

of Things” concept, as well as the integration of mobile payments in the financial system, have all created new revenue stream possibilities and present us with opportunities for future development.

China Mobile believes in growth via making new markets, and advocates for rational competition to preserve industry profitability levels. Based on our strong foundation and integrated capabilities, the Group will focus on growing its telecommunication and information service business, continuing to meet our customers’ needs, and achieving sustained growth. Driven by value creation, we will expand 3G services and promote mobile broadband services to individuals, families and corporate customers. We will move into new business areas in mobile Internet and the “Internet of Things”. At the same time, we will capitalize on our overall influence to promote and participate actively in research on the development of LTE mobile networks.



## Robert E. Kahn

### Chairman, CEO and President of the Corporation for National Research Initiatives

Robert E. Kahn is Chairman, CEO and President of the Corporation for National Research Initiatives (CNRI), which he founded in 1986 after a 13-year term at the United States Defense Advanced Research Projects Agency (DARPA). CNRI is a not-for-profit organization for research and development of the National Information Infrastructure.

Following a Bachelor of Electrical Engineering from the City College of New York in 1960, and MA and PhD degrees from Princeton University in 1962 and 1964 respectively, Dr Kahn worked at AT&T and Bell Laboratories before he became Assistant Professor of Electrical Engineering at the Massachusetts Institute of Technology (MIT). He took a leave of absence from MIT to join Bolt Beranek and Newman, where he was responsible for the system design of the Arpanet, the first packet-switched network.

In 1972, Dr Kahn moved to DARPA and subsequently became Director of its Information Processing Techniques Office. There he initiated the United States government's Strategic Computing Program. Dr Kahn conceived the idea of open-architecture networking. He is a co-inventor of the TCP/IP protocol, and was responsible for originating DARPA's Internet Program.

More recently, Dr Kahn has developed the concept of a digital object architecture to provide a framework for interoperability of heterogeneous information systems. He is also co-inventor of Knowbot programs, mobile software agents in the network environment. Among his numerous awards, Dr Kahn received the Presidential Medal of Freedom in 2005 and the National Medal of Technology in 1997.

## Interview with Dr Robert Kahn, co-inventor of the Internet

**1** *Some 40 years ago, you showed the world how to connect different kinds of computers on different types of computer networks. The modern Internet is the direct result of those efforts. How do you feel about this huge success?*

**»» Robert Kahn:** I used to do white-water canoeing when I was a little younger. You put your canoe into the river and it just keeps going because of the raging rivers. And it feels a little bit like this whole Internet evolution has been like a raging white-water stream that we got into some 40-odd years ago, and still going. It's pretty amazing to see what has happened around the world. In 1973, the initial work on Internet protocol development began, and, by the mid-1970s, a nascent Internet was created within the research community. It was not until 1983 that the Internet protocols were formally adopted for use.

The most eye-opening of all of the events that I've witnessed was probably at the 2003 World Summit on the Information Society in Geneva, when for the first time I got to witness all the nations of the world, coming together and publicly discussing what the impact of the Internet was on their country, and how they planned to deal with it, going forward.

*Note: Dr Kahn's full interview is available online at [www.itu.int/itunews](http://www.itu.int/itunews)*

**2** *There are those who say that the underlying architecture of the Internet may not cope with ever-growing traffic from new, bandwidth-hungry applications. They advocate a clean-slate approach to the future Internet. Are they justified? Or is evolving the Internet the answer?*

» **Robert Kahn:** From my perspective, the Internet is a global information system that enables component structures like networks, computers and devices of different kinds to intercommunicate by passing information between them. The essence of the Internet is the protocols and procedures that enable this to happen. The protocols and procedures were designed to be independent of the kinds of networking and computing components that comprise it.

We have to keep evolving the Internet. And the way to evolve it is by integrating with or building on what's there. I don't think you need to destroy what exists in order to create a better future. When the original computer networks were developed, they weren't developed by destroying the telecommunications infrastructure. Where we are today with the Internet, we can do the same thing by leveraging the capabilities that are there to build new and better, more powerful, more relevant applications for the future and more relevant infrastructure to support those applications.

A clean slate is not really practical. Maybe it once was, when there was nothing to begin with. But once you have something that's widely deployed and in daily use by a large fraction of the world's population, you have to work with what you have.

**3** *You developed the digital object architecture concept. What is it exactly and how does it work?*

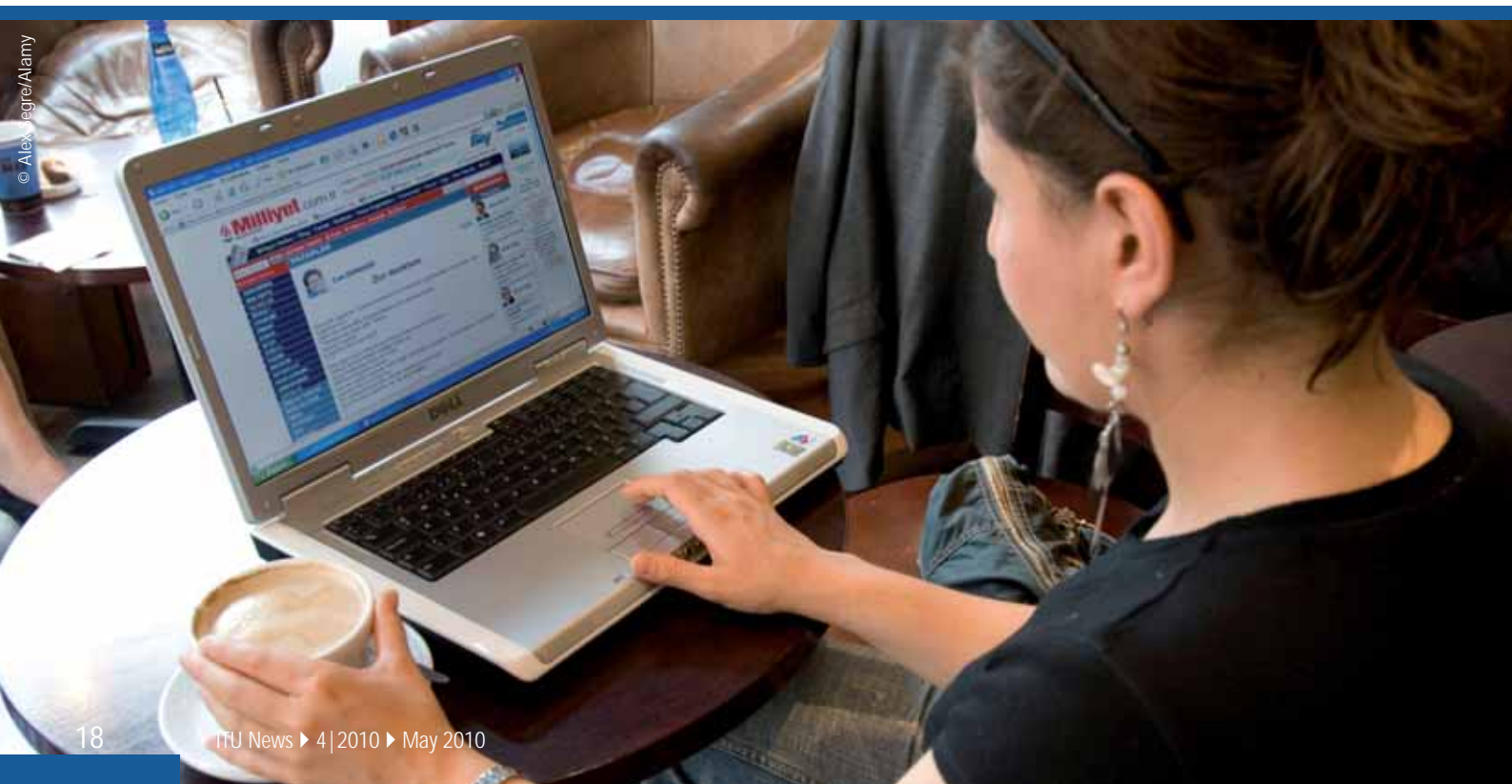
» **Robert Kahn:** The Internet, as originally envisioned by me and others that I worked with, involved moving bits around from place to place on a worldwide basis, without having to know details like what network the party was on, how to route data, and so forth. It was a convenient way to get information (as essentially undifferentiated bits) from one place to another, reliably and rapidly.

What occurred to me, a number of years ago, was that we needed to take an additional step forward, and begin to think about the Internet as a vehicle for managing information, as opposed to just delivery of undifferentiated bits. The problem with much of the technology on the Internet today is that it is a function of other technology that's available on the Internet. To give you an example, when I first started in computer networking, the way we addressed computers was by the wire that the computer was connected to — on the one and only network in existence. When we got to multiple networks, then that wire might actually go to another network, and so it wasn't sufficient to say "send it out on that wire", you had to say "then what? Where else would it have to go?" So we created the notion of IP addresses to identify the machines, regardless of where they were. And then we had to create simple ways for people to remember those addresses. That was a kind of application, which is now well-known as the domain name system (DNS). We made the decision to adopt the DNS in the mid-1980s; and it has served us well for more than two decades.

When the World Wide Web was created, the idea there was that you could essentially simplify procedures that we had been using for decades. The idea was to turn procedural methods, like having to log in somewhere and having to know exactly what keys to type, into a clickable version, based on a URL, where the protocols behind the scenes would do essentially the same things for you. But that tied it to the way it was implemented: specific machine names which were resolvable through the DNS and then to specific files on those machines. The half-life of these URLs is not very long, and probably within five years the vast majority of them will either no longer work, or will produce different information. So the notion that we had was to literally identify the information represented in the form of a persistently identifiable data structure we called those data structures digital objects, and, by giving each a separate identifier, every digital object is uniquely identifiable.

**4** *Are we really running out of IP addresses based on the current Internet protocol version 4? And what do you think of the transition to IPv6?*

» **Robert Kahn:** IPv4 is a 32-bit addressing protocol. We created the 32-bit protocol back in 1973. At the time, we thought 8 bits would be more than enough to identify each network; and the remaining 24 bits enough to define which machine on that network. The reality was that, with the explosion in local area networks, particularly the Ethernet, it became clear that that was insufficient. That's what's put the pressure on IPv4 addresses. Now, depending on how you manage IPv4 addresses, it may or may not be sufficient. But the way it's being managed today, given the lack of good alternatives for making use of a limited amount of IPv4 addresses, it seems very clear that these addresses will be consumed fairly soon.





That was the motivation for creating IPv6, which uses 128-bit addresses. It has been asserted that this is enough to identify every atom in the universe. The conversion to IPv6 has been anything but straightforward and simple. And getting adoption everywhere in the world still seems a challenge in many respects. But let's assume that the transition to IPv6 is going to happen as it seems almost inevitable.

The real question is: are we going to cavalierly use IPv6 to identify absolutely everything in the Internet, or are we going to find some other, more prudent, long-term strategy to do that? For example, if I run a system that contains a number of these digital objects I was talking about, suppose it's got a trillion digital objects in one of these systems, one possibility is to give every one of those objects an IPv6 address. But to me, that's a very foolish use of these addresses, because IPv6 is also used for routing purposes, in part. It makes for a much more complex system than if you just say, this particular item that I'm looking for, this digital object, is at a system that's got a given IPv6 address, and then once you get to that system, give me the object that's got this unique identifier, which has nothing to do necessarily with IPv6. And now if that object moves, you simply say, well, the

object is over here now, or it's in several places, and please give me the object with the same identifier.

**5** *Will IPv6 bring us the "Internet of things", where for example, refrigerators will be able to exchange information with supermarket shelves, where one can be in one's office kilometres away and switch on and off a microwave oven?*

**»»** **Robert Kahn:** I don't know that history gives us any good guidance as to what to expect in these cases. Usually, initial views of what a technological future will look like are wrong. For example, in the history of telephony, there's quite a bit of text that's been written about Alexander Graham Bell, who is credited with the discovery or the invention of telephony in the United States, thinking that it would be a very good means for getting concerts into the home. Well, do you know anybody that listens to concerts over the telephone today? History is replete with examples where the initial view of people as to what might happen turned out to be wrong, and in time more socially effective means of using the technology emerged.



In the context of IPv6, ultimately, whether we are talking about the Internet of things or identity management for individuals, the bottom line is that we are talking about information about those entities or individuals. All these questions revolve around the same set of issues: How do you get to the information? What do you do with the information? Is it accurate? Can you trust it?

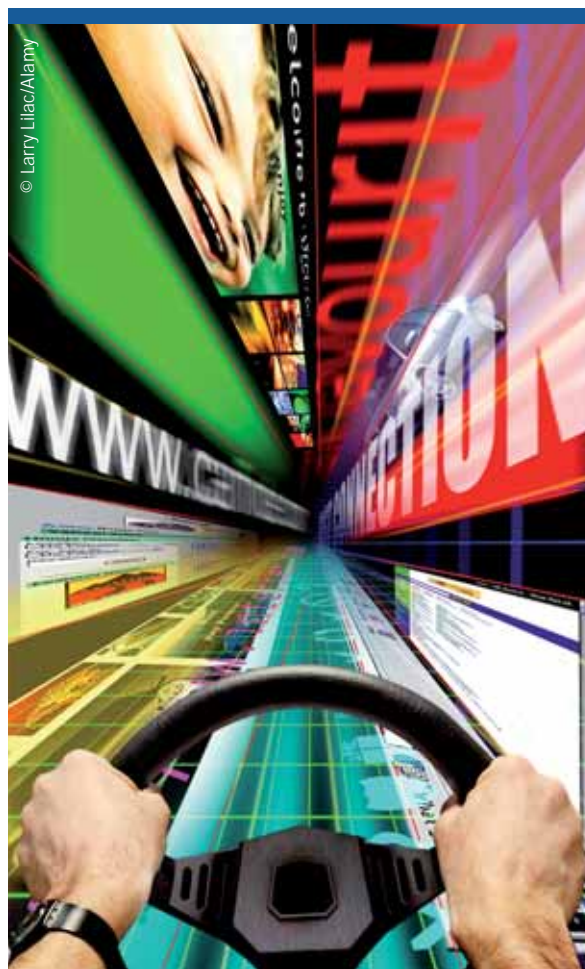
**6** Tell us more about Knowbots and the “handle system” that you created.

» **Robert Kahn:** One of the people I worked with for a long time in the networking area is Vint Cerf, who’s also gotten a lot of publicity for the work he and I did with the Internet. Vint worked with me at DARPA for many years, he left briefly to go to MCI, and then he joined me again, back as employee number two when I started CNRI; he was at CNRI for another eight years or so after that.

During that period, we got quite interested in the idea of finding and managing information on the Internet by virtue of sending out mobile programs that could execute in different places — you could task them to carry out various objectives for you. One major concern we had was that organizations would not want a mobile program that somebody else had written to just show up on their computers and execute. I suppose it seemed like an open invitation for viruses to show up, or worse.

We were thinking of using “knowbot service stations”, which (among other things) would be responsible for injecting mobile programs into the Internet, and for accepting mobile programs originated elsewhere and running them. So multiple programs could show up and interact with each other, and these programs could somehow, all together, figure out the answer to a question, or carry out a task. It’s still pretty much waiting to happen on a larger scale.

In the early 1990s, instead of proceeding down the knowbot path, I decided to focus on the case where the mobile component was removed from the picture. The digital object architecture is what resulted. It was assumed that these digital objects would be stored in accessible locations on the Internet called repositories, and that you could access information in these repositories solely by virtue of knowing the





identifier of the object. So you didn't have to worry about what technology base it was on now or at any point in the future because presumably, if implemented properly, it could all support this kind of a notion.

A way was needed to resolve identifiers to locations and other useful information, like the ability to validate information including identity. This latter ability translates to getting public keys for an individual, who could then verify information with a private key, or authenticate information, or access the object's terms and conditions. So, the whole notion of the digital object architecture was based on a more static view of these mobile programs. While it was anticipated that it could be used in a mobile environment, this was not the initial focus of this work.

Privacy becomes important in this context. There are search engines on the Internet today that allow you to locate things that are publicly accessible, for example on the web. But that's not likely to help you find your medical or financial records. The question of privacy is a small part of the larger issue that I really think the digital object architecture was intended to address: How do you get different kinds of infor-

mation systems that have reasons to interoperate, to be able to interoperate without having somebody specifically figure out ahead of time, for every possible interaction, how they should do it?

## 7 Your final thoughts?

» **Robert Kahn:** The world is increasingly connected. The coming decades are going to be as exciting as the past decades have been, probably in dimensions that we don't really know how to predict or envision. It is ultimately the creativity of the human spirit that is going to drive and fuel this, and anything that we can do to essentially stimulate that, and invigorate it, and enhance it, will probably help to come up with new and better ways of dealing with our societal needs going forward.

# WSIS FORUM 2010

10-14 May Geneva



WSIS:  
Implementation  
Projects  
Initiatives  
Partnerships



Working  
Towards  
2015

WSIS Action Line Facilitation Meetings  
High Level Panels  
Thematic Workshops  
Kick-off Meetings  
Knowledge Exchanges  
Ministerial Roundtables



ITU/V. Martin

“ As a follow up to the World Summit on the Information Society (WSIS), ITU has launched an upgraded stocktaking platform. ITU has been maintaining the WSIS Stocktaking database as a publicly accessible system, which now consists of more than 4200 entries of ICT-related initiatives and projects aimed at furthering the goals of the Summit. The upgraded platform integrates improved features, such as the application of web 2.0 tools and a searchable database. ”

Houlin Zhao  
ITU Deputy Secretary-General and  
Chairman of the WSIS Task Force

Hosted by: WSIS Forum 2010:



World Summit  
on the Information Society  
Turning targets into action

Organised by:



[www.itu.int/ws10](http://www.itu.int/ws10)



# WSIS Forum 2010

## Tracking progress

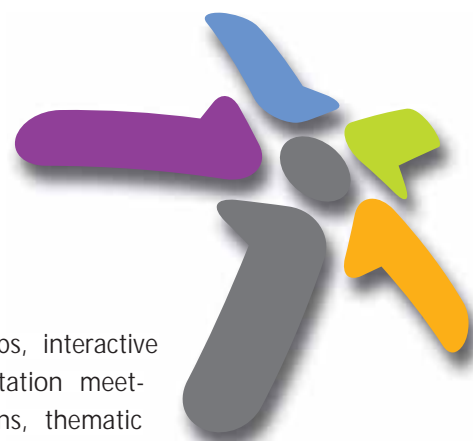
■ ITU plays a leading role as facilitator in implementing the outcomes of the World Summit on the Information Society (WSIS), alongside the United Nations Educational, Scientific and Cultural Organization (UNESCO), the United Nations Conference on Trade and Development (UNCTAD), and the United Nations Development Programme (UNDP). How far have we come in turning the WSIS targets into action? To review progress, a week of meetings has been held every year in Geneva since 2006, coinciding with celebrations of World Telecommunication and Information Society Day (17 May). In 2009, this gathering was given a new name: the WSIS Forum.

This year, ITU, UNESCO, UNCTAD and UNDP jointly organized WSIS Forum 2010 from 10 to 14 May at ITU headquarters in Geneva. The event attracted high-level representatives from government, the private sector, civil society and regional and international organizations. It featured high-level debates addressing issues that are critical to WSIS implementation in

multi-stakeholder set-ups, interactive WSIS action line facilitation meetings, interactive sessions, thematic workshops, kick-off meetings for new initiatives and projects, knowledge exchanges, the launch of new publications and an exhibition. Some of the main topics discussed are highlighted below.

### Turning targets into action: WSIS and the Millennium Development Goals

The year 2010 marks the halfway point between the end of WSIS in 2005 and 2015 — the deadline set by world leaders to achieve the United Nations Millennium Development Goals (MDGs) and the WSIS targets to connect the world. Can technology bridge the development gap and accelerate progress towards achievement of MDGs, especially in the wake of the recent global financial crisis?



## Build on broadband

Access to information and communication technologies (ICT), and broadband in particular, could help facilitate the achievement of many of the MDGs. For example, high-speed broadband networks carrying advanced applications can enrich education and boost basic hygiene and health awareness, while delivering real results in reaching public health goals — a top priority for many developing countries. Availability of broadband can also provide new opportunities for economic growth and international trade and investment.

## Broadband applications for tomorrow

The promise of broadband infrastructure lies not just in rolling out national high-speed networks accessible to all citizens for boosting economic growth, but also in delivering tailored applications fulfilling the targeted needs of specific communities in education, health care, government, energy and the environment. High-speed, always-on, real-time communications have enormous potential for delivering real and tangible benefits in people's everyday lives.

## Social networking

The rise of the social web and various social networking services is transforming the online world as we know it, through new forms of social interaction, dialogue, exchange and collaboration. Social networking services are turning online communications from one-way broadcasting of information into multi-party conversations. They may even be changing

social structures and reshaping people's perceptions of time, distance and location.

But what is the potential and promise of social networking services for ICT development? Can social networks give a voice to the voiceless, empower individuals to take direct action or mobilize the masses? Can they help create online communities of citizens concerned about different issues?

## ICT for disaster management

Disasters disrupt national economies, severely weaken the poor and vulnerable and are recognized as major impediments to sustainable development and reduction of poverty, especially in least developed countries and small island developing States. When disasters strike, they leave a legacy of lost or broken lives and economic damage. The impact is even worse for those living in remote and isolated areas with no access to basic information and communication facilities.

ICT play a critical role in disaster prediction, monitoring and detection. ICT can save human lives through the timely dissemination of early warning alerts. In the immediate aftermath of disasters, ICT play an important role in coordinating search and rescue operations, in the supply of food, medicine and other essential services, and in providing critical information to the victims of disasters.

Emergency telecommunications are critical in the immediate aftermath of disasters, to ensure a timely flow of vital information which is much needed by government agencies and other humanitarian actors





# National e-Strategies for Development Global Status and Perspectives 2010

■ The report *National e-Strategies for Development, Global Status and Perspectives 2010* is a new publication within the scope of the World Summit on the Information Society (WSIS). It has been written to coincide with the fifth anniversary of the Tunis phase of WSIS in 2005 and the adoption of the *Tunis Agenda for the Information Society*.

The report reviews progress in the development of comprehensive, forward-looking and sustainable national e-strategies, and makes recommendations on policies and measures. These include ICT strategies as an integral part of national development plans and poverty reduction strategies, as was called for by the *Tunis Agenda for the Information Society*.

Major questions addressed in the report are:

- ▶ What is the status of national e-strategies worldwide in 2010?
- ▶ What are the approaches and trends in ICT strategies? How can they be explained?

- ▶ What is the status of sectoral e-strategies? What trends can be observed?
- ▶ Have national e-strategies been integrated into poverty reduction strategies?
- ▶ How do ICT strategies evolve?

The report shows that at least 161 countries and territories (84 per cent of all countries in the world) have already fulfilled the WSIS target of having a national e-strategy in place by 2010, and at least another 13 countries (7 per cent) are in the process of formulating or adopting a national e-strategy. The report emphasizes, however, that there is still room to improve existing plans, especially regarding the strategic orientation and integration of ICT into national development plans and poverty reduction strategies.

There is a consensus among stakeholders that health care, agriculture and environmental protection could benefit from the use of ICT. A wide range of initiatives and projects are being implemented in

these areas. Nevertheless, many countries have still not formulated national sectoral e-strategies that are necessary to make use of the full potential of ICT for the economy and society.

Many national e-strategies follow similar approaches: telecommunication regulation, ICT as a driver for economic growth, innovation and employment, and capacity development of ICT professionals. Other common trends are the establishment of e-government solutions, making the national ICT industry globally competitive, and following the WSIS multi-stakeholder approach. Infrastructure remains a concern, and broadband and mobility are the two major technological areas that governments are addressing. In most strategies, the private sector plays a crucial role in deploying ICT infrastructure. Nearly all countries are continuing along the path towards liberalization in order to stimulate the market through competition. Tariff reductions are another effect expected to arise through increasing competition.

Growing competition between countries in the ICT sector is also driving national ICT strategies. Many governments are hoping to benefit from increasing their exports of ICT or by attracting outsourcing to their countries, while others are trying to protect their positions. Issues of intellectual property rights, international standards and economic regional integration are becoming more visible in national e-strategies. Some studies on e-strategies show that many countries are focusing on making their own ICT industries globally competitive. There is strong competition for well educated and skilled ICT professionals.

Confidence and security are still a concern in many national e-strategies. Governments and other stakeholders agree that they need to take measures to establish trust in ICT applications. This development seems to be prompted by the fact that two of the

most prominent sectoral applications of information and communication technologies are e-government and e-business. Sensitive transactions take place in these two sectors, and uptake by citizens and customers depends on trust in these technologies.

One unique feature of the whole WSIS process has been its multi-stakeholder approach. This approach is also being followed by most governments at the national level, involving civil society, non-governmental organizations, the private sector, academia, and regional and international organizations. ITU will continue to support its Member States in their efforts to elaborate and improve their national e-strategies and to keep track of worldwide developments in this area.

The report largely draws on ITU's WSIS Stocktaking activities ([www.itu.int/wsis/stocktaking/index.html](http://www.itu.int/wsis/stocktaking/index.html)), national ICT and sectoral e-strategies of Member States, as well as on contributions from the five United Nations Regional Commissions, namely: the United Nations Economic Commission for Africa (UNECA), the United Nations Economic Commission for Europe (UNECE), the United Nations Economic and Social Commission for Western Asia (ESCWA), the Economic and Social Commission for Asia and the Pacific (ESCAP) and the Economic Commission for Latin America (ECLA).





## World Telecommunication/ ICT Development Report (WTDR) 2010 focuses on *Monitoring the WSIS Targets*

- The year 2010 marks the midpoint between the 2005 Tunis phase of the World Summit on the Information Society (WSIS) and 2015, the deadline for achieving the ten targets that governments agreed upon at WSIS.

The 9th edition of the ITU World Telecommunication/ICT Development Report (WTDR 2010), will provide a mid-term review of each WSIS target, which range from connecting villages, schools, health centres, libraries and government agencies to developing content, and providing ICT services to people (see box below). The report provides policy-makers with a comprehensive assessment of the achievements that have been made to date, proposes concrete indicators to monitor progress and makes recommendations on policies and measures to help achieve the targets.

The report reflects a joint effort among several international organizations, led by ITU, with contributions from the United Nations Educational, Scientific and Cultural Organization (UNESCO), World Health Organization (WHO) and the United Nations Department of Economic and Social Affairs (UNDESA), as well as from representatives of civil society.

*“ This new report provides policy-makers with a comprehensive assessment of the achievements that have been made to date, proposes concrete indicators to monitor progress and makes recommendations on policies and measures to help achieve the targets. ”*

*Sami Al Basheer Al Morshid,  
Director of ITU's Telecommunication  
Development Bureau*



# The 10 WSIS targets to be achieved by 2015

"To connect villages with ICTs and establish community access points"



"To connect all local and central government departments and establish websites and e-mail addresses"



"To connect universities, colleges, secondary schools, and primary schools with ICTs"



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



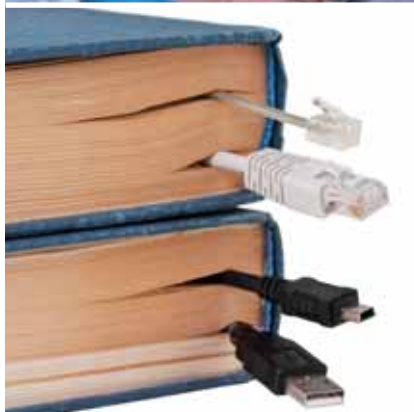
"To connect scientific and research centres with ICTs"



"To ensure that all of the world's population has access to television and radio services"



"To connect public libraries, cultural centres, museums, post offices, and archives with ICTs"



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



"To connect health centres and hospitals with ICTs"



"To ensure that more than half the world's inhabitants have access to ICTs within their reach"



## ■ New ITU standards to boost IMT-2000 (3G) mobile phone capabilities

Satellite interface enhances international roaming, high-speed data transfers and compatibility

A new ITU standard will ensure worldwide compatibility, international roaming, and access to high-speed data services for third-generation (3G) IMT-2000 mobile phone systems. Announced on 8 March 2010, Recommendation ITU-R M.1850 identifies satellite radio interface specifications for IMT-2000 systems which, via radio links, provide access to a wide range of telecommunication services.

ITU Secretary-General Hamadoun Touré praised the timely endeavour of government and industry experts in developing this new standard. Updates and enhancements to the satellite radio interfaces incorporated in Recommendation ITU-R M.1850 are compatible with the original goals and objectives of IMT-2000, while responding to changing global requirements.

Work is already in progress to develop satellite radio interfaces for IMT-Advanced, to provide a global platform for the next generation of interactive mobile services. "The satellite component of IMT-Advanced will be designed to cope with increasing demands from the rising number of users, offering faster data access, unified messaging and broadband multimedia," notes Valery Timofeev, Director of ITU's Radiocommunication Bureau. ■



ITU/V. Martin

*“ The satellite component of IMT-Advanced will be designed to cope with increasing demands from the rising number of users, offering faster data access, unified messaging and broadband multimedia. ”*

*Valery Timofeev, Director of ITU's Radiocommunication Bureau*

## ■ UN agencies coordinate space-related activities

Focus on satellite communications for emergencies

"Space Technology for Emergency Communications" was the topic discussed at an open informal session of the 30th United Nations Inter-Agency Meeting on Outer Space Activities, which took place in Geneva in March 2010. Member States talked to UN entities about using space technology to predict catastrophes, warn people in advance and, when disaster occurs, quickly provide help and restore vital communications.

Organized by the United Nations Office for Outer Space Affairs (UNOOSA) and hosted by ITU, the Inter-Agency Meeting discussed future prospects for improved coordination, cooperation and synergy within

the United Nations system in space-related activities. Participants agreed that the Secretary-General's report on coordination of space-related activities in the UN system should be aligned with the UN development agenda, and that the report's contents should be restructured to reflect the work of the Commission on Sustainable Development.

UNOOSA is responsible for promoting international cooperation in the peaceful uses of outer space, and assisting developing countries in using space science and technology. It implements the decisions of the General Assembly and of the Committee on the Peaceful Uses of Outer Space. ■

## ■ Security

Work on telecommunication security continues to intensify to meet today's challenges for more secure network infrastructure, services and applications. One particularly urgent area of work is in combating identity theft, which was identified in an ITU survey as the biggest fear preventing users from placing more trust in online networks.

From 7 to 16 April 2010, Study Group 17 of ITU's Telecommunication Standardization Sector (ITU-T) on security saw record attendance, with a much increased number of delegates from developing countries. "Study Group 17's responsibility includes maintaining overall security frameworks as well as project management activities, and the coordination, assignment and prioritization of actions that lead to the timely adoption of security standards," says Malcolm Johnson, Director of ITU's Telecommunication Standardization Bureau. There are many ITU standards (ITU-T Recommendations) on security, or which have security implications. In particular:

- ▶ The X.500 series of Recommendations on directory services and authentication, including the well-known X.509 Recommendation which lies behind public key infrastructure (PKI) encryption;
- ▶ The X.800 series on Security Architecture framework.
- ▶ The X.1000 series on Telecommunication Security.
- ▶ The new Y.2700 series on security for next-generation networks

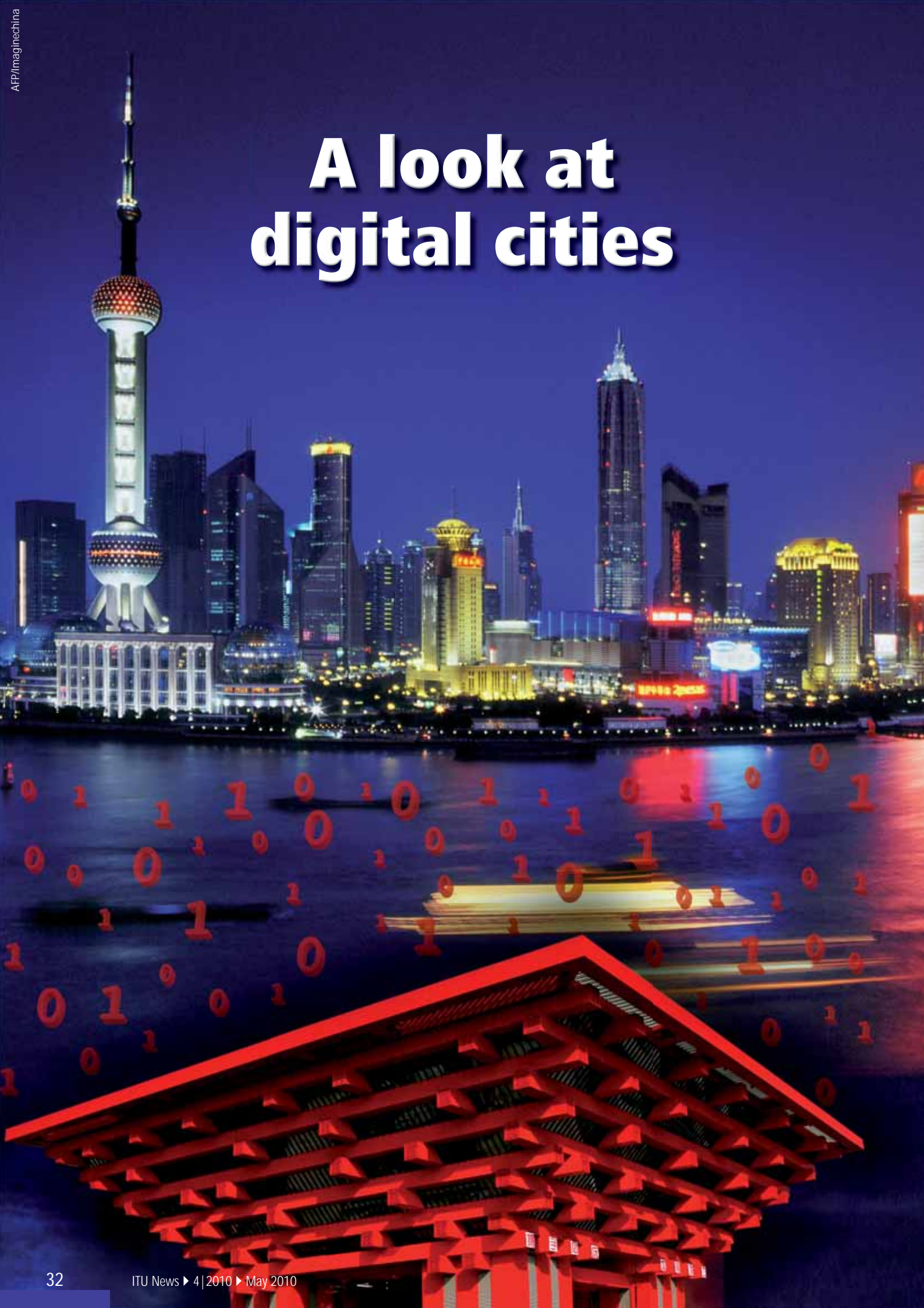
Study Group 17's work programme contains more than sixty work items on topics as diverse as identity management (IdM), IPTV security and cybersecurity. Among the work areas that achieved significant progress at the April meeting were directory services. The heavily deployed directory assistance protocol Recommendation ITU-T E.115 was revised at this meeting. E.115 is used for directory assistance information exchange among service providers. E.115 also gives a description of the principles and procedures to be followed in interconnecting different national computerized directory assistance services.



*" Study Group 17's responsibility includes maintaining overall security frameworks as well as project management activities, and the coordination, assignment and prioritization of actions that lead to the timely adoption of security standards. "*

*Malcolm Johnson, Director of ITU's Telecommunication Standardization Bureau*

# A look at digital cities





## Bridging the urban divide

Anna Tibaijuka

Executive Director of UN-HABITAT

■ The urban divide stands out as one of the major paradoxes — some would say scandals — of this early 21st century. After all, cities concentrate what has become known as the “urban advantage”, namely, a bundle of opportunities which, from basic services to health, education, amenities and gainful employment, have never been so favourable to human development. Yet all too frequently, cities also concentrate high, unacceptable degrees of inequality as these opportunities elude major segments of the population.

Equal access to urban services and opportunities is often restricted by all kinds of invisible barriers, but the outcome is so visible. Look, for example, at the growing number of gated communities in many countries that continue to shut the have-nots out. Walk along a street in the capital of a developing country, and you can see the back of the well-serviced, well-appointed local headquarters of a worldwide business consultancy facing a row of tiny, ramshackle shops catering to the needs of low-income residents.

More often than not, the bumpy stretch of mud that passes for a street will lead to a slum — the cruellest form of urban divide. The other paradox — or scandal — of early 21st century cities is that the opportunities that come with the “urban advantage”

are often closed to women, children and young people with vital roles to play in our collective future. Beyond livelihoods, health and personal development, the whole continuum of deprivations that characterizes the wrong side of the urban divide has a tangible impact on bodies and minds, stunting the physical and intellectual potential of millions among present and future generations.

Even from a purely economic perspective, the stark inequalities are making the urban divide look paradoxical too. Business and affluent residential areas typically thrive on the many cross-border linkages that ultimately connect them to the tight network of “global” cities dominating the world economy. The resulting prosperity is what drives the rural poor and immigrants into urban areas, in the hope of securing their own fair share.

The irony is that for lack of qualifications or opportunities, they remain largely confined to a slum-based informal sector that looks like an inverted image of the glowing formal economy in terms of productivity, technology and business connections.

Nearly 10 years into the 21st century, the urban divide has become

so acute that its main determinants have, in turn, become easier to identify. Just as slums and sub-standard housing stand as the by-products of



inadequate land and housing policies, the informal economy stands as an offshoot of inadequate regulation.

Today's urban divide is largely an outcome of the biases and inadequacies of the three main tiers of government — central, local and municipal. "The State of the World's Cities 2010/2011: Bridging the Urban Divide" is published in a very important year (2010) — a key milestone that marks the halfway point towards the deadline for the "slum target" of the Millennium Development Goals. Government efforts to reduce the number of slum dwellers show some positive results.

According to new estimates presented in this report, between the year 2000 and 2010 over 200 million people in the developing world will have been lifted out of slum conditions. In other words, governments have collectively exceeded the Millennium Target by at least a multiple of two. However, this achievement is not uniformly distributed across regions.

Success is highly skewed towards the more advanced emerging economies, while poorer countries have not done as well. For this reason, there is no room for complacency, because in the course of the same years the number of slum dwellers increased by six million every year. Based on these trends

it is expected that the world's slum population will continue to grow if no corrective action is taken in the coming years.

The international survey at the core of the report does more than identify the factors behind the economic, social, political and cultural inequalities that continue to plague so many urban areas across the world. Survey respondents and analysts answer the challenges of the urban divide with a number of pointed recommendations.

I believe that the way public authorities perform their duties is just as important as the nature of what they achieve. Governments must strengthen existing institutions, or create new ones. Effectiveness also requires new linkages and alliances to be established





Photo © Mauricio Hora

between the three tiers of government as a matter of daily routine, for the sake of sustained, enhanced coordination and sharing of resources across any political gaps or shifts.

A realistic assessment of specific assets and potential opportunities must give rise to a sustained, comprehensive “vision” for any given city, and one that speaks to the aspirations of the whole population. The gradual realization of this vision entails the broader, more equitable redistribution needed to close the urban divide.

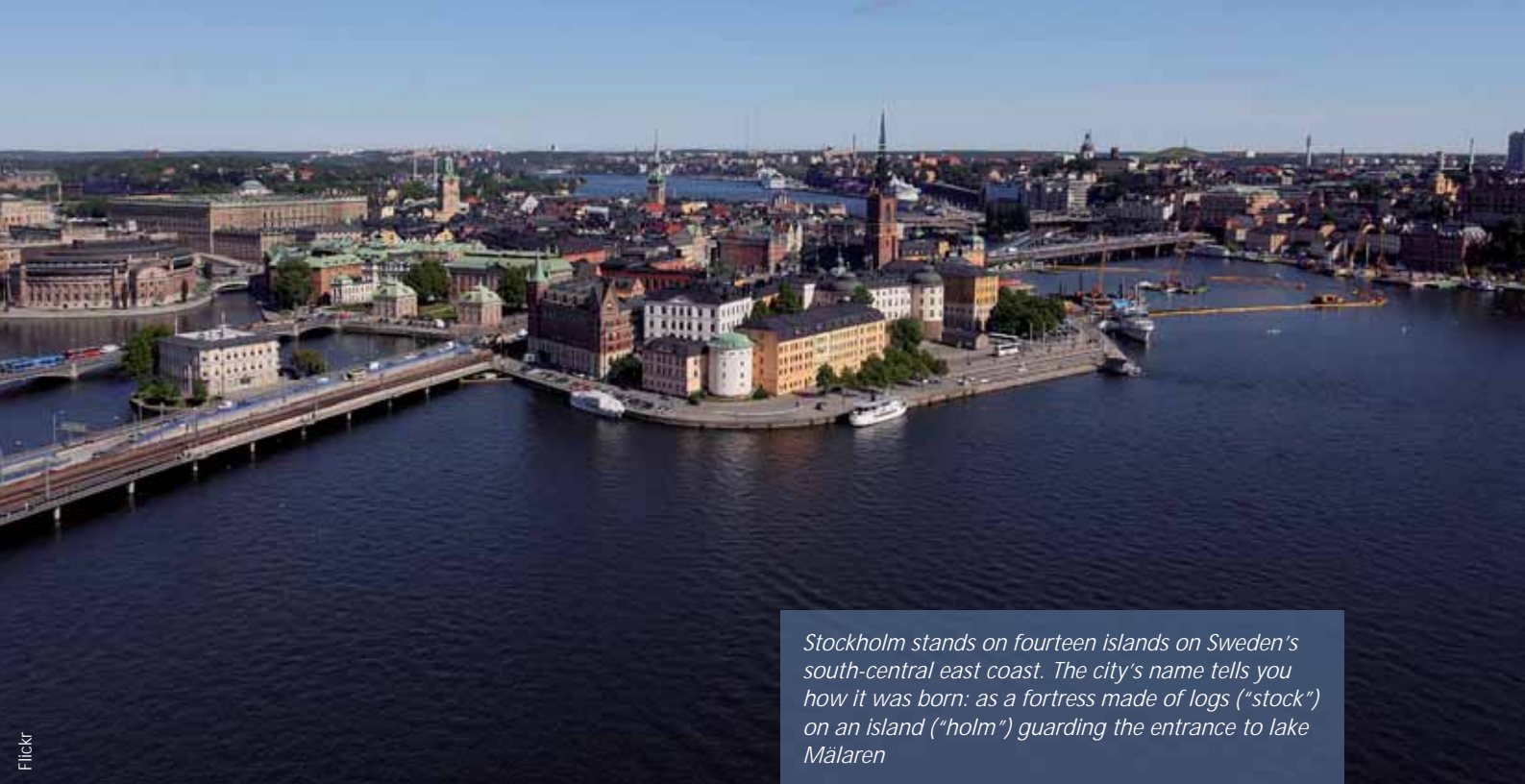
Such sustained redistribution cannot be just of an economic nature: integrating the poor and marginalized into mainstream urban life calls for a redistribution of broader opportunities as well. This brings improved quality of life, human capital as well as enhanced political and cultural inclusion. It also brings cleaner, greener cities, and places that are good for business for everyone.

Experience shows that lack of inclusionary planning is only planning for trouble. Any sustainable vision for the future of any city can only be of an inclusive, not divisive nature. These are just some of the reasons why we chose to launch a new global campaign at the Fifth Session of the World Urban Forum in Rio de Janeiro in March 2010. We see Rio as the beginning of something new — the World Urban Campaign. We launched this campaign to keep up the momentum of the forum, to heed the messages of our partners inside and outside government, the private sector, and of course our survey respondents.

The idea is to start with 100 best cities in the world and then trumpet their ideas to spread the word to more and more cities so that we can multiply to 1000 cities and beyond. This is how UN-HABITAT and our partners will lobby to bridge the urban divide.

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*Sources: Urban World, December 2009–January 2010 and “The State of the World’s Cities 2010/2011: Bridging the Urban Divide”. Reproduced with permission from UN-HABITAT.*



*Stockholm stands on fourteen islands on Sweden's south-central east coast. The city's name tells you how it was born: as a fortress made of logs ("stock") on an island ("holm") guarding the entrance to lake Mälaren*

## Stockholm, Sweden

### Encouraging competition with an open-access broadband network

- *Stockholm has become one of the leading information and communication technology (ICT) centres in the world, offering its citizens groundbreaking services. What is behind the city's success?*

Sweden has been named the world's most networked economy in the 2010 edition of ITU's report: *Measuring the Information Society*. Its levels of household computer and Internet access are very high, with an Internet user penetration of around 88 per cent. Published in February 2010, the ITU report sees Sweden keeping its top ranking and likely to remain a leader in ICT development. For example, Swedish operator TeliaSonera was the first worldwide to launch commercial 4G services in Sweden and Norway in December 2009. The report features the latest *ICT Development Index* and *ICT Price*

*Basket* — two benchmarking tools to monitor information society developments worldwide. The Index ranks 159 economies.

A report published in March 2010 by the World Economic Forum (WEF) also ranked Sweden the world's most connected economy. The WEF report ranks 133 countries for their ability to leverage ICT services to achieve sustainable economic growth and promote innovation and education for its citizens. "It happens to us a lot," says Torbjörn Bengtsson, head of ICT promotion for Stockholm's investment promotion agency, on learning that his country had also topped the rankings in WEF's Global Information Technology Report.

"We are leaders in many ways for example in usage of technology and if you look at mobile infrastructure, we are always up there." It is no surprise to Mr Bengtsson and his colleagues at Stockholm

Business Region Development because Sweden has been a pioneer in ICT development since the mid-1970s, realizing great benefits for its citizens through access to groundbreaking services.

Before these reports, Sweden's capital Stockholm was recognized by the United States think-tank, the Intelligent Community Forum, as one of the "Top seven" intelligent communities of 2009. To gain a place among the "Top Seven", communities undergo an intensive analysis of their strategies, programmes and results in five categories: broadband deployment, the ability to create and sustain a knowledge-based workforce, digital inclusion, innovation, marketing and advocacy. They have to excel in all of these areas. This makes them the most compelling models of best practice in economic and community development worldwide, according to the Intelligent Community Forum, which studies the impact of broadband and related ICT on communities.

In that same year (February 2009), Stockholm was named the first Green Capital of Europe by the European Commission. The city was appointed for its "holistic vision that combines growth with sustainable development and includes the ambitious target of becoming independent of fossil fuels by 2050".

### The Stokab ICTmodel — A success story

Key to Stockholm's success has been the ICT model established in the capital where one out of every eleven Swedes lives. In the early 1990s, Sweden liberalized the market for telecommunication services. In order to sustain strong competition, the Stockholm government decided to build a network, which would be open to all on an equal basis. To support the operations of both the public and private sectors — as well as to offer better opportunities to individual citizens — the Stockholm government set up a

### Sweden's broadband strategy

*Sweden's Ministry of Enterprise, Energy and Communications announced in November 2009, that 90 per cent of all households and businesses in the country should have access to broadband at a minimum speed of 100 Mbit/s in 2020, with 40 per cent expected to have this access by 2015.*

*A strategy statement on the ministry's website says that it is important that Swedish businesses and households in all parts of the country are able to benefit from the opportunities that access to powerful broadband gives in order to change traditional working methods, enable development of new services and business models and new patterns of behaviour.*

*The statement goes on to add that "all households and businesses should also have good opportunities to use electronic public services with broadband access. As more and more services in society become digital, everyone must be given the opportunity to be connected. Everyday life should run smoothly. It is, in essence, a matter of democracy and rights." According to Sweden's broadband strategy, it is for market players to invest in infrastructure. And "the government's task is to strive for well-functioning markets and give market players good business conditions through suitable regulation".*

company called Stokab in 1994 to build a fibre-optic network throughout the municipality as a level playing field for all operators.

Stokab dug up the streets just once, installed fibre everywhere and began offering transmission capacity to competing carriers for less than it would cost them to build their own networks. "The city was going out and asking for good offers for telecommunication services, but because Telia (the national incumbent operator then) had all the infrastructure, they could set the price they wanted. So, the city decided that if it could create infrastructure for everyone on equal terms, it would be good for competition," says Anders Broberg, Director of Communications at Stokab.

Today, the 1.2 million kilometre network has more than 90 operators and 450 enterprises as primary customers. The Stokab infrastructure is used by the city's administration and by 100 000 students and schoolchildren in the Stockholm area. What sets Stokab apart is that because it is owned by the City of Stockholm, its aim is to benefit citizens and





businesses directly. "The goal for the owners is not to make a profit but to create a good environment for companies," says Mr Broberg. Profits are always reinvested in the network. "Between 1994 and 2008, we invested EUR 300 million in the network," adds Mr Broberg. Stockholm's Mayor has set a goal of connecting 90 per cent of all households to fibre by 2012. Stokab has begun the expansion of its network to the remaining blocks of flats in the city.

### Online services for all

It is this type of innovation and investment in infrastructure development that has pushed Sweden to the top of ICT rankings. Having established the infrastructure through Stokab, Stockholm's city government announced a programme in 2007 to invest USD 72.2 million over four years to develop e-services for citizens. The city now provides an impressive list of online services. For example, citizens can follow City Council meetings online and view the associated documents. Applications can be made for

parking permits. Couples can make an appointment for a wedding ceremony at City Hall — and nine out of ten couples now do so via the web. Among parents, the same percentage applies online for a child's place at a kindergarten.

It is also possible for family members to view information about the city's care for elderly people. The online system saves money by managing municipal operations at all levels, and by automating routine administrative tasks while fostering collaboration among agencies and the savings made allow each project to be self-financing.

The success of the Stokab model — providing essential communication infrastructure that can be used by all — is one that has been noted around the world, including in Australia, Singapore and the United States.

### Kista Science City

A further element to Stockholm's successful development of ICT services has been the growth of its science city at Kista, a district in the northwest of the capital. Kista is particularly prominent in mobile and wireless communications, multimedia and broadband systems. This is complemented by strong growth in several fields that make intensive use of ICT, such as biomedical and environmental engineering, as well as nanotechnology.

What was originally a science park has become a thriving community with 120 000 residents, 4653 companies and 30 000 employees together with 5000 students in research institutes. "What is so special about Kista is that generally, science parks are developed around universities but ours was developed around companies," says Anette Scheibe, CEO of Kista, which is dubbed a science city because it provides the infrastructure for residents as well as

the employees. "Some 3000 more apartments will be built within the next five years and there will be a new light rail within three years," adds Ms Scheibe.

In 1976, Ericsson moved its *Svenska Radioaktiebolaget* (SRA) unit to Kista district. This was not just a routine move. "It laid the foundation for what would be called Sweden's Silicon Valley, although at that time, mud was more common than silicon." Ericsson now employs a third of all employees in Kista and has helped attract a wealth of suppliers, partners and competitors. Because of their proximity, established firms and newcomers find it easy to exchange business ideas and to grow. Public-sector organizations and research and educational institutions are also present in Kista, including the computer science department of the University of Stockholm as well as a branch of the Royal Institute of Technology.

"Kista is important for us as the entire business sector is there," says Fredrik Nyström CEO at PlusFourSix, which produces mobile applications. "We can find like-minded entrepreneurs in Kista."

The entrepreneurs look to the researchers to provide the technology for start-ups or new product launches and research students become the talent which the companies hire to develop their products. The dominance of the Nordic region in ICT with Nokia and Ericsson means that Kista's proximity to the airport has attracted many international names such as IBM, Intel, NEC, Huawei, Philips and Oracle.

"From Stockholm's Arlanda airport, it takes less than an hour's flying time to reach 80 per cent of the world's market for 3G-net infrastructure," says Jim Bowes of Anritsu, the Japanese company which manufactures testing and measuring equipment for communications.

The Kista model attracts a lot of interest from other cities to develop similar technology parks with over 150 visits a year from what Ms Schiebe calls non-technical tours. One of the reasons is that the model is economically robust with subsidies only forming 20 per cent of the science city's turnover. "We are trying to create projects and applications that are interesting enough that companies will pay for them," says Ms Scheibe.

As well as stimulating economic and social development of its own citizens, Stockholm is now looking beyond its own territory to assist developing economies with its ICT experience. For Ms Scheibe, one of the key focuses for Kista's companies in the future will be the development of applications for mobile phones so that healthcare advice and financial services can be delivered to citizens in developing economies. As she put it: "We in Europe are using cell phones for Facebook and networking, but in developing countries when people get connected through a cell phone, there is genuine welfare available for those people."





## Seoul, Republic of Korea

### Seoul's Internet-savvy citizens

How they are managing their own city's development

- *While other cities aim to make their citizens' lives easier by offering planning permission, parking permits and wedding packages online, Seoul has taken the ultimate step in engaging its citizens. The world's fifth biggest metropolis, with a population of over 10 million people, is using the Internet to give its residents a direct role in the running of the city.*

The OASIS Online Policy Suggestion System, which was launched in October 2006, enables citizens to contribute ideas about city policies and to discuss suggestions directly with city officials. The ideas suggested by citizens through OASIS follow three stages to become city policies: first, the idea is reviewed through online discussions, with the participation of public officers, experts and citizens; second, the idea is reviewed through offline meetings between the

citizen who proposed the idea and policy-makers in order to expand the proposal and to establish feasibility; and finally, the idea is implemented into policy.

Since the launch of the system, 4.2 million citizens have participated with on average 4640 daily visits to the site. Among successful citizens' suggestions have been the provision of English subtitles in Korean movies for international spectators; and the ability for users of public transport to make donations through their transport card.

"We are implementing citizen-oriented e-governance initiatives via the Internet and making some citizens' suggestions into actual policies," says Youngsoon Lee, Manager in the Information System Planning Bureau of the Seoul Metropolitan Government. As a result, Seoul was given two United Nations Public Service Awards on 23 June 2009 in recognition of the impact that this initiative has had on the day-to-day lives of citizens.

The OASIS system's innovative approach promoting active participation of citizens was made possible by the idea of "creative governance," combined with the application of leading information technologies in the city. "Creative governance" is a phrase coined by Oh Se-hoon in 2006 when he took office as the 33rd Mayor of Seoul and the term has since become the motto of the Seoul Metropolitan Government.

"We are improving our work processes with creativity and imagination to ultimately enrich the quality of life for citizens and to enhance city competitiveness," said Mayor Oh on receiving the UN awards. "We hope the city's creative governance inspires other cities in the world to provide better services for their citizens."

For more than a decade, Seoul has had the justifiable reputation of being one of the most wired cities in the world. The shift towards an economy that includes more information technology, after the severe financial crisis of 1997, is now regarded as an enormous success.

The Republic of Korea is an ICT leader in a number of ways. Some 95 per cent of Korean homes have a broadband Internet connection — by far the highest percentage worldwide, according to the 2010 edition of ITU's report: *Measuring the Information Society*. Published in February 2010, the report features the latest *ICT Development Index* and *ICT Price Basket* — two benchmarking tools to monitor information society developments worldwide. The Index ranks 159 economies, and the Republic of Korea is in third position. The country has the highest proportion of households with fibre-optic connections, a technology that is essential for supporting the next generation of ultra-high speed applications.

The country has a strong domestic ICT industry with a number of large manufacturers and operators, including Samsung, LG, KT, Hanaro Telecom and LG Telecom. Other factors that contribute to the country's strong performance include high educational levels, government awareness and support for ICT projects as well as an "ICT culture" — Koreans are



AFP/Photomons/lop

known to be ICT savvy and eager to adopt new technologies. The country was one of the first worldwide to adopt mobile broadband third-generation technologies. And by the end of 2008, it had over 35 million mobile broadband subscriptions for a population of about 49 million people.

With such widespread access to the Internet, it is no surprise that Seoul has been one of the leaders in introducing online services to benefit its citizens. A year before the OASIS system was launched, TOPIS (Transport Operation & Information Service) came on stream in 2005 to help passengers plan their journeys better and select the best modes of transportation by flagging congestion areas, giving estimated travel times, and providing bus arrival and waiting times. Its key functions include data collection and integration, operation and control, information pooling and usage, improved service and information sharing, mitigation of traffic congestion, incident management, using data for policy-making, remote enforcement for illegal parking, and bus management.

"Citizens are now able to get the information they need at home and at work," says Youngsoo Lee. "They get real-time updates on traffic and jobs, all on the move. They also can report complaints and inconveniences directly to the municipal government and can pay taxes and participate in e-procurement on the web."

The government is also making efforts to bring together the latest in communication technology with existing infrastructure to ensure protection of the environment while rolling out new technologies. The Republic of Korea is aiming to build the world's first nationwide smart grid system to reduce its emissions by monitoring energy use more carefully. The grid, to be set up by 2030, is part of the country's USD 103 billion initiative to increase its generation of

green energy from the current 2.4 per cent of total power to 11 per cent in the next two decades.

Unlike conventional "dumb" electricity grids, smart grids allow two-way communication between electricity suppliers and consumers, as well as enabling more dispersed generation and storage of power. According to a government-led committee, the Republic of Korea could lower its greenhouse-gas emissions by 40 million tonnes. Meanwhile, State-run electricity monopoly, Korea Electric Power Corp, plans to set up a USD 65 million smart grid pilot project in the country's southern Jeju Island by 2011.

"Korean technology companies have been at the forefront of innovation in information and communication technologies and they are now poised to take a significant leadership role in the smart grid market, both within the Republic of Korea and on a global level," says Andy Bae, an industry analyst and contributor to the smart grid advisory service of Pike Research — a market research and consulting firm for clean technology markets.

The Internet has become an indispensable part of life for Seoulites. From participating in social media to avoiding traffic jams, Seoul's residents have become completely dependent on the Internet. What if all Internet access was cut off just for one day? "It would be complete chaos," said Youngsoo Lee. "If all online services in public and private sectors were suspended, the inconvenience would be beyond the imagination." ■



About 25 000 people live in and around Victoria, the capital of Seychelles, on the island of Mahé

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## Seychelles leads Africa in ICT development

- *While all eyes may be focused on South Africa as it prepares to host the 2010 FIFA World Cup, Seychelles has been unveiled in ITU's ICT Development Index as the leading country in information and communication technology (ICT) development in the African region.*

Seychelles, a small island nation located in the Indian Ocean about 1600 kilometres east of Kenya, comprises more than a hundred islands. Its capital city Victoria is situated on the north-eastern side of Mahé, the largest island. Victoria is home to about 25 000 people, out of the country's total population estimated at more than 87 000 at the end of December 2009.

The country's main industries are tourism and fishing, but the government has been promoting diversification in the economy of this small island developing State, by promoting agriculture and small-scale manufacturing. And during the last decade, the

Seychelles Petroleum Company has developed the country's first fleet of modern petroleum tankers. All of these industries need robust ICT infrastructure.

According to the ICT Development Index, Seychelles has a teledensity of about 27 fixed phone lines for every hundred inhabitants — and mobile penetration has surpassed the 100 per cent mark. Around a quarter of households have a computer, and some 40 per cent of the population are users of the Internet.



### Linking to a broadband fibre-optic cable

Seychelles has always been among the leaders in the region with regard to ICT deployment. A programme of ICT development is under way to boost broadband in the country. In January 2010, Benjamin Choppy, Seychelles' Principal Secretary for ICT, announced that the country is to build a link by the end of 2011 to one of the international submarine fibre-optic cables installed along the east coast of Africa.



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The USD 47 million project will significantly improve the country's Internet connections and access to international telephone calls.

The geographically isolated position of Seychelles makes connectivity a key issue. A feasibility study on the link to the east African cable was carried out for the Seychelles government by French consultancy firm Axiom, and funded by the African Development Bank. Currently, the Seychelles uses very few megabytes of bandwidth for international connections via satellite but being linked to a fibre-optic cable could give up to 200 megabytes immediately, with the possibility of several thousand more in the future. Such connectivity will not only benefit Seychellois citizens, but will also give a further boost to inward investment and the crucial tourist industry. A company called Seychelles Cable Systems was formed in 2008 to start up the project. Although it was formed by the government, private firms are welcome to be part of it.

In his state-of-the-nation address on 26 February 2010, James Alix Michel, President of the Seychelles, expressed his delight and pride at the progress being made by the country to increase connectivity and develop technologies of the future. "The awards which I received, on behalf of the Seychellois people, at UNESCO (United Nations Educational, Scientific and Cultural Organization) and in Beirut last year, symbolize the innovative spirit of a people who have enjoyed equal opportunities in education," said President Michel. "We have proved our ability to innovate and to make possible what had appeared impossible."

The government of the Seychelles believes that the country's ability to enhance its economic competitiveness and improve the quality of life of its citizens is crucially dependent upon its developing as an ICT hub. As a consequence, a national ICT policy has been published, which looks to international best practice and promoting the use of ICT in all sectors, including the government itself. The policy has five areas of focus: ICT infrastructure; legal and regulatory frameworks; human resource development; ICT industry; and government.

Seychelles' Minister for National Development, Jacquelin Dugasse, highlights the importance of the country working together to ensure further ICT development, in his foreword to the *National Information and Communications Technology Policy* (NICTP). "The publication of the NICTP lays the foundation stone required for the development of a comprehensive National ICT Strategic Plan, which will be the road map to guide ICT development in this country," explained Mr Dugasse. "I am therefore confident that each and everyone involved will rise up to the challenges and contribute to the creation of a conducive environment and make provision of the appropriate ICT tools for the social, economic and cultural

development in the fulfilment of the aspirations of the people of Seychelles.”

The Seychelles has recognized that providing affordable, accessible, high quality and well-maintained ICT facilities and services is key to realizing the goal of a modern, innovative, knowledge-based society. The development of the ICT sector is a significant undertaking by the government, illustrating the acknowledgment of the vital role that access to information and communication technologies can have on the advancement of the country as a whole. Committing to the expansion of ICT services will aid the progression towards a more informed society, the promotion of sustainable development and improving the quality of peoples’ lives in Seychelles.

### Developing a knowledge-based society

President Michel has put great emphasis on Seychelles maturing into an efficient, knowledge-based society and not just following the developments in ICT but actually being part of the

innovative processes, highlighted by the opening of the University of Seychelles in September 2009, the first, independent, not-for-profit university in the country’s history.

As well as business administration, it offers courses in computing and information systems. Students can gain qualifications from the University of London, in the United Kingdom, through its external programme. Study includes in-depth online research, and support and guidance is provided to help students develop these skills. The university says that all students qualify for the concessionary purchase of a laptop computer.

“It is the principle of justice and equal opportunity that is the basis of our government and despite the challenges of 2008 and 2009, we have increased our investment in education to ensure that equality of opportunity is always there,” said President Michel in his address to the nation. “Our university is a great step forward. We are proud of our 54 students who started their studies last year. There are also 229 young people benefiting from government scholarships overseas and many others on various other training programmes.”

An initial priority of the University of Seychelles has been to establish ICT facilities that not only serve its own needs, but that will also link with public and private sector entities in the country, as well as non-governmental organizations. One of the stated key goals of the university is “to serve as a hub for the development of a knowledge-based society”.

### The “Small Islands Voice” initiative

Encouraging young people to learn about and use ICT is extremely important in setting a precedent for future generations. The concerns of residents in countries such as Seychelles are reflected in an



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Young people in Seychelles will be able to benefit from increasing access to ICT

initiative called “Small Islands Voice”, begun in 2002 by UNESCO. It focuses on the concerns of islanders in the Pacific, Caribbean and Indian Ocean regions, and, as well as meetings and workshops, uses the potential of ICT to generate dialogue among these communities, and to enhance their capacity to take part in the information age.

The goal of this initiative is to ensure the voice of the general public in small islands is heard and becomes a driving force for island development. While this is a long-term vision, it is hoped that “Small Islands Voice” can make a significant contribution to the achievement of sustainable development goals in small island economies around the world.

Several activities have taken place involving young people in Seychelles, as well as the general public. For example, an online discussion was organized between Seychellois students aged from 13 to 15 at Anse Royale Secondary School in Mahé and those in St Vincent and the Grenadines and in St Kitts and Nevis in the Caribbean, as well as with students in Palau and in the Cook Islands in the Pacific. Each group of teenagers posted their views on topics such as the advantages and disadvantages of living on an island and their prospects after leaving school.

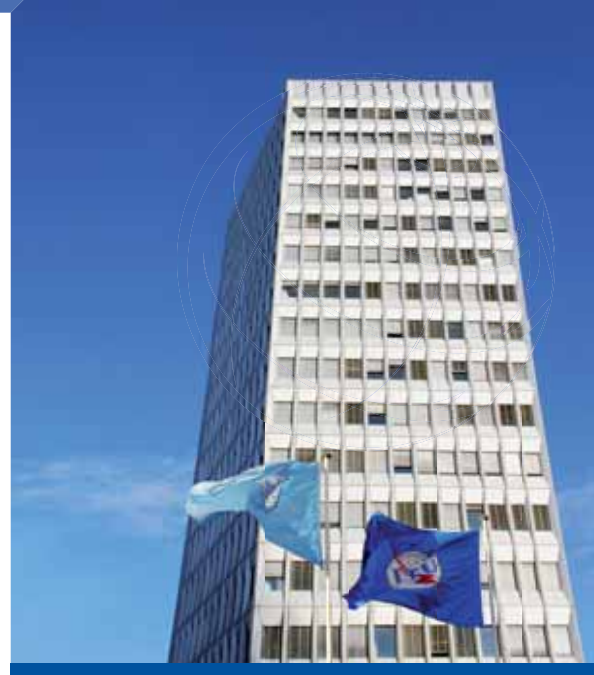
### Innovation as the key to success

Seychelles is making great strides in ICT development and this is reflected in its ranking as top nation in the African region in ITU’s latest ICT Development Index, featured in the report *Measuring the Information Society*, published in February 2010. Establishing a Council for Technology and Innovation illustrates President Michel’s commitment to continue this progression and push towards the goal of a modern ICT-enabled economy and a knowledge-based society.

“When we look at our place in this globalized world, it is clear that innovation is the key to our success,” said President Michel. “It is for this reason that I am establishing a Council for Technology and Innovation, to promote creativity, research and development. We are preparing our country for tomorrow.”

# Official Visits

*During March 2010, courtesy visits were made to ITU Secretary-General Hamadoun I. Touré by the following ambassadors to the United Nations Office and other international organizations in Geneva, and other important guests.*



Séraphin Lissassi, Ambassador of Benin



Birama Boubacar Sidibé, Vice-President of the Islamic Development Bank



Akira Terasaki, Japan's Vice-Minister for Policy Coordination, Ministry of Internal Affairs and Communications



Datuk Mohd Noor Amin, Chairman, Management Board, IMPACT (International Multilateral Partnership Against Cyber Threats)



From left to right: Houlin Zhao, ITU Deputy Secretary-General; Tan York Chor, Ambassador of Singapore; Dr Hamadoun Touré; and Leong Keng Thai, Director-General of the Infocomm Development Authority of Singapore (IDA)



From left to right: Houlin Zhao, ITU Deputy Secretary-General; He Yafei, Ambassador of China; and Dr Hamadoun Touré



Hannu Himanen, Ambassador of Finland



Betty King, Ambassador of the United States

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