

# The road to next-generation networks

## Global Symposium for Regulators issues best practice guidelines

Telecommunications is on the cusp of a new era: the migration to next-generation networks (NGN), based on the Internet protocol (IP). It heralds the shift from a "one network, one service" approach, to the delivery of many services over a single network.

NGN can be developed using a number of technologies, including wireless and mobile, fibre and cable, or by upgrades to existing copper lines. A number of traditional fixed-line operators have begun to deploy next-generation networks, mainly to offer television service in addition to voice calls and broadband Internet access (see pages 19–21).

Some market analysts predict that in the developed countries, full fixed-line NGN will be in place by 2012 and mobile by 2020. ITU predicts that by 2008, at least 50 per cent of all international telecommunication traffic will be carried on IP networks.

### Regulatory challenges

Many of the regulatory challenges arise from the obvious technical differences between circuit-switched and packet-switched networks as most of the current regulatory principles and practices worldwide are based on a circuit-switched environment. Next-generation networks are often regarded as a combination of the telecommunication and Internet environments. However, the telecommunication regulatory model,

usually heavily regulated, is very different from the Internet model which has little or no regulation. What will be the appropriate model in a converged environment?

Regulators also have to decide between *ex ante* and *ex post* regulatory models, where these exist. Under *ex ante* regulation, rules are established to prevent anti-competitive or other undesirable activity by operators before it occurs. With *ex post* regulation, which relies primarily on competition law, few (or no) rules are set in advance, but regulatory measures can be applied later, if required, to remedy a market failure or to deal with anti-competitive behaviour.

In some countries, regulators have required incumbent operators to provide their competitors with mandatory access to their networks (local loop unbundling, bitstream or wholesale access and/or resale). But with the transition to NGN, which will require significant investments by the incumbent operators, should the new IP-based networks be subject to the same access obligations? In considering this issue, regulators are assessing the level of competition in their markets to determine whether a shift towards an *ex post* model could sustain existing levels of competition and enhance consumer welfare. On the other hand, regulators also have to determine whether NGN leads to new services and markets that should be free from existing *ex ante* regulation.



The theme of this year's Global Symposium for Regulators was "The road to next-generation networks (NGN): can regulators promote investment and achieve open access?" The meeting examined such pressing issues as investment, competition, consumer protection, universal access, and international Internet interconnection.

Discussion Papers were issued for the global gathering of regulators to help form a common understanding of key regulatory issues raised by the move to NGN. These papers are available at <http://www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR07/agenda-documents.html>



## Developed and developing countries

Until recently, the debate regarding the appropriate regulatory framework for the NGN environment focused mainly on developed economies such as Australia, Japan, Singapore, the United States, and some European Union Member States, notably the United Kingdom, Germany, and the Netherlands. In these countries, issues such as extending existing *ex ante* access obligations to NGN, IP-interconnection, and the universal service implications of IP-based services (particularly voice) have been at the top of the regulator's agenda.

Some developing economies, such as India, have also initiated consultations and are promoting public awareness of NGN through various regulatory processes and initiatives. Also, regulators in Costa Rica, Morocco and Poland have indicated that they believe access obligations are a good way to increase broadband penetration and deployment of NGN.

## Best practice guidelines

Policy-makers and regulators must respond effectively to regulatory challenges in the emerging world of NGN. To help with this, some 500 participants, including national regulators from around the world, as well as representatives of industry and international organizations, attended the 7th ITU Global Symposium for Regulators (GSR) on 5–7 February 2007. It took place in Dubai, hosted by the Telecommunications Regulatory Authority of the United Arab Emirates (UAE). The authority's Director-General, Mohamed Al Ghanim, chaired the event, which he described as "the industry's premiere symposium for ICT regulators".

UAE's Minister for the Development of the Government Sector, Sultan Bin Saeed Al Mansoori, underscored the role that telecommunications and information and communication technologies (ICT) play in driving economic and social progress. The UAE's ICT strategy is designed to support and develop the non-oil economic sectors, including trade and commerce, financial services, education, transportation and healthcare services. The minister said that the government plans to increase broadband services, and to use the best technology available for fixed-line NGN services.

Following extensive discussions, the symposium reached consensus on a set of *Best Practice Guidelines* that can serve as a road map for migration to NGN. "The migration to NGN is an ideal time for regulators to develop innovative regulatory frameworks that better enable developing countries to meet their ICT development goals," ITU Secretary-General Hamadoun I. Touré told the symposium. "We believe the best practices adopted at this meeting will ultimately offer the possibility of delivering real benefits to providers and consumers, through cost reduction as well as offering innovative new services," he added.

The *Best Practice Guidelines* for NGN cover all aspects of service provision, including authorization, access, interconnection and interoperability, numbering, universal access, quality of service, consumer awareness, and security.

Commenting on the guidelines, Sami Al Basheer Al Morshid, Director of ITU's Telecommunication Development Bureau (BDT), said that they "will be immensely useful in the difficult task faced by national regulators in developing the necessary political support to create an effective regulatory environment which leverages the benefits of



Mohamed Al Ghanim,  
Director-General, UAE  
Telecommunications  
Regulatory Authority



Sultan Bin Saeed  
Al Mansoori, UAE's  
Minister for the  
Development of the  
Government Sector



technological and market developments". Participants in the symposium noted that national regulators may be perceived as only one of many competing voices in national debates. However, policy-makers are more likely to adopt regulatory practices which they know are supported by countries around the world.

The *Best Practice Guidelines* state that an enabling regulatory regime for NGN must include:

- ▶ establishment of an effective regulator separated from operators;
- ▶ adoption of clear and transparent regulatory processes;
- ▶ regulatory flexibility and technology neutrality to promote technological innovation;
- ▶ regulatory certainty for both incumbent and competing providers, so as not to stifle innovation;
- ▶ regular reviews to remove undue regulatory barriers to competition and innovation.

Because the deployment of NGN will take time, the best practice guidelines encourage regulators to allow for the co-existence of legacy and IP networks, alternative voice services, such as voice over Internet

protocol (VoIP), and the bundling together of voice, video and data services (commonly known as triple play). In doing so, regulators should consider applying the same rules to all operators, irrespective of how services are delivered to consumers.

Regulators are also urged to adopt investment-friendly regulation considered as of paramount importance for the success of NGN deployment, while maintaining a level playing field and protecting consumer interests. For instance, regulators should see NGN as a continuation of their broadband and convergence policies, and provide operators with a stable framework that permits them to take the risks associated with deployment of such networks. However, regulators should keep in mind that their role is not to provide incentives to make particular investments. Rather, they should ensure that incentives for efficient investment are not distorted, particularly as a result of disproportionate regulation. //



*Regulators take part in "speed exchanges", a new part of the GSR programme designed for participants to share views informally at round-table meetings*



*Ernest Ndukwe, Chief Executive Officer, Nigerian Communications Commission, moderating the "Interactive Panel Discussion" on creating an enabling environment for NGN*



*Hamadoun I. Touré,  
ITU Secretary-General,  
addressing the  
symposium*



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



Participants in the symposium

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## Awards at GSR



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*Sami Al Basheer Al Morshid, Director of the ITU Telecommunication Development Bureau; Cuthbert Lekaukau, former Executive Chairman of the Botswana Telecommunications Authority (BTA) accompanied by his wife; and Hamadoun I. Touré, ITU Secretary-General.*

*Mr Lekaukau, who retired from BTA in December 2006, is the first recipient of the Honorary GSR Chairmanship Award, given in recognition of his commitment to effective regulation. "You have been a role model for all of us," Mr Al Basheer said presenting the award. Botswana was one of the first countries in Africa to establish an independent and effective regulator. Mr Lekaukau was the first Chairman of the Global Symposium for Regulators in 2000.*



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*Hamadoun I. Touré, ITU Secretary-General receiving, on behalf of the Union, the first GSR Trophy from Mohamed Al Ghanim, Director-General of the Telecommunications Regulatory Authority of the United Arab Emirates.*



ITU/TRA

*Farah Khuram, Secretary-General, Afghanistan Regulatory Telecommunication Authority receives the G-REX Award from Mr Al Basheer.*

*Other recipients of the G-REX Award were the Telecom Regulatory Authority of India; the Pakistan Telecommunication Authority; the National Telecommunications Corporation of Sudan; the Office of the Telecommunications Authority of Hong Kong (OFTA); the Nepal Telecommunications Authority; as well as the regulators of Ethiopia, St Vincent, Ecuador, Venezuela and Peru. The annual G-REX Award is presented to the most active users of the Global Regulators' Exchange (G-REX), an online forum for regulators and policy-makers.*

## Early adopters of NGN



▀ The deployment of next-generation networks (NGN), using the Internet protocol (IP) to support fixed, wireless and mobile voice, video, data, and broadcast television services, is expected to provide new opportunities to increase consumer choice.

Although ITU has defined NGN (see box), views still vary and operators and vendors that have begun the process of development or migration have different claims and definitions. In the Republic of Korea, Korea Telecom uses the name BcN (Broadband convergence Network), and plans to have an entirely IP-based network by 2012. Telekom Austria aims to do the same by 2009. In Canada, Telus and Bell Canada have also announced plans to implement NGN, as well as Sprint and Qwest of the United States, and Italy's Telecom Italia. Japanese carrier, NTT, is building an NGN and developing ubiquitous broadband services.

### BT rolls out NGN

In the United Kingdom, BT has named its NGN the 21st Century Network, to which it transferred the first customer lines in November 2006. The firm's first NGN customers live in the village of Wick, near Cardiff in Wales. By the end of summer 2007, around 350 000 households in the area are expect-

ed to have joined them. BT will then review the project before moving (from early 2008) to the planned national upgrade of all remaining customers across the United Kingdom — some 30 million lines supported from over 5500 telephone exchanges. There is a forum where regular consultations take place with all other operators in the country, so they can understand and influence BT's plans.

"Big ideas usually start with simple thoughts," BT Wholesale Chief Executive Officer Paul Reynolds, said at ITU TELECOM WORLD 2006, commenting on his firm's first NGN system. "BT's 21st Century Network programme started life as a simple thought — BT would transform its business, eliminate cost and complexity and make life simpler and more flexible for our customers," Mr Reynolds explained.

BT says that the new network will deliver voice, data, broadband and multimedia services, more quickly and cheaply than before. These include a new generation of broadband with speeds of up to 24 Mbit/s — three times faster than those currently available for most UK customers. The company's move to an all-IP network is estimated to cost around GBP 10 billion.

*ITU defines a next-generation network as a packet-based network able to provide telecommunication services including multiple broadband, which use quality of service (QoS)-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies.*

*Singapore's Next Generation National Infocomm Infrastructure (Next Gen NII) project, announced in February 2006, is intended to be the country's new "digital super-highway". The project comprises a wired broadband network called Next Generation National Broadband Network (or Next Gen NBN). It is planned to deliver speeds of 1 Gbit/s to all homes, offices and schools. In addition, a Wireless Broadband Network (WBN) is expected to offer "pervasive connectivity".*



*In future, it is expected that access networks will provide bandwidth of up to 100 Mbit/s for individual users and transmission rates in the gigabyte range for commercial customers. All of these can support multimedia services, including broadband Internet, television and fixed and mobile telephony. A sampling of bandwidth offerings at present includes 24 Mbit/s in France, and 100 Mbit/s and rising in markets such as Japan, the Republic of Korea, Hong Kong (China) and Singapore (the last having set 1 Gbit/s as a target).*

### Broadband policy matters

NGN evolution may differ between developed and developing countries because of access and affordability, since these remain pressing issues in the developing world. NGN development is expected to flourish in countries with robust broadband policies or extensive broadband penetration. In these countries, mainly in the developed world, consumer demand for high-end, innovative services is matched only by limitations on bandwidth.

Meanwhile, countries such as India, Pakistan and Malaysia have adopted facilitative broadband policies, making these markets ideal candidates for NGN migration.

### What users want

How people pay for services is also influencing demand for NGN. Consumers want simpler billing systems that cover everything they receive through the network, and more personalized services of a higher quality. Demand is being fuelled too by increasing communication across national borders for both personal and business purposes, requiring high performance, widely available, secure voice and data services.

Business users are already looking for flexible, virtual private network (VPN) solutions. Future demand is likely to focus on innovative services and network intelligence — security, storage and ways to support better integration of their networking and information systems.

### Operators seek savings and efficiency

Among the factors driving operators to migrate to NGN is the growing competition in old markets and newly liberalized ones. Falling revenues from voice calls (and the multiplicity of networks that can deliver them using VoIP technology) are prompting operators to convert to a fully IP-based architecture (see article on pages 5–9).

Traditional fixed-line carriers have generally been the leaders in broadband Internet access using digital subscriber line (DSL) technology. But they are faced with pressure from competitors such as mobile operators, new VoIP providers, or wireless carriers, as well as from cable television networks that can now support bi-directional IP-based services.

In Romania, for instance, competitive pressure from cable television operators has led the incumbent to modernize its network and decide to move towards NGN. In anticipation of joining the European Union on 1 January 2007, Romania passed legislation in 2002 that includes a general authorization regime. Its resulting regulatory framework promotes competition in infrastructure, with cable television operators offering triple-play voice, Internet and television services at the equivalent of EUR 9 per month.

Convergence and growing competition have made traditional operators invest in common IP-based core infrastructure. These investments will eventually lead to savings, through reducing the cost of running different networks while increasing the products offered and thus (potentially) the number of subscribers. Operational efficiencies can also be anticipated.



## Many paths, one goal: to bridge the digital divide

Despite dramatic advances in telecommunications in many developing countries — particularly via mobile telephony — major disparities remain in providing Internet and broadband services. For example, most African countries have yet to launch high-speed Internet services, although a few, such as Morocco, offer broadband services of up to 20 Mbit/s and Sonatel in Senegal has rolled out a triple-play service bundle offering voice, Internet access and television programming. Most mobile operators have 2G (second-generation) networks. Some of these are being transformed into 2.5G or GPRS (general packet radio service) networks, but, for most people in the developing world, mobile broadband services such as GPRS and 3G are still out of reach.

Service providers in developing countries are aware of the potential cost-saving efficiency of NGN and in Brazil, India and Viet Nam, for example, they have announced plans to migrate to core NGN. Projects for FTTx (fibre-to-the-home or other building, or to the curb or node) are also being undertaken in such countries as Bangladesh, Brazil, Pakistan and Viet Nam in anticipation of moving to NGN, although they are mostly concentrated in highly populated, high-income areas.

The technological innovations that can be leveraged when migrating to NGN such as Wi-Fi or broadband wireless access (BWA)

technologies are already changing the way universal access is being extended to rural and remote areas in both developed and developing countries. In Mongolia, for example, rural areas are being given spectrum free of charge for Wi-MAX and Wi-Fi in order to improve Internet access.

India's Telecom Regulatory Authority has recommended measures to de-license spectrum in the 5.1 GHz and 5.3 GHz bands and to earmark additional spectrum bands that are not in high usage for deployment of BWA networks.

The Dominican Republic, which has already launched 3G services, plans to introduce Wi-MAX soon. Its state-of-the-art operators use soft switches, with other operators still offering services based on circuit-switched systems. The road to NGN may take many paths. But developing countries also have certain advantages in the migration process to NGN. Compared to more developed markets, service providers in the developing world generally have fewer legacy products in their core networks (for example, ISDN, IP, ATM, FR, and SHDS). This makes it easier for them to "leapfrog" to all IP-based systems. Limited deployment and penetration of copper networks, and the falling cost of fibre, can also facilitate "greenfield" deployment of FTTx projects. In some developing countries, the absence of complex access-based *ex ante* regulations also means that there are fewer regulatory commitments to consider. ▮



South Africa is to host the 2010 Football World Cup. In preparation, it is capitalizing on advances in 3G and digital migration to ensure that every mobile phone in the country can receive mobile television, while visitors from around the world will be able to use mobile multimedia services to send images and video footage of the action at South African stadiums.

Sources:  
**GSR Discussion Paper on NGN Overview**, by Tracy Cohen, Councillor, Independent Communications Authority of South Africa (ICASA).  
**GSR Discussion paper on NGN Enabling Environment**, by Janet Hernández, Senior Vice President, Telecommunications Management Group, Inc., United States.  
**Report of the Chairman, 7th ITU Global Symposium for Regulators (GSR)**. All of these documents are available at <http://www.itu.int/ITU-D/treg/Events/Seminars/GSR/GSR07/agenda-documents.html>