BROADBAND IN BRAZIL
A MULTIPRONGED PUBLIC SECTOR APPROACH TO DIGITAL INCLUSION
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Although classed as an emerging economy, Brazil is among the top ten countries worldwide when ranked by total number of broadband users. At the end of 2010 Brazil was in 9th position, with about 15m fixed broadband subscribers, as well as 20m mobile broadband (3G) subscribers. This is not particularly surprising considering that Brazil is the world's fifth most populous nation, but due to the high levels of wealth disparity and the relatively large numbers of poor and rural inhabitants scattered across its vast terrain, broadband penetration in Brazil is lower than in other countries of equivalent income levels (ranked by the World Bank as 57th in the world by GDP/capita - US$10,710 in 2010).

Regionally, Brazil is slightly above the Latin American average in terms of penetration, but behind Chile, Argentina, and Uruguay. Speed of access follows a similar pattern – Brazil is better than the regional average, but below US or European levels. Likewise, Brazil has relatively good international fibre connectivity, although it is not as well connected as some of its neighbours. Similarly, prices for telecommunication and broadband access are lower than other countries in the region yet still relatively high compared to North America and Europe, especially outside the major cities. Phones, computer and telecommunication equipment costs are also significantly higher, partly due to import duties on IT equipment, further reducing affordability of access among the lower-income groups.

**Large variation in access levels:** As reflected by the wide variation in income levels, within the country, broadband access is very uneven. At one end of the spectrum there is a high density of access in the industrialised urban areas, mostly in the south east of the country. In these areas, Brazil has recorded some of the world's highest levels of Internet use, and in particular, Brazilians have been early users of social networking services such as Orkut, and now Facebook. At the other end of the spectrum, there are the vast hinterlands of unconnected rural and remote areas, most particularly in the less wealthy north and west part of the country. For example in the Nordeste, fixed broadband penetration languishes at 1.46%, while it is over 11% in the Sao Paulo region to the south.

The pattern of uneven access also repeats itself at the local level. Most cities have wealthy areas with high levels of domestic broadband access, while close by, in the informal townships (favelas), which house most of the country's poor, there is almost no fixed broadband and residents mostly depend on cybercafes or relatively slow and more expensive 3G connections.

In the last 10 years, the federal government has had little success in disbursing its Universal Service Funds to address the digital divide using, although a variety of state and municipal level initiatives have improved the availability of public access facilities to some extent.

**Limited fixed infrastructure:** The private sector has invested about USD80bn in telecommunications over the last 12 years, but Brazil's vast size and low population density in the rural areas has resulted in limited national pervasion of telecommunication infrastructure. This presents one of the biggest problems in broadening access to the Internet. The relatively low level of fixed infrastructure, both in the long-haul and in the local loop for DSL-based broadband services is one of the key constraints, and the lack of middle-mile infrastructure necessary to ensure the connection of the 5500+ municipalities to the national backbones probably represents one of the biggest challenges to ensuring equitable broadband access across the country.

Competition in the fixed-line sector is low and fixed line penetration has actually been falling due to mobile subscriber substitution. With the relatively high level of penetration and competition between mobile networks, 3G services are expanding rapidly to fill the demand
for broadband, especially among lower income households. As a result wireless access is likely to be the main growth area for broadband in Brazil, especially now that some of the constraints in access to radio spectrum have recently been addressed.

**National broadband initiative launched:** In an effort to help to improve coverage and reduce the cost of broadband access, the government has begun a major broadband infrastructure development initiative which has set ambitious targets to triple broadband uptake by 2014. The largest ICT infrastructure project ever carried out in Brazil, called the National Broadband Plan (PNBL¹), it aims to ensure that broadband access is available to low-income households, especially in areas that have so far been poorly served.

In May 2010, when the project was officially announced, it was initially allocated up to R$1bn (US$600m) a year until 2014 to ensure broadband reaches the 4000 cities and towns without broadband services, so that at least 40 million homes (or 68% of the population) have access to speeds equal to or greater than 1Mbps, for about USD20 per month.

The new government, under President Dilma Rousseff, has re-affirmed its commitment to the PNBL which was originally developed under the previous President Lula da Silva's administration. To implement the programme, the dormant former state-owned monopoly operator, Telecomunicacoes Brasileiras (Telebras), has been resurrected and given the task, working closely with the national regulator, Anatel, and the Ministry of Communications which has also set up a special secretariat to co-ordinate the PNBL in concert with the government’s other digital inclusion programmes.

The initial focus of the PNBL has been to address the deficiencies in the existing telecommunication operator backbones by bringing on the oil and electricity network operators to help fill in the gaps. Local access is now also being addressed through a variety of other measures, such as tax exemptions, reducing broadband license fees, accelerating efforts to make additional radio spectrum available and other incentives to encourage the provision of broadband in rural areas. In May this year (2011), Telebras awarded three operators contracts worth USD43mn to provide transit, wholesale and broadband services in some states.

The Internet sector in Brazil is also supported by a large number of industry, government and civil society groups, both monitoring and promoting access to ICTs. As a result the level of up-to-date information on broadband utilisation is high, and the debate over strategy is widespread.

The resurrection of the old public monopoly operator Telebras to compete with the private sector has not been without controversy, and the extent to which the poorest of the poor get access to broadband remains to be seen. But steadily rising economic prosperity for the less wealthy, along with the flurry of ICT investment made to prepare for the FIFA World Cup in 2014 and the Olympics in 2016, suggests there are much improved prospects wider adoption of broadband in Brazil. The strategies adopted and lessons learned from both public and private initiatives will be valuable for other developing countries planning to promote better access to broadband, and are likely to have special relevance for other large emerging economies, in particular the BRICS countries - Russia, India, China and South Africa.

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1. Demographic, Political and Economic Context

Brazil is the fifth most populated and fifth largest country in the world, with over 190 million people and an area of about 8.5 million sq km. Urbanisation levels are relatively high compared to many other emerging economies, and a large majority (84%) live in built-up environments, mostly along the coast. The five largest cities are São Paulo, Rio de Janeiro, Salvador, Belo Horizonte, and the federal capital, Brasilia. There are 44 cities of over 500,000 people, and 5,563 municipalities. With almost 30 million people in the rural areas outside municipal services, provision of affordable broadband to this group, which have among the lowest average income levels, presents a particularly severe problem.

Constitutionally, Brazil is a federation of 26 states and the Federal District (Brasilia), which can be divided into five regions - the North, North-East, South, South-East, and Centre-West. Each region has its own geography, economic activity, and culture. Emerging from decades of military rule in 1985, Brazil has since been governed as a democratic republic. The president is elected to a four-year term and each state has a governor and each municipality has a mayor, both being elected directly. Similar to other federal republics, the individual states have a significant degree of financial and policy-making autonomy, resulting in some significant variations public policy support for broadband access.

 Brazilians are diverse in origin, with just under half the population being of European descent, while more than 40% are of mixed African and European ancestry. There are an estimated 350,000 to 550,000 indigenous peoples, mainly found in the rain forests of the Amazon River basin. Portuguese is the official language and is nearly universal, while English is widely taught as a second language. None of the other countries in the region speak Portuguese, and the relative

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<td>Population Density / sq Kms</td>
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<td>Rural Population</td>
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Table 1-1: General statistics
size of the diaspora is very small, resulting in minimal demand for access to Internet content and applications in neighbouring countries or outside the region, and vice-versa, except for the few other Portuguese speaking countries (Angola, Cap Verde, Macau, Mozambique, Portugal and Sao Tome e Principe).

With the progressive macro-economic, social support and education policies of the centre-left administrations of the last decade, Brazil's economy has grown steadily, bolstered by the global demand for commodities and the countries relatively advanced industrial export sector. As a result record numbers of poor have entered middle class, unemployment is at an all-time low (6%), and population growth is down to 1% annually. Official statistics divide Brazilian society into 5 classes, A-E, with E being the poorest. Class C, often called 'the new middle class' by the media, includes people with an individual monthly income of US$188-$815 (R$300 to $1,300). The growth of this group is one of the most important trends of the last decade, now representing just over half of the population, and expected to reach 60% by 2014. Part of the increasingly influential BRICS group of large emerging nations, Brazil is now a net creditor to the US and has over US$300bn in currency reserves. Since early 2009 the value of the Brazilian currency, the Real (R), has been steadily appreciating against the US dollar, rising from about 0.4 to 0.65 USD in August 2011, and by many benchmarks is amongst the most overvalued currencies in the world. Although its value slid by more than 10% in September 2011, the Real is still seen as overvalued, and as a result, the currency's strength needs to be taken into account when making broadband cost comparisons with other countries.

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2 Brazil, Russia, India, China and South Africa
Brazil's broadband market is serviced by a wide range of access technologies deployed by the network operators. These range from fibre to the home, copper cable-based DSL, broadband over power lines and cable-TV, to a variety of wireless and satellite-based systems, but mainly 2.5/3G, MMDS and WiFi.

Similarly there are substantial variations in the types of broadband providers (fixed, mobile and TV network operators, as well as domestic and internationally based companies), and many do not compete directly with each other due to geographic market segmentation of licensing at the four government levels – national, regional, state, and most recently, municipal.

In addition, the sector is going through major transformation, with the merger of a number of the large fixed and mobile operators, and the recent opening up of the subscription/cable TV market to foreign owned telecom operators. Mobile operator Claro, and fixed operator Embratel, are both now majority owned by the Mexican businessman Carlos Slim, and Telefonica of Spain controls the country’s leading mobile carrier by subscribers, Vivo Participacoes, as well as Telesp, the incumbent operator in Sao Paulo state.

This web of technologies, multiple licensing regimes, types of service providers, geographic separation and supplier consolidation has created a highly complex broadband market compared with most other countries.

2.1 National ICT sector management - policy and regulation

The main ICT sector policies are determined at a national level by the Ministry of Communication (known as MiniCom) and regulated by Anatel, the national telecommunication agency. Anatel is also responsible for regulating satellite capacity provision and administering radio frequency channels for use by both telecommunications service providers and broadcasting companies.

Brazilian telecommunications services do not have a unified legislation, and policy is implemented through many the fragmented directives that have built up over the years to respond to the evolution of the market. The telecommunications legal regime is defined at a high level in the General Telecommunications Law (LGT) of 1997 which provides the main guidelines on telecommunication services, universal service goals and the functions of Anatel. The licensing regime includes provisions that if an operator does not provide the services it has agreed to in its license the State can take over its operations, including its existing infrastructure. The LGT is supported by a large number of more specific regulations, the major ones of which are outlined below.

In 1998 the General Grant Plan (PGO), with a 10-year scope, identified which telecommunication services must be provided as a public service, with consequent price controls, quality of service and universal service obligations. At the time PGO only included voice services, and this did not change in the 2008 updated PGO, however MiniCom has since proposed that it be modified to include broadband services. The 1998 PGO also established the basis for privatisation of the state owned monopoly operator Telebras, and divided Brazil geographically into four major areas, limited cross ownership and the number of players in the market.

In addition, the 1998 PGO also established the basis for a universal service fund known as the Fund for the Universalisation of Telecommunication Services (FUST). An additional fund was also established at the same time, aimed at supporting innovation and capacity building to make the Brazilian telecom sector more competitive, called the Fund for Telecommunications Technological Development (FUNITTEL). There is a third fund, the Telecommunication Inspection Fund (FISTEL), to cover the cost of managing the telecom sector. Revenues for the three funds are gathered from the operators licensed to provide public telecommunication services (i.e not ISPs currently, although this would likely change if broadband becomes defined as a public service under the PGO).

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4 Lei Geral de Telecomunicações
5 Plano Geral de Outorgas
6 Of interest is that all telecom services were in private hands until 1972, when they nationalised by the military government
Universal service objectives (USOs) and obligations are defined in more detail in Anatel’s General Plan of Universalization Goals\(^7\) (PGMU). The PGMU has been updated a number of times, and in September 2010 the PGMU III was adopted, and is expected to cost participating service providers R1.7 billion for the network infrastructure and maintenance costs between 2011 and 2015. While not directly focussed on broadband development, the infrastructure that will be required will naturally be used to support broadband services.

In 2008 Anatel issued the General Update Plan of Brazilian Telecommunications\(^8\) (PGR) which defined the 10-year strategic vision for the sector and included goals for improving broadband access and establishing mobile virtual network operators (MVNOs). The 1998 PGO restriction which precluded the incumbents from operating in more than one of the authorized regions was also ended at this time.

In August 2009 the Steering Committee for Digital Inclusion Programmes\(^9\) (CGPID) was established, which laid the groundwork for the National Broadband Plan (PNBL), subsequently announced in May 2010. The PNBL is described in more detail in section 5.

2.1.1 Broadband licensing

Anatel requires a license for all entities that provide broadband access, with the most prevalent licenses being 3G mobile, cable TV and the Multimedia Communication Services\(^10\) (SCM). The latter is the most common public ISP license, allowing service delivery using wireless technologies, and more recently cable technologies, following Anatel's sanction of broadband over power lines (BPL) in 2009.

In addition, the Limited Private Service\(^11\) (SLP) permit is available and mainly used by municipalities to provide free access to relevant public information.

\(^7\) Plano Geral de Metas para a Universalização  
\(^8\) Plano Geral de Atualização da Regulamentação das Telecomunicações  
\(^9\) Comitê Gestor do Programa de Inclusão Digital  
\(^10\) Serviço de Comunicação Multimídia  
\(^11\) Serviço Limitado Privada
services (such as for libraries and e-government applications in public spaces). The Private Network Service\textsuperscript{12} (SRP) permit is similar, but for corporate entities. The SCM license used to cost R9000 annually (but is being revised – see below), while both the SLP and SRP permits cost R400 per year.

Voice over IP (VoIP) services are permitted, and unlicensed in Brazil, as they do not qualify as a telecommunications service - rather they are seen as value added services that are supported by the underlying telecommunication network.

2.1.2 Radio spectrum

SLP and SRP licensees may use the unlicensed Wi-Fi spectrum in the 2.4 and 5.8GHz bands. SCM licensees may also use these bands, but they can also operate in the 2.5GHz band using MMDS type services, which are often used for subscription/cable TV, or sometimes WiMax. Spectrum licenses are required for all frequencies in cities larger than 500 000 people, including the WiFi 2.4 and 5Ghz bands. In towns smaller than 500 000 people, licenses for these bands are not required.

Spectrum licenses are required for Wimax (available in the 2.5, 3.5 and 10.5Ghz wavebands) and for 3G in the 800 and 900Mhz. The auctioning of the (1.9/2.1 Ghz) with mandatory sharing of infrastructure, took place in December 2010 despite some operator protests against the inclusion of Nextel, a new fifth player (the band was only to be available to operators with a mobile voice license). The mobile operators have a total of about 340MHz of spectrum allocated, with the maximum amount available per operator being 85MHz.

2.1.3 Internet governance

Management of key Internet resources, such as domain names, the CERT\textsuperscript{13} and Internet exchange points (IXPs), is carried out by the Brazil Internet Steering Committee\textsuperscript{14} (CGL.br) which also monitors the uptake of Internet services and helps guide the development of the Internet in the country. As shown below, CGL.br is structured as a multi-stakeholder group comprising an equal mix of government and civil society representatives appointed by Ministerial decree.

\textsuperscript{12} Serviço de Rede Privado
\textsuperscript{13} Computer Emergency Response Team
\textsuperscript{14} Comitê Gestor da Internet no Brasil

2.2 The broadband ecosystem

2.2.1 Backbone networks

With Oi/Telemar's purchase of Brazil Telecom in 2008, the group now operates the largest fibre network in the country, as well as one of the main submarine cable networks linking the country to the global backbones. The terrestrial network is about 138,000 kilometres of long distance fibre, 30,400 kilometres of metropolitan fibre and the 22,000 kilometre GloboNet submarine cable network links Brazil to Venezuela, Bermuda and the USA. As shown in the map below, an indication of the challenges presented by the vast size of the country combined with the low income and population levels in the northern region is that capital of Amazonas was only connected to the fibre backbone this year, and it was more cost-effective to do this via Venezuela's network.

While not even close to the same scale as Oi's network, the incumbent long distance operator Embratel's network is also among the largest in the country, running from the extreme south to Rio
Grande do Sul in the north, totalling about 26,000 kilometres of optic fibre.

Aside from Telebras' recently established national network of about 31,000 kilometres combining the infrastructure of the electricity and fuel distribution operators (see Section 5), the other major backbones are operated by AES/AES Electropaulo Telecom, GVT, Geodex and CEMIG Telecom. AES/AES Electropaulo Telecom has a network of about 4,700 kilometres. GVT (owned by Vivendi) has about 25,000 km of optical fibre, while Geodex (owned by UBS, Deutsche Bank and Meridiana Interprises) has a network of 11,000 km. CEMIGTelecom, which changed its name from Infovias in 2010, offers the largest optical fibre network in the state of Minas Gerais.

Internationally, a number of other submarine cables connect Brazil to the region and to North America and West Africa (Sam-1, SAC, Americas-I, Americas-II and Atlantis-2). There are also plans for a large (12Tbps) cable called SAex to connect Brazil with Angola, which will also give it an alternative route to Europe and Asia via the west African coastal cable systems.

2.2.2 Alternative/complementary infrastructure operators

The operators and owners of overhead electricity pylons and poles, ducts and rights of way for highways and railways are well known for charging high fees for use of these resources for telecommunication fibre cabling in Brazil. It is not uncommon to find a charge for overhead poles as high as R10 per month per pole, compared to R1 in the USA.

The current situation also favours the incumbent operators, which negotiated long-term contracts decades ago, and there may not be physical space available for new entrants or they are charged much more for the more valuable resource that these rights of way have become.

Considering that much of the new investment in backbone infrastructure is going into the more remote

Figure 2-3: OI/Tele Norte Leste backbone fibre network
(Source: http://www.globenet.net/PDF/Network-Map.pdf)
and less population-dense areas, where returns are lower, high costs of access to alternative infrastructure are a significant constraint to more rapid deployment of broadband to the peripheral areas.

There are also a variety of large electrical energy generation and transmission companies operating at either the federal or state level that sell telecommunication services directly, usually via a subsidiary. The largest of these are:

- Eletronet, a joint venture between the parastatal Eletrobrás and AES. The Eletrobrás group has subsidiaries in different provinces - Furnas, Chesf, Eletronorte and Eletronorte, with a total of 16,000 kilometres of optical fibre drawn. The network runs through 18 states, but only reaches the outskirts of large cities. In the least well-served area, northern Brazil, the Eletronorte network is now expanding considerably because of plans to distribute hydroelectric energy to many cities due to the construction of new hydroelectric schemes in Amazonia.

- CEMIGTelecom operates a carrier-to-carrier model using the infrastructure of its parent company, electrical energy provider CEMIG in Minas Gerais.

- Petrobras has an extensive fuel distribution network across the country

2.2.3 Interconnection

There are 16 Internet exchange points (IXPs) in Brazil, which improve performance for customers and applications on different provider networks. The IXPs also save on transit fees for broadband providers, reducing the flow of local data that transits externally. The IXP model in Brazil is independent non-commercial, with NIC.br providing financial and capacity building support for establishing IXPs where needed.

The first IXP in the northern region will be inaugurated this year and their deployment in a number of major cities in other states is also underway.

As to be expected the largest is in Sao Paulo city with 185 members exchanging about 50 Gbps of traffic at peak times, with the remaining IXPs exchanging a total of about 10 Gbps of traffic at peak times.

2.2.4 Broadband providers

2.2.4.1 Fixed broadband

The current extent and future growth of fixed line broadband services is mainly limited by the stagnating market for fixed voice services, although this is being increasingly augmented by deployments of subscription/cable-TV services, spread spectrum/Wi-Fi, fibre to the home (FTTH) and broadband over power lines (BPL).
Brazil's fixed-line teledensity is about 23% higher than average for Latin America, but there has been little growth since 2002, partly because fixed line rentals are relatively expensive compared with other countries in the region. The fixed voice market is dominated by three groups which all have substantial foreign ownership - Spain's Telefonica, which owns Telesp (and mobile provider Vivo), Mexico's America Movil, which owns Embratel (and mobile provider Claro) and fixed/mobile provider Oi (Telemar Norte Leste/Telemar), which is owned by Brazilian investors and Portugal Telecom. The market leaders are the two incumbents Oi and Telesp, with 48% and 27% respectively of the fixed lines. Two other companies, the long-distance incumbent Embratel, and Vivendi's GVT, have gained an increasing share of the market with 18% and 5% respectively.

Although there are about 2,700 companies that provide fixed broadband services in Brazil, the five largest hold about 95% of the market, mainly consisting of the incumbent voice operators. According to the government's Institute for Applied Economic Research (IPEA), in June 2011 Oi was the largest broadband provider, with about 36% of the broadband market, followed by NET Servicos (Embratel) with 26%, Telefónica Brazil with 24%, and GVT with 8%.

Until the arrival of Telebras (see below) there has been little structural wholesale/retail separation in the market and the 1,600 small ISPs largely resell (and compete with) capacity from the larger telecom operators.

The principal operators in Brazil's cable/subscription TV market are Net Servicos, Sky Brasil, Embratel, Telesp, and Oi TV. Net Servicos is the largest multi-service cable provider in Latin America, and is controlled by local media group Globo, although long-distance fixed-line incumbent Embratel owns a majority of the company's stock. Sky Brasil, the largest High Definition satellite TV operator, is controlled by DirecTV, with Globo as a minority shareholder. Independently of Net Servicos, Embratel provides satellite TV services.

All of these companies provide TV/broadband double-play packages, except for Sky, which has a partnership with GVT for broadband services. However Sky will soon enter the broadband market as it is now in the process of establishing one of the first deployments in the world of TD-LTE technology, following its purchase of 2.5Ghz spectrum.

Fibre to the home (FTTH) is now beginning to take off in Brazil's major cities, seeing much increased investment over the last two years. Telefonica Brasil is among the largest providers of FTTH services and is planning to extend its network coverage, initially focussing on Sao Paulo state. Backed by Telefonica of Spain, the group already has fibre coverage of a potential 400,000 households, of which 20,000 are currently signed up to its services. By the end of 2011 it plans to increase coverage to about one million households and boost the actual subscriber base to 70,000, with a long term plan to have one million fibre customers by 2015.

Intelig, a subsidiary of TIM Brasil (owned by Telecom Italia), has recently launched broadband and fixed telephony services using broadband over powerline
(BPL) technology in selected areas of Sao Paulo city, provided over the infrastructure of local power utility Eletropaulo.

Triple-play bundles (voice, Internet and IPTV) and quad-play bundles (plus mobile) are becoming increasingly available, following recent consolidation of fixed, mobile and subscription-TV providers. The triple-play leaders in this area are GVT in partnership with Sky, and TVA (owned by the Abril Group and Telefónica), while Oi launched the first, and so far only, quad-play service in the country in 2008.

### Mobile broadband

There are seven GSM operators in Brazil – Vivo, Claro, TIM, Brasil Telecom, Oi, Sercomtel and CTBC (now Algar Telecommunications). By August 2011 they had rolled out 3G services in 28% (1,588) of the 5,565 municipal areas, which covers about 144 million people, or 76% of the total population. Vivo is the dominant player in terms of numbers of subscribers and also in terms of coverage - it is present in over 1,500 municipal areas, while its nearest rival, Claro, is present in only about 500 so far.

Having heavily invested in new 3G spectrum (a total of R2.7 billion was realised in the H band auction in December 2010), the mobile operators are now rapidly expanding their 3G networks, which should cover at least 2,000 municipalities by 2012. In the H band auction a new operator, Nextel, acquired frequency in virtually all of Brazil and will soon become a new specialised 3G competitor in the market.

The government is looking to ensure that 4G/LTE networks are in place in time for the FIFA World Cup in 2014, and it has already identified about R200 million worth of investments to encourage this. Bidding for 4G mobile network licenses is scheduled for April 2012.

### Satellite

Because of the remoteness of many areas in Brazil,
the country has an extensive satellite sector. Three companies operate national satellites: Star One, Telesat Brasil, and Hispamar. Star One was the first to provide satellite services, and is the market leader. Star One C3, scheduled for launch in 2012, will cover all of South America including Brazilian territorial waters. The launch of Telstar 14R (known as Estrela do Sul 2 in Brazil), was launched in mid-2011 and covers the whole Brazilian territory as well as delivering services to the rest the Americas.

2.2.5 Access devices

PCs and laptops are also becoming more widely present in households, although smartphones are now the dominant consumer broadband access device in Brazil. In total it is estimated that there are 60 million PCs and laptops in use in Brazil, rising to 100 million by 2012. However not all of these are connected to the Internet and many are in businesses or large households which share the Internet connection.

In contrast, there is a closer match between the number of 3G phones and the number of 3G broadband subscribers, although again the match is not 1:1. In a field survey, Grupo Mobi estimated in February 2011 that there were 19 million smartphones in Brazil; this is also higher than the number of 3G subscribers due to the large number of subscribers with multiple phones, and many using smart phones on 2/2.5G subscriptions. The survey found that 41% of their sample of mobile phone users in general, and 83% of the smartphone users used their phone to go online.

The federal government has a long history of support for local industry to develop low cost access devices. In 2000 strong efforts were made to establish reference models for low-cost open-source based PC manufacture. As a result Linux is widely available as an option on locally made desktop and laptops from the major white-goods chain stores and other outlets. In 2010 it was estimated that about 14 million, mostly locally made computers, had been sold in Brazil, often on instalment plans provided by the major retailers.

Recent plans to provide tax incentives to promote the local manufacture of low-cost tablet devices echo these earlier efforts, and have attracted Taiwanese computer manufacturer, Foxconn Technology, to produce Apple's iPad tablet in the city of Jundiai in Sao Paulo state. In addition Motorola, Samsung and Asus have also expressed interest in producing tablets locally.

2.2.6 Public access facilities

Internet cafes, or LAN-houses, as they are commonly called in Brazil, are widely used throughout the country and are present in virtually every community, either to serve the youth in the richer areas, or to serve the general population in the poorer areas. Privately run, usually by small businesses (90% of which are informal), the Cetic.br\(^{15}\) estimated in 2010 that there were about 100,000 in the country, serving 30-35 million people. This is a slight decline on previous years, most probably because of the increased penetration of broadband in homes and on mobiles.

Provision of public access facilities for those who cannot afford their own equipment and connections has also long been part of the Brazilian government's digital inclusion strategies. The largest of these is government parastatal Serpro's\(^{16}\) digital inclusion programme (PSID)\(^{17}\) which has rolled out over 8,000 telecentres, providing free access in 98% of municipalities. Part of Serpro's remit is to facilitate citizens' relations with the government, including the development of e-government applications and under this responsibility the PSID was launched in 2003. The programme includes donation of computers to public and civil society institutions.

Serpro is now developing a new programme with the Ministry of Agricultural Development which will support integrated management of telecentres, called the Brasil Digital Network\(^{18}\) which will be used to support the digital inclusion initiatives of both institutions. The proposal is to form a central database with information from a variety of digital inclusion initiatives in order to generate inputs for the implementation of government policies.

In addition to a tool kit for the management of the telecentres, the Brazil Digital Network provides the coordination of a digital inclusion panel with information necessary for decision making. The data are presented in reports and graphs, as well as geo-referencing. So there is a mechanism for monitoring

\(^{15}\) Center for Studies on Information and Communication Technologies
\(^{16}\) Formed in 1964 to modernise the strategic sectors of the Brazilian Public Administration, Serpro is one of Brazil's largest public companies, responsible to the Ministry of Finance.
\(^{17}\) Programa Serpro de Inclusão Digital
http://www.serpro.gov.br/inclusao/oprograma
\(^{18}\) Rede Brasil Digital http://www.serpro.gov.br/inclusao/rede-brasil-digital / redebrasildigital.org.br
and tracking of benefits to the population and the variables that hamper the smooth operation of telecentres in Brazil.

Serpro's PSID is also collaborating with the government's Casa (House) Brazil project\(^{19}\), Broadband in Schools\(^{20}\) and One Laptop per Student programmes\(^{21}\).

Casa Brazil is a similar but much smaller project, also established in 2003. Working in poor communities, the project provides computers and connectivity to communities, focusing mainly on use of open source technologies to promote culture, art, entertainment, popular participation and community liaison. A Casa Brazil typically has a telecentre, a reading room, an auditorium and several laboratories and workshops where use of digital technologies can be made. About 100 units have so far been established with support from the Ministry of Science and Technology, in partnership with other government agencies, the private sector and municipalities.

Banco Brazil and other large businesses are also donating computers to public access programmes such as the above to support digital inclusion efforts.

2.2.7 Content and applications

With a large population and advanced electronic and print media market, along with the relatively high number of wealthy people, Brazil's local online content market is well-developed. This has been encouraged by the lack of Portuguese content elsewhere (except to a certain extent in Portugal), the popularity of local social networking, and the substantial efforts by government to provide services online.

In addition, e-commerce services for consumers are widespread, partly due to the relatively high proportion of the population that have bank accounts and credit cards\(^{22}\). It is expected that e-commerce will have a turnover of US$18.7 billion at the end of 2011, representing an increase of around 26% compared to 2010. By the end of 2011 it is expected that about 32 million people will have made at least one purchase online.

Another indication of trends in Brazilian applications and content is that Google Brazil's revenues grew 80% in the last year, bringing in close to US$500 million.

2.3 Patterns of broadband utilization

As of mid-2011 there were an estimated 43 million broadband subscribers in Brazil, representing a penetration rate of about 23% of the population. With about 74 million Internet users in the country, this brings the proportion of broadband subscribers to about 60%.

The rate of broadband uptake also appears to be accelerating fast - new activations hit a record in the month of August 2011 when there were 2.2 million additions, compared to the average of about 1 million a month between July 2010 and July 2011. As a whole, broadband subscriber growth over the last year was about 60%. In the last year 3G broadband overtook fixed broadband subscriptions. Telebrasilm's August 2011 assessment indicates that fixed broadband grew by 25% in August 2011, while mobile broadband had a growth rate of 87%. Other features of broadband uptake in Brazil include:

About 27.4% of households had Internet access of some form in 2009 according to IBGE's National Household survey, while 12% of households had broadband access in 2010, estimates IPEA.

Regional variations in access to broadband are large, mainly reflecting the pattern of income levels and population densities. About 80% of broadband users are concentrated in the Southeast, while the Northeast and Midwest have 9% each, and the North, only 2%. Subscription/Cable TV had about 11.1 million subscribers in mid-2011, representing a growth of 31.8% over the last 12 months.

A number of projections have been made on the future levels of broadband uptake. These include:

Mobile chip manufacturer QUALCOMM estimates that there are likely to be over 107 million 3G subscribers in Brazil by 2014.

Telecom industry group SindiBrasil estimates that if investments of about R145 billion are made in network infrastructure and services, broadband penetration could reach 78 million subscribers in 2014 and 153.6 million in 2020. If no action to encourage

\(^{19}\) http://www.casabrasil.gov.br  
\(^{20}\) Banda Larga nas Escolas  
\(^{21}\) Um Computador por Aluno  
\(^{22}\) The reasons for this date back to the years of hyper inflation in the previous century, where funds kept in bank accounts were index linked to maintain their value.
public or private investment takes place, this expansion would be limited to 57.3 million in 2014 and 93.2 million in 2020.

The IPEA estimates that if the price for broadband is reduced to the PNBL target of R35/month (see next section), the number of households connected would rise to 35 million (52% of total households).

Brazil also has had an extensive "Broadband in Schools" program which has resulted in about 84% of Brazilian students having access to free broadband in urban public schools.
Beginning with the PGR in 2008, the Federal and State governments have adopted extensive and wide ranging strategies for supporting improved access to broadband. These efforts emerged from earlier efforts to promote the uptake of ICTs more generally in Brazil, prior to the advent of 'broadband Internet'.

The first systematic effort by the Government took place in 2000 when the then President Henrique Cardoso issued a decree to establish the Secretariat for Logistics and Information Technology in the Ministry of Planning, Budget and Management (SLTI/MP), as the lead agency for developing and implementing Brazil's 'e-strategy'. SLTI/MP served as the secretariat for an inter-agency committee chaired by the President's Civilian Chief of Staff - the Executive Committee on e-Government, to which a number of inter-agency technical groups reported.

ICT development at the Federal level continued during the first administration of President Lula da Silva (2003-2006), and some progress was made in digital inclusion, with the development of an interoperability framework and other aspects of e-applications development. E-strategies also advanced at lower levels of the federal system, albeit unevenly in the 26 states and the Federal District, as described further below.

Developed by the Lula government in 2010, the culmination of earlier efforts toward digital inclusion is the PNBL (Programa Nacional de Banda Larga, National Broadband Program), which, after about a year of preparation, marked its first deployment in August 2011. The five key objectives of the PNBL are:

- Broaden access to broadband-based Internet services
- Accelerate economic and social development
- Promote digital inclusion
- Reduce social and regional inequalities
- Promote job creation and income

To implement the programme, the dormant former state-owned monopoly operator, Telecomunicacoes Brasileiras (Telebras), was revived and given the task, working closely with the national regulator, Anatel, and the Ministry of Communications. Telebras has also been made responsible for ensuring that connectivity is provided for some of the 2014 World Cup stadiums.

The government owns 89.88% of Telebras shares with voting rights, and 72.67% of the share capital. In June 2011 it was announced that additional private investment in Telebras can be made, but that government would still maintain control. Telebras' business model envisions it to be cash flow positive by its 2nd year.

Aiming to cover 40 million households or 68% of the population by 2014, Telebras core activity will be to act as a 'wholesale' operator, providing infrastructure and network capacity for the broadband providers, as well as the administrations of the federal government, the states and Federal District, municipalities and non-profit organizations such as universities, schools, hospitals, community telecentres and other points of public interest. The deployment of a national fibre network which will eventually reach 3,045 municipalities without access to fibre.

In essence the overarching strategy with the revival of Telebras has been to create a public broadband operator that will compete with the private operators in order to lower prices and improve service levels. The government's view is that the private broadband providers are not competing effectively and therefore charging too much and giving poor service. MiniCom cites as evidence for this the fact that average broadband prices have already dropped by 50% since the announcement of the PNBL strategy, even prior to any actual roll-out of services.

Not unexpectedly, the larger providers have criticised the entry of a state funded entity into their market arguing instead that the government's role should be restricted to stimulating demand, such as through provision of improved online services and perhaps subsidising users. Nevertheless some of the larger providers have signed agreements with Telebras, and a large number of the smaller operators have approached Telebras, seeing the opportunity to break the control of the larger operators on the market.

The service is expected to be particularly useful to small broadband providers operating in the smaller towns and more remote areas that have not been reached effectively by the large operators. So far about 600 broadband providers have registered their
interest on the Telebras web site, with 1000 registrations expected by the end of the year.

The other key actions being taken by Telebras and the government agencies to achieve the PNBL objectives above are:

- The establishment of a broadband price/performance target of R35 per month for a 1Mbps connection
- The provision of broadband services directly to consumers where other operators are not present or providing inadequate services
- Provision of soft loans to small broadband providers to expand their services
- Freeing up additional radio spectrum for use in broadband provision
- Tax exemptions for equipment and providers meeting local manufacturing or performance objectives

The PNBL also aims to support the development of the Brazilian ICT equipment and related services industry, which is seeing strong international competition especially from China. Telebras is able to give preferential treatment to Brazilian firms by allowing Telebras’ procurement process to select local companies even if the cost is higher than the bids of foreign companies.

A consortium was formed in July 2011 to promote the development of local Brazilian ICT equipment sector, called GENTE25, which consists of companies that each invest more than R150 million of their sales in R&D (about 20%). This includes Gigacom, CPQD, ASGA, WXBR, Trópico, Icatel, Parks, Digital e Datacom and PadTec. Padtec recently won Telebras’ R68 million tender for hardware to support the PNBL rollout. The company is a subsidiary of the Centre for Research and Development in Telecommunications (CPqD), a private foundation that was the technology arm of Telebras prior to its dissolution following privatization of the telephone sector. Telebras still holds a 65.7% stake in Padtec.

The scope of the PNBL may widen further if the PNBL adopts the September 2011 recommendations of the IPEA. The IPEA proposes a series of measures to address those at the bottom of the pyramid who cannot even afford the R35/month target price for broadband. These include extending tax breaks to mobile phones and television sets, more public support for additional public access/telecentre facilities, and offering prepaid plans and fractional prices (weekly rates for example).

The key elements of the envisaged activities outlined above, along with other related government initiatives are described in more detail below.

### 3.1 Price and performance targets

The R35/month target was determined by field research which indicated that the 70% of the Brazilians that are still offline would be willing to pay this amount for the connection. As mentioned above however, the September 2011 IPEA indicates that even this price is still too high to be affordable by the poorest segment of the population. In addition the R35/month target does not include the cost of the subscriber equipment, and this could also be a significant barrier to entry unless bundled into long-term contracts.

The initial speed target is perhaps the more difficult component to derive, since 'broadband' is such a rapidly evolving area26, and in fact the initial speed target for the PNBL was 512Kbps, but this was subsequently increased to 1Mbps shortly after the Rousseff government took over. Operators using the Telebras network are initially required to provide a minimum of 20% of the target speed of 1Mbps.

The government is also planning to ensure the speed of offerings of all broadband connections in the country is guaranteed. Currently most broadband users receive considerably less capacity than advertised. As a result Anatel has proposed that providers with more than 50,000 customers will have to deliver to users at least 60% of average contracted plans. The rule also provides for raising the requirement to 70% in 12 months, and 80% after the following year.

Efforts are also being made to monitor and benchmark the quality of available broadband services. In mid-2011 Anatel proposed the establishment of a broadband speed test service which would be available to subscribers directly, and the test is now available on the NIC.br web site. However Sinditelebrasil, the national lobby group of

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24 Lines of credit have been made available by the National Development Bank (BNDES) with interest rates of 1% per month and no collateral requirements.

25 Grupo de Empresas Nacionais de Tecnologia

26 It may be recalled that the maximum speed only a decade ago was 56Kbps dialup or GPRS was the standard
telecom operators and service providers, has objected to using this as a benchmark because it believes that the variable capacity of the end-user access devices\textsuperscript{27} will distort the test and make it unreliable in providing an accurate assessment of broadband quality. Sindibrasil has made an alternative proposal that the ISPs should provide speed measurements directly.

Although Telebras’ speed target is expected to rise to 5Mbps by 2014, a major limitation currently is the total traffic download limits allowed by Telebras. This is only 300Mbytes/month for fixed links and 150Mbytes for mobile links (after which users will be responsible for paying additional usage fees). This places a major restriction on the extent of use for the fixed fee of R35, especially as speeds increase. For example, this would only allow a download of one 45minute video\textsuperscript{28} per month. As a result this aspect of the PNBL strategy has come under criticism from civil society groups and a number of the broadband providers who have indicated that this will limit their interest in using the Telebras network, pointing out that many of their low-end packages already offer better value. For example GVTs basic service is 5Mbps for R49 per month and NET offers a triple-play package in Sao Paulo, including 1Mbps internet for R29.80 per month, taking advantage of the VAT exemption.

At the wholesale level, Telebras is selling dedicated capacity on its network for R230/Mbps/month, which is currently about half the available price from the commercial providers. This is a significant decrease and will no-doubt put downward pressure on the wholesale market, and should therefore be good value for the small providers. However some have observed that combined with the minimum price/performance stipulations the economics of the offering do not yet make business sense. They point out that with the 20\% minimum performance target this means only 5 subscribers can share the 1Mbps upstream capacity purchased, thereby only generating a revenue of R175/month (R35/month/subscriber).

### 3.2 Coverage targets

As indicated above the primary target is to ensure that 40 million households or 68\% of the population are able to access broadband by 2014.

In May 2010, the first 100 under-served cities were identified and the availability of PNBL services from Telebras’ wholesale facility announced. With a combined population of 14 million, most of the cities are in the Northeast (58) and Southeast (30). The states with the most cities listed are Bahia, Minas Gerais and Rio de Janeiro, with eight listed in each.

By the end of 2011 at least 300 cities should be covered. These have been selected as those at the bottom of the Human Development Index (HDI) and in states that have exemption from sales tax.

### 3.3 Backhaul/backbone network development

To establish its national backbone fibre network, Telebras is leasing capacity from traditional and alternative infrastructure fibre operators (mainly the energy distribution parastatals). So far it has established a fibre network of about 35 000kms, having reached agreement with Eletronet and Petrobras.

Telebras is in the process of making similar arrangements with other wholesale fibre operators, such as electrical energy distribution group CEMIGTelecom in the state of Minas Gerais.

### 3.4 Promoting increased broadband competition

In July 2011 Anatel approved rules to increase competition in the telecom sector with the introduction of the General Plan for Competition\textsuperscript{29} (PGMC) which applies only to the large telecommunication and subscription/cable TV companies with Significant Market Power (SMP). The regulation allows Anatel to compel the operators to share network infrastructure with smaller players who must be offered lower wholesale prices than the SMPs offer at the retail level. In the area of subscription TV, users would be allowed to purchase their own decoders at retail prices. A form of local loop unbundling is also being considered that would allow any provider to sell services on the last mile if the operator that installed it is not providing services. In addition broadband providers will also be required to implement 51 new internet exchange points IXPs.

\textsuperscript{27} Such as CPU speed, memory, viruses, botnets, downloads running in background etc

\textsuperscript{28} Using a rough estimate of 600Mb for a 90minute video in a standard compression format such as the AVI codec

\textsuperscript{29} Plano Geral de Metas e Competições
The PGMC also aims to create three organizations funded by the operators. One will compare the offers from retail services to give more transparency to the consumer and pinpoint the best options for them. Another will provide a representative forum for operators without significant market power, and a supervisory body will be create a centralized database of wholesale offers and to promote conflict resolution between operators.

Finally, operators are expected to provide a range of backhaul capacities, depending on the city size – 32 Mbps (for municipalities of up to 20,000 inhabitants), 64 Mbps (for 40,000 inhabitants), 128 Mbps (60,000) and 256 Mbps (over 60,000 inhabitants). Where there is capacity available companies will have 60 days to install the link.

In August 2011 Anatel announced proposed revisions to the SCM license (the main broadband service provision license), which aimed to make it easier for small providers to enter the broadband market. The main changes are to relax the criteria for evaluating the credentials of the licence applicant and to create new licenses with smaller geographic scope – state and municipal level licenses. Previously there was only the national licence costing R$9000 per year, the price of which remains unchanged, while the annual fees of the new licenses are R$1200 for a state license and R$400 for a municipal license.

Other planned changes include:

- Companies without SCM licenses would be able to partner with an existing SCM license holder to provide niche services such as broadband-based home security systems.
- The individual costs of bundled services (such as broadband with IPTV or voice telephony) are to be made explicit and operators required to allow any part of the service bundle to be cancelled by the subscriber.
- Above the 50,000 subscriber threshold the quality of the provider’s service will be regulated and increased time limits imposed on subscriber data retention.
- The concept of net neutrality would be upheld, whereby providers are not allowed to limit the speed of any of the data passing to the subscriber.

3.5 Use of satellite

A network of free broadband services via satellite, known as the GESAC Program, has been incorporated as part of the national broadband strategy. In November 2010 new contracts were signed between MiniCom and a private satellite operator to expand the number of ground stations in schools, community telecenters and other public or community entities in areas not served by other broadband services. The number of ground stations will be expanded by 1,460 to a total of 13,379, operating at speeds between 512 kb/s and 2 Mb/s.

In addition, the auction of four satellite positions for private use took place in September 2011, should reinforce the availability of satellite capacity for remote areas by 2014. In the same month broadband provider Ozônio Telecomunicações announced it planned to invest US$1.2bn in a satellite based internet service for the Amazonas, using the O3b satellite network which is to be launched in 2013. IPEA has also proposed that the feasibility of a national satellite to complement PNBL be examined.

3.6 Extension of mobile services to remote areas

Another strategy that is being discussed by Anatel to support the PNBL is to improve mobile network coverage in the more remote and rural areas that are currently under-served. The two options under consideration are either to provide some type of subsidy to encourage the existing operators to extend their networks, or to establish a shared wireless infrastructure managed by a third party which would lease services to the existing operators.

3.7 Universal service

This year (2011) Anatel has been conducting a 5-year review of voice telephony (PSTN) licenses, the concessions for which expire in 2025. This includes reviewing the licensees' universal service objectives to ensure they are in line with updated requirements for meeting outstanding connection needs in remote and rural locations. In May 2011, Anatel held a series of public consultations on the license review which culminated in new USO proposals. Supporting the objectives of the PNBL, they included expansion of

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30 Currently only about 13 SCM licensees have more than 50,000 subscribers.
the fixed telephony network to support broadband services by ensuring a minimum transmission capacity of 2.5 Gbps to all municipalities with more than 30,000 inhabitants. In addition the proposals, if adopted, will allow operators to apply their license renewal fees directly toward universal service projects.

3.8 Content and applications

Demand for local government services is to be supported by the PNBL with Federal government plans to establish a cloud services platform for use by municipalities. This strategy has also generated some controversy among some members of the private sector which have said the provision of application services should be left to the private sector, as with broadband service provision.

3.9 Radio spectrum liberation

Anatel is accelerating the process of making more radio spectrum available for broadband, and a number of spectrum bands have already been released. With its long-distance transmission characteristics, the 450Mhz band has been opened for rural communications, previously held by a number of state agencies. In the 3.5Ghz band Anatel also expects to allocate a specific segment for the PNBL. The availability of the 3.5Ghz band was initially delayed in court by the fixed line operators, which challenged Anatel's plan to make the band available for only for new competitors, but their protest was unsuccessful.

Unused parts of the 1.9 GHz band are to be issued to new mobile operators with the requirement that 3G services be provided with coverage in all municipalities of 100,000 inhabitants or more, even although mobile services are not under PGO public service regulatory regime. Similar requirements are likely to be imposed on operators seeking authorizations to operate in parts of the 3.5 GHz band.

Other spectrum liberation activities include:

- Frequencies above 6 Gzh will be made available for Telebras to provide point-to-point links in municipalities using high-speed radios
- The designation of the 2.170-2.182Ghz band, and the 2.5-2.690Ghz band has been changed, in order to foster broadband access, and has published public consultations regarding the designation of other radio frequency channels, with similar objectives.

3.10 Subscription/cable TV broadcasting

The opening up of the subscription/cable TV sector has been under discussion for some time but this intention appears to have been accelerated following the announcement of the PNBL. In August 2011 the government announced the removal of the legal limitation that prohibited majority foreign owned telecommunication companies from operating in the subscription/cable-TV market. This will allow entry by some of the major telecom providers who are foreign owned, notably Embratel, Telefonica, GVT and Sky.

The IPEA's analysis of the impact of this measure on broadband-use indicates it should boost the number of subscribers significantly. The agency said in a September 2011 research report that the presence of a subscription/cable-TV provider could increase broadband subscribers in the location by up to 35%.

3.11 Fiscal incentives and subsidies

Tax levels on equipment and services are relatively high in Brazil, and according to the telecom industry lobby group Telebrasil, the government tax on broadband services currently increases the cost to the consumer by 43%, while taxes on imported modems adds 78% to the price. Some tax exemptions on connectivity services pre-dates the PNBL in some states, however the government at both federal and state levels is now adopting a broad a range of tax exemptions to promote the uptake of broadband and other ICTs.

Concerned that the backbone and middle-mile networks will not be sufficient to cope with rising local demand for broadband, in August 2011 the Ministry of Finance agreed to forfeit an estimated R4 billion in tax revenue to encourage operators and suppliers to make R70 billion worth of investment in the construction of fibre-optic networks over the next four years. Priority will be given for projects that include coverage of North and Northeast regions.

Due to import substitution promotion, foreign ICT equipment is subject to 50% duties and this is encouraging efforts to develop more advanced local manufacturing facilities to help reduce the cost of

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32 The license for the 3.5Ghz band does not allow existing fixed line operators to use it in their market areas.

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computers, phones and other telecommunication equipment. In 2009, the government announced that
the exemption on taxes for strategic capital goods, including computers and tablets, would be extended
to 2014. For computers alone, this was expected to cost the government about R1.6bn in 2010. In
addition all taxes and import duties have been waived on computers for the public school system.

To further reduce the cost of tablets and related network access devices, in May 2011 the government
announced its intention to exempt locally made hardware from industrial taxes which, when
combined with sales tax exemption, this could reduce prices to consumers by 30-40%. The bill was passed
by the lower house in September and is expected to be approved by Senate shortly. Also in September,
IPEA published a report proposing that tax exemptions be extended to mobile phones and
televisions if universal access to the Internet is to be achieved.

A growing number of states are exempting broadband from sales taxes. In 14 of the 26 states (which have a
total of 49% of the population) agreement to exempt broadband from sales tax (VAT) has recently been
reached. However of these, only seven have signed the exemption in local law - Sao Paulo, Rio de
Janeiro, Espirito Santo, Parana, Goias, Pernambuco and Pará. The remaining states where this is pending
are Distrito Federal (Brasilia), Acre, Amapá, Ceará, Rio Grande do Sul, Santa Catarina and Sergipe.

Brazil's lower house has given approval to a proposed measure offering tax breaks for national production
of tablet computers. The bill, which still must gain final approval in the Senate, would offer
manufacturers full exemption from industrial manufacturing and retail taxes, as well as import taxes
for electronic components. According to government estimates, the tax breaks could help reduce the final
cost to consumers by 20%-30%.

To promote deployment of broadband to remote and under-served areas the government is currently
discussing the possibility of subsidising the cost of providing connections to the end user.

The government also plans to discuss with the energy distributors the possibility of offering lower electricity
prices to small broadband providers.

3.12 State and municipal efforts

Prior to the PNBL there have been a variety of number of municipal and state supported efforts to
improve access to the Internet, including the use of tax incentives and provision of low cost, or even free,
broadband services in public access facilities and schools. These efforts are now accelerating following
the PNBL. A growing number of municipalities are participating in the PNBL and partnering with
Telebras for use of network infrastructure. In the agreement, the Telebras will use the municipal
networks and offer access in cities where broadband is not widely available.

An example is the state of Sao Paulo which has exempted broadband from sales tax for the last two
years but in August 2011, the State announced that a complete mapping of the investment by operators
would be made, including capacity and locations covered. From this, the department will mount a
public investment plan for municipalities not covered. The goal is to ensure that in the next two years, all
municipalities of less than ten thousand inhabitants in urban areas, have broadband access – this is expected
to be about 230 cities. Where current operators indicate they are unlikely to cover these cities within
two years, the state will offer finance and tax incentives to other operators to ensure that access is
provided.

The State of Paraná has been taking a different approach to improving connectivity for its citizens,
using the state energy company, Copel33, as its primary vehicle for this. The Paraná State Plan for
Broadband was adopted In August 2010 and in February 2011, Copel announced that it would use its
17 000 km fibre optic network to provide 100Mbps broadband connections. With an investment of R100
million, the company plans to ensure 100% coverage of all municipalities by 2012. Paraná State is allowing
Copel to defer its tax payments in return for a) ensuring the wholesale 1Mbps price is R230 or less, b)
reserving 15% of capacity for low-income groups paying R15/month or less, and c) reserving another
15% of capacity for services at R30 per month. In addition a 10:1 contention ratio is specified by the state.

The State of Ceará is also amongst the most advanced in its efforts to ensure broadband access for its
citizens. In 2008, the state government decided to

33 Companhia Paranaense de Energia
create its own fibre optic and WiMax infrastructure, with the aim of providing broadband access in major cities. Coverage of 92% of the population was expected by July 2011. Known as the Ceará Digital Belt\textsuperscript{34} (CDC), with an investment of R65m, a ring of 2500 km of fibre has been established linking all 56 metropolitan areas. Free access is provided to all public institutions in the state.

At the city level, the mountain municipality of Canela with about 40 000 inhabitants near Porto Alegre has become a digital city role model. In March 2011 Canela planned to open a 1 Gbps network, developed in partnership between city and federal governments and private enterprise. The network has been established mostly with support from the private sector in provision of infrastructure.

\textsuperscript{34} Cinturão Digital do Ceará
When the Cardoso government promoted the privatisation of the telecommunications sector in Brazil in 1998, the promise was that increased competition would bring down prices. While the extension of services has reached most areas for voice services, prices have remained relatively high, and the availability of new services such as broadband have been slower and more costly than expected. In addition the telecom sector has become more concentrated among fewer dominant players which are mostly owned by foreign operators. The PNBL is clearly responding to this market environment, aiming to reduce costs, increase coverage and support local Brazilian industry.

It is notable that the PNBL did not come out of nowhere and builds on much prior experience, including in sector regulation. However most direct initiatives concentrated on public access facilities (telecentres), e-applications development and low cost access equipment – open source, locally manufactured desktop computers. Since then the environment has moved on, broadband has become a priority, local applications development has continued to take place and access devices have switched to laptops, smartphone and tablets which are a once-off cost and becoming increasingly affordable. As a result lowering broadband costs and improving performance is rightly seen as the key priority to achieve digital inclusion and leverage the benefits of ICTs for development.

The operators' mixed reactions to the PNBL has highlighted the continuing tension between public and private sectors, and between the dominant players and the small ones, in defining the best way forward. The technical and market complexity of Internet provision generally, and in Brazil in particular, has not helped either side to identify a clear collaborative strategy, and as elsewhere in the world, this is an ongoing area of debate.

The discussion over the role of the public versus the private sector is also taking place within different parts of the federal government. Subsequent to the announcement of the PNBL, which was largely developed by the Ministry of Planning, some other parts of government have indicated that they are not entirely in agreement with the strategy, and similarly to the private operators, have indicated their preference for a model focussing on subsidising the cost of providing connections to those who cannot afford current market rates.

In any event the 'proof will in the pudding' and it remains to be seen how effective Telebras will be in competing with the private sector to drive down prices and extend the range of services. However it seems that simply the threat of this type of initiative has already caused the private operators to respond by lowering prices and increasing their coverage targets.

In Brazil, as in China, the role of the state is notable in equipment development and the efforts of the government to support local manufacture of equipment are extensive, ranging from R&D support, tax breaks and import barriers for foreign equipment. The effectiveness of import barriers is as yet unclear, but currently the cost of much of the consumer equipment available in Brazil is higher than it is in Europe or North America. This has also resulted in a small but significant grey market in ICT goods, either bought from tourists, or while travelling abroad, and sometimes even smuggled in.

Among the other key issues that the initiatives taking place in Brazil have drawn attention to so far are:

- The setting of performance targets for the quality of broadband services under the PNBL has highlighted discussion of the relative importance of speed versus traffic limitations. Many have said that with low monthly traffic caps, access to higher broadband speeds is largely meaningless.

- Price target setting needs to be able to take into account the bundled service offerings which can extend the basic broadband service to double and triple-play, where TV and voice services may be part of the broadband package. In fixed line ADSL services, the bundling of voice telephony subscriptions is also very common, but increasingly unneeded due to the availability of mobile telephony.

- If the setup cost for the access equipment (modem and terminal device) is not taken into account, and remains at market-related prices, the lowest income groups will likely find the cost of entry unaffordable. Some operators have initially responded by making
a USB modem free if a contract is signed, but this is not guaranteed to continue indefinitely.

- Brazil's experience also show that tensions between broadcast and telecom sectors, and between fixed and mobile sectors needs to be anticipated. The broadcast sector will resist opening up to telecom operators and the subsequent debate over network neutrality can slow down implementation of effective solutions.

- Technically, the debate over the ability of mobile operators to service the demand for high speed broadband (>5Mbps) continues. Clearly, in developing and emerging markets where the penetration of fixed infrastructure is low, mobile wireless will have a vital role to play for some time to come. But even in these markets, notwithstanding the lack of experience with LTE, fixed-line infrastructure – fibre to the home in particular, may well be the ultimate evolutionary path to cope with exploding demand for capacity.

- The consolidation of fixed, TV and mobile operators in single integrated companies offering triple- and quad-play services also appears to be becoming a world trend, improving operator profitability with economies of scale, streamlined management and better optimization of investments. Demand for broadband is also an accelerator of this process in the mobile sector - with 3/4G mobile broadband, the only way to scale services sufficiently is to use fibre in the backhaul transmission to connect their cell sites. These conclusions seem to be gaining wider acceptance as underlined by the merger of Embratel and Claro, the purchase of GVT by Vivendi and the efforts of Telefonica to buy Portugal Telecom's share in Vivo. A similar dynamic is also evident between the broadband and TV broadcasting sectors.

- Fiscal measures such as tax exemptions for equipment and broadband services are a key plank in Brazil's broadband strategy but do not seem to be as well recognised elsewhere. Brazil’s approach is even more innovative in that it proposes to exempt operators who reduce the cost of their offerings by a significant margin. In a federal system such as Brazil, the variation in the extent of exemptions underscores the need for buy-in at each level of government.

- Top-level support from government has been observed as a key feature of many of the more successful national broadband plans and Brazil is no exception. The PNBL was devised under the previous President Lula’s close leadership and reaffirmed by the current President Rousseff, who said, in her first public address to the population following her taking of office earlier this year, that the implementation of the PNBL would be accelerated. At the other end of the spectrum, the efforts of a number of municipal governments to support broadband development, and even provide free broadband services, are noteworthy, highlighting the important role of municipal governments in provision of broadband as a utility, just like water, electricity and sanitation. Finally, the variation in activities of the federal, state and municipal governments also calls attention to the need for all levels of government to co-ordinate their efforts to ensure the most effective use of resources and to make affordable high speed broadband available as quickly as possible.

- The opportunity to massively reduce the costs of broadband network deployment by ensuring access to other complementary infrastructure sectors – namely power and transport, has not gone unnoticed by Brazilian broadband policy makers - one of Telebras' first actions was to secure access to the fibre infrastructure of the petroleum and electricity distribution networks. However little discussion has so far taken place for the future advantages of ensuring that ducts are provisioned in every new road, and ensuring smooth and low cost access to rights of way for fibre cable.

- In making additional radio spectrum available for broadband, the tensions with the dominant players, and incumbent mobile operators in particular, to use control over access to spectrum as a way of staving off competition signals the importance of forward planning in spectrum management and the need for strong independent policy-making.
In conclusion, although it is early days in the PNBL programme, developments over the coming year will be watched with keen interest by policy makers, civil society and providers wherever the promotion of access to ICTs has become a national policy issue. In this respect the Brazilian experience is and will continue to be a valuable one for most other countries planning broadband strategies.
5. Annexes

5.1 A timeline of events relating to the PNBL

August 2009. The Steering Committee for Digital Inclusion Programmes is formed, which lays the groundwork for the PNBL.

May 2010. The PNBL is officially announced by Government decree 7.175.

June 2010. Supported by the CGPID, a series of public consultations on the PNBL takes place with civil society, private sector and government officials.

24 Aug 2010. Complementing the 16 State capitals already announced, Telebras publishes the list of the next 100 cities that will receive broadband access by end 2010. It said a further 1063 cities are planned for 2011.

November 2010. Padtec, a Campinas based Brazilian equipment supplier, wins Telebras' R68m tender for hardware to support the PNBL roll-out.

A consortium of 29 operators, represented by SindiBrazil, files an objection in the Federal Court in Rio de Janeiro claiming that Telebras does not hold the power to provide services for the Federal government, and saying that the use of Telebras as a state company is "anticompetitive". The claim is not upheld.

Anatel approves measures allowing operators to apply their license renewal fees directly toward universal service projects.

The government announces plans to host cloud-based applications in support of the PNBL to make it easier for municipalities to provide online content.

January 2011. The budget for the PNBL is revised – Initially, R600 million was to be released to Telebras in 2010 and R400 million in 2011. Now, Telebrás is to have R316 million for 2010 and an additional R273 million in capital investment in 2011.

Federal development bank, Banco Nacional de Desenvolvimento Economico e Social (BNDES), provides credit lines without collateral requirements to small Internet providers participating in the PNBL.

Telebras is issued with an SCM license and thereby authorised by Anatel to provide services to the last mile.

February 2011. The new Secretariat for Digital Inclusion is inaugurated by the federal Government Ministry of Communications.

Fibre optic cable reaches Manaus (the capital of the Amazonas) via Venezuela in a joint project with Brazil to interconnect the power and fibre networks of the state utilities of Eletrobrás and the Compañia Anónima Nacional Teléfonos de Venezuela (CANTV).

Seven Brazilian state governments agree to eliminate state taxes for broadband service provision and tablet computers will also be exempt from federal taxes, in line with the existing exemption on PCs and laptops.

April 2011. Telebras announces that it had invested R166m in equipment and services to establish itself as a broadband provider.

May 2011. Telebras reaches agreement with Petrobras and Eletrobras (Furnas, Chesf, Eletrosul and Eletronorte) to use the fibre networks of their energy distribution grids.

Government announces intention to reduce taxes on locally manufactured tablet computers.

The 'Broadband is Your Right' campaign is launched by a coalition of civil society groups.

**August 2011.** The cable TV market is opened to telecom operators and others with foreign-ownership exceeding 49%.

After public consultation Anatel releases the proposed revisions to the SCM license which aims to make it easier for small providers to enter the broadband market.

The Ministry of Communication announces that it plans to ensure that at least 80% of metropolitan areas will have 4G coverage by 2014 (in time for the FIFA World Cup). To achieve this, tenders for the provision of 4G are being speeded up and the first set of tenders will be issued in April 2012.

Telebras announces that budget cuts for the PNBL programme this year from R1bn to R350m will delay the roll out but that 250 cities should be covered by end 2011.

Mobile operator Claro announces that it will join the PNBL and is now able to provide a 1Mbps service based on 3G in 515 cities for R29.90 / month (with a 200Mb/month traffic cap). Claro also said that by the end of 2011 the service will be available in 1017 cities.

The city of Santo Antônio do Descoberto in Goiás state is the first to see the rollout of PNBL with residents able to obtain the 1Mbps service.

The Federal government says it will provide tax exemption for the deployment of new telecommunication networks in areas which are not yet served.

Telebras signs a contract with the state of Ceará to use its 740km of its 2500km fibre backbone for the PNBL.

**September 2011.** Brazilian manufactured tablets become available.

Brazil's government (lower house) agrees to exempt locally manufactured tablets from the federal taxes, which is expected to reduce tablet price by 30%. The bill now goes to Senate.

Telecom operator GVT, part of the Vivendi Group, announces it will invest U.S.$300–500 million to build a backbone network International in partnership with international carriers.

Telebras announces that it has signed contracts to supply network infrastructure for more than 20 Internet service providers and expects to close the year with more than one thousand ISPs registering their interest on the Telebras web site (currently about 600 have registered).

### 5.2 Relevant links

#### 5.2.1 Government agencies

- **Cabinet Office of the President** [http://www.casacivil.gov.br](http://www.casacivil.gov.br)
- **Ministério das Comunicações (primary broadband policy maker)** [http://www.mincom.gov.br](http://www.mincom.gov.br)
- **Anatel (National regulator)** [http://www.anatel.gov.br](http://www.anatel.gov.br)
- **PNBL** - [http://www4.planalto.gov.br/brasilconectado/pnbl](http://www4.planalto.gov.br/brasilconectado/pnbl)
- **Multistakeholder Internet Management**
  - **CGI.br (Internet governance)** [http://www.cgi.br](http://www.cgi.br)
  - **CETIC.br (Internet Metrics)** [http://www.cetic.br](http://www.cetic.br)
  - **PTT.br (Internet Exchange Points)** [http://www.ptt.br](http://www.ptt.br)
- **ICT and broadband market information sources**
  - **Teleco** [http://www.teleco.com.br](http://www.teleco.com.br)
  - **Teletime** [http://www.teletime.com.br](http://www.teletime.com.br)
  - **Anatel** [http://www.anatel.gov.br](http://www.anatel.gov.br)
- **CETIC.br & NIC.br** - Reference centres for indicators and statistics on the use of ICTs in Brazil
  - [http://cetic.br](http://cetic.br)
  - [http://nic.br](http://nic.br)
5.2.2 Major broadband and telecommunication operators active in Brazil

AES Com [http://www.aescomrio.com.br]
Cenig Telecom [http://www.infovias.com.br]
Claro [http://www.claro.com.br]
CTBC [http://www.ctbc.com.br]
Dialdata [http://www.dialdata.net.br]
Diveo [http://www.diveo.net.br]
DslIPvox [http://www.dslipvox.com.br]
Easytone [http://www.easytone.com.br]
Eletropaulo Telecom [http://www.eletropaulotelecom.com.br]
Embratel [http://www.embratel.com.br]
Engevox [http://www.engevox.com.br]
Epsilon informática [http://www.epsilon.com.br]
Global Crossing [http://www.globalcrossing.com]
Global Osi [http://www.globalosi.com.br]
GT Group [http://www.gti.net]
GVT [http://www.gvt.com.br]
IDT [http://www.idlatinamerica.com]
Nextel [http://www.nextel.com.br]
Oi/Telemar [http://www.oit.com.br]
Portugal Telecom Brasil [http://www.portugaltelecom.pt]
Sdw [http://www.sdwtecnologia.com.br]
Sercomtel [http://www.sercomtel.com.br]
Sky [http://www.sky.com.br]
Telebras [http://www.telebras.com.br]
Telefonica [http://www.telefonica.net.br]
Tellfree Brasil [http://www.tellfree.com.br]
Tim [http://www.timbrasil.com.br]
Tmais [http://www.tmais.com.br]
Transit do Brasil [http://www.transitbrasil.com.br]
Vivo [http://www.vivo.com.br]

5.2.3 Industry Associations

Abranet Brazilian Internet Association [http://www.abranet.org.br]
Abrint Association of Brazilian Internet and Telecommunication service providers [http://www.abrint.com.br]
Campaign for Universal Broadband [http://campanhabandalarga.org.br]
Conapsi[37] Internet Service Providers Association [http://www.conapsi.org.br]
SINDITELEBRASIL[38] Lobby association of the 40 largest telecom operators [http://www.sinditelebrasil.org.br]
TelComp[39] Telecom industry association [http://www.telcomp.org.br]
Telebrasil[40] Association of Brazilian Telecom operators [http://www.telebrasil.org.br]

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[35] Associação Brasileira dos Provedores de Internet e Operadores de Comunicação de Dados Multimídia –
[36] Associação Brasileira de Telecomunicações Rurais
[37] Conselho Nacional das Entidades de Provedores de Serviços de Internet
[38] Sindicato Nacional das Empresas de Telefonia e de Serviço Móvel Celular e Pessoal -
[39] Associação Brasileira das Prestadoras de Servicos de Telecomunicoes Competitivas
[40] Associação Brasileira de Telecomunicações
BROADBAND IN KENYA
BUILD IT AND THEY WILL COME
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Glossary of Terms

ADSL  Asymmetric Digital Subscriber Line
ASP  Application Service Provider
BPO  Business Process Outsourcing
CCK  Communications Commission of Kenya
COMESA  Common Market for Eastern and Southern Africa
CSP  Content Service Provider
DSL  Digital Subscriber Line
EABs  East African Backhaul System
EAC  East African Community
EASSy  Eastern Africa Submarine Cable System
FONN  Fibre Optic National Network
GDP  Gross Domestic Product
HDI  Human Development Index
KENET  Kenya Education Network
KICTB  Kenya Information and Communications Technology Board
KIE  Kenya Institute for Education
KIXP  Kenya Internet Exchange Point
KNADS  Kenya National Archives and Documentation Service
KTCIP  Kenya Transparency Communication Infrastructure Programme
LLU  Local Loop Unbundling
LTE  Long Term Evolution
LION  Lower Indian Ocean Network (undersea cable)
MOIC  Ministry of Information and Communications
MTP  Multimedia Technology Park
NEPAD  New African Partnership for Development
NFP  Network Facilities Provider
NOFBI  National Optic Fibre Backbone Infrastructure
PPP  Private Public Partnership
QoS  Quality of Service
TEAMS  The East African Marine System
TESPOK  Telecommunications Service Providers Association of Kenya
USF  Universal Service Fund
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This case study is one of an initial series of seven that will contribute to the Broadband Strategies Toolkit, an online resource for policy-makers and regulators, especially in developing countries (see www.broadband-strategies.org). The case studies are generously funded by the Korean Trust Fund (KTF) on Information and Communications for Development (IC4D). The KTF is a partnership between the government of the Republic of Korea and the World Bank Group whose purpose is to advance the ICT4D agenda to contribute to growth and reduce poverty in developing countries.
This report considers the case of broadband in Kenya and the manner in which the country has tackled its capacity challenges. Kenya has a natural geographic advantage, being strategically positioned on the East Coast of Africa. Its government-led “build it and they will come” approach to broadband development has leveraged that advantage, and has played a major role in dramatically increasing fibre optic backbone capacity. Many of Kenya’s milestones have been realized in less than five years – three cables had landed by the end of 2010 changing the face of the broadband market. The country has gone from relying on satellite for international capacity, to having access to almost four terabits over fibre from the three cables combined.

Although the landing of the cables is merely a first step, it has already resulted in an 80 percent decrease in wholesale bandwidth costs. Lower prices and greater availability are expected to increase access to the Internet as well as to promote the continued spread of sophisticated mobile applications and services and consequently improve opportunities for the creation of and access to information and knowledge. Affordable broadband is expected to increase Kenya’s competitiveness, particularly in the Business Process Outsourcing (BPO) sector, and to encourage entrepreneurship and innovation.

What the Kenyan case demonstrates is that the promotion of broadband capacity is multifaceted and takes place on a number of different levels. This report analyses the approach that has been taken to addressing network capacity challenges (supply side), as well as human capacity considerations affecting usage and uptake (demand side) by considering:

- the wholesale market for broadband connectivity (domestic and international backbone connectivity);
- the retail market for broadband access (i.e. “last mile connectivity”); and
- the development of services, applications and content.

With an estimated fixed and mobile broadband penetration rate of 2 subscriptions per 100 people in 2010, Kenya still has significant progress to make with respect to broadband uptake. Stimulating demand and usage by Kenyan citizens and the public and private sector remains a challenge. Kenya has, largely through the government, taken an innovative and pro-active approach to putting the user at the centre and addressing the other elements of the broadband ecosystem, such as education, literacy, applications and content. This has been done through good regulation, the promotion of polices relating to ICT in education, the subsidization of relevant content and application projects, and facilitating creative Public Private Partnerships (PPPs).

This report finds that much of Kenya’s success is due to four important factors:

- A clear national vision articulated in Vision 2030;
- Strong leadership and direction;
- A credible regulatory, policy and institutional framework; and
- Leveraging the strength of the public and private sectors through PPPs.

The initiatives discussed in the report possess elements of these traits across all aspects of the broadband ecosystem.

The Kenyan experience is inspiring, yet it has not been perfect. There have been a few hiccups in terms of the pace of implementation, and overlaps in the policy and institutional framework. These are discussed in this report to provide a proper context for the Kenyan broadband story and to enable countries to learn from Kenya’s experiences.
1. Why Broadband Matters

Developing country policy makers in the ICT sector have spent the last 15 to 20 years encouraging the competitive supply of networks and services through market reform processes. The same policy makers are now faced with the challenge of moving beyond networks and the need to start developing strategies to increase demand. They are furthermore faced with the glaring reality of the cross cutting impact of ICTs and the need to recognize that ICT access is not just a Ministry of Information and Communications issue – government agencies responsible for the ICT sector now need to work more closely with other public sector stakeholders to create content (e.g. online application forms, e-government solutions, online payment mechanisms, etc.) to drive demand in order to make broadband access meaningful. The policy response to broadband is thus changing.

The Government of Kenya recognized this relatively early and in 2006 had included a holistic approach to ICT in its national Vision 2030, its National ICT Policy and its approach to regulation. Although there is no separate Broadband Policy, making the Kenyan approach seem fragmented at a glance, there is a holistic ICT framework with strong dependencies on access to high-speed connectivity in Kenya. The national framework recognizes that broadband is an ecosystem and as such considers strategies, policies and regulations that address both supply and demand side considerations. The ICT framework is set against the backdrop of the MOIC Strategic Plan and includes the regulatory incentives provided by the Communications Commission of Kenya (CCK) relating to infrastructure sharing and spectrum licensing, as well as supply side interventions made by agencies such as the Kenya ICT Board which are discussed in section 6.2. The Kenyan framework recognizes that there are two types of broadband capacity – network capacity, i.e. the development of high-speed data communications networks, and human capacity enabling the use of the services through the development of relevant content and applications to promote the use of these networks. Building capacity in both areas is what will make broadband matter.

The economic and social impact of broadband is well researched and documented. An increase in broadband penetration has a greater impact on economic development than a concomitant increase in access to other telecommunications services. The World Bank estimates that in low and middle-income countries such as Kenya every 10-percentage point increase in broadband penetration accelerates economic growth by 1.38 percentage points.¹

The economic impact of broadband is wide – it positively impacts innovation, job creation and employment, as well as the software and manufacturing industries. It promotes access to information – thus promoting transparency and good governance, critical in a country like Kenya with a historic reputation for corruption, with related political and social benefits. In recognition of the critical role of broadband, and in light of the Ministry of Information and Communications’ objective of moving Kenya towards a Knowledge Based Economy by 2012,² policy makers, regulators and industry players alike are seeking ways to increase broadband coverage and increase usage. In light of the high costs associated with deploying broadband networks, and the fact that broadband is part of an ecosystem which includes demand side factors such as applications and content, and in which users are central, tackling the broadband divide is not quite the same as tackling the digital divide which has been primarily conquered through mobile phones with light touch regulation.

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² The term broadband is defined differently in different countries, primarily with reference to speed. As such, the term must be understood within a country context and the particular aspects of the broadband value chain should be recognized. Broadband in Kenya is defined “as speeds greater than or equal to 256 Kbps in one or both directions.”² In addition, there are several layers in the broadband value chain (wholesale, retail, applications and content) each of which must be treated differently.

2. The Kenyan Context

2.1 Country Background
Located in East Africa, Kenya is bordered by Ethiopia, Somalia, Sudan, Tanzania and Uganda. Kenya’s coastline, along the Indian Ocean, covers over 536 km and its port, like the undersea cables that land along the coast, serves its land-locked neighbours. Kenya is divided into eight provinces and 47 semi-autonomous counties each having its own semi-autonomous government headed by an elected governor. At present the country’s population is approximately forty million, with 68 percent of Kenyans living in rural areas, and about 13 million people living in urban areas. Nairobi is the capital city, and the largest city in East Africa, with a population of over three million. According to the Constitution, Kenya’s national language is Kiswahili, and English and Kiswahili are the official languages, with most Kenyans being bilingual.

Figure 1: Map of Kenya (Source: CIA World Factbook)

Kenya is one of the most industrialised countries in the East African region, yet industry represents only 10 percent of its Gross Domestic Product (GDP). The largest sector of the economy is the agricultural sector which employs 80 percent of the working population, accounts for 50 percent of all exports and 25 percent of the GDP. In light of the fact that the Kenyan economy is highly dependent on agriculture, periodic drought has a significant impact on the economy and has threatened GDP growth. Traditionally tourism, tea and coffee have been the largest foreign exchange earners, but horticultural products and industrial exports such as refined petroleum are also becoming important.

2.2 Human Development
Inequality in Kenya is high with the distribution of income, measured by Gini coefficient, estimated at 39 percent in rural areas and 49 percent in urban areas. Kenya ranks 128 out of 169 countries in the United Nations Development programme (UNDP) Human Development Index (HDI), an alternative to conventional measures of national development. The HDI looks beyond economic growth and provides a composite measure of three basic dimensions of human development namely health, education and income; it represents a push for a broader definition of well-being.

According to the UNDP, over the past 30 years Kenya’s HDI has remained higher than the Sub Saharan African average and has risen by 0.5 percent annually. Kenya’s HDI in 1980 was 0.404 and has risen to 0.470 in 2010; this can be compared to the HDI of the region which increased from 0.293 in 1980 to 0.389 over the same period. Kenya’s position as 128 out of 169 makes it a developing country with low human development.

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5 http://www.unicef.org/kenya/overview_4616.html
2.3 Socio-Economic Climate
According to a report from the World Bank, over the last decade, the Kenyan economy has grown at an average of 3.7 percent. In this time, the Kenyan ICT sector has grown at a rate of 20 percent per annum and has outperformed all other segments of the economy. The World Bank estimates that without ICT, economic growth would have been only 2.3 percent, and income per capita would have stagnated.

In 2010, largely due to tourism, telecommunications, transport, and construction sector growth and recovery in the agriculture sector, an estimated 4.5 percent GDP growth was achieved. A GDP growth of 5.3 percent is forecast for 2011. These improvements in the economy are supported by a large pool of increasingly urbanized (32.2 percent\(^\text{11}\)), highly educated (at least 61.5 percent literacy rate)\(^\text{12}\) and bilingual professional workers who are fluent in English.\(^\text{13}\) This positions Kenya well to use broadband to support its own internal market, as well as to participate globally.

2.4 Regional Role – Kenya as a Hub
An investor-friendly country, Kenya is generally perceived as East and Central Africa’s hub for financial, communication and transportation services; and rivals South Africa as an investment

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http://www.knbs.or.ke/Census%20Results/KNBS%20Brochure.pdf


\(^\text{13}\) English and Swahili are the official languages of Kenya; English is the language of instruction at all levels of school.
hub in Sub Saharan Africa. Political stability is key for Kenya to maintain its influential position in the region and following political instability in 2007, Kenya enacted a new Constitution in 2010 and has emerged in less than five years with a strengthened political, economic and social system. The return to political stability was enabled by the swearing in of a Grand Coalition Government in April 2008 which was established under the “National Accord and Reconciliation Agreement.” The National Accord provides for a power sharing arrangement between the President’s Party of National Unity (PNU) and the Prime Minister’s Orange Democratic Party (ODM).

The country is well positioned as a member of the Common Market for Eastern and Southern Africa (COMESA), which has 19 member states with a combined population of 430 million (2008).\(^{14}\) Kenya is also a member of the East African Community (EAC), which includes Kenya Burundi, Rwanda, Uganda and the United Republic of Tanzania. The EAC adopted a common market protocol in mid-2010 creating a single 130 million-person market with a combined GDP estimated at $72 billion (KES 5.98 trillion).\(^{15}\) Kenya is the largest player in the EAC contributing 40 percent to the regional block’s GDP.

\(^{14}\) COMESA Website. See: [http://www.comesa.int/](http://www.comesa.int/)

One of Kenya’s strengths lies in the central role that ICT in general and high-speed communications infrastructure in particular, plays in its national strategy, *Vision 2030*. A key characteristic of the Kenyan broadband space is the pervasive role of the government which is supported by the strategic, policy and regulatory framework. However, criticisms have been levelled against the heavy institutional framework that has been created to support this vision, particularly in the ICT sector. While the framework has facilitated the growth of the ICT sector in general, the impact on consumers of Internet and broadband has yet to be fully felt.

3.1 Vision 2030

The Kenyan government’s recognition of the strategic role played by ICTs in the economy is an important aspect of the implementation of *Vision 2030*, the country’s ‘development blueprint’.

Vision 2030’s key goal is that Kenya will be one of the top three investment destinations in Africa by 2030. This will be achieved by addressing three pillars – Economic, Social and Political (Figure 3). ICT is explicitly dealt with under the Economic Pillar, which is geared at attaining prosperity for all Kenyans through an economic development programme aimed at achieving an average GDP growth rate of 10% per annum over the next 25 years.

Importantly, one of the factors that has been identified to enable the Kenyan economy to achieve its Vision 2030 targets is the Business Process Outsourcing (BPO) industry, one of 20 flagship projects of the Vision, which includes call centres, back office operations and software development. Even where it is not explicitly stated, ICTs cut across all three pillars in light of e-governance applications and the vision towards a knowledge based economy, as is reflected in the Ministry of Information and Communications’ (MOIC) Strategic Plan (2008 – 2012). It is further reflected in the approach taken by the Permanent Secretary of the MOIC to implement the Strategic Plan, which is to ensure that the ICT sector is not considered in isolation and that it has an impact on national development.

The MOIC Strategic Plan takes the objectives articulated in Vision 2030, interprets them from an ICT sector perspective and puts timeframes and resources to them. It defines projects intended to increase ICT sector developments; discusses strategic initiatives and proposes projects such as the National Optical Fibre Backbone Infrastructure (NOFBI), the East African Marine System (TEAMS), and the Kenya Transparency Communication Infrastructure Programme (KTCIP) which includes Digital Villages and Bandwidth subsidies as sub-projects. The establishment of ICT/Business Process Outsourcing (BPO) Parks and Multimedia Technology Parks (MTP) forms part of the MOIC Strategy and these projects are specifically linked to promoting broadband infrastructure rollout and encouraging capacity uptake. The Strategy recognises that the ICT sector requires input from other sectors of the economy and suggests that despite the aggressive targets set at a national level, budgetary and financial constraints, non-ICT infrastructure such as electricity and roads, are key challenges to meeting ICT sector objectives.

3.2 Policy and Regulatory Framework

The government has liberalized the ICT sector to achieve universal service and access objectives, firstly through competition—all ICT markets are theoretically open to competition—and reliance on the market to deliver services; and where necessary through government intervention. Governments participation in the sector includes retaining equity interest in a number of ventures at various levels of the ICT value chain – as a shareholder in Safaricom (mobile, broadband), Telkom Kenya (fixed, mobile, broadband) and recently TEAMS (undersea cable) and NOFBI (terrestrial backbone network). Recent indications are the government will participate in the rollout

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16 *Vision 2030*,

of a national LTE last mile network.\textsuperscript{18} Balancing public sector participation in the ICT sector with market reform can be a challenge; the manner in which Kenya has addressed this is discussed in Section 6.1.

3.2.1 Modern ICT Policy Framework

The national policy framework that supports broadband network deployment and access includes:

- **2006 National ICT Policy\textsuperscript{19}** which deals with convergence, ICT in health and education, e-commerce, e-governance, privacy and cybercrimes, and recognises the evolution of the ICT market;

- **2006 ICT Strategy: Collaboration and Outsourcing for Economic Growth\textsuperscript{20}** which seeks to simultaneously target the development of the ICT sector and to use ICTs for creating employment, poverty reduction, enabling economic recovery and achieving national developmental goals. It is aligned with Vision 2030 and has a key focus on the BPO sector.

\textsuperscript{18} Interview with Permanent Secretary on 16 January 2011, and Osiakwan, E. “Kenya to launch an open access LTE network to help drive down prices and extend coverage.” http://www.afrispa.org/index.php?option=com_content&task=view&id=96&Itemid=2 viewed on 28 February 2011


Box 1: Kenyan Licensing Regime

Like its regional counterparts in Rwanda, Uganda and Tanzania the CCK has adopted a technology neutral unified licensing framework (ULF). Network operators and service providers are licensed under a market structure consisting of the following broad market segments:

**Network Facilities Provider (NFP)** - Licensees under this category can own and operate any form of communications infrastructure (based on satellite, terrestrial, mobile or fixed). The NFP category is further divided into National NFP and International NFP. Investors who wish to land a submarine cable in Kenya require a Submarine Cable Land license while those interested in building system for the provision of international voice/data services are required to get a license for international Systems and Services. An International NFP (Incl. submarine cables and international gateway facilities) costs KHS 15 million as an initial fee, and the higher of 0.5% of Annual Gross Turnover or KES 5 million (US$ 60,170) per annum. The spectrum fee payable is based on bandwidth and coverage.

National NFP are described based on the use of spectrum. National NFPs are further identified as Tier 1 (exclusive use of spectrum countrywide), Tier 2 (exclusive use of spectrum regionally) and Tier 3 (exclusive utilization of spectrum by Administrative District). The initial license fee for Tier 1 and Tier 2 NFP licenses is KES 15 million; the fee for Tier 3 NFP licenses is KES 200,000. (US$ 2400) In addition a spectrum fee is payable based on bandwidth and coverage.

**Applications Service Provider (ASP)** - Licensees under this category are permitted to provide services to end users using the network services of a facilities provider (NFP). The initial license fee is KES 100,000, and an annual fee of the higher of KES 100,000 (US$1200) and 0.5 percent of Annual Gross Turnover is payable.

**Content Services Provider (CSP)** - Licensees under this category can provide content services material, information services and data processing services. The initial license fee is KES 100,000 (US$1200) and an annual fee of the higher of KES 100,000/US$1200) and 0.5 percent of Annual Gross Turnover is payable.


- **1998 Kenya Communications Act, as amended in 2009** to become the **Kenya Information and Communications Act.** 21 The 1998 Act separated the roles of policy formulation, service provision and regulation and as such restructured Telkom Kenya, splitting out the regulator (Communications Commission of Kenya), and creating a policy advisory body (National Communications Secretariat) and an Appeals Tribunal. It dealt with the progression from a market monopoly to a liberalised ICT sector. The 2009 Amendment Act was aimed at aligning the 1998 legislative framework with the 2006 ICT Policy. It did this by enabling a technology neutral and converged approach to the market structure, licensing and regulation in general. It also delved for the first time in Kenya into an area that still requires more definition - electronic commerce and transactions. The 2009 Amendment Act provides a high level framework for, amongst others, the recognition of electronic signatures and records and introduces content regulation.

A gap in the Kenyan legal framework is the absence of a specific law that address electronic transactions. While a framework is provided by the Communications Act which recognizes advanced e-mail, electronic signatures and electronic records as equal to written signatures and physical records respectively, consumers, particularly first time users of the Internet, require comfort to provide documents electronically and to spend money online. A legal framework that is sufficiently detailed, practical and implementable and instils trust would play a key role in encouraging the use of the Internet by consumers and businesses for daily transactions. The CCK's regulations which seek to expand on the provisions of the Communications Act, only

provide a broad framework and are still fairly high level. For example while they define the institutional framework they have not yet licensed Certification Service Providers to authenticate electronic signatures.\(^{22}\)

The legal and policy framework is complemented by recent 2010 regulations issued by CCK, all of which, while they do not explicitly deal with broadband, create an enabling environment and affect the impact of the regulatory environment on the promotion of broadband, namely:

- **Universal Service and Access Regulations**\(^{23}\) which address both access to public voice and to Internet. Many African countries are still undergoing processes to amend the definitions of universal service and access to include Internet and advanced services. The regulations provide for the provision of subsidies, loans and grants for both basic and advanced ICTs as well as building human capacity and encouraging innovation – key areas if Kenya is to encourage Internet uptake. Operators must pay a levy not exceeding one percent of gross revenues to the newly established USF for projects and programmes which may include Internet and broadband projects for both public and private access. A report on Universal Service indicates a target for 2005 – 2010 of 1 internet point of presence per district\(^{24}\); but no formal tracking or evaluation of this is available.

- **Frequency Spectrum Regulations**\(^{25}\) which deal with spectrum licensing and pricing, and provide for spectrum sharing where CCK mandates it (not yet mandated). Importantly they provide that pricing, including that for broadband spectrum, will be arrived at “based on the economic value of the spectrum in a manner that promotes its efficient use and sector growth.”\(^{26}\) To date although the law provides for auctions as one of the methods of licensing, beauty contests have been used for initial licenses, and a ‘first come first served’ approach for requests for additional spectrum, such as 3G spectrum. A dispute is underway regarding the pricing of 3G spectrum – Airtel and Orange were granted 3G licenses in 2010 for 60 percent less than the fee paid by Safaricom in 2007. The fee reduction was motivated by a desire by the government and regulator to increase broadband penetration.

At present in Kenya 3 licensees have 1900 MHz spectrum, 3 licensees have been assigned 3G spectrum in the 2100 MHz band and 18 licensees have been assigned broadband spectrum in the 3.3 GHz – 3.5 GHz bands\(^{27}\);

- **Licensing and Quality of Service Regulations**\(^{28}\) provide a framework for granting, registering, transferring, and otherwise managing licenses, as well as quality of service monitoring and reporting. The CCK measures the quality of each of the mobile networks, however no specific QoS requirements have been stipulated and thus measured for broadband to assess speeds, network quality or other parameters;

- **Facilities Leasing and Interconnection Regulations**\(^{29}\) and Fair Competition

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Regulations\footnote{See CCK Website, \url{http://www.cck.go.ke/regulations/downloads/xFair_Competition_and_Equality_of_Treatementx_Regulationsx_2010.pdf}} which indicate the regulators’ encouragement of co-location agreements which are to be commercially negotiated, however CCK has the right to intervene in case of a dispute. The regulations also provide for the provision of Reference Interconnection and Access Offers by dominant operators to facilitate fair competition and the entry of new players. The Fair Competition Regulations provide a framework for market reviews and determinations of dominance, and confirm the CCK’s mandate over ICT competition matters. They provide that licensees must give equal access and non-preferential treatment to all customers on a first come, first served basis. This applies to all network facilities, i.e. any element that forms part of an electronic communications network including ducts, cables, antennae and masts – critical elements of a terrestrial backbone network.

The regulations also define dominance, and aspect of the regulations that proved controversial and was contested by some operators in the market, and provide for the CCK to undertake market reviews as necessary, none have been conducted in the broadband markets.

\footnote{See CCK Website, \url{http://www.cck.go.ke/regulations/downloads/xFair_Competition_and_Equality_of_Treatementx_Regulationsx_2010.pdf}}

\subsection*{3.2.2 Policy Framework Beyond Networks}
Government’s role in promoting broadband network rollout is a fundamental pillar in Kenya’s broadband achievements to date. The bandwidth now available is impressive, however, the challenge remains how to make it meaningful from a user perspective. Some aspects of the regulatory framework will need to be amended to address this. This includes consideration of the legal and regulatory framework dealing with content and applications. In addition to the above, there is legislation that specifically affects the online sector including the following:

- **Constitution (2010)\footnote{\url{http://www.kenyalaw.org/klr/fileadmin/pdfdownloads/Constitution_of_Kenya__2010.pdf}}** – Under the new Constitution, every person has the right to privacy, which includes the right not to be searched (i.e. their person, home or property); not to have their possessions seized; information relating to their family or private affairs unnecessarily required or revealed; or the privacy of their communications infringed. Citizens furthermore have the right of access to information held by the State; the provision to the public of timely and accurate information is promoted for the public sector.

- **Public Archives and Documentation Service Act** which was passed in 1966 and revised in 1990, and which created the Kenya National Archives and Documentation Service (KNADS) provides a framework for the preservation of public records and archives. The Government Printer and government ministries, agencies and departments must provide KNADS copies of any published or generally circulated document or report produced by their respective offices. As noted by Global Information Society Watch, the Act does not, however, expressly recognize the rights of citizens to access these public archives, nor does it require the information to be made available in
electronic format, which are important aspects of e-law.

- **Copyright Act (2001)**, which provides intellectual property and copyright protection and restricts access to information. It is focused on the traditional broadcasting sector and more recent concepts such as “open source”, and “online content” are not sufficiently covered in the Act which is problematic from a broadband content and applications perspective. Strengthening such provisions will have a practical impact and facilitate the sharing of resources in schools, hospitals and clinics, amongst others. In the education sector as an example, digitised textbooks and educational software, can be shared electronically by all schools on an education network thus reducing costs and increasing access.

- **Freedom of Information Bill**, which deals with the general right of access to information, which is defined as “any documentary material regardless of its physical form,” that is held by public authorities and private bodies performing a public function. The Bill addresses the proactive dissemination of information through the publishing and updating of information by public authorities, and the right for persons to correct their personal data held in government records, as well as introducing the principle of maximum disclosure. It also provides for the appointment of an Information Commissioner to ensure compliance with the legislation.


4. Institutional Arrangements

4.1 Defining Roles
Kenya’s ICT sector and market reform process is supported by the sector ministry, the national ICT regulatory authority and the relevant Parliamentary Portfolio Committee on Communications. From an implementation perspective, Kenya’s market oriented approach sees licensed operators responsible for implementing the aspirations set out in national policy. This is done by private operators and also through a number of innovative joint ventures and Public Private partnership models. Further to the institutions that have become the norm in liberalised markets (i.e. policy maker, regulator, operators), Kenya has a fairly unique framework which demonstrates its commitment to increasing universal service and access of ICTs, and also the strategic importance of ICTs and specifically broadband and Internet access in the economy.

Kenya’s institutional framework as it relates to promoting broadband uptake and impact, is closely tied to a relatively new organisation called the Kenya Information and Communication Technology Board (KICTB). It plays an important role in terms of the promotion of the BPO industry, and also with respect to the facilitation and subsidization of projects that drive demand, such as the creation of “Pasha Digital Villages” and the rollout of the “Wezesha”34 programme to subsidize laptops for university students. In addition, the establishment of the Government Information Technology Services (GITS) in 2000, a Directorate of E-Governance (created in 2004), and a National Communications Secretariat (NCS) (created in 2006) points to the strategic import of ICT to the government and its recognition that it is important that it creates content for users to access. Each of these institutions has a critical role to play in promoting and facilitating broadband access, mainly on the demand side.

These ICT sector specific institutions are further supported by a Monopolies and Prices Commission which deals with competition issues

4.2 Line Ministries and Departments – Breaking the Silo
The promotion of broadband presents both opportunities and challenges in light of the cross cutting impact of broadband on the economy, and the role that government as a whole (and not just the Ministry responsible for ICT) must play to meet the country’s ICT targets and objectives. Kenya has learned that the promotion of broadband requires a level of coordination across line Ministries that appears to be unprecedented in recent history; hence a common concern is raised about the “silo effect.” Public administration, health, education, agriculture and trade and industry departments are key institutional stakeholders in the development of broadband in Kenya. Their role is to ensure the promotion of broadband for their own internal efficiency, as well as to deliver content and services to their respective constituencies. Kenya’s experience demonstrates that once the cables have landed the effective use of broadband by line ministries requires that they:

- Recognize the value of broadband
- Are themselves comfortable with using technology in general, and broadband in specific
- Trust technology
- Have the capacity to evaluate broadband projects and initiatives
- Coordinate their policy intervention and projects

The above does not seem to be the case for all government departments which is leading to delays in the achievement of some of the Vision 2030 targets, particularly as they relate to digitisation of government content and e-government. Looking outside of the MOIC, in Kenya a policy exists for ICT in Education, however, no formal ICT policy seems to exist for

34 The program provides a voucher of KES 10'000 (US$120) towards the purchase of a laptop. The subsidies for the first phase will cover the purchase of around 16'000 laptops. See: http://www.ict.go.ke/index.php/sport/wezesha/about
other sectors. As such, the extent to which they are coordinated with the National ICT Policy is unclear, and monitoring and evaluation of such policies is done by line ministries, with sharing of information across ministries reliant on the relationships between particular government officials, as opposed to mechanisms built into the institutional framework. This has the potential to increase costs and duplicate efforts – for example when the Department of Health promotes projects aimed at connecting rural clinics without collaborating with the Department of Education which may be addressing the rural schools divide simultaneously. Similarly, where Local Government Departments may initiate infrastructure projects, without having regard to projects underway that may be led or funded by other ministries.

4.3 Too Many Actors?
While on one hand the institutional framework can be seen as a strength in that all aspects of policy formulation and its implementation are comprehensively addressed, on another it has been criticized for causing duplication in functions for example between the National Communications Secretariat and the better known KICTB which are both responsible for advising the government on policy issues;35 and the KICTB and the Brand Kenya Board which both promote the ‘ICT image and reputation’ of the country. In addition, the role of the KICTB (funded primarily through donor funding) and the newly established Universal Service Fund (funded through levies on operators) may overlap with respect to the promotion and subsidization of projects which seek to increase accessibility, availability and affordability of ICTs and in particular broadband. Projects such as the telecentres and community access points projects that are promoted by the

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USF and provide communities with a server, computers, printers, and free Internet connectivity for at least one year, may overlap with the KICTB’s Digital Villages programme discussed later in this report. The presence of a strong MOIC Permanent Secretary who has a good understanding of the sector and how best to use the institutions effectively is central to minimising conflict and reducing overlap.

4.4 The People Factor
Many countries have excellent ‘paper policies’ but are thin on implementation. A significant contributor to the success or otherwise of a broadband strategy is the commitment of the people implementing it. In Kenya, a strong Permanent Secretary and dedicated and charismatic leaders of key ICT sector institutions are an important part of the country’s success. In addition, the entrepreneurial nature of Kenyans has played a role. The conceptualisation and implementation of TEAMS and NOFBI required strong leadership to push national objectives, particularly in the face of regional challenges and the need to negotiate implementation with regional political and private sector players. The Kenyan case, like that in countries like Rwanda, South Korea and Malaysia, shows the importance of a “champion” to meet targets.
Like most countries in Sub-Saharan Africa, Kenya has experienced a telecommunications revolution, and particularly a mobile revolution. It has seen an increase in mobile subscriber numbers, and has innovated in ways that have impacted the region and the world. As expected, the ICT sector is an engine for economic growth.

5. ICT Market Snapshot

5.1 The Mobile Miracle...
One of Kenya’s greatest successes has been the unprecedented uptake and usage of mobile services. Kenya was a slow starter with only 114,000 subscribers seven years after mobile was first introduced, well below the subscription rates of the country’s Sub Saharan peers. Following market reform and liberalization, there were 22 million subscribers in September 2010 for a penetration rate of 60 subscriptions per 100 people (Figure 5).

The mobile market comprises four licensees, including a dominant player in the market in the form of Safaricom (76 percent market share), a publicly listed company with shares also owned by the government and strategic investor Vodafone of the United Kingdom. The remainder of the market is divided between private operators Airtel (14%), Essar (7%) and the mobile arm of the incumbent, Orange (4%).

Kenya's mobile sector is characterized by innovation, particularly mobile money. Safaricom’s M-Pesa led the way and today all of the mobile operators have a mobile money service. Over 80% of Safaricom’s subscribers or 13.5 million people have registered for the M-Pesa service. Mobile money is not the only non-voice application people are using on their mobiles with other activities including sending SMS, accessing the Internet and watching TV (Figure 6).

Despite mobile success, there is still room for progress. Population coverage of 2G networks is still far from universal (86% in 2010) and 3G coverage is limited to urban areas. The remaining challenge remains access for residents of rural and remote areas without affordable network coverage.

5.2 …Meets the Broadband Revolution?
The mobile miracle has become a typical success story of most developing countries, with the advent of pre-paid coupled with mobile technology driving the uptake of mobile voice services. What is unique about Kenya is that over the last two years, its broadband market has undergone a revolution. This was spurred by key developments including the landing of three undersea fibre optic cables (see Section 6.2). This

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36 For more on M-Pesa see: Mas, Ignacio, and Dan Radcliff. 2010. “Mobile Payments Go Viral: M-PESA in Kenya.” In Yes Africa Can: Success Stories from a Dynamic Continent.


favourably positions the country from an infrastructural perspective particularly international Internet capacity. The undersea cables (that at least four licensees have built, or that are in the process of being built), are complemented by Kenya’s regional and national fibre backbone projects (see Section 6) to drive connectivity in rural areas.

Despite the landing of the cables, there is significant scope for retail broadband to take off. Internet and broadband services are provided by mobile operators and by Internet Service Providers (ISPs) including the more popular Kenya Data Network (KDN), Jamii Telkom, UUNET, AccessKenya, Wananchi Online, Communications Solutions and AfricaOnline. While there is competition in the Internet and broadband markets, these are the least accessible ICT services in Kenya, as is the case in most African countries. There were only 37,356 fixed Internet subscriptions at September 2010 using WiMAX, DSL and fibre optic technologies. One challenge is the lack of fixed telephone lines and coaxial cable television networks to provide the basis for developing fixed broadband access. The total number of fixed lines (both copper and fixed wireless) stood at 369,971 in September 2010. Telkom Kenya, of which France Telecom is the strategic investor, is the primary provider of fixed lines. Though some competition has been injected through the licensing of Tier 2 (local loop, and regional) Network Facilities Providers the impact has been limited and in fact the number of fixed lines has been declining. The number of copper-based fixed lines stood at just 228,391 in September 2010 of which 12,216 were connected to a DSL subscription meaning that only a little over 5% of fixed lines were connected to broadband. Fixed wireless lines are based on CDMA 2000 1x technology including broadband EV-DO in the case of Telekom Kenya.

Consistent with the trends displayed as part of the 2G ‘mobile miracle,’ mobile broadband is far more prevalent than fixed with some 780,000 subscribers by the end of 2010. Until recently Safaricom was the only mobile operator offering 3G services. It was granted a license in 2007 and launched service in 2008. Its HSDPA network uses the 2100 MHz frequency and provides download speeds up to 7.2 Mbps comparing favourably with fixed broadband solutions. Airtel and Orange were granted 3G licenses in 2010.

It is likely that broadband usage and uptake in a Kenyan context, like in many developing countries with high mobile penetration, will be primarily wireless. Overall Internet access (narrowband and broadband) from mobile phones already far outstrips fixed Internet subscriptions, and this is

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unlikely to change going forward in light of fixed line penetration.

5.3 Affordability
With reference to the broadband market, while wholesale bandwidth charges have decreased, there is a perception that retail prices have not dropped as much. According to the Kenya ICT Board the price of a monthly international E1 link dropped from US$7,500 in 2007 to US$ 1,290 by the end of 2009, a reduction of over 80%.

During the same time period retail prices have dropped by the same magnitude. For example, Telkom Kenya’s 256 Kbps DSL package dropped from KES16’008 to KES 2’999. There is some truth however to the recent rigidity in retail pricing. After initial reductions, they have mostly remained fixed at the same price with some operators arguing that their long term contracts with satellite providers which only expire post 2011 keep their costs high. Instead of lowering prices, operators are increasing speed or adding other features. For example, while the price of the Telkom Kenya 256 Kbps ADSL offering has not changed since 2009, it now includes 30 minutes of free on-net talk time per month. Another contributing factor to the perception of broadband price rigidity is the rapid drop in prices on mobile networks, particularly following a recent reduction in wholesale termination rates. According to the CCK, the average price of a pre-paid on-net call dropped 33.4% from June-September 2010.

One notable aspect of Kenyan retail pricing is the variety of choices and entry-level speeds (Table 5-2). While an entry-level ADSL package begins with an advertised download speed of 256 kbps, most other technologies have a higher starting speed. The least expensive monthly price is fixed wireless using EVDO technology at around US$11 (KES 900) per month. However even that price is out of reach for many Kenyans. In order to make access more affordable most mobile operators offer prepaid data packages in small denominations. For example Orange offers 150...
MB of use for US$2 (KES 150) per month while Safaricom offers as little as 5 MB for KES 5 (US$0.07) per day. While these may not allow intensive on-line use, they at least provide an option for the budget conscious consumer to check their e-mail.

Table 1: Broadband subscriptions in Kenya, 2010
(Source: GSMA and CCK)

<table>
<thead>
<tr>
<th>Technology</th>
<th>Subscribers</th>
<th>Penetration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobile broadband</td>
<td>779,886</td>
<td>2.1</td>
</tr>
<tr>
<td>Fixed broadband</td>
<td>84,726</td>
<td>0.2</td>
</tr>
<tr>
<td>- Terrestrial wireless</td>
<td>15,907</td>
<td>-</td>
</tr>
<tr>
<td>- DSL</td>
<td>12,216</td>
<td>-</td>
</tr>
<tr>
<td>- Fiber optic</td>
<td>8,369</td>
<td>-</td>
</tr>
<tr>
<td>- Others</td>
<td>864</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>864,592</strong></td>
<td><strong>2.4</strong></td>
</tr>
</tbody>
</table>

Note: Mobile broadband subscriptions refer to data published in November 2010. Fixed broadband refer to September 2010. There is a discrepancy between the total number of broadband subscribers reported by CCK and the item breakdown. Penetration figures based on 2010 population reported by the IMF.

Table 2: Monthly retail broadband prices, February 2011

<table>
<thead>
<tr>
<th>Operator</th>
<th>Technology</th>
<th>Download speed (Mbps)</th>
<th>Monthly price (KES)</th>
<th>Monthly price (US$)</th>
<th>Price per Mbps (US$)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orange</td>
<td>EVDO</td>
<td>3.1</td>
<td>850</td>
<td>$11.16</td>
<td>$4</td>
<td>Data card</td>
</tr>
<tr>
<td>Telkom</td>
<td>ADSL</td>
<td>0.256</td>
<td>2,999</td>
<td>$39.36</td>
<td>$154</td>
<td>Includes 30 minutes per month of free voice on Orange networks</td>
</tr>
<tr>
<td>Safaricom</td>
<td>HSDPA</td>
<td>7.2</td>
<td>1,428</td>
<td>$18.74</td>
<td>$3</td>
<td>Price adjusted to reflect 1GB per month usage</td>
</tr>
<tr>
<td>Zuku</td>
<td>Cable modem</td>
<td>1</td>
<td>999</td>
<td>$13.11</td>
<td>$13</td>
<td>Limited availability; hybrid fiber/cable</td>
</tr>
<tr>
<td>Access</td>
<td>WiMAX</td>
<td>0.32</td>
<td>4,640</td>
<td>$60.90</td>
<td>$190</td>
<td>Guaranteed speed; speed shown averaged over month since different speeds apply at different times of day</td>
</tr>
</tbody>
</table>

Source: Adapted from information on operator websites.

Note: Including taxes. All plans are entry level with download speed of at least 256 kbps. Converted to US$ using 2010 annual average exchange rate. All packages for unlimited access unless noted.
The Kenyan government’s role in the ICT sector has been all but “hands off.” It is an example of a country where focused and strategic interventions in the market by government have brought about positive benefits for the industry as a whole. However, balancing playing a strong and central leadership role in the ICT sector, with promoting the principles of a competitive market, can be difficult as seen in the discussions on PPP projects such as TEAMS and NOFBI and the BPO and Multimedia Technology Parks. While PPP modelled interventions have received a significant amount of attention, the supply side and demand side interventions made in Kenya have been carried out using a combination of private, public and PPP financing structures that are discussed in the following section.

6. Strategies and Approaches to Support Kenya’s Long-Term Vision

The addition of new fiber optic capacity has dramatically increased the amount of international Internet bandwidth available to Kenya (Figure 8). By mid-2010 Kenya had 20 Gbps of international bandwidth, an increase of 20 times since just before the cables landed and astounding 2,000 times since the beginning of the decade. It can draw on an available capacity of 200 Gbps if needed. Satellite accounts for just one percent compared to 100 percent at the beginning of 2009. This current bandwidth glut firmly places Kenya in a position to participate in the global information economy and is the most dramatic illustration of the country’s proactive broadband push.

6.1 Supply Side: Kenyan Approach to Building Network Capacity

Kenya’s approach to addressing the network capacity challenge has been bullish. As discussed earlier in this document, the government’s attitude to broadband network deployment has been to “build it, and they will come.” This is dramatically reflected in international Internet bandwidth capacity. It has taken advantage of its strategic location along the East Coast of Africa and used it to strengthen its infrastructure position. From no international fiber optic connectivity at the beginning of 2009, Kenya had three high-speed undersea cables landing in Mombasa by the end of 2010 (Figure 9 and Table 3). In addition the LION cable and a terrestrial National Optical Fiber Backbone Infrastructure are being laid and set to launch commercially in 2011.

The Kenyan government has been keen to gain access to undersea fiber optic cables for years...
Table 3: The cables have landed: Fiber optic cables in Kenya (Source: Summit Strategies Ltd, supplemented by Pygma Consulting research)

<table>
<thead>
<tr>
<th>Cable</th>
<th>Capacity</th>
<th>Launch Date</th>
<th>Configuration</th>
<th>Business model</th>
<th>Participating parties – promoters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eastern Africa Submarine Cable System (EASSy)</td>
<td>3.84 Tbps</td>
<td>July 2010</td>
<td>Covers almost 10,000km linking 8 countries from Sudan to South Africa via Djibouti, Somalia, Kenya, Tanzania, Madagascar and Mozambique.</td>
<td>Owned and operated by a consortium of 16 African (92%) and 6 international (8%) operators and service providers.</td>
<td>22 telecom operators from 20 countries</td>
</tr>
<tr>
<td>The East African Marine System (TEAMS)</td>
<td>1.28 Tbps</td>
<td>Sept 2009</td>
<td>Links Fujairah, UAE to Mombasa.</td>
<td>TEAMS Limited holds 85%, Etisalat (UAE Incumbent) holds 15%. TEAMS Limited is a consortium consisting of the Government of Kenya (20%) and private investors (80%).</td>
<td>Kenya Government with Etisalat of the United Arab Emirates, regional operators and Private investors from Kenya and Uganda.</td>
</tr>
<tr>
<td>SEACOM</td>
<td>1.28 Tbps</td>
<td>July 2009</td>
<td>13,000 km undersea fibre optic network connecting South Africa, Madagascar, Mozambique, Tanzania, Kenya, India and Europe</td>
<td>SEACOM is a Mauritian company, owned by non-telecoms operator private investors.</td>
<td>Aga Khan Fund for Economic Development (26.56%) Venfin (25%) Shanduka (12.5%) Convergence Partners (12.5%) Herakles Telecom (23.44%)</td>
</tr>
</tbody>
</table>

Given their suitability for massively increasing international bandwidth compared to satellite. It realized that the only solution for building a viable BPO sector was being connected to international fiber optic systems. The government became increasingly frustrated with the slow pace of the then New African Partnership for Development (NEPAD) endorsed EASSy cable project. It commissioned the TEAMS project to hasten provision of bandwidth and in the longer term provide variety when other submarine cables land to ensure competition and redundancy. The end result was Kenya’s decision to promote a national project, with benefits for the region, as opposed to waiting for the regional (NEPAD) approach to bear fruit. As such, the Government of Kenya established TEAMS in terms of the Companies Act when the Government and ETISALAT (the incumbent telecom operator in the United Arab Emirates) entered into an MoU for the construction of the cable from Fujairah to Mombasa.

The cable project was done under a PPP model and managed through a special purpose vehicle namely TEAMS. The decision of the government to take the lead and to invest in a broadband infrastructure project in a liberalized ICT sector requires some analysis. The liberalization of the ICT sector in Kenya is premised on the belief that encouraging competition and private sector participation in the delivery of ICTs is key. The decision to invest in TEAMS was taken by the government against the backdrop of a situation that had prevailed for over a decade of only one means of getting international bandwidth – satellite – which was costly and the absence of any prior investment in the delivery of undersea cable capacity to Kenya.
The approach to structuring TEAMS is one that can be replicated for any major ICT infrastructure project. Its ownership is structured in terms of a two-tiered PPP approach.

- In the first tier, the project was initially funded by the Government of Kenya and ETISALAT according to their percentage ownership (85/15). ETISALAT then signed a construction and maintenance agreement to design and build the cable.

- In tier two, a privatization process was undertaken and the Government of Kenya sold part of its 85 percent stake in the project to local and regional investors, retaining only 20 per cent. The PPP consortium was called TEAMS Limited.

An investor’s ownership of shareholding in TEAMS Limited is directly proportionate to the equivalent ownership of TEAMS’ share of capacity on the cable system. All TEAMS consortium members are licensed and can sell capacity – since they all compete in the market, this will ensure price competition at both retail and wholesale level. Importantly,

- All licensees were given an opportunity to participate in the cable project, thus reducing costs. Amongst the 11 participants, there is representation from all of the license categories;

- Government’s shareholding is held through the Ministry of Finance and not the MOIC which would present problems since it is the policy maker for the sector;

- Concerns of potential collusion in light of so many players cooperating are reduced.
in light of Government’s participation and 20 percent shareholding;

- TEAMS was not given exclusive rights and its implementation was not done at the exclusion of other fibre projects, hence the landing of EASSy and SEACOM within 12 months of each other.

- TEAMS capacity or access is provided to all market players on a competitive basis and in a transparent and non-discriminatory manner.

The Government’s involvement in the cable, and its ownership of capacity equivalent to the value of 20 percent of its shareholding gives it a lever.

Although this option has not been exercised, the Permanent Secretary argued that if the government was not satisfied with prices, it could sell capacity and compete with the other 11 TEAMS shareholders thus driving down market prices; and if that failed, the model enables the regulator to intervene through price regulation.\footnote{Interview with Permanent Secretary, January 2011} In addition, Government may dilute its shareholding should additional market players wish to “join the TEAM.” This is critical in that it ensures that new entrants can also participate in future. A simple ownership structure and good financial backing have been cited as key reasons why the TEAMS submarine cable succeeded.

Since the launch of TEAMS, two other undersea fiber optic cables have landed in Kenya, both using different ownership models. SEACOM, launched in July 2010, is a private sector consortium whose partners are specifically not operators to reduce conflicts between ownership and use. The EASSy cable, launched in July 2010, is owned by African operators. The importance of these two additional cables is that it demonstrates that the Kenyan government’s involvement in TEAMS did not discourage investment by private players nor did it distort competition. In fact, it is arguable that Kenya’s decision to promote TEAMS hastened the deployment of the other two cables. All three cable systems are offered on an open access basis providing competition which in turn increases quality and puts downward pressure on prices. Along with TEAMS they provide Kenya with a high degree of redundancy in case of disruptions to one of the cables.

### Table 4: Internet subscriptions by operator, September 2010
(Source: CCK) Note Subscriptions refer to both narrowband and broadband. Celtek Kenya now trades as Airtel.

<table>
<thead>
<tr>
<th>S/No.</th>
<th>Name of Operator</th>
<th>Subscriptions</th>
<th>Market share (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Safaricom Ltd</td>
<td>2,977,584</td>
<td>92.18</td>
</tr>
<tr>
<td>2.</td>
<td>Celtel Kenya Ltd</td>
<td>149,053</td>
<td>4.61</td>
</tr>
<tr>
<td>3.</td>
<td>Telkom Orange</td>
<td>66,030</td>
<td>2.40</td>
</tr>
<tr>
<td></td>
<td>Telkom Fixed</td>
<td>11,638</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Communication Solutions (Access Kenya) Ltd</td>
<td>7,512</td>
<td>0.23</td>
</tr>
<tr>
<td>5.</td>
<td>Wananchi Telkom Ltd</td>
<td>7,500</td>
<td>0.23</td>
</tr>
<tr>
<td>6.</td>
<td>Kenya Data Networks</td>
<td>5,451</td>
<td>0.17</td>
</tr>
<tr>
<td>7.</td>
<td>Africa Online</td>
<td>1,608</td>
<td>0.05</td>
</tr>
<tr>
<td>8.</td>
<td>Flexible Bandwidth</td>
<td>1,198</td>
<td>0.04</td>
</tr>
<tr>
<td>9.</td>
<td>Swift Global</td>
<td>1,133</td>
<td>0.04</td>
</tr>
<tr>
<td>10.</td>
<td>Callkey Networks Ltd</td>
<td>800</td>
<td>0.02</td>
</tr>
<tr>
<td>11.</td>
<td>Others</td>
<td>516</td>
<td>0.02</td>
</tr>
</tbody>
</table>

6.1.2 Moving Inland: How Kenya is Doing It
Kenya has a number of terrestrial networks which connect to the three undersea cables that land in the country. The regulatory framework has enabled the entry of a number of players into this space and has resulted in some large ISPs rolling...
out national and metropolitan fibre backbones and wireless broadband access networks. The main players in this area are licensed by CCK under the unified licensing regime which allows Network Facility providers to rollout competitive international, national and regional networks (see Box 1).

There are now a number of players competing to provide retail broadband service on a fixed and wireless basis. Competitors in this market include two players who provide fixed residential fibre and copper networks; at least five players in the corporate fibre network space; and at least ten licensees providing wireless services. Table 4 shows the main ISPs including the number of both narrowband and broadband subscriptions.

Last mile access remains a challenge, however it is surmountable using a combination of private and public funding, and regulatory and policy clarity. The gains that have been made in Kenya with respect to last mile access have been enabled by a number of strategic regulatory and policy level interventions including:

- open market entry,
- facilitating competition through mandating infrastructure sharing,
- frequency spectrum licensing,
- facilitating private initiatives with regional implications, and
- investing in a PPP based terrestrial network.

Open Market Entry
Market entry is an important aspect of the policy and regulatory framework in that it determines the availability of opportunities for investment in the ICT sector. The CCK, like its counterparts in Tanzania, Rwanda and Uganda, has implemented an open licensing regime which enables market entry into all categories of licenses on an on-going basis. The CCK issues operating licenses on a first-come-first-served basis with an estimated turnaround time of 135 days.\(^4\) Market entry is subject to the operator or service provider (1) meeting publicised minimum criteria, including the requirement that in general licensees should be registered and located in Kenya and issue at least 20 percent of their shares to Kenyans within 3 years of being licensed, and (2) paying a license fee. Spectrum licensing is subject to availability of the frequency spectrum resource.

The CCK started the process of migrating to a unified licensing regime in 2007 and issued the first licenses in 2008. The regime allows operators to decide which market to play in from a service and technology perspective, without the regulator being prescriptive. Since moving to the unified licensing framework, the country has seen an increase in mobile internet and mobile operators have become the biggest providers of internet services; at the same time though ISPs who were previously required to obtain a separate VoIP license and limited by technology restriction have been able to expand their service offerings.\(^5\)

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Box 2: Electricity Company & Infrastructure Sharing

Kenya Power and Lighting Company (KPLC) was granted a Network Facility Provider licence (Tier 2, with regional spectrum) by CCK enabling it to construct, install and operate an electronic communications system which may in turn be leased to licensed operators. KPLC has indicated that it has 18 pairs of fibre for leasing and has so far leased three through infrastructure sharing agreements signed with licensed operators Safaricom (20 years), Wananchi Group (5 years) and Jamii Telecoms (5 years). The agreements allow them access to KPLC’s fibre optic network that runs on the national electricity grid. KPLC’s model enables ISPs to connect to them to reduce their time to market, and the need to duplicate costly broadband infrastructure.\(^1\) Their infrastructure sharing model provides a supplementary revenue stream for KPLC. The three infrastructure sharing contracts signed to date are worth KES 588 million (USD 7.2 million) in revenue.

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\(^4\)http://www.cck.go.ke/licensing/telecoms/procedures.html

an infrastructure level, in addition to the Network Facility Licenses, investors who wish to land a submarine cable in Kenya require a Submarine Cable Landing license; those interested in building system for the provision of international voice/data services are required to obtain a license for international Systems and Services (see Box 1).

Infrastructure sharing
A common solution that is encouraged as regulatory best practice for enabling last mile connectivity is Local Loop Unbundling (LLU). This helps to boost the ADSL broadband market since it allows competitors to the frequently monopolized copper line network of the incumbent operator. This has not been implemented by CCK and as such there is no specific framework governing this area in Kenya outside of the generic Facilities Leasing Regulations (See Section 3.2.1). The fact that broadband is increasingly expected to be delivered over wireless networks brings to question the importance of focussing on local loop unbundling where the copper local loop is inconsequential relative to wireless penetration. Although LLU is not in place, Kenya has promoted infrastructure sharing and facility leasing on a non-discriminatory and transparent basis in regulation as well as in its ICT sector Strategic Plan. This approach has seen the conclusion of infrastructure sharing agreements between telecoms operators and by telecoms and traditionally non-telecoms companies (i.e. the electricity utility, see Box 2) to increase revenue streams by selling excess capacity.

Licensing Broadband Access spectrum
The ease of entry, including the cost of acquiring a license affects market entry and ultimately competition. The CCK played an important role in creating a framework to encourage competition in the mobile market by reducing the license fee for third-generation (3G) spectrum by 60 percent to $10 million in order to increase competition, which should in turn reduce prices and raise penetration. It furthermore indicated that aside from the normal frequency and service license fees, CCK would not charge operators for an upgrade to 4G.44 As a result of its actions by the end of 2010, Airtel and Orange had been issued 2100 MHz 3G spectrum bringing the total number of 3G licensees in the market to three. Safaricom was granted a 3G license in November 2007.

The unified licensing regime leaves it to licensed operators to determine which technologies to deploy. While the corporate market is well served, the residential market is still in its infancy. Other than 3G, broadband wireless technologies such as EV-DO and WiFi are available and can be provided with the necessary licenses relating to provision on network facilities and retail access.

Despite the recent award of two additional 3G licenses, spectrum allocation continues to remain a challenge particularly given its importance for wireless broadband. The expected growth of wireless data is likely to put severe pressure on existing spectrum availability. One constraint is that the government itself has important spectrum that could be used for broadband wireless access. Apart from freeing up the government-owned spectrum, another solution is to reuse spectrum in the transition to digital TV. One problem in addressing the looming spectrum crisis is that the issue has not received widespread public attention.45

Government-Led PPP
Following the success of the use of PPPs in deploying the TEAMS network, the government has utilised a PPP model to address the challenges relating to the national backbone network. The open access National Optical Fibre Backbone Infrastructure (NOFBI) terrestrial network complements TEAMS, SEACOM and EASSy by connecting the districts in the country. It is undertaken by a company established in terms of the Companies Act called the Fibre Optic National Network. Telkom Kenya has been issued a management contract to rollout the network, which contract will be open for competitive tender when it expires according to the Permanent Secretary. Over 5,000 km of cable has been laid to date in major cities and districts.

Read more:
http://www.ibtimes.com/articles/28163/20100611/kenya-
to-cut-3g-licence-fee-no-charge-for-4g-
cek.htm#ixzz1DlO2eVqM
Private initiatives with regional implications
Kenya’s decision to promote TEAMS does not appear to have been dismissive of the need for a regional approach to ICT development. Kenya’s private operators such as Jamii Telecoms and Kenya Data Networks (KDN) are building backhaul networks connecting countries in the region. Jamii Telecoms is set to launch its Fibre to the Home (FTTH) network to deploy fibre-optic cables to 100,000 homes in Kenya. Kenya Data Networks, East Africa’s largest data network, has deployed more than 15,000 km of fibre across Kenya, Rwanda and Uganda. KDN has a stake in TEAMS and also works with SEACOM to distribute their services in Kenya. In Kenya, KDN covers the main towns and has over 500 km of metropolitan fibre optic cable in Nairobi, 50 in the cities of Kisumu and Mombasa and 20 in Nakuru, Eldoret and Thika.

The CCK licensed KDN in January 2003 as a “Public Data Network Operator.” The changes in the regulatory framework enabling a technology neutral and converged approach have made it possible for KDN to become a Tier 2 operator with permission to rollout a national network and access spectrum on a regional basis. This has enabled KDN to provide a broader range of services than originally envisaged in terms of the license. It provides last mile access using WiMAX technology as well as wholesale Internet connectivity to ISPs.

In addition to the initiatives by private operators on an individual basis, a consortium approach has been taken to the deployment of a regional backhaul network. Over 30 operators in the EAC have initiated and participated in the East African Backhaul System (EABs) project to rollout infrastructure to connect to the undersea cables that have landed in Tanzania and Kenya (See Box 3).

Universal Access: Still more to do...
Providing access to broadband spectrum, encouraging infrastructure sharing and licensing converged and technology neutral networks and services have promoted broadband network deployment. However providing service to rural areas remains a challenge. The ICT sector framework provides a number of options for stimulating investment in the last mile in underserved areas. The newly formed USF can be used to obtain subsidies at either an operator or consumer level based on projects identified by the Fund. Similarly, the Kenya ICT Board promotes projects aimed at the same objective (see Section 6.2.4).

The Government of Kenya has also recently endorsed a project to roll out an open access national Long Term Evolution (LTE) network in 2011 in a bid to ensure universal access to services and to create a level playing field for operators seeking access. According to discussions with the Ministry, the government will issue a tender for a public-private partnership to build a national network to be shared by telecoms providers ensuring a transparent, fair and open process.

Unlike the TEAMS project where high project costs and long time lags could be used to justify government intervention, the LTE project is more difficult to position in a competitive environment, and its impact on the market will depend on where the network is deployed and the identification of underserved areas. The process that the Kenyan government follows will be critical in light of the fact that there is competition in the last mile market, and there is a risk, as with any project where public subsidies may distort competition if it not managed properly. However,

Box 3: East African Backhaul System (EABs)

EABS is a joint venture project among operators from Tanzania, Burundi, Rwanda, Uganda and Kenya. The Backhaul system links the five East African Community countries, and is particularly important for the three landlocked EAC countries Burundi, Rwanda and Uganda. The EABs involves about 30 operators in Eastern and Southern Africa and feeds from the cable systems that have landed in Mombasa and Dar es Salaam. The backbone infrastructure has been rolled out in four of the five EAC countries, with Burundi’s segment still under construction.

http://www.intelligencecentre.net/2010/05/28/fixed-broadband-in-africa-is-finally-turning-the-corner/
in light of Kenya’s previous PPP experience in the ICT sector, it is anticipated that the model followed will be sound and transparent.

6.1.3 Kenyan Internet Exchange

Most internet traffic generated by users in developing countries tends to be international, resulting in large capital outflows paid to foreign Internet providers. Local content providers tend to be hosted offshore to lower the costs of infrastructure – thus a local Internet Exchange Point (IXP) is important to stimulate local hosting of services and encourage local content development. It also enhances competitive opportunities; reduces latency thus improving quality; and uses more local bandwidth thus increasing affordability of Internet services.\(^\text{46}\)

Kenya has two IXPs (KIXP) – one located in Nairobi (launched initially in 2000) and one in Mombasa (launched in 2010) – operated by the Telecommunications Service Providers Association of Kenya (TESPOK) which is a non-profit organisation that represents ISP and other telecoms operators interests. The first KIXP was launched in Nairobi before the market was fully liberalised. Following a dispute in 2000, the KIXP was forced to shut down when CCK ruled in favour of Telkom Kenya which lodged a complaint arguing that KIXP was not licensed and violated its exclusive rights to carry international traffic. TESPOK/ KIXP appealed the CCK’s decision at the Communications Appeal Tribunal presenting technical arguments demonstrating that KIXP was locally exchanging domestic Internet traffic and not infringing on Telkom Kenya’s international rights. Following a year of debate, KIXP Limited was granted a licence by CCK in November 2001, making Kenya the first country in the world to create and issue an IXP license.\(^\text{47}\)

Since then, following the arrival of the undersea cables and in anticipation of an increase in local and regional Internet traffic, a second IXP has been launched in Mombasa, the landing point for the undersea cables. This development ensures that the region’s traffic is exchanged locally, thus improving the end user experience, and lowering costs for ISPs and operators who no longer have to send regional traffic via Nairobi. Unlike the Nairobi IXP which was hosted at a neutral location not owned by any licensee at launch, the Mombasa one is hosted by SEACOM for the next 3 years.\(^\text{48}\)

6.2 Stimulating Demand: Services, Applications and Content

Despite the availability of bandwidth and more than ten retail access providers offering a multitude of broadband technologies (WiMAX, 3G, fiber and ADSL amongst them), and 2 IXPs, Kenyan broadband penetration is currently at only approximately 2 percent demonstrating room for significant improvement. On one hand, the low penetration is partly due to coverage; networks are urban focused and universal service and access must be addressed. On the other hand, the low penetration in the face of the availability of large amounts of bandwidth is evidence of the key difference between broadband networks and mobile networks that catered for voice. While 2G voice networks were successful based on an “if you build it, they will come” approach, this is not the approach for broadband. Once networks are deployed, broadband use and uptake is still dependant on other factors such as digital literacy, levels of education, relevance of content and applications. Affordability is also an issue since broadband access typically entails higher costs than mobile in terms of access devices and sometimes the lack of prepaid options.

Demand stimulation is an important part of Kenya’s broadband framework, and is seen to be a key component of the policy framework in many of the countries that have been successful in developing broadband connectivity.\(^\text{49}\) With literacy rates of over 60 percent, high levels of entrepreneurialism and an innovative IT and applications market, Kenya is well positioned to

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\(^{46}\) Jensen, M. Promoting the Use of Internet Exchange Points: A Guide to Policy, Management and Technical Issues.

\(^{47}\) Ibid.

\(^{48}\) See http://www.businessdailyafrica.com/Company%20Industry/Internet%20data%20exchange%20point%20launched%20in%20Coast/-%20/539550/978498/-/5hru7b/-/index.html

\(^{49}\)Williams, M. Broadband for Africa: Policy for Promoting the Development of Backbone Networks.
maximize on usage if the right policy framework is in place. This section discusses the Kenyan education and ICT policy framework, an important factor in broadband uptake, and then describes some model initiatives taken and strategies adopted which position Kenya well to increase uptake and usage.

New value added services, and in particular the Internet have emerged over the last decade in parallel with the mobile boom. Amongst the Internet based services available in Kenya are Voice over IP and WiFi which are legally provided and liberally used in Kenya. In developing countries, the existing fixed infrastructure is leveraged to deploy broadband and to offer triple play services — telephone, Internet and television — over IP networks. Notwithstanding the benefits of the mobile revolution, one of its drawbacks is that it has left countries like Kenya at a disadvantage in terms of gaining access to high speed, high quality fixed broadband networks. The growing preference for mobile communications and wireless internet connectivity may satisfy consumers’ needs to use basic applications and access content in the form of e-mails, browsing, and file transfers. However, wireless platforms are not likely to provide high speed, high quality networks for heavy business use or for rolling out triple play services in homes.

Triple play services in Kenya are hampered by the lack of fixed line infrastructure in the country, which in turn negatively affects the availability of fixed line broadband. In another Sub Saharan first, Kenya’s Wanainchi Group, has launched a triple play service branded as Zuku which offers customers television, Internet broadband and telephony on one line using a combination of fibre, cable and Wimax technology. Zuku’s triple play service is only available in a few neighborhoods in Mombasa and Nairobi and starts at KES 1’999 (US$ 24) per month for

Table 5: How computers are used in Africa

<table>
<thead>
<tr>
<th>City</th>
<th>Browsing internet</th>
<th>Sending /downloading e-mail</th>
<th>Word processing</th>
<th>Computer games</th>
<th>Spread sheets</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL (1’792)</td>
<td>69%</td>
<td>56%</td>
<td>50%</td>
<td>37%</td>
<td>28%</td>
<td>5%</td>
</tr>
<tr>
<td>Nairobi Kenya (290)</td>
<td>82%</td>
<td>69%</td>
<td>60%</td>
<td>52%</td>
<td>40%</td>
<td>8%</td>
</tr>
<tr>
<td>Lusaka Zambia (107)</td>
<td>57%</td>
<td>59%</td>
<td>60%</td>
<td>50%</td>
<td>22%</td>
<td>-</td>
</tr>
<tr>
<td>Antananarivo Madagascar (133)</td>
<td>44%</td>
<td>27%</td>
<td>59%</td>
<td>63%</td>
<td>39%</td>
<td>16%</td>
</tr>
<tr>
<td>Lagos Nigeria (204)</td>
<td>78%</td>
<td>67%</td>
<td>43%</td>
<td>18%</td>
<td>19%</td>
<td>6%</td>
</tr>
<tr>
<td>Hargeisa Somaliland (140)</td>
<td>56%</td>
<td>23%</td>
<td>8%</td>
<td>9%</td>
<td>16%</td>
<td>-</td>
</tr>
<tr>
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<td>57%</td>
<td>73%</td>
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<tr>
<td>Addis Ethiopia (150)</td>
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<tr>
<td>Kigali Rwanda (125)</td>
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<td>67%</td>
<td>22%</td>
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<td>Dar Tanzania (1480)</td>
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<td>61%</td>
<td>17%</td>
<td>43%</td>
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unlimited broadband (1Mbps) and 43 English channels, plus free on-net voice calls. Zuku has regional aspirations with a plan to launch in 9 countries.

6.2.1 Education

A 2008 study which compared Nairobi to 15 other capital cities in Africa, found that Kenyans had the highest rate of using computers for browsing the Internet (Table 5). In addition, 74 percent of residents in Nairobi have used a computer at least once, followed by Lagos, Nigeria and Kampala, Uganda at 69 and 68 percent, respectively. Kenya’s high urban computer usage can be attributed to high literacy rates and the concerted efforts by the government and other stakeholders in promoting use of ICTs through various programmes and projects discussed in this section. The main challenges with respect to accessibility of ICTs in education are with respect to schools in remote areas and urban slums.

Kenya’s 8-4-4 (primary – secondary - tertiary) educational policy introduced universal free but non-compulsory primary school education in 2003. From a policy perspective, in addition to the 2006 National ICT Policy which promotes e-learning, there is the 2006 National ICT Strategy for Education and Training, which addresses connectivity and infrastructure, digital equipment and content, harnessing emerging technologies, integration of ICT in education, training and research and development. The Ministry of Education (chaired by the Permanent Secretary and supported by the ICT unit) leads in terms of the ICT and Education strategy. ICT can be used to address the challenges related to the high costs of purchasing and distributing text books and other learning and teaching materials, and poor math and science performance – broadband will be important to ensure sufficient capacity and speeds to download voluminous information, and open source software can increase access to information at a low or no cost.

The National ICT Policy emphasises the importance of integrating ICTs in the curriculum at all levels of education, establishing education networks so that educational resources can be easily accessible and shared, and promoting e-learning. They can also be integrated in the curriculum in order to equip Kenyans to participate in a knowledge based economy. Computer Studies is offered as part of the official Kenya Certificate of Secondary School Examination (KCSE) curriculum defined by the Kenya Institute of Education (KIE). In this curriculum, students are expected to learn and develop practical ICT skills with the main focus being general IT awareness and software development. In the final year of study, candidates are expected to develop a complete software project using a recommended set of tools and programming languages. The CCK has initiated a number of universal access projects including the digitisation of the secondary school curriculum. The CCK has collaborated with the Kenya Institute for Education (KIE) and provided KES 15 million (US$ 180,500) of funding to support the acquisition of software and hardware, and provide capacity building, to digitise 11 subjects for the Form 1 KCSE curriculum. The digitised subjects were piloted in 20 schools of which 16 are the beneficiaries of the CCK’s school-based ICT centre initiative.

50Zuke Website, http://www.zuku.co.ke/coverage/
51ICT in Education Options Paper (Ministry of Education & USAID), July 2005
53http://www.csdms.in/gesci/pdf/KENYA.pdf
Another important institution in the ICT for Education (ICT4E) space is the Kenya ICT Trust Fund, founded in 2004, which facilitates PPPs to mobilize resources to bring a portal for information sharing and the development on a national computer assembly centre. Its implementation arm is the Network Initiative of Computers in Education (NICE) which is responsible for core activities aimed at promoting ICTs in the learning institutions (primary, secondary and tertiary institutions). Kenya ICT Trust Fund draws its membership from the government, private sector, and regulatory bodies. Kenya ICT Trust Fund in 2010 successfully disbursed over 3000 donated software licenses, issued at least 200 teacher training certificates in collaboration with Microsoft, and refurbished 250 computers donated by the Kenya Ports Authority for distribution in the coastal region of Kenya.

At a tertiary and regional level, three East African higher education regulatory authorities have signed an agreement harmonizing their approach to ICTs making the possibilities of distance learning, e-education and use of virtual universities more accessible. This will enhance the EAC, increase the mobility of EAC residents, and promote the use of regional and international standards.

6.2.2 Equipment

Access devices, which are traditionally laptops and computers, and increasingly smartphones and tablets, must be affordable for broadband uptake to increase. In Kenya, laptops and PCs are competitively priced and readily available on the market. In 2003, in line with measures taken in Tanzania and Uganda, the Department of Finance zero-rated tax on all computers and other ICT equipment imported into the country in a move that has seen the sector accelerate its growth. The decision is part of a strategy to drastically reduce the cost of computers in the country and complement other projects such as the
Technology Parks. The Ministry of Finance in Kenya took bold moves in the 2009/10 financial year and committed to:

- invest KES 1.3 billion (US$ 100 million) for mobile computer labs for high schools in all constituencies;
- support Digital Villages in partnership with the World Bank to create business hubs and entrepreneurial opportunities in rural areas;
- launch a one million laptop/PC campaign in conjunction with broadband providers by undertaking to underwrite part of the interest on funds that are borrowed to buy personal computers and laptops;
- allow ISPs to offset against their taxable income the costs incurred in acquiring the right to use undersea cables over a 20 year period;
- increase the depreciation on telecoms equipment, including cables from 12.5 percent to 20 percent; and
- provide tax deductions of 5 percent on software; and
- exempt all handsets from VAT.

These comprehensive incentives should stimulate the supply of computers, reduce costs and increase PC penetration to stimulate broadband use. However, a related factor that is not included in the favourable tax regime is the 10 percent excise duty on mobile airtime. It is argued by operators that the 10 percent airtime tax coupled with the 16 percent value added tax (VAT) adds to the cost of services for end users and negatively impacts the affordability and accessibility of services.

6.2.3 Promoting Applications, Content and Services

BPO sector

Box 4: BPO Bandwidth Capacity Support

The Kenya ICT Board supports the Local BPO industry by providing bandwidth capacity support funding. The purpose of this capacity support is to reduce the cost of bandwidth making local operators competitive on a global scale. The BPO “Bandwidth Capacity Purchase Scheme” is aligned with Kenya’s Vision 2030 and was conceived as a transitional and non-discriminatory support with a sunset clause so as to be compatible with Kenya’s existing commitments under the WTO. The period of validity was initially between 1st July 2007 to 31st December 2008, pending the landing of the undersea cables which were expected to significantly reduce retail rates. This period has however been extended and the subsidies are still available pending an evaluation of retail reductions.

BPO operators are licensed by the CCK and eligibility for the support is open to all operational BPO operators in Kenya. The subsidy is provided by means of a reimbursement of monies paid for bandwidth as indicated on the ISPs invoices to the BPO operator.


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**Box 5: Judiciary Telepresence Project**

“The Judiciary ICT Committee” which is chaired by the Judge of Appeal. This Committee oversaw the formulation of the ICT Policy and Strategic Plan 2011-2013 which eventually led to the establishment of the “Telepresence” and other ICT based projects.

Through a PPP initiative between a broadband provider, an equipment vendor and the Ministries of ICT and Justice, the judiciary in Kenya has ushered in the digital era by commissioning a telecommunication link that connects courts in Nairobi with those in Mombasa. Using “Telepresence” it is anticipated that Kenya will ease court processes and help in curbing cases of corruption. The private sector offered the technical support for this project which will enable sitting judges to preside over cases remotely, a move that will effectively cut down on travel costs incurred by judicial personnel.

Apart from video conferencing there are other applications that will be instituted in the judicial Telepresence scheme. A system for recording, preserving and retrieval of court proceedings will be put in place. In relation to this, there will be imaging and automation of court records. In order to manage the telecommunication link for distant court stations, a Wide Area Network is in place while Local Area Networks will be used within individual court stations. Other applications include a web portal for judicial information, an Integrated Financial Management Information System (IFMIS), and an Integrated Personnel and Payroll Database (IPPD).


Kenya’s BPO strategy is central to Vision 2030 and is highlighted as one of the means to make Kenya a middle-income country within a period of 20 years; in part through creating 7,500 direct jobs in the BPO sector and 2,500 indirect jobs by 2012. Kenya compares itself to Mauritius—one of Africa’s BPO successes—in the ICT sector Strategic Plan and hopes that increased bandwidth, cheap labour, clear accents and its location could help it tap this multi-billion dollar industry. As with other aspects of the country’s broadband strategy, Kenya’s policy framework (Kenya ICT Strategy 2006) provides strategic direction on how to realize the BPO vision. In terms of institutions, a self-regulatory regime is provided for – the “Kenya BPO and Contact Centre Society” has been formed to set standards and provide for self-regulation. The Kenya ICT Board is responsible, as part of its role of marketing the sector, for promoting the country abroad as a BPO destination. The Kenya ICT Board furthermore provides bandwidth

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60 http://www.kenyabposociety.or.ke/
subsidies to the BPO sector through a grant from the World Bank (See Box 4), in anticipation of price decreases until the impact of the newly landed cables is felt.

Other measures taken in countries like India and Philippines that have thriving BPO sectors include government-supported corporate locations such as business and technology parks and export processing zones; laws supporting intellectual property; attractive labour laws; and reasonable rates for skilled and unskilled workers. Similarly, Kenya has identified Export Processing Zones (EPZ) which will be used to locate technology parks such as Kitengela (See Section 6.2.4, Public Private Partnerships). It is also in the process of amending and updating its IP legislation. Following the various funding and policy initiatives relating to the BPO sector, Kenya currently has 25 licensed BPO operators, although not all of them are operational. According to the KICTB, by 2009 about 3,550 BPO jobs had been created from a baseline of 500 in 2007.62

Online government services
The Kenyan government is taking steps to digitise content and provide services online. Although there is still significant work to be done in this area, the Kenyan e-government portal (http://www.e-government.go.ke) enables citizens to apply for public service jobs, track the status of ID and passport applications, obtain exam results, submit tax returns and report corruption. In addition there is a business licensing e-registry. Providing e-government services has proven to be challenging in light of the ‘silo effect’ discussed earlier and the need for line ministries to take responsibility for developing and digitising relevant content for users.

The fact that ICT Units are not necessarily senior in the organisational structure of a ministry means that the projects may not be prioritised or given the strategic importance that they deserve. Kenya

Box 6: Mobile Money Meets E-Commerce

In a recent innovation launched in early 2011, registered customers of mobile phone money transfer service, M-Pesa, can withdraw cash in any currency from Visa branded automated teller machines (ATMs) anywhere in the world. They can also make purchases in accepted merchant outlets or shop online moving it from a money transfer service to a mobile commerce innovation, still for the unbanked. This innovation will move M-Pesa from a service conducted primarily over 2G networks, to one whose relevance will increase over broadband networks in light of the ability to use it to shop online and across borders.

PesaPal is a payment platform that enables Kenyans to buy and sell on the Internet using M-Pesa, Zap and Credit Cards and has targeted e-commerce, school payment, and e-ticketing as value propositions. It is an online based service that uses the popular mobile money accounts that were launched in Kenya, or credit cards to:

- Get receipts immediately for payments,
- Get email and SMS notifications.
- Load money once and use it for multiple payments using PesaPal Credit,
- Make payments (such as school fees) in instalments,
- Request and receive payments from other members,
- Receive protection from fraudulent sales
- Buy tickets for events in Kenya online
- Buy products and services from vetted merchants.

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61 CCK Register of Licensees under Unified Licensing Framework
http://www.cck.go.ke/licensing/telecoms/register.html

has seen that line ministry projects that are done in collaboration with the MOIC, such as the Judiciary Telepresence Project (see Box 5) and the Technology Park project which is partnered with the Trade Ministry are likely to achieve success.

**Encouraging local innovation**

Kenya is earning a reputation as an innovation hub, and a centre for the development of relevant African applications and content. Initially developed on narrowband mobile and SMS platforms, many of Kenya’s innovations have had regional and global impact. Innovations include:

- **Ushahidi**, an open source application used in conjunction with Google Maps, uses crowd sourcing for social activism and have since been replicated in Haiti.
- **M-Pesa** which has generated considerable publicity leading to similarly styled mobile money solutions to spread across the continent. Interestingly, although M-Pesa is a 2G mobile solution, it is finding relevance online through its recent partnership with Visa, and can be used as a tool to generate demand.
- **KenyaImagine**, a local website originally founded to address the gap in quality of online content from Kenyan news and magazines, has turned into an online content hub, with involvement of local Kenyans as well as the Kenyan Diaspora.

In addition, to these innovations which have taken place in a narrowband context, applications like PesaPal, a locally developed payment platform that is a sort of hybrid of PayPal and M-Pesa, will find greater relevance as broadband take up increases. PesaPal enables Kenyans to buy and sell on the Internet using mobile money or a credit card and has targeted applications such as school fee payment, e-ticketing and e-commerce (See Box 6).

**6.2.4 Funding Local Demand**

**Loans, grants and subsides**

While it is still early and the impact cannot be evaluated, Kenya has put in place several funding mechanisms to support local development of content and applications, and to stimulate the BPO sector. The institutions that mainly support this are the Kenya ICT Board (KICTB) and the newly established Universal Service Fund managed by the CCK and focused on under serviced areas. The USF is funded from a levy imposed on licensed operators, while the KICTB receives funding for projects mainly from donors, including a Revolving Fund for Digital Villages.

In 2007, as part of the World Bank’s Regional Communications Infrastructure Project, Kenya agreed to rollout Digital Villages in rural areas to promote Internet connectivity to enable citizens to access government and commercially generated information available on the web. The KICTB started with a pilot programme in 2009 called the “Pilot Pasha Centres” (Pasha means “to inform” in Swahili). The pilot programme was important to ensure the development of a model that was relevant within the Kenyan rural context and was sustainable. Although a single model was initially envisaged, the pilot resulted in three categories of Pasha Centres being developed. The categories acknowledge the evolving definition of broadband and the types of applications supported by different speeds. Accordingly, human resource capacity and training will vary depending on the category of the Pasha Centre that is deployed. Five digital villages located in Nkubu, Garissa, Kangundo, Malindi and Mukuru were established in the pilot phase. The Kenya ICT Board in 2009 and 2010 had conducted nationwide training of 1000 people in business management, entrepreneurship, marketing, basic accounting and technical management (a “starter-kit”) to prepare potential Pasha Centre managers to run their centres, and from January 2011 will disburse at least one loan for a Pasha Centre per county. KICTB’s target is to have 210 Pasha Centres, one in each constituency, by 2012.

While Pasha Centres are a significant project aiming to increase digital inclusion, other projects are underway involving other consumer groups such as academia. The Kenya Education Network (KENET) and the KICTB have worked together to disburse 200 MB of bandwidth to 64 tertiary

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64 http://www.ict.go.ke/index.php/sport/pasha/pasha-updates/299
institutions across Kenya using private and donor funding.65

### Table 6: Categories of Pasha Centres
(M=Mandatory) (Source: Cisco IBSG, 2010)

<table>
<thead>
<tr>
<th>Mandatory Functions</th>
<th>Basic</th>
<th>Standard</th>
<th>Advanced</th>
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<tr>
<td>Number of PCs</td>
<td>M&gt;3</td>
<td>M&gt;7</td>
<td>M&gt;15</td>
</tr>
<tr>
<td>Internet Access</td>
<td>M (256 Kbps)</td>
<td>M (512 kbps uncontended for all PCs)</td>
<td>M (minimum 1Mbps)</td>
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<tr>
<td>Collaboration software</td>
<td></td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Videoconferencing software</td>
<td></td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Web 2.0 access – webcam and microphone</td>
<td></td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>eSkills Training Services</td>
<td>M</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Group training facilities</td>
<td>M</td>
<td>M</td>
<td>M</td>
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<tr>
<td>Pasha Portal accessible</td>
<td>M</td>
<td>M</td>
<td>M</td>
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<tr>
<td>Government information</td>
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<tr>
<td>Management Information</td>
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The KICTB recognizes the need for locally developed and relevant national content and has issued grants for digital content and software applications as part of the Tandaa Digital Content Strategy. The KICTB has amongst its priorities: issuing Kenyan firms and software application developers grants to support local content and software applications; providing subsidies for laptops for university students (“Wezesha”), although uptake has been low and through interviews with university students it appears that many are able to obtain laptops relatively easily, the low cost of hardware and the competitive nature of the market being two contributing factors. The cost of the laptop or PC is far less of a concern that the cost of connectivity itself.

**Public-private partnerships**

Most of the demand side initiatives in Kenya have been either led by donors or established through PPPs. Kenya has managed to successfully structure PPPs to stimulate demand. The biggest success stories do two important things – they leverage the strengths of the private and public sectors, and they break the “silos effect” by encouraging collaboration across government departments and line ministries. This is exemplified in the approach to the establishment of technology parks.

The Government has committed to establishing Multimedia Technology Parks and promoting home-grown industries developing ICT products

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through fostering a partnership between the MOIC, the Ministry of Trade and Industry and private investors. The Minister of Trade and Industry has identified Export Processing Zones (EPZs) which will also house the Technology Parks, thus linking the ICT sector to broader economic projects. The government through the MOIC will, in terms of the PPP, provide land (500 hectares in Kitengela which is about 25 kilometers outside of Nairobi) and the plans for the layout. Private sector players interested in the concept, land and plan, will then be able to build out the business premises and either use it for their own operations or lease it out to other appropriate businesses.

PPPs are furthermore used in Kenya to establish data recovery centres, to provide storage and recovery for all government databases, and for the establishment of Incubation Centres and Satellite Assembly Centres where local PCs will be assembled. Additionally skilled graduates will be employed at Incubation Centres and Satellite Assembly Centres, thus increasing the impact of broadband on job creation.
7. Lessons Learned

7.1 Potential Stumbling Blocks
Despite Kenya’s success it is important to acknowledge some of the unique aspects of the Kenyan regime, which if not noted and properly managed may make the implementation of similar strategies in other countries a challenge. Two aspects of the Kenyan case that make it different from most best practice case studies are that Kenya does not have a broadband policy, nor does it have a simple institutional framework – these two issues are discussed in turn.

Kenya does not have a single broadband strategy. The strategy is instead integrated into a number of policies and plans found in a number of sectors, such as education and health. Vision 2030, supported by the ICT Strategic Plan 2008 – 12, is what ties all of these strategies together and in so doing, recognizes the role of ICT as an enabler of all other policies, and broadband or high-speed access is a key component of the ICT sector. In the absence of a single policy, strong leadership is the main factor that ties the various aspects of the policy together and makes the Kenyan approach work.

Kenya has created a multidimensional institutional framework. The Kenya ICT Board is a success story in itself in terms of its ability to design and develop programs and secure funding for implementing them. A strong, central body is thus essential, as is determined leadership. However, the risk lies in the fact that the Kenya ICT Board has overlapping mandates with the Kenya ICT Trust Fund (education) and the USF (CCK) creating the potential for conflict and duplication. Likewise the National Communications Secretariat and the MOIC have similar roles.

In addition to ICT specific and Kenya specific challenges, there are challenges which are shared with many developing countries. Challenges arising both from the ICT sector as well as adjacent sectors such as electricity and education remain. These challenges may stall the further impact of broadband in the country – Kenya has missed its 2010 target to provide electricity overage in 20 percent of the country. The national target was to raise the coverage rate gradually from 4 percent then to 20 percent in 2010 and 40 percent by 2020.66

7.2 Kenya’s Strengths
Kenya’s accomplishments arise first from the manner in which it has tackled the challenge of lack of backbone network infrastructure and now the creation of strategies and programmes to increase uptake is vital. The manner in which Kenya has approached these two elements of the broadband ecosystem can serve as a model for other developing countries. The lessons it has learned and challenges it has faced are also instructive. Developing countries can learn key lessons from the Kenyan broadband experience including:

- **Necessity of a clear vision**, in Kenya’s case Vision 2030, which includes ICTs and specifically a focus on the BPO sector as one of its key pillars provides guidance to all ministries, departments and agencies, as well as the private sector;

- **Importance of government leadership and a project “champion”** – It is repeatedly mentioned that the story of the landing of the cables in Kenya is not complete without the perspective of the Permanent Secretary. Clear and unequivocal leadership in support of stated national policy objectives is critical in ensuring that projects move from theory to practice;

- **Central role of good regulation**, including flexible and technology neutral licensing, the facilitation of infrastructure sharing, the encouragement of facilities based and service based competition, the regulation of wholesale prices to stimulate competition, and the facilitation of innovation;

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• **Benefits of Public Private Partnerships at all levels of the broadband ecosystem** — to build high cost backbone networks, to develop applications, services and content, and to support initiatives to improve literacy and ICT in education. These must be well designed so that they promote broadband without distorting the market;

• **Actions speak louder than words** — implementation of legislation, programmes and properly structured projects is critical, while respecting the market reform process. Although the government of Kenya has demonstrated this in the cases of TEAMS and NOFBI, this remains to be seen with regards to demand stimulation. For example, while the new Constitution declares the citizen’s right to public information, actual access is limited by various factors, including the availability of content and the nature of the platforms on which this information is deployed.
Kenya’s “Build It and they Will Come” approach to broadband has led to broadband achievements being partially realized in less than five years since the ICT Policy was adopted. The Kenyan government has taken an active role in breaking the satellite dependency for international capacity and thus overcoming the first hurdle, with the highest upfront costs, in the broadband ecosystem. The delivery of international bandwidth over high-speed networks has been successfully accomplished with the landing of three cables to date. Stimulating demand remains a challenge. Kenya has proactively put in place a sound regulatory and policy framework, backed by clear strategies to try to improve this going forward.

However, broadband is not a panacea. Using innovative means, 2G mobile networks, service and applications are being used to achieve many of the same functionalities that broadband enables in Kenya including access to banking, mobile money and now e-commerce, SMS based e-government services, and even e-education through applications such as textbooks downloaded on mobile phones. The user experience would be enhanced through broadband networks, however, this does not mean that in the absence of broadband Kenya will remain behind. It is mainly businesses and the BPO sector that will be the beneficiaries, in the short term, of the broadband revolution that is taking place in Kenya – the same is likely to be true for all of the countries in the region. As with the evolution of 2G, broadband for the mass market, accompanied by low cost services and importantly devices, will be introduced over time as operators, vendors and equipment manufacturers broaden their consumer markets.

The strategy of improving Kenya’s positioning in terms of broadband access is deliberate, and is aligned with the objectives of Vision 2030. The glut of capacity enabled by infrastructure investments which have been both government led and privately driven, places Kenya in a strategic position in the region and in the continent and promises, if all other elements of the ecosystem are supportive, to improve socio-economic development. The cables have been laid and now the people need to come.
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infoDev is a global development financing program among international development agencies, coordinated and served by an expert Secretariat housed at the World Bank Group, one of its key donors and founders. It acts as a neutral convener of dialogue—and as a coordinator of joint action among bilateral and multilateral donors—supporting global sharing of information on ICT for development (ICT4D), and helping to reduce duplication of efforts and investments. infoDev also forms partnerships with public and private sector organizations who are innovators in the field of ICT4D. infoDev is housed in the Financial and Private Sector Development (FPD) Vice Presidency of the World Bank Group.

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BROADBAND IN MOROCCO
POLITICAL WILL MEETS SOCIO-ECONOMIC REALITY

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POLITICAL WILL MEETS SOCIO-ECONOMIC REALITY

AN infoDEV PUBLICATION PREPARED BY:
Samantha Constant
2011
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<th>Description</th>
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<td>2G</td>
<td>Second Generation mobile telecommunications system</td>
</tr>
<tr>
<td>3G</td>
<td>Third Generation mobile telecommunications system</td>
</tr>
<tr>
<td>ADSL</td>
<td>Asymmetric Digital Subscriber Line</td>
</tr>
<tr>
<td>ANRT</td>
<td>Agence National de Réglementation des Télécommunication (National Telecommunications Regulatory Agency)</td>
</tr>
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<td>GB</td>
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<tr>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GHz</td>
<td>Gigahertz</td>
</tr>
<tr>
<td>GNI</td>
<td>Gross National Income</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Pack Radio Service</td>
</tr>
<tr>
<td>HCP</td>
<td>Haut-Commissariat au Plan (High Commission for Planning)</td>
</tr>
<tr>
<td>HSDPA</td>
<td>High Speed Downlink Packet Access</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communications Technology</td>
</tr>
<tr>
<td>IP</td>
<td>Internet Protocol</td>
</tr>
<tr>
<td>IPTV</td>
<td>Internet Protocol Television</td>
</tr>
<tr>
<td>ISP</td>
<td>Internet Service Provider</td>
</tr>
<tr>
<td>ITU</td>
<td>International Telecommunications Union</td>
</tr>
<tr>
<td>kbit/s</td>
<td>Kilobits per second</td>
</tr>
<tr>
<td>MAD</td>
<td>Moroccan Dirham. Conversions to United States dollars have been carried out on the basis of US$1 = MAD 7.83, the rate of 1 September 2011</td>
</tr>
<tr>
<td>MENA</td>
<td>Middle East and North Africa</td>
</tr>
<tr>
<td>Mbit/s</td>
<td>Megabit per Second</td>
</tr>
<tr>
<td>MHz</td>
<td>Megahertz</td>
</tr>
<tr>
<td>NGN</td>
<td>Next Generation Technologies</td>
</tr>
<tr>
<td>ONCF</td>
<td>Office National des Chemins de Fer (National Office of Railroads)</td>
</tr>
<tr>
<td>ONE</td>
<td>Office National de l'Électricité (National Office of Electricity)</td>
</tr>
<tr>
<td>POP</td>
<td>Point of Presence</td>
</tr>
<tr>
<td>PSTN</td>
<td>Public Switched Telephone Network</td>
</tr>
<tr>
<td>SEPTI</td>
<td>Secrétariat d'État aux Postes et Technologies de l'Information (State Secretariat for Posts and Information Technology)</td>
</tr>
<tr>
<td>SMEs</td>
<td>Small and Medium Enterprises</td>
</tr>
<tr>
<td>SMS</td>
<td>Short Message Service</td>
</tr>
<tr>
<td>SMW3</td>
<td>South-East Asia - Middle East - Western Europe 3</td>
</tr>
<tr>
<td>US$</td>
<td>United States Dollar</td>
</tr>
<tr>
<td>USF</td>
<td>Universal Service Fund</td>
</tr>
<tr>
<td>VAT</td>
<td>Value Added Tax</td>
</tr>
<tr>
<td>VoIP</td>
<td>Voice of Internet Protocol</td>
</tr>
<tr>
<td>VSAT</td>
<td>Very Small Aperture Terminals (satellite)</td>
</tr>
<tr>
<td>WCDMA</td>
<td>Wideband Code Division Multiple Access</td>
</tr>
<tr>
<td>Wi-Fi</td>
<td>Wireless Fidelity</td>
</tr>
<tr>
<td>WiMAX</td>
<td>Worldwide Interoperability for Microwave Access</td>
</tr>
</tbody>
</table>
This report presents the broadband landscape in Morocco and the approach by which the country has advanced its ICT sector over the past fifteen years. Despite being constrained by human development challenges and regional political uncertainty in today’s “Arab Spring,” Morocco has emerged as a trailblazer in certain areas with particularly impressive mobile broadband results.

This would not have been possible without early visioning. Morocco was one of the first countries in the Middle East and North Africa region that institutionalized a regulatory environment for promoting competition in the telecom sector and as such made great strides in leveling the playing field for private operators to enter and succeed in the market. As early as 1999, a national strategy was developed to lay out the country’s ICT vision which later became the foundation for subsequent plans such as e-Morocco and now Digital Morocco. By 2006, both the fixed and mobile markets had become competitive with the award of operator licenses focused on quality rather than price.

As a result, Morocco’s broadband share of total Internet subscribers was over 99 percent by 2008, exceeding that of its neighboring Arab states. Today, the country boasts a quarter of households equipped with broadband, significantly higher than two percent in 2004. Almost half the country uses the Internet, demonstrating public demand in virtual networking and communicating via the World Wide Web.

Overall, the report finds that three factors contributed to Morocco’s success:

- Prioritizing ICT at an early stage so that subsequent planning could build on previous experiences;
- A youthful and eager population first getting online at the widespread cyber cafes and later wireless broadband; and
- Expanding private competition and opting for an emphasis on technical requirements, innovation, quality, and access.

The mobile industry is a big spotlight in Morocco’s broadband achievements. The introduction of third generation wireless technology in 2007 led to substantive growth of overall Internet subscriptions. This however has come at the cost of investment in fixed infrastructure. There is a need to boost fiber deployment in both local access and backbone networks. Understandably, such civil works require financing that will only happen if the private sector is confident it will see a return in its investments.

In order for Morocco to meet its ICT vision, the following three areas merit attention:

- Incentives that encourage a well-balanced, broadband infrastructure and greater investments in both fiber backhaul and local access networks;
- The prioritization of broadband in universal access policies including concrete efforts for dealing with affordability and awareness issues; and
- Programs to develop digital literacy among the older and rural population in addition to those that can effectively cultivate a next generation of e-content and software producers and developers.

Going beyond its initial broadband success and making broadband sustainable and transformational will be a challenge for Morocco. Deeping broadband access must find a way to deal with the social and economic reality of a lower-middle-income country. This will require fresh and innovative solutions including more emphasis on bottom-up initiatives.
The Kingdom of Morocco is a lower-middle-income economy situated in the northwest of Africa with a large coast bordering both the Atlantic Ocean to the west and the Mediterranean Sea to the north.

The population of Morocco was estimated at 31.9 million in 2010 distributed over 16 districts, with 57 percent living in urban areas.\(^1\) Rabat is the capital and lies 88 kilometers north of Casablanca, the country’s financial center and largest city of three million inhabitants. Moroccans are a fused society of Arabs and Berbers. Arabic and very recently (since July 3\(^{rd}\) 2011) Tamazight and Hassani are the official languages with French operating as language of government and business. The local dialect of Darija is a mix of Berber, Arabic and French.

Over the past two decades, the country has demonstrated progress in human development and economic indicators. It achieved a primary school completion rate of 80 percent in 2009 up from 51 percent in 1990 (Figure 1-1, left). Life expectancy increased from 64 years in 1990 to 72 in 2009.

In 2009, Morocco’s GDP annual growth rate was 4.9 percent and GNI per person doubled between 2003 and 2010 reaching US$ 2,950 (Figure 1-1, right). Economic diversification as well as climate vulnerabilities resulting in frequent droughts have contributed to a gradual increase of non-agricultural activities, led by the services sector constituting 55 percent of GDP in 2009. Despite this progress, the country continues to be vulnerable to economic shocks, high unemployment and low literacy rates, as well as increasing pressure on natural resources.

While Morocco weathered the economic crisis relatively well, pre-crisis challenges persist. Primary enrollment has improved, but secondary enrollment stood at 56 percent in 2009, and the literacy rate is still low at 58 percent. Young people continue to suffer from lack of economic opportunities and gainful employment. Youth unemployment (ages 15-24) was 18% in 2009 with almost one third of urban youth without a job. Additionally, while the agriculture sector is shrinking, it employs 41 percent of the nationally active population, demonstrating a mismatch of available skills and labor market demand. Finally, these figures do not take into consideration the number of people who are underemployed or working for the informal sector, where security and social safety nets are not available.

Historic changes are taking place in Morocco and the wider Middle East and North Africa region.\(^ii\) Yet, the country has emerged relatively stable from the “Arab Spring” compared to the dramatic events that have transformed the political landscapes of neighboring Egypt, Libya, and Tunisia. The government has responded to the call for reforms with a new constitution that proposes drastic changes to diffuse the power of the King and give greater legislative power to the parliament. With elections due on November 24\(^{th}\) 2011, outcomes are yet to be seen but expectations from citizens remain high. Similar to their fellow Arab neighbors, Moroccans are becoming increasingly more demanding of their government to develop effective policies that translate into concrete accomplishments.

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\(^{i}\) According to the United Nations Human Development Index.  

\(^{ii}\) Sources: World Bank, UNDP, and authors calculations.
2 Regulatory and institutional framework of the ICT sector

2.1 Background
Morocco experienced important reforms in its ICT sector starting in 1995, when access to the World Wide Web became available to the public. At the time, telecom and postal operations along with the administering of Internet access was carried out through the state-owned institution Office National des Postes et Télécommunications (ONPT).

During the period 1995-2000, the Moroccan government instituted a series of reform efforts that continued to build and evolve into the millennium, leading up to the present-day national ICT plan Maroc Numeric 2013 (Digital Morocco). At the time however, the most significant measure was the passing of Law 24-96 in 1997.iii This law led to the separation of ONPT into three entities: i) the creation of a new regulating authority Agence Nationale de Réglementation des Télécommunications (ANRT); ii) the formation of Maroc Telecom (Itsadat al Magreb) as a limited liability company; and iii) the restoration of Poste Maroc (Bareed al Magreb) which retained its national state-owned identity dedicated solely for postal and some financial services.

In addition, a secondary level of efforts was carried out in 1997-1998. The Ministry of Industry and Trade created an independent group to hold a seminar on the role of teleservices in June of 1997, which then later emerged into a formal body in 1998 as the Secrétariat d’Etat aux Postes et Technologies de l’Information (SEPTI), responsible for developing strategies specific to the ICT sector. In parallel, the Committee for Information Technologies Monitoring (CITM), a public private partnership, was formed in 1999 to support SEPTI and the result was a report analyzing the sector and strategies for moving forward. Building on this analysis, Morocco produced a five-year visioning document (1999-2003) outlining the potential of ICT and this became the basis for future strategy making across the sector at that time.iv Since then, three additional plans have been developed, e-Morocco 2004, updated in 2010, and Digital Morocco.

Hence with this early planning, Morocco was one of the first in the MENA region to put in place and enforce a competitive timeline for liberalization of its telecom sector. It was ahead of its neighbors in establishing an independent regulating authority and a partially privatized telecommunications operator (by 1998) and also ahead in instituting competitive markets in both the fixed and mobile industry as well as the launch of third generation (3G) mobile services.

All of this translated into concrete results. As early as 2008, Morocco’s broadband share of total Internet subscribers was over 99 percent, exceeding that of neighboring Arab states (Figure 2-1). Today, Internet usage is estimated at 49 percent of the population, higher than Tunisia, Jordan and Saudi Arabia.v Overall, the role of the government has been central in gaining successes and between 2008-2010 the country moved up 10 positions in the International Telecommunication Union (ITU) ICT Development Index (IDI).vi

At the same time, the government has faced challenges. Impact on the ground has been mixed, with questions about the effectiveness of the sector’s governance. In the most recent study carried out by the World Economic Forum and INSEAD benchmarking countries for national readiness in adaptation of ICT, Morocco ranks 83, down thirteen positions from 2006-2007 and trailing Egypt, Jordan, and Tunisia.vii When it comes to the perception of laws related to ICT, institutional effectiveness, and government ICT prioritization, Morocco falls behind the world mean and trails peer countries despite its advanced policy positioning (Figure 2-2). This suggests that not only is there is a divergence between government ICT strategies and the opinion of business leaders in the country but that other peer governments are just as absorbed as Morocco in actively promoting ICT.
Importance of ICT to gov't vision

Laws relating to ICT

Gov't prioritization of ICT

Gov't success in ICT promotion

Figure 2-1: Dial-up and broadband shares of total Internet subscribers in the Arab states, 2008
(Source: ITU 2009, Information Society Statistical Profiles 2009: Arab States)

Figure 2-2: Morocco’s score in ICT sector governance performance, 2010-2011. Note: Out of a 1-7 (best) scale. This indicator is derived from the World Economic Forum’s Executive Opinion Survey.
(Source: INSEAD and WEF. The Global Information Technology Report 2010-2011)
A possible factor for Morocco’s relatively low sector governance perception could be attributed to the high turnover in the ministries responsible for ICT policy (Table 2-1). Since September 2007, ICT policies and planning in Morocco have been designed and carried out by the Ministry of Industry, Trade and New Technologies while the Ministry of Communications, which had previously handled the ICT sector, is now responsible for governmental internal and external affairs, media relations, support in the development of communication sector and partnering on audiovisual efforts ratified by the office of the Prime Minister. While the Ministry of Communications is not in charge of ICT, it has an important role to play in advancing broadband and is an active partner in the governing structure of Digital Morocco.

Ministerial changes are common in many developing countries, and where these do create challenges in areas of governance they also create opportunities. Two complimentary tactics emerged in Morocco that helped the country continue its focus on ICT – the backing of the sector from the highest national level (the Prime Minister office, and His Majesty King Mohammed VI) and from municipal ICT strongholds (such as the example in Fez (see chapter 4)). While this report primarily focuses on broadband access, the country has demonstrated considerable commitment to development of ICT in the business sector notably with the establishment of Casablanca Technopark and the expansion of offshore services such as call centers, both of which are creating employment, attracting private (foreign and domestic) investment, and driving demand for high quality, high speed Internet.

2.2 The regulator

The Agence Nationale de Réglementation des Télécommunications (ANRT) was established in 1998 under Article 27, Law 29-06 as the national regulatory authority responsible for the drafting and enforcing of laws related to the telecom sector, including licensing, pricing, compliance, and fair competition. While it is entitled to financial autonomy and has its own legal status, ANRT presides in the office of the Prime Minister and is subject to state supervision. The agency consists of three main bodies:

i. Conseil d’Administration, chaired by the Prime Minister and consisting of government representatives along with five key ICT experts from the private and public sectors. It sets the strategy, fiscal envelop, and carries implementation oversight;

ii. Comité de Gestion, appointed by the Conseil d’Administration and on a five year rotation to consider all affairs decided upon by the council; and

iii. Directeur Général which houses four major operations of the ANRT – the department of Monitoring and

<table>
<thead>
<tr>
<th>Year</th>
<th>Official body</th>
</tr>
</thead>
<tbody>
<tr>
<td>June 1994-January 1995</td>
<td>Ministry of Postal Services and Telecommunications</td>
</tr>
<tr>
<td>February 1995– February 1998</td>
<td>Ministry of Postal Services and Telecommunications</td>
</tr>
<tr>
<td>March 1998 – August 2000</td>
<td>Ministry of Communications</td>
</tr>
<tr>
<td>September 2000 – September 2002</td>
<td>Prime Minister Office, Department of Post, New Technologies, and Communications (SEPTI)</td>
</tr>
<tr>
<td>November 2002 – May 2004</td>
<td>Ministry of Culture and Communications</td>
</tr>
<tr>
<td>June 2004 – August 2007</td>
<td>Ministry of Communications</td>
</tr>
<tr>
<td>September 2007-Present</td>
<td>Ministry of Communications</td>
</tr>
</tbody>
</table>

Table 2-1: ICT policy-making bodies from 1994-present
Competition, Technical Department, the General Secretariat, and National Institute of Posts and Telecommunications. Under Law 29-06, Articles 2-28 establish the regulatory framework by which ANRT is authorized to carry out its responsibilities including licensing of public telecommunications networks operating in the public domain or using radio frequency service, authorization of independent networks, assignment of radio frequency spectrum and approval of radio facilities and terminal equipment connected to public networks. It also enforces compliance measures to ensure conditions outlined in the Law are adhered to, including fees, validity period of the licensing, zoning in terms of coverage, leasing of lines, and technical requirements for licensing.

Since its establishment in 1998, ANRT has progressively increased its institutional capacity. It has pushed sector liberalization, enhanced the consultative process, increased transparency through online availability of sector laws and regulations and monitors ICT development through regular statistical reports and analysis. Early in 2010, ANRT released an orientation note covering its perspectives on the sector through 2013 in areas such as regulation and legislation, liberalization, development of broadband, and universal access. A select number of measures highlighted in the note include inter-network tariffication rules that favor small-scale operators, the ability for customers to change operators while maintaining the same number, and development of new models to incentivize wholesale traffic. Further, a study to allocate frequencies for 4G technologies by end of 2011 is under review along with new policy levers to support VSAT viability, including a plan to issue new licenses for VSAT and GMPCS networks. In addition to its domestic efforts, ANRT also pursues active cooperation with Arab and francophone regulators and according to a World Bank study, “ANRT’s excellence is recognized on a regional scale.”

2.3 Policies and national strategies

In 1998, when liberalization efforts were underway with the splitting up of the ONPT, the government instituted a ministerial level body to design strategies that would help advance Morocco’s ICT position. The formation of Secretariat d’ État aux Postes et Technologies de l’Information (SEPTI) was not significant in of itself as its principal role was to design a strategy before it was then rebranded as a new department after two years of existence. SEPTI’s importance lay in the fact that it set the stage for strategic national planning, with both international and domestic ICT visioning. On the international front, its 1999-2005 strategy focused on building a knowledge-based economy and developing human resources to compete with an increasingly globalized world; on the domestic level, the strategy highlighted the need for the government to be a model for the rest of the country in terms of new technology usage and delivering of services.

It was not until 2004, with the passing of Law 55-01, incorporating addendums to Law 24-96 that guidelines were introduced to further open the market, expand competition and enhance universal access. The major reform measures related to Law 55-01 include:

- Strengthening the role of ANRT in terms of compliance, monitoring and enforcement of fair competition. This includes managing the numbering system, regulating prices and imposing reporting requirements on operators.
- Expansion of the definition of universal service to include value added services such as the Internet. A key goal is to ensure that all areas especially rural and low-density regions are covered. However, as it stands universal access can be done via 2G mobile networks at less than broadband speeds.
- The possibility for companies to lease their infrastructure to telecom enterprises and for operators to share infrastructure if requested. This is of particular significance considering the incumbent Maroc Telecom owns most of the fixed infrastructure.
- The creation of the Fund of Universal Telecoms Service (FUTS) and a reduction of contribution by telecom operators of two percent of revenues (net of taxes and interconnection payments).
- The establishment of a special fund for research and development. The fund depends on contributions from licensed
operators of 0.25% of net turnover (excluding interconnection charges).

The multiple policy efforts that were underway early on were a positive sign of government commitment. However they proved a challenge given that duplication and divergence of activities became inevitable. For example, as discussed earlier, government turnover was frequent (the ministerial bodies related to the sector alone changed seven times in a decade) hence not all policies designed were implemented. Further, some regulatory measures have created artificial constraints for the operators as well as the regulator such as a specific rather than generic licensing framework as in the case of some wireless services being restricted to limited mobility.

Nevertheless Morocco has come a long way in a little over a decade, from a government-owned monopoly to the creation of an independent regulator and a competitive market driven by three private operators (Figure 2-3). Further it is continually exploring new solutions. For example, this past year, ANRT commissioned two major studies, currently underway, to look into an effective approach to national planning of broadband and accelerating growth of high speed Internet in new project developments.

2.4 From e-Morocco to Digital Morocco

The government’s vision for the ICT sector has been guided by a series of holistic plans. The first e-Morocco strategy was launched in 2001, followed by a second updated version in 2005 laying out the vision until 2010. Drawn from the SEPTI strategy of 1999-2005, the themes of e-Morocco focused on closing the digital divide and positioning Morocco globally as a key ICT player. The premise was to create an ecosystem of good governance and enabling regulation that fosters competition, knowledge production and ICT exportation. Major programs such e-governance, e-commerce services, social and health care provision to citizens, NGO/youth portals, community access centers and equipping schools with computers among many others were introduced early in the e-Morocco planning and either continue to date, were merged with other programs, or re-prioritized in future strategy making.

At the heart of Morocco’s modern-day ICT vision is Digital Morocco 2013: The National Strategy for Information and Digital Economy 2009-2013 (better known as Maroc Numeric) released by the Ministry of Industry, Trade, and New Technologies. The strategy focuses on umbrella areas – the governance structure, the beneficiaries and program, and the budget allocation to fund proposed strategies and recommendations.
Digital Morocco stands out from earlier e-Morocco strategies primarily for two reasons. The first is its emphasis on broadband, which for the first time is not only explicitly articulated but is the first pillar in the strategy. The second is the country’s demonstrated commitment -- endorsed by His Majesty King Mohammed VI -- to advance the sector and engage cross-sectoral governance bodies to support ANRT in its regulatory mandate and oversee implementation of planned activities.

Built on the principals of creating momentum, strategic prioritization, governance reform and smart resource distribution, and long-term action planning, Digital Morocco is designed around four strategic priorities:

1) Expanding citizen access to broadband with an emphasis on knowledge;
2) Focusing on e-government and public service provision that is user-oriented;
3) Promoting computerization across small and medium enterprises to increase productivity; and
4) Supporting local actors to develop IT markets and build greater potential for sector exports.

The importance of interacting economic gains with social needs supported by a multi-sectoral governance body and an enabling environment resonates in the strategy set forth by the Moroccan government. (Figure 2-4) demonstrates the conceptual visioning of these aforementioned components, and how the country sees the objectives fit in to meet its goal to place itself on the forefront of the ICT field.

![Figure 2-4: Digital Morocco vision for the advancement of ICT in Morocco](Source: Digital Morocco 2013)
3 The broadband market

3.1 Background

Broadband became available to the Moroccan public via the introduction of ADSL in mid-2003, and users had options in obtaining high-speed Internet at speeds ranging from 128, 256, 512, or 1024 kbit/s. At the time, the broadband market consisted of ADSL and leased lines, which were sold to businesses and ISPs. Today, ADSL is available at downlink speeds of 2, 4, 8, and 20 Mbit/s.

The mobile market was built from the GSM standard later evolving to GPRS and EDGE and then 3G through Wideband CDMA (WCDMA) and High Speed Downlink Packet Access (HSDPA) with speeds ranging from 1.8 to 7.2 Mbit/s. Fixed wireless technologies such as WiMAX and CDMA 2000 1X EV-DO were also introduced.

There are three major companies operating in the Moroccan telecommunications services sector market: Maroc Telecom, Méditel and INWI. As a result of Law 29-06, the incumbent Maroc Telecom was created as a limited liability company and partially privatized in 2001 when 35% was sold to the French company Vivendi. Since then there was an additional sale to Vivendi and in 2007, part of Maroc Telecom was offered to the public through a listing on the Casablanca Stock Exchange. At the end of 2010, Vivendi owned 53% of the shares, the Kingdom of Morocco 30% and the public 14%. Maroc Telecom is also a strategic investor in West Africa with holdings in incumbent telecommunication operators in Burkina Faso, Gabon, Mali and Mauritania.

Maroc Telecom is the only company that owns the copper fixed line telephone network (local loop unbundling is available). It has a 49% share of the mobile market, a 57% share of the overall Internet market and a 45% of the 3G market. It offers ADSL, leased lines and fiber optic in the fixed broadband market and GSM and HSDPA in the mobile market. It also provides IPTV service.

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<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Per 100 people</th>
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<tr>
<td></td>
<td>2010</td>
<td>June 2011</td>
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<tr>
<td>Population</td>
<td>31,851,000</td>
<td>32,187,000</td>
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<tr>
<td>Fixed telephone subscriptions</td>
<td>3,749,364</td>
<td>3,646,318</td>
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<tr>
<td>- of which fixed wireless</td>
<td>2,493,336</td>
<td>2,383,290</td>
</tr>
<tr>
<td>Mobile subscriptions</td>
<td>31,982,279</td>
<td>34,975,076</td>
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<tr>
<td>Total Internet subscriptions</td>
<td>1,866,963</td>
<td>2,345,725</td>
</tr>
<tr>
<td>- of which ADSL</td>
<td>497,640</td>
<td>527,016</td>
</tr>
<tr>
<td>- of which 3G</td>
<td>1,366,472</td>
<td>1,816,792</td>
</tr>
<tr>
<td>- of which data cards</td>
<td>1,281,616</td>
<td>1,281,616</td>
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<tr>
<td>Total broadband (ADSL + 3G)</td>
<td>1,864,112</td>
<td>2,343,808</td>
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</table>

<table>
<thead>
<tr>
<th></th>
<th>% of households 2010</th>
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<tbody>
<tr>
<td>Households with Internet access</td>
<td>25</td>
</tr>
<tr>
<td>Households with a PC</td>
<td>34</td>
</tr>
<tr>
<td>Households with a mobile phone</td>
<td>84</td>
</tr>
<tr>
<td>Households with a classic (wired) fixed line</td>
<td>13</td>
</tr>
<tr>
<td>Households with a fixed wireless line</td>
<td>29</td>
</tr>
<tr>
<td>Households with electricity</td>
<td>92 (2009)</td>
</tr>
<tr>
<td>Households with a television</td>
<td>90 (2009)</td>
</tr>
<tr>
<td>Households with a satellite dish</td>
<td>65 (2009)</td>
</tr>
</tbody>
</table>

Table 3-1: Key ICT indicators
(Source: Adapted from ANRT, HCP, Les Indicateurs sociaux du Maroc, 2009)
Until the year 2000, Maroc Telecom was the sole operator providing telephony and Internet services in country with the exception of a limited number of small-scale ISPs. After being awarded the second GSM license in 1999, Méditel began to operate on March 2000 leading to a major evolution in Morocco’s mobile history. Méditel original owners were Portugal Telecom, Telefónica (Spain) and local investors. Portugal Telecom and Telefónica sold their shares in 2009 and the following year France Telecom bought 40 percent. The two local shareholders are Caisse de Dépôt et de Gestion (CDG) and FinanceCom. Méditel’s offerings include corporate leased line and fiber access, GSM and HSDPA mobile and WiMAX. In June 2011, its mobile market share was 32% and its 3G market share stood at 24%.

Rebranded in early 2010, INWI is also referred to as Wana Corporate. Formerly a subsidiary of France Telecom, Wana Corporate became the third operator when it was awarded a landline license in 2005 under the name of Maroc Connect. It was awarded a 3G license in 2006 and later a GSM mobile license. In 2009, 31% of the company was opened to a joint venture between the Zain Group and Al Ajial Investment Fund Holding leading to a rebranding of Wana Corporate to INWI. The company offers leased lines and fiber for corporate clients, ADSL (through local loop unbundling), CDMA 2000 1x fixed wireless, EV-DO broadband and GSM mobile. Its share of the fixed market (copper line and limited mobility wireless subscriptions) stood at 66% in June 2011 with its mobile market share at 19% and its share of the 3G market at 31%.

3.2 International connectivity

The country’s geography with over 3,000 kilometers of coastline facing both the Atlantic Ocean and Mediterranean Sea ensures access to a number of international fiber optic submarine cable systems. Maroc Telecom obtains access to international bandwidth through two gateways in Casablanca and Rabat, and four submarine fiber optic cables: SMW3, Estepona-Tetouan, Eurafro and more recently Atlas Offshore. In addition, Maroc Telecom is investing in a new fiber optic network to connect its operations in Mauritania, Burkina Faso, Gabon and Mali. Since 2003, Méditel has been using its own international gateway. INWI leases international bandwidth mainly through operators in Spain.

During 2002 – 2010 Morocco increased its international bandwidth capacity from 200 Mbit/s to 75,000 Mbit/s, with 25 percent increase in the last year alone. In 2010, there was 2,461 bits per person in Morocco, higher than Algeria and Egypt, similar to Jordan but significantly below Tunisia (Table 3-2).
### 3.3 In-country backbone infrastructure

As the incumbent, Maroc Telecom has the widest coverage of fiber in country with a 24,440-kilometer network. With the awarding of their fixed licenses in 2005, Méditel and INWI have the option to either build their own backbone or lease infrastructure from others. This includes utilities such as the Office National d’Électricité (ONE) with nationwide coverage of 4,000 kilometers of fiber and the Office National de Chemin de Fer (ONCF), the national railway operator, which has 1,100 km of fiber.

There are also alternative wholesalers such as the Marais Group (via its subsidiary Finetis Maroc) having deployed 1,200 km of fiber in 2008 currently available for use. For example, INWI leases fiber from ONE and Marais. In 2006, Méditel established a long-term partnership with ONCF to construct fiber optics along the rail connecting major cities in Morocco and has installed around 2,500 kilometers of fiber backbone to support its mobile base stations and fixed wireless systems.

With concerns that the current infrastructure is limiting or controlled tightly by the incumbent, there are high-level discussions led by ANRT among various institutional actors regarding deployment of new cables. Since the cost of deploying new fiber cables is prohibitive, improving existing networks is always an option but reaching rural and remote areas still without coverage remains a problem. At the time of this report, ANRT is planning to carry out an operational study to assess the feasibility and cost of running 500 kilometers of fiber and then proposing to the three operators that they share 75 percent of the cost (25 percent each) with ANRT paying the remaining quarter and selecting one to manage the network. If agreement can only be reached with two operators, an alternative strategy would be a one third cost share.

### 3.4 Penetration of broadband

#### 3.4.1 Wireline broadband

The fixed infrastructure in Morocco's delivery of broadband to the home is based on the copper network that was inherited by Maroc Telecom from ONPT. With the introduction of ADSL in 2003, there came new Internet billing options that made access more affordable than traditional dial-up, and hence led to an accelerated rate of take up. At the end of December 2003, four percent of Internet subscriptions were ADSL. This figure jumped to 61 percent by the end of 2004, and continued to grow until the introduction of mobile broadband. Narrowband access has decreased to a negligible amount accounting for less than 1,000 subscriptions by June 2011. Fiber to the premises is limited to mainly commercial use with home fiber access basically non-existent. Broadband via cable modem never developed in Morocco due to a preference for direct to home satellite for the delivery of multichannel television.

Leased lines accounted for 1,003 Internet subscriptions in June 2011 but have been dropping. Maroc Telecom started offering leasing lines in 1995 and at the time lines were copper. Today, leased lines are all fiber but in time entities that were leasing started switching to ADSL. Several reasons can explain the declining figures: i) the introduction of static IP addresses to ADSL subscribers in 2005 which until then were available only via leased lines, 2) around the clock service guarantee with ADSL subscriptions, inspiring greater confidence among customers, and 3) cost of leased lines are high compared to ADSL lines. However, government agencies and big banks continue to see value in renting fiber optic lines to run Wide Area Networks (WAN) as do other businesses who want to control their own servers directly.

By June 2011, there were 527,016 ADSL subscriptions in the country, almost all of which

<table>
<thead>
<tr>
<th>Country</th>
<th>Gbit/s</th>
<th>Bits per second per person</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010</td>
<td>2008</td>
</tr>
<tr>
<td>Egypt</td>
<td>94</td>
<td>348</td>
</tr>
<tr>
<td>Jordan</td>
<td>15</td>
<td>833</td>
</tr>
<tr>
<td>Morocco</td>
<td>73</td>
<td>861</td>
</tr>
<tr>
<td>Algeria</td>
<td>35</td>
<td>98</td>
</tr>
<tr>
<td>Tunisia</td>
<td>50</td>
<td>1,170</td>
</tr>
</tbody>
</table>

Table 3-2: International Internet bandwidth
(Source: ANRT and regional regulatory authorities)
are provided by Maroc Telecom. The rate of ADSL subscriptions grew rapidly following launch with penetration reaching 1.5 percent of the population by 2007 (Figure 3-3). Since then growth has been negligible due to the impact of the introduction of 3G. As demand for services that require greater bandwidth and speed increased, ADSL has experienced a slightly upward trend recently. This might continue if the environment and infrastructure is right. This is especially true with enterprises that require fixed technology to operate effectively. Nevertheless, the long-run potential for ADSL broadband will inevitably remain constrained due the limited number of wired telephone lines. Only two in five households have a “fixed” telephone line and this number is inflated since it includes fixed wireless subscriptions. Just 13% of households have a classic copper-based fixed line.

As of March of 2011, the majority of ADSL subscribers access at speeds between 1 and 4 Mbit/s, much faster than mid-2008 when most were well below 1 Mbit/s (Figure 3-4). One reason is the need for bandwidth is increasing as users become more interested in downloading photos, videos, etc. On the other hand, the incumbent has been increasing bandwidth while keeping the price stable. In July 2011 Maroc Telecom removed the 1 Mbit/s connection and today the entry-level bandwidth a subscriber receives is 2 Mbit/s.

The incumbent, Maroc Telecom had a monopoly over the fixed infrastructure network until landline licenses were allocated to Méditel (the second operator) and Maroc Connect (which later became Wana Corporat and now INWI) in 2005. However they choose not to invest in wired telephone lines. In order for the other operators to offer broadband using ADSL they have to purchase it through local loop unbundling which did not go into effect until 2007 (partial)/2008 (full), and is still very limited. When Méditel and Wana received their landline licenses, ANRT was keen to have them invest in fixed infrastructure; however, the financial burden was much higher than investing in wireless networks. The return on investment for deployment of large-scale, intensive civil works is not apparent, and continues to be a challenge today especially with the mobile market being so robust. For this reason, ANRT is exploring incentives for the operators to further invest in building fixed networks.

3.4.2 Broadband on the move

![Figure 3-3: ADSL subscriptions (Source: Adapted from ANRT)](image1)

![Figure 3-4: ADSL distribution by speed, March 2008 and 2011 (Source: Adapted from ANRT)](image2)
Morocco was one of the first countries in the MENA region to award 3G frequencies in 2006. Unlike most other countries that awarded 3G spectrum through an auction, Morocco chose a beauty contest, resulting in lower costs for operators. Spectrum was awarded to a new operator, shaking up the existing duopoly and triggering intense competition in the mobile broadband market (Box 3-1). As a result, mobile broadband, which launched in 2007, surpassed fixed broadband connections by 2009 and made up almost three quarters of all broadband connections in 2010 (Figure 3-5).

The number of 3G subscriptions in Morocco stood at 4.3 per 100 people in December 2010. It is difficult to make comparisons to peers due to definitional issues and the lack of data. Among MENA countries for which data is available, wealthier upper income nations such as Bahrain, Libya and Saudi Arabia have a higher 3G penetration than Morocco (Figure 3-6). However,
except for Libya, Morocco had the highest 3G penetration among North African countries (by the end of 2010, Algeria and Tunisia had yet to commercialize mobile broadband according to the GSM Association).

It is revealing to compare the assessed speed and usage of mobile broadband networks in Morocco with peer countries. According to monitoring of mobile networks in five MENA countries carried out in the first quarter of 2011, users in Morocco consumed the most data on a monthly basis (414 MB) (Figure 3-7, right). This is a reflection of the operator’s liberal mobile data consumption policies. Further though Morocco was not top-ranked for average speeds, it did rank first for peak speeds with bandwidth surging up to 9.8 Mbit/s (Figure 3-7, left). This is somewhat surprising given that the highest speed advertised by Moroccan mobile operators is 7.2 Mbit/s.

Currently two variations of 3G broadband technology are used in Morocco. Maroc Telecom and Méditel have deployed WCDMA with HSDPA extensions whereas INWI uses CDMA 2000 1x EV-DO technology. Méditel has a WiMAX network used to offer fixed wireless broadband services. According to ANRT’s General Orientation Note for the sector, 4G LTE spectrum will be allocated prior to 2013.

Overall Internet subscriptions grew 300 percent in less than three years largely due to 3G. Growth might be even greater if 3G coverage was higher. Although 2G networks cover over 95% of the population, the rate for 3G is much lower (Table 3-3). For example, while Maroc Telecom covers practically the entire population with 2G the corresponding figure for 3G was 46.4% coverage in 2010. When mobile broadband users are outside the range of 3G, speeds drop to 2G technologies (GPRS/EDGE or CDMA 2000 1x).

<table>
<thead>
<tr>
<th>Operator</th>
<th>2nd Generation Technology</th>
<th>3rd Generation Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAROC TELECOM</td>
<td>6,336</td>
<td>3,099</td>
</tr>
<tr>
<td>MEDI TELECOM</td>
<td>3,500</td>
<td>1,000</td>
</tr>
<tr>
<td>WANA CORPORATE</td>
<td>1,939</td>
<td>1,635</td>
</tr>
<tr>
<td>TOTAL</td>
<td>11,775</td>
<td>5,734</td>
</tr>
</tbody>
</table>

Table 3-3: Number of mobile base stations, 2011 (Source: ANRT, July 2011)

3.5 Retail broadband prices

Moroccan retail prices for fixed broadband are competitive compared to other countries in the region. In a benchmarking survey covering 200 ADSL services across 18 Arab countries, Morocco had the lowest prices for low and medium speeds and the second cheapest for very high speed (after Saudi Arabia). Maroc Telecom’s entry-level ADSL package provides the highest speed and lowest prices compared to other Arab countries (Table 3-4). Also, it is the only Arab operator outside the Gulf that offered high-speed options (i.e., > 15 Mbit/s).

In respect to 3G prices, there are both prepaid and postpaid options (Table 3-5). Ninety six percent of the population use pre-paid tariffs that tend to be structured around duration (one day, one week or one month). In respect to postpaid, pricing differences revolve around the download speed of the package. Maroc Telecom has a relatively liberal download limit (5 GB per month);

<table>
<thead>
<tr>
<th>Band-width (Down-link)</th>
<th>Algeria</th>
<th>Egypt</th>
<th>Jordan</th>
<th>Morocco</th>
<th>Tunisia</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry level &gt; 256 kbit/s</td>
<td>31.76</td>
<td>27.26</td>
<td>59.51</td>
<td>23.53</td>
<td>38.24</td>
</tr>
<tr>
<td>4 Mbit/s</td>
<td>N/A</td>
<td>N/A</td>
<td>102.27</td>
<td>46.04</td>
<td>86.04</td>
</tr>
<tr>
<td>&gt; 15 Mbit/s</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
<td>136.07</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Note: Moroc Telecom quotes the following ADSL rates to its customers: 2, 4, 8, 20 Mbit/s at 99, 149, 199, 499 MAD (12.54, 18.87, 25.21, 63.21 US$) respectively. (Source: Adapted from Teligen)
if it is exceeded then the user’s speed is reduced. Méditel offers unlimited data explaining its higher tariffs. INWI offers data-only postpaid packages with speeds up to 1 Mbit/s so its offering is not comparable to the other operators.

Comparing mobile broadband prices to peer countries is difficult due to different pricing structures, speeds and options. Furthermore, there is a difficulty with 3G speeds in that actual bandwidth can differ dramatically from theoretical speeds based on the user’s device, coverage and network capacity. In terms of prepaid mobile broadband, Maroc Telecom offers an unlimited option with a validity of one month. However the speed is 0.512 kbit/s, lower than what peer operators in other countries advertise. On the other hand the peer operators have data caps after which speeds are reduced or users have to pay for additional downloads. Although the Maroc Telecom prepaid price is the most expensive compared to peers, on a data download basis it could be considered the cheapest since it offers unlimited usage with no penalty (Table 3-6). For monthly mobile broadband using USB connections to link a laptop, Maroc Telecom offers the second cheapest tariff compared to peers and the cheapest on a price per GB basis. However like the prepaid option, Maroc Telecom’s prices are the highest on a price per theoretical speed basis.

In respect to prices for bundling of broadband services, both Maroc Telecom and Méditel offer triple play packages. Maroc Telecom provides a package of television (IPTV), broadband (ADSL) and telephony (PSTN and VoIP) (Table 3-7). By December 31, 2010, Maroc Telecom recorded 40,000 households with IPTV, which is a fixed line TV service launched in 2006. Given that Méditel does not offer fixed line broadband, its package uses 3G voice and data coupled with satellite television.
The option of holding a beauty contest rather than an auction to award licenses is attractive for governments interested in assessing each applicant’s vision and long-term business plan before making final selections. In a beauty contest the request for proposals focuses on technical criteria rather than price, and includes questions that request prospective operators to address equity in coverage especially in rural areas, job creation, service provision, and to also provide strong indication of financial viability. Further, the option of the beauty contest provides space for new entrants or aspiring operators who are not as well financed to compete against incumbents that may be better positioned financially and with a stronger customer base. Although a beauty contest may be perceived as less transparent than an auction, a significant benefit is that winners typically do not pay the large amounts that an auction entails, which theoretically should result in lower prices for consumers.

In the case of Morocco, ANRT ran a beauty contest in 2006 to award three 3G licenses and the results were astounding – mobile broadband subscriptions increased 530 percent between 2007 and 2008. Today, mobile broadband accounts for three quarters of the country’s broadband market share. As it wished to expand competition in the marketplace and push for universal access, ANRT designed a proposal that would ensure that the license would be awarded to the best technical and quality oriented bid. In addition to the technical requirements, a fixed license fee was set at MAD 360 million plus an additional MAD 36 million for the re-organization of the radio frequencies. In the end, bidders included Maroc Telecom, Méditel, WANA (Maroc Connect at the time) and Maroc Nejma (a Kuwait-based company). The evaluation was based on four criteria: 1) deployment of infrastructure, 2) service quality engagement, 3) diversity, innovation, and incentive packages to customers, and 4) financial viability of bidder and shareholder relations.

The aspiring operator WANA made a great impression and was ranked first, followed by Maroc Telecom and Méditel. The introduction of a third operator in the market reaped benefits for both ANRT and the newly licensed company. WANA’s launch of its restricted mobility service (branded as Bayn) in 2007 and full mobility service (branded Wana Mobility) in 2008 expanded mobile broadband as well as its own public reach and penetration. So large was this achievement, however, that WANA became a victim of its own success. When the company launched WANA mobility using CDMA technology as opposed to the GSM standard Méditel and Maroc Telecom use, they also followed the policy of giving away free phones (two for the price of one). The promotion was so popular that WANA sales exceeded expectations and the company faced two major challenges: 1) a still under-developed infrastructure that could not handle the burden of so many users at once, and 2) technology incompatibility resulting in unexpected roaming issues (most neighboring countries were using GSM). Eventually, many of the customers switched back to Maroc Telecom and Méditel and the surge of customers leveled.

A lesson learned and improved upon – since 2010 WANA was recapitalized through new investments by the Zain Group, changed management, and adopted a new brand name “INWI” phasing out WANA mobility and upping its sale figures. INWI currently claims the greatest 3G coverage, providing CDMA2000/EVDO for all new customers and 1X (an IMT-2000 technology but slower) where coverage areas have not yet been enhanced with EVDO technology.


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### Box 3-1: Awarding 3G in Morocco: The story behind INWI’s success

<table>
<thead>
<tr>
<th></th>
<th>Maroc Telecom</th>
<th>Méditel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monthly Price</strong> (with VAT)</td>
<td><strong>SILVER BOX</strong></td>
<td><strong>GOLD BOX</strong></td>
</tr>
<tr>
<td>MAD 299 (US$37.21)</td>
<td>MAD 349 (US$43.42)</td>
<td>MAD 389 (US$48.41)</td>
</tr>
<tr>
<td>ADSL Speed</td>
<td>2 Mbit/s</td>
<td>4 Mbit/s</td>
</tr>
</tbody>
</table>

Table 3-7: Bundled offers, September 2011. Note: Maroc Telecom packages include IPTV with two channels and the option to purchase additional ones, a wired telephone line and VoIP service with unlimited free calls to Maroc Telecom fixed lines. Meditel’s package includes free calls between other HD-BOX subscribers. (Source: Adapted from Maroc Telecom and Meditel)
4 Creating an enabling environment

4.1 Overview
The World Bank views broadband as an ecosystem consisting of various components that needs to be in harmony for the broadband market to be healthy and sustainable. An enabling environment is necessary to promote supply-side growth as well as to facilitate demand. The Moroccan government has implemented regulations to open up the local loop in an effort to create greater supply of broadband connections and has also developed a number of programs to increase access. It has also promoted e-Government through several strategic plans with the aim of developing e-services to encourage citizens and businesses to interact with it online.

4.2 Regulation

4.2.1 Tariff guidelines
At the time of writing this report, a set of tariff guidelines produced by ANRT in August 2010 is still ongoing with the aim of establishing a regulatory framework around retail pricing, paying special attention to the newest operator which may not benefit from the same reach and longevity as the incumbents. With these guidelines, ANRT will be monitoring four major practices that it will consider unlawful:

- The squeeze effect resulting in tariffs that cannot be replicated by competitors in a manner that will be economically viable. It is strategy by which a vertically integrated operator sets its tariffs below the cost level of a reference operator.
- Predatory pricing practiced by an operator that exposes the competition to a reduction of their margin and as such is apt to exclude them from the market.
- Abusive bundling is taking advantage of the ability to provide the sale of two or more different services that cannot be replicated by competition, affects the interest of the client, comprises the commercialization of competitor offers, and reduces demand for competitor products.
- Unfair cross-subsidization where an operator uses profits from one service to subsidize losses in another service.

The document purposes to protect against the potential domination of one operator over the other, especially the one with greatest cliental network and financial leverage. The above prohibitions of practices would cover voice, data, messaging and other data transmission services over telephone, mobile and data networks.

4.2.2 Local Loop Unbundling
In an effort to promote competition, ANRT prioritized the issue of local loop unbundling as early as 2004 through a decision resulting in negotiations with the incumbent Maroc Telecom which needed to provide technical specifications about its legacy copper infrastructure and pricing options for operator access. However it was not until an order from the Prime Minister that dates were set for implementation of local loop unbundling – with partial unbundling expected by January 2007 and full unbundling by July 2008. A final agreement on full unbundling was reached on December 27, 2007 after a series of correspondence between ANRT and Maroc Telecom. This also included new modifications to pricing of partial unbundling.

Under ANRT oversight, the monthly costs that were decided upon for 2008 were competitive and favored affordable operator access. The tariff structure is multi-layered, including costs relating to:

- Maroc Telecom intervention in case there is a problem,
- technical issues specific to shared access,
- the creation of specific applications in order to access the local loop,
- infrastructure (or entities) within Maroc Telecom to implement the local loop, and
- billing access to the local loop.

With the final agreement, Méditel and INWI's expected monthly cost to access high frequencies of the unbundled lines (partial) was estimated at MAD 35, 30 percent less than what was initially agreed upon for the year 2007. For full
unbundling, the estimated cost was MAD 100, lower than what Maroc Telecom charges its direct customers and what many incumbents in Europe were charging their competitors.

Additionally, Maroc Telecom was required to provide information about its subscribers as well as specifications that pertain to its equipment sites enabling competitors to have the option to either rent lines or share the physical infrastructure. This would give flexibility to the competitors in terms of lowering costs by running their own lines through shared infrastructure. While these measures are deemed encouraging for competitors, the impact of local loop unbundling on broadband has so far been limited. As of June 2011, Maroc Telecom had a 99.8 percent share of the ADSL market.

In addition, while local loop unbundling can be useful policy for promoting broadband competition, in the case of Morocco its relevance is also restricted. There are only 1.2 million copper-based fixed lines of which 40% are already used for ADSL.

4.2.3 Universal access

A key objective of ANRT and the Ministry of Industry, Commerce and New Technologies has been the promotion of universal access. It is also a fundamental strategy of Digital Morocco where extending citizen access to broadband is viewed as an essential ingredient for social transformation.

As mentioned earlier, a Universal Service Fund (USF) was created in Law 55-01 requiring all operators to allocate two percent of revenue. This meant that a fund would be available for incentivizing infrastructure development in remote and hard to reach areas. If operators invest in those areas on their own, the amount they spent is reduced from their USF contribution (“Pay or play”).

In 2007, the “PACTE” program (2008-2011) was approved by a special commission in charge of universal service. The program, which is the largest financed by the USF intends to address coverage of 9,263 locations classified as “white areas,” of which 50 percent are listed under the National Initiative for Human Development (Initiative Nationale pour le Développement Humain, INDH). These areas belong to 55 regions and 841 communes of the territory, including 2.3 million inhabitants or approximately 17% of the rural population in Morocco. The budget for this activity is estimated at MAD 1.44 billion. By the end of the PACTE program it is envisaged that essentially all populated areas will have mobile coverage, up from 97.5% of the population in 2010.

<table>
<thead>
<tr>
<th>Program</th>
<th>Objective</th>
<th>Budget</th>
<th>Time frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>GENIE</td>
<td>Equipping 9,260 educational institutions with multi-media rooms and Internet</td>
<td>MAD 2 billion of which MAD 1 billion from is from the USF</td>
<td>2009-2013</td>
</tr>
<tr>
<td>NAFID®</td>
<td>Providing computers with mobile broadband to teachers</td>
<td>MAD 216 million (including support from the Mohammed VI Foundation)</td>
<td>2009-2012</td>
</tr>
<tr>
<td>GENIE–SUP</td>
<td>Provision of digital equipment to universities and training institutions.</td>
<td>MAD 120 million</td>
<td>2011-2012</td>
</tr>
<tr>
<td>INJAZ</td>
<td>Provision of computers with mobile broadband to senior secondary school students</td>
<td>MAD 246 million</td>
<td>2009-2013</td>
</tr>
<tr>
<td>CAC</td>
<td>Creation of community access centers that provide access to ICT</td>
<td>MAD 80 million</td>
<td>2009-2013</td>
</tr>
</tbody>
</table>

Table 4-1: Universal Service Fund programs (Source: Adapted from ANRT)

The “PACTE” program was approved by a special commission in charge of universal service. The program, which is the largest financed by the USF intends to address coverage of 9,263 locations classified as “white areas,” of which 50 percent are listed under the National Initiative for Human Development (Initiative Nationale pour le Développement Humain, INDH). These areas belong to 55 regions and 841 communes of the territory, including 2.3 million inhabitants or approximately 17% of the rural population in Morocco. The budget for this activity is estimated at MAD 1.44 billion. By the end of the PACTE program it is envisaged that essentially all populated areas will have mobile coverage, up from 97.5% of the population in 2010.
For the period of 2008-2013, the remaining allocation of the USF (around 60 percent) is disbursed across five targeted programs most of which relate to provisioning schools and students with ICTs. In addition there is a program to create 400 access centers as called for in Digital Morocco (Table 4-1). According to ANRT orientation note, it is anticipated that a study will be launched by the end of 2011 to establish guidelines for the next stage of the program development including plans for Universal Service Fund during 2012-2016.

### 4.2 Applications

The majority of those using the Internet in Morocco are doing so for entertainment purposes or for communication via email (Figure 4-1). Exchanging videos and music, social networking and Internet telephony are main uses driving people to broadband, averaging a combined increase of 29 percentage points in 2010.

There is no denying that social media is driving Internet usage in the Middle East, particularly given the recent political events. According to a 2011 study, in UAE and Qatar, almost 30 percent of the population is on Facebook. Egypt added two million Facebook users in four months. In Morocco, 67 percent of the population that goes online does so for social networking. This is up almost 20 percentage points from 2009 and today the country has the third highest number of Facebook users in the Arab world (Figure 4-2). With 79% of Moroccan Facebook users between the ages of 15-29, there are three considerations when thinking about the Internet market:

- The first is that given that most Internet users in Morocco are on some kind of social networking platform with rich multimedia features, demand for better quality in service will increase.
- Second, the majority of users driving broadband are between the ages of 15 and 29, an attractive audience for broadband market opportunities but also in terms of finding ways of increasing usage of applications that impact their livelihoods.
- Finally, social media has pushed Morocco’s ahead many of its neighbors in broadband usage and as such reveals a niche population ready to be networked and capitalized.

In contrast to entertainment activities, e-commerce usage by consumers in Morocco is low. Only six percent of Internet users take advantage of online banking or ordering goods over the Internet. In respect to purchasing goods over the Internet, only 4% of surfers do this. The main reason given is that there is no need. This is tied to 57% who say they do not purchase online because they cannot “touch” the product. Security is also a concern with almost seven out of ten users.

There are several domestically developed online payment services for Moroccan Internet users. Maroc Telecommerce, an initiative of Moroccan banks, provides an e-commerce platform where users can make online purchases and merchants can sell products and services. Businesses use the service to open online stores after passing security clearance and demonstrating financial capability in order to provide users with confidence when making purchases. Mobicash introduced in 2008 by Maroc Telecom is a mobile payment system. Users can transfer and receive money from others, pay their Maroc Telecom bills or recharge their phones and use their handsets to make purchases from authorized merchants.

### 4.3 e-Government

The Moroccan government has promoted the vision of ICTs for transforming public administration for a number of years. The government can be a leader by computerizing its own operations as well as providing online services to stimulate broadband demand. A number of initiatives have been launched but progress has been slow. One challenge has been incentivizing the bureaucracy to adopt a greater public service perspective. Successful projects include those that have been able to overcome ingrained resistance through a proactive public administration such as in the city of Fez (Box 4-1).
Morocco developed a four-year e-government plan called IDARATI (Informatisation des Départements Administratifs et leur mise en Réseau Adéquate via les Technologies de l'Information) covering the period 2005-2008. It was intended to leverage on government progress to date for example in establishing a national portal and passing supporting legislation. By 2010, there were 370,000 visits to the citizen public administration portal and some 200 forms online.
E-government is a key pillar of the Digital Morocco strategy. Concrete targets include increasing the number of e-government services from 16 in 2008 to 89 by 2013 (Figure 4-3). Additionally, the government is anticipating that by 2013 all enterprises generating revenue of more than MAD 20 million annually will be using transactional services. Other targets include raising the country’s e-Government score in UN rankings and increasing the number of public administration sites in the top Moroccan 100.

In order for the program to meet its objectives, a governing structure was established with 15 flagship services to be implemented by 2011 and a timeline for the completion of all targeted 89 e-Government services by 2013. The 89 e-government services include 42 transactional, 30 informational, and 17 infrastructure related applications. The focus is on delivery of transactional processes given that e-services require direct interaction with citizens and enterprises to achieve their full utility.

It will be important to ensure that services available online are also accessible in some alternative form so that all segments of population benefit. There is a risk of exclusion when digitizing public services, especially if other mediums of delivery are phased out before online access is universal.

### 4.4 Moroccans online

Morocco has experienced major growth of the Internet over the last decade, reaching an estimated 14 million users by the end of 2010 or almost half the population (Figure 4-4, top). When it reached one million in 2003, the majority were accessing via cybercafés. The significance of these public spaces continues with 76 percent of users who access the Internet outside of the home doing so via a cybercafé (approximately 8 million users). As the country continued to push reforms with Law 55-01 in 2004 and the liberalizing of fixed and cellular markets, the usage of Internet expanded. In particular, the country experienced its highest Internet growth rates between the years 2007-2009 which coincided with the deployment of 3G technologies by the three operators. As a result, when compared to the rest of the region, the percentage of the online population in Morocco exceeds most countries in the MENA region including neighbors Egypt and Tunisia (Figure 4-4, bottom).
Employees of the Bureau d’État Civil (BEC) in the Moroccan city of Fez previously had to search for birth certificates through hundreds of handwritten records and transcribe by hand information from the original birth certificate to provide citizens with copies needed for applying for a job. It could take hours, if not days, to fill this request along with the many others received that day. Applying for these certificates could take days. Although under-the-table bribes were common, the process could still be unbearably long. Those who finally received their documents were often so elated that they fail to double-check the handwritten copies, resulting in a return visit to the BEC to fix poorly transcribed entries that had not been accepted at their final destination.

In an effort to remedy this problem the local Al-Akhawayn University developed the e-Fez Action Research Project, funded by Canada’s International Development Research Centre (IDRC) to design, develop, and implement an e-government system to automate delivery of citizen-oriented services. With a two-year grant from IDRC, the university had to prioritize. It opted for automating one of the most widely used services in BEC offices: providing birth certificates. A pilot project, undertaken in partnership with the Université Laval in Québec and in collaboration with the Fez municipal government, was planned for the Agdal district. Its BEC office was set up in 1986, and had registered approximately 15,000 citizens.

The research team soon discovered that automation required more than they had bargained for. Every birth certificate in the Agdal office would have to be digitized. This meant installing the necessary infrastructure in the office, which previously had no computers or Internet connections. Even the electrical service was prone to interruptions. The municipality of Fez played a major role by installing new electrical lines, Internet connections, and computers; the project provided cables and servers. The municipality was so highly motivated that it began automating two other offices at the same time.

The team then needed to find a way to digitize the existing records. They tried scanning, but the error rate was 60%. The only viable alternative was to enter the information on each birth certificate into a database. The result was unprecedented. For the first time ever, Moroccan citizens’ records were digitized. Data entry began in February and ended in November 2005.

Citizens now have three choices for obtaining a birth certificate. Rather than wait days to receive a handwritten copy, they can provide office staff with their serial number and the computer system generates and prints a copy of the certificate.

The impact of the e-Fez Action Research Project has been far-reaching. At the local level, some 15,000 registered citizens now have access to government services instantly. Services are transparent and take less time and effort. The project generated collaboration between various sectors of society in Fez. An academic institution, citizens, elected officials, government employees, and an international organization worked together to make better local governance a reality. The project has won widespread recognition, winning Morocco’s National Prize for Electronic Administration: e-Mtiaz 2006. And in 2007 the project earned a Technology in Africa Award (TIGA) and a United Nations Public Service Award (UNPSA).

Building on e-Fez, Al Akhawayn University launched another project with IDRC and IT+46 of Sweden and with support from the city and the ANRT to deploy a WiMAX network interconnecting government offices and providing public access through hotspots. The Wireless Metropolitan Area Network @ Fez (Wman@Fez) project is the first WiMAX community network in the country. It has been extended to several other towns in the Middle Atlas region.

http://www.aui.ma/PresidentsCabinet/News/news10/news10-index.htm

Box 4-1: e-Fez
Thirty-four percent of households have personal computers and 25 percent of households have broadband access at home, significantly higher than the two percent in 2004. Of the households with Internet access, 78 percent use 3G with a USB modem. Just over a fourth of households with electricity but without Internet access envision having 3G in the next 12 months.

There are barriers to increasing Internet use that are likely to constrain future growth such as the lack of electricity in some rural areas. Another barrier is cost with just over half of households without Internet saying they cannot afford it. This is mainly attributed to the price of purchasing a computer. A key obstacle is digital literacy with almost half of households without Internet saying they do not see the utility and one quarter replying they lack skills to use it. This is mainly a problem with the older generation given that most of the country’s Internet users are young. While the Digital Morocco plan calls for providing Internet access to all schools, it does not explicitly deal with digital literacy training for those no longer in school. Thus digital illiteracy is likely to remain a bottleneck for increasing broadband access.

Figure 4-4: Internet users in Morocco and selected countries (Source: Adapted from ANRT and regional communications authorities)
Morocco was one of the first countries in the Middle East and North Africa region that institutionalized an independent regulator to govern and incentivize the market and introduce 3G technologies, in an effort to expand broadband access to the people. The framework of Digital Morocco reinforces essential policies around access and content, a multi-stakeholder governance body to oversee the process and a budget to finance activities. There is a monitoring system via the regulator’s Observatory where an online platform is available for the public to access results and analysis of the market on a quarterly basis.

Government policies such as the introduction of an additional operator and early awarding of 3G licenses through a beauty contest have impacted Morocco’s broadband market. Dial-up Internet access has practically disappeared and speeds of up to 20 Mbit/s are available with ADSL. Fixed broadband pricing is relatively low compared to peer countries. Mobile broadband has taken-off following allocation of the three licenses in 2006 and accounted for over three quarters of the broadband market by mid-2011. Operators offer a variety of mobile broadband payment plans ranging from one-day use to monthly subscriptions. Though difficult to measure precisely because of different speeds and data consumption practices, mobile broadband pricing in Morocco is relatively inexpensive compared to its peers. Usage of mobile broadband is high compared to peer countries for which data is available.

At the same time, the impact of the programs implemented over the years has not always been certain and there is limited evaluation regarding the quality and outcomes of increasing access. Facilitating dialogue on deeper reform of the sector, intensifying the competitive environment, and demonstrating improvements in livelihoods through ICTs are some of the key issues facing ANRT, which is in the process of strengthening its capacity to deliver on its mandate. The regulatory and political environment are only parts of an ecosystem; the business environment, the production of content, exporting of broadband enabled services, and the consumption of information are parts that are at times disconnected from each other. At the same time, while there are high expectations for ICT in the country, Morocco’s level of social and economic development including more than two out of five people residing in rural locations, constrains broadband diffusion and will be difficult to change in the short-term.

There are three overarching gaps that Morocco faces when one considers the current state of broadband in country: the need for well-balanced infrastructure, improved quality and affordability, and greater push for demand driven services. These gaps are interrelated as shown by the table below which illustrates the penetration of Internet access in Moroccan households according to income and geographic zone and the corresponding literacy rate.

<table>
<thead>
<tr>
<th>Monthly household income (MAD)</th>
<th>&gt; 18,000</th>
<th>8,000-18,000</th>
<th>3000-8000</th>
<th>&lt;3,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Density Zones</td>
<td>80%</td>
<td>35%</td>
<td>15%</td>
<td>2%</td>
</tr>
<tr>
<td>Medium Density</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grey/White Zones (sparsely populated)</td>
<td>35%</td>
<td>15%</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td>Literacy rate (%)</td>
<td>100%</td>
<td>95%</td>
<td>90%</td>
<td>55%</td>
</tr>
</tbody>
</table>

Table 5-1: Household Internet penetration rate by geographic zone and monthly income, 2008

(Source: Adapted from Digital Morocco)
Penetration is reduced with the geographic location indicating the need for well-balanced infrastructure. Penetration drops as income falls, indicating the need for greater affordability. Finally penetration is less where illiteracy is high indicating the need for skills development in order to use broadband services.

5.1 Well-balanced infrastructure

Growth in the broadband sector in Morocco is driven by the mobile industry, in particular 3G. Today, over three quarters of broadband penetration is due to 3G and it has the promise to reach populations otherwise neglected. Yet the overall country access rate remains low especially in low-density areas. And while all operators use 3G technologies, Maroc Telecom delivers 99 percent of ADSL, through its historic control over the wired telephone network. Local loop unbundling has been in effect since 2007 but results are negligible. Operators must be encouraged to share infrastructure to lower costs in an environment where fixed networks are limited and wireless networks costs can be leveraged to help cover larger areas. In order for broadband diffusion to be successful significant efforts to improve backhaul is critical. This includes deploying fiber deeper into rural areas. At the same time, the level of electrification in rural areas needs to be boosted. These steps will require fresh and innovative thinking since purely competitive solutions can only go so far in addressing these problems.

5.2 Improved quality and affordability

3G has proven quite popular in Morocco and is the main channel for broadband access. Nevertheless, there are looming quality concerns. One issue is inconsistent coverage with users often switched to slower 2G speeds outside urban areas. Additionally, the popularity of social networking is resulting in growing mobile data usage that is starting to place a strain on mobile networks. Quality issues also affect fixed broadband particularly for subscribers who are not close to the exchange.

Affordability is a significant barrier. It is cited as the main reason people do not have computers or Internet access at home in ANRT surveys. Additional efforts are needed to make broadband service and end user devices cost effective for ordinary citizens.

5.3 Greater push for demand driven services

Morocco has made tremendous strides in getting its population online. The number of Internet users has increased from 3.5 million in 2004 to 14 in 2010. According to surveys many people are using entertainment type applications. There is a need to channel that demand into other applications that can help improve livelihoods. This includes developing applications in education, government and health that incorporate social network features to make them attractive and encourage user content creation. It also calls for private-public partnerships to explore innovative ways of getting young people online to search for jobs and economic opportunities otherwise only accessible by a select few via personal connections.

At the same time there is a need to remedy the digital divide in Moroccan Internet use. Most Internet users are young indicating a need to get more people over thirty online. While government is focusing efforts on increasing school connectivity there is a pressing need to provide digital literacy training to those out of school.

5.4 Lessons learned and remaining challenges

- Just under half the population uses the Internet in Morocco, higher than other countries, and an impressive achievement considering the relatively low literacy level. The widespread availability of Internet cafes and more recently a trend towards home access with 3G has been a factor contributing to Internet growth as has a youthful population. Most usage is currently towards entertainment. A shift is needed to make users become producers and access information that can help them in their daily lives.

- The government’s early decision to license of 3G through a beauty contest has boosted Internet penetration, with household penetration tripling. The challenge will be to expand access beyond the one quarter of households that already have it. Stimulating and filling demand will be challenging due to lack of adequate coverage and electricity in rural areas, affordability constraints, and unawareness
about the benefits. There needs to be focus on reducing prices and raising digital literacy, especially among the older population.

- Enhancement of infrastructure is fundamental. Mobile broadband coverage is not consistent across the country with bandwidth often falling back to 2G speeds outside urban areas. At the same time, the exponential growth in mobile broadband use is affecting quality. Greater efforts are needed to expand high-speed backbone infrastructure throughout the country. Microwave technology is limited in its ability to support the exponential growth in mobile broadband. In that respect, operators need to upgrade their backhaul with fiber.

- Innovative approaches are needed to expand local high-speed access to increase diversity of options beyond ADSL and 3G. Morocco faces a situation where fixed broadband options are essentially limited to ADSL because cable modem is not a viable alternative (due to the popularity of satellite television) and where the cost of fiber installation for local access is often prohibitive. A fresh approach is needed including incentives for encouraging fiber deployment and reviewing experiences of other countries with open access and flexible ISP laws. Inclusive and bottom up approaches could also stimulate local broadband development. One example is municipal Wi-Fi (Box 5-1), where efforts in Morocco have been constrained by various laws and regulations. These might be loosened to encourage alternative low-cost solutions for broadband access.

Global efforts to build community-based Wi-Fi networks have emerged as a solution for people to access free broadband. One such example is FON established circa 2007 in Madrid, Spain. Today, the network has over four million hotspots in 24 countries. Morocco is the only country in the Middle East and North Africa region with members formally registered with the network.

In 2007, Abdesselam El Omari, an IT entrepreneur based in Rabat heard of the newly established FON network. When Abdesselam contacted the company to join, he received four routers free of charge and was requested to keep one for himself while giving the remaining three to others with broadband connections and interested in becoming part of the movement.1 As a member, he received an identifier that would allow him to connect to any FON wireless network around the world and could potentially make enough money to subsidize his monthly broadband connection costs if traffic was sufficient. This was made possible because the company also sold prepaid cards that would allow anyone to connect to the community network. Money generated by these cards would be split between the company and the owner of the router to which the prepaid card holder connects to at any given time.

Abdesselam installed one router in his apartment and one in his parent’s house as they live next to the Hilton Hotel with promising potential for traffic. He gave the two other routers to friends in Casablanca. After speaking to a lawyer about this opportunity and his desire to expand it in country, he was dissuaded from continuing as it posed two types of legal problems:

- The first challenge was in regards to his ISP and rules against reselling Internet access. Sharing was permissible but selling was not.

- The second was related to fiscal issues and declaration of unauthorized income. Making money without declaring it and receiving VAT from users was problematic.

As a result, Abdesselam stopped the service. While in principal, the network provided an alternative solution to accessing broadband the incentive model does not take into consideration local telecom regulations in regards to sharing versus reselling bandwidth. Also, the emergence of mobile devices to connect to broadband reduced the market base. Nonetheless, community-based Wi-Fi networks remains relevant where creative solutions are needed to provide broadband access in poorly served areas.

*Interview with Abdesselam El Omari, Rabat, July 2011.*

Box 5-1: Experimenting with Community-Driven Wi-Fi in Morocco
About infoDev

infoDev is a global development financing program among international development agencies, coordinated and served by an expert Secretariat housed at the World Bank Group, one of its key donors and founders. It acts as a neutral convener of dialogue—and as a coordinator of joint action among bilateral and multilateral donors—supporting global sharing of information on ICT for development (ICT4D), and helping to reduce duplication of efforts and investments. infoDev also forms partnerships with public and private sector organizations who are innovators in the field of ICT4D. infoDev is housed in the Financial and Private Sector Development (FPD) Vice Presidency of the World Bank Group.

For additional information about this study or more general information on infoDev, please visit www.infodev.org/publications.
Endnotes


ii For the purpose of this study and unless otherwise noted, the Middle East and North Africa region constitutes the following countries: Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Qatar, Tunisia, Saudi Arabia, Syria, West Bank & Gaza, and United Arab Emirates.

iii Loi 24-96 relative à la poste et aux télécommunications. 7 August 1997. http://www.anrtnet.ma/fr/admin/download/upload/file_tr1818.pdf. The basic telecom law has had several amendments over the years. A consolidated version, Loi n°24-96 consolidée relative à la poste et aux télécommunications, telle qu'elle a été modifiée et complétée, is available here: http://www.anrtnet.ma/fr/admin/download/upload/file_tr1825.pdf


v The figure refers to the electrified areas only; the figure over entire population is 43 percent.


xii A 2001 ITU report notes there was a “Lack of a clear separation between the functions and roles of the SEPTI and ANRT in the area of regulation; overlapping of functions, as noted by representatives of the State.” ITU. 2001. Effective regulation case study: Morocco. http://www.itu.int/itusto/itועד/itou/promo/bdt/cast_breaker79125.pdf


xvii WiMAX is considered fixed in the case of Morocco however it can also be classified as mobile depending on the specific technology.

xviii Maroc Telecom’s formal name is Itissalat Al-Maghrib (IAM). For more information about the company see its web site at: http://www.iam.ma/Groupe/Pages/accueil.aspx

xix Initially, ONPT rented out its bandwidth to ISPs through leased lines and the ISPs then sold dial-up services to customers. With dial up, customers were paying a connection fee in addition to minutes since their phone service was billed on a pay per use basis and this continued until the introduction of broadband. When Maroc Telecom was formed in 1998, it modified its policy and began selling services directly to customers making it difficult for smaller ISPs to compete. In 1999, Casanet was bought by Maroc Telecom which then became its Internet subsidiary Manara; Maghrebnet canceled its internet provision and only providing network services, Wanadoo Morocco a subsidiary of France Telecom eventually became Wana which was later absorbed into WANA Corporate, now INWI, and other internet service providers shut down, such as ELAN and Fusion. MTDS, one of the oldest ISPs in Morocco, was established in 1993 and continues to date. As a wholesaler, it buys bandwidth from the incumbent selling mostly to a select group of commercial customers, as well as providing network security, technical know-how, and ICT applications for social and economic development purposes.


xxi Méditel’s full name is Médé Télécom. For more on the company see its web site at: http://corporate.meditel.ma/servletAccueil?rach=PageIndex#

xxii For more on INWI see: http://www.inwi.ma/corporate


Partial unbundling includes access to only high frequencies in the copper line (ADSL) and full unbundling includes both voice and ADSL.


The local loop unbundling policy applied to operators. MTDS which has a customer base of around 1000 ADSL subscribers has a separate agreement with Maroc Telecom dating back from the days of ONPT. Specific details are confidential.

INDH was announced in a speech by King Mohammed VI to highlight social challenges and launch a program that can mobilize resources and raise living standards and social development indicators: http://www.indh.gov.ma/


BROADBAND IN SRI LANKA
GLASS HALF FULL OR HALF EMPTY?
BROADBAND IN SRI LANKA
GLASS HALF FULL OR HALF EMPTY?

AN infoDEV PUBLICATION PREPARED BY:
Helani Galpaya
2011
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<th>Description</th>
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<tr>
<td>3G</td>
<td>Third Generation</td>
</tr>
<tr>
<td>ADSL</td>
<td>Asymmetric Digital Subscriber Line</td>
</tr>
<tr>
<td>BPO</td>
<td>Business Process Outsourcing</td>
</tr>
<tr>
<td>CAGR</td>
<td>Compound Annual Growth Rate</td>
</tr>
<tr>
<td>CDMA</td>
<td>Code Division Multiple Access</td>
</tr>
<tr>
<td>DCS</td>
<td>Department of Census and Statistics, Sri Lanka</td>
</tr>
<tr>
<td>DS</td>
<td>Divisional Secretariat (a unit of government administration)</td>
</tr>
<tr>
<td>EBITDA</td>
<td>Earnings Before Interest, Tax, Depreciation and Amortization</td>
</tr>
<tr>
<td>FDI</td>
<td>Foreign Direct Investment</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Packet Radio Service</td>
</tr>
<tr>
<td>GoSL</td>
<td>Government of Sri Lanka</td>
</tr>
<tr>
<td>HSPA</td>
<td>High Speed Packet Access</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technology</td>
</tr>
<tr>
<td>ICTA</td>
<td>Information and Communication Technology Agency of Sri Lanka</td>
</tr>
<tr>
<td>IT</td>
<td>Information Technology</td>
</tr>
<tr>
<td>ITeS</td>
<td>Information Technology Enabled Services</td>
</tr>
<tr>
<td>IX</td>
<td>Internet Exchange</td>
</tr>
<tr>
<td>Kbps</td>
<td>Kilo bits per second</td>
</tr>
<tr>
<td>LEARN</td>
<td>Lanka Education and Research Network</td>
</tr>
<tr>
<td>LKR</td>
<td>Sri Lankan Rupees (Rs.)</td>
</tr>
<tr>
<td>Mbps</td>
<td>Mega bits per second</td>
</tr>
<tr>
<td>NBN</td>
<td>National Broadband Network</td>
</tr>
<tr>
<td>NGN</td>
<td>Next Generation Network</td>
</tr>
<tr>
<td>SIM</td>
<td>Subscriber Identity Module</td>
</tr>
<tr>
<td>SLT</td>
<td>Sri Lanka Telecom</td>
</tr>
<tr>
<td>Tbps</td>
<td>Terra bits per second</td>
</tr>
<tr>
<td>TCO</td>
<td>Total Cost of Ownership</td>
</tr>
<tr>
<td>TRCSL</td>
<td>Telecom Regulatory Commission of Sri Lanka</td>
</tr>
<tr>
<td>USD</td>
<td>United States Dollars (US$)</td>
</tr>
<tr>
<td>WCDMA</td>
<td>Wideband Code Division Multiple Access</td>
</tr>
<tr>
<td>WiMAX</td>
<td>Worldwide Interoperability for Microwave Access</td>
</tr>
</tbody>
</table>
This report was drafted by Helani Galpaya of LIRNEasia, with significant contributions by Michael Minges, who directed the case studies for the Broadband Strategies Toolkit. The project was carried out under the supervision of Tim Kelly (infoDev) and Carlo Rossotto (ICT Sector Unit), with the Telecommunications Management Group Inc. (USA) providing overall project coordination. Philippe Dongier, Sector Manager (ICT Sector Unit) and Valerie D’Costa, Program Manager (infoDev), provide overall management guidance for the development of the toolkit. Samhir Vasdev edited the report and prepared it for publication.

This case study is one of an initial series of seven that will contribute to the Broadband Strategies Toolkit, an online resource for policy-makers and regulators, especially in developing countries (see www.broadband-toolkit.org). The case studies are generously funded by the Korean Trust Fund (KTF) on Information and Communications for Development (ICT4D). The KTF is a partnership between the government of the Republic of Korea and the World Bank Group whose purpose is to advance the ICT4D agenda to contribute to growth and reduce poverty in developing countries.
Sri Lanka, an island nation located in the Indian Ocean just south of India, has lately experienced an explosion in the use and availability of broadband services. The increase is primarily due to the high rate of adoption of third generation (3G) mobile technologies such as HSPA and HSPA+ dongles and associated SIM cards. This trend is typical of Sri Lanka and many other South Asian countries which do not have access to widespread copper last mile connectivity, and therefore are reliant on wireless networks to increase access, be it simple voice or broadband. Several factors have contributed to Sri Lanka’s success in connecting its citizenry to the internet via mobile broadband:

Innovative Business Models making services accessible to all: The increase in mobile broadband rides on the wave of extremely high mobile voice growth, enabled by successful innovations by the Sri Lankan (and Asian) operators. Faced with low ability to pay of many consumers in the region, the operators could have settled into serving the high-end, rich consumers. However, because the regulators and policy makers enabled new entry into the market, the intense competition forced operators to innovate in such a way as to be able to profitably serve even the poorest consumers. Network costs were reduced drastically by sharing passive and active infrastructure, by outsourcing key parts of the operation including even the management of the core network. Cost of billing was completely dispensed with and credit risk eliminated by moving to a pre-paid model. Distribution costs were minimized by enabling electronic reloading (e-reload), thereby eliminating cost of printing and distributing top-up cards for pre-paid users. Finally, even consumers with very low and very variable incomes were attracted to the market by enabling extremely small top-ups at any time (as low as USD 0.50 or less). This “budget telecom model”1 based on low costs high volumes (high minutes of use per user enabled operators to make positive EBITDA margins even though the Average Revenue per SIM was low, around USD 2 – 5.

This budget model of telecom that was first developed for the voice business is now being applied to mobile broadband in Sri Lanka. In particular, enabling pre-paid mobile broadband and allowing for very low value re-charges, the youth (who have highly variable incomes) have been brought into the mobile broadband market. The two first movers into the 3G space (Dialog Axiata and Mobitel) offered special promotional discount packages of up to 50% specifically for students. These early adopters created significant interest in mobile broadband. By 2008, the English and Sinhala blogosphere in Sri Lanka was barely mentioning fixed broadband; all the discussions and debates about quality and price was about mobile broadband.

Early availability of 3G spectrum: Of course all of the above was made possible because 3G spectrum was made available early to the operators in Sri Lanka. Here, the regulator deserves credit. As far back as 2003 test frequency was made available. By 2006, commercial 3G was launched. This is in sharp contrast to India which only managed to allocate 3G spectrum in 2010. Early access to spectrum enabled Sri Lanka to become the first Asian nation to offer 3G services.

Government's e-development agenda motivating investment: Apart from the regulator, the ICT Agency of Sri Lanka (ICTA) has had a major focus on broadband in the country. ICTA is the implementer of e-Sri Lanka, a cross-sectoral ICT-enabled development program for the whole country. ICTA set the ICT agenda through a series of comprehensive supply and demand side activities/projects (for example, setting up network of over 500 rural telecenters, announcing plans for a least-cost subsidy scheme to build and operate a fiber backbone in rural areas, development of e-

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government applications, providing ICT skills to citizens from all walks of life, promoting investment in Business Process Outsourcing which in turn drives the demand for high speed connectivity) and helped create a significant buzz about the potential demand for BB in the country. All this helped increase awareness about opportunities afforded by ICTs. Operators were motivated to invest in the network infrastructure in light of upcoming demand.

However, having reached this stage, Sri Lanka needs to overcome several challenges if it is to continue on its early success and make broadband a truly mass-market product instead of the niche popularity it still enjoys.

A key challenge is that of bringing a product of adequate quality to consumers. Budget broadband/budget telecom models mean low cost and therefore low prices. But they also mean low quality. This is indeed the case with Sri Lankan broadband. While the Sri Lankan mobile broadband performs better than Sri Lankan fixed broadband various quality of service measures, when compared with the developed world Sri Lankan consumers get less value for money on broadband. Part of the reason is bad advertising (promising broadband speeds that are possible theoretically, but not in reality). But a bigger part is the infrastructure – in particular, bottlenecks in international connectivity due to high prices.

The other challenge for operators is to keep up their investments necessary to move to the next technology cycle in face of declining margins. While at least two mobile operators have announced LTE network deployments, extending these upgrades beyond the population centers will prove challenging because of revenue and margin erosions due to intense competition.
Broadband in Sri Lanka: A Case Study

2. Socioeconomic Overview

The Democratic Socialist Republic of Sri Lanka is an island nation of just over 65,000 square kilometers located in the Indian Ocean near the southern tip of India (Figure 1). Sri Lanka is a lower-middle-income economy emerging from years of conflict. With a GDP Per Capita of USD 2,053 in 2009 (or about USD 4,715 PPP adjusted), an adult literacy rate of 91% among the 20.6 million population and a Human Development Index of 91, Sri Lanka is the most developed country in the South Asian region behind the Maldives. Primary and secondary education indicators are good, with only 4.4% of the population reported as having never attended school and 99.4% of the population aged 5 - 14 years currently attending school. Sri Lanka is a multi-ethnic society consisting of Sinhalese (82%), Tamils (9.4%), Moors (7.9%) and other groups. Sinhala and Tamil are official languages while English is widely spoken (Sri Lanka is a member of the Commonwealth). After the government introduced English medium instruction into primary and secondary education, it has become an increasingly popular choice for students who could previously study only in Sinhalese and Tamil, with English only taught as a second language. Sri Lanka is also a multi-religious society with 77% of the population identifying themselves as Buddhists, 8% as Hindu, 8% as Islamic and 7% as Catholic and Christian.

Sri Lanka is of late undergoing considerable economic growth. Year-over-year GDP growth for the first half of 2010 was 7.8%. Though agriculture played a significant role in the Sri Lankan economy in the past, today the economy is driven by the services sector (Figure 2).

While the economy is on the upswing, until a few years ago Sri Lanka was in the middle of civil war that saw the country unable to capture the economic growth rates experienced by its emerging market peers. The war that went on for

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nearly 30 years was often limited to the North and North Eastern provinces of the country though Colombo and other major cities also came under intermittent terrorist attacks. Significant outward migration (to Canada, Australia and Europe) of the minority Tamil community took place during the years of the war. The conflict and the resulting under-investment saw the war-torn region declining in all socio-economic indicators. A ceasefire agreement in 2002 led to a resumption of economic activity in the region, only to be curtailed when fighting resumed in 2005. In 2009, the conflict was ended through a major military operation by the government. Since then, the North-East region has been a focus of development activity and is expected be a major attractor of investment in Sri Lanka. Indications are that the overall country is already benefitting from the end of the war – arrival of tourists and foreign direct investment into the country has increased.

![GDP Composition by Sector, 2004-2009](Figure 2: Sri Lanka GDP composition by sector, 2004-2009 (Source: Central Bank of Sri Lanka, 2010. Economic and Social Statistics of Sri Lanka))

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10 [http://www.idrc.ca/cp/ev-118602-201-1-DO_TOPIC.html](http://www.idrc.ca/cp/ev-118602-201-1-DO_TOPIC.html)
3. The ICT Sector

3.1 Regulatory and policy institutions and instruments

Up until 1991, fixed telephone services in Sri Lanka were provided by the Department of Telecommunication (DoT) of the Government of Sri Lanka. Corporatization of the incumbent was done under the Telecom Act of 1991, and a new, government owned, corporation called the Sri Lanka Telecom Corporation (SLT Corp) was formed by transferring to it DoT’s assets. SLT Corp was partially privatized in 1997, creating Sri Lanka Telecom Limited (SLT), of which 35% was owned by NTT of Japan, 3.5% by SLT employees and 61.5% by the Government of Sri Lanka (GoSL). SLT continued to have the monopoly in fixed line services until 1996 (when WLL licenses were issued) and on international telephony until 2003 (when EGO licenses were issued).

The 1991 Act also created the regulatory agency. In 2003, the ICT Agency of Sri Lanka was created as the apex ICT policy implementing body in Sri Lanka.

3.1.1 ICT policy

ICT policy making in Sri Lanka has traditionally been carried out by a ministry (often the Ministry of Post and Telecommunications). However, in 2002, ICT was brought to the fore-front of the government’s development strategy, away from any one ministry when the then government’s primary policy document titled Regaining Sri Lanka11 made particular mention of using ICTs to achieve its goal of pro-poor growth (closing the “information divide between poor communities and dynamics markets” was mentioned, as was “improving access to telecommunication facilities and bringing the Internet to the countryside”). Regaining Sri Lanka proposed “e-Sri Lanka”, an initiative/project to “apply the benefits of modern technology to the workings of government and the private sector”. E-Sri Lanka (further detailed in the e-Sri Lanka Roadmap) laid down a comprehensive plan for ICT-enabled development for the country and covered multiple sectors (private, public, education etc.) and geographies (urban and rural). It also saw the creation of the ICT Agency of Sri Lanka (ICTA) as the implementation body for e-Sri Lanka, and therefore the de-facto policy-implementation (and in some specific areas, the policy making) organization (more on ICTA below). Though ICTA was under the Ministry of Economic Reform, Science and Technology at its creation in 2003, the year 2004 saw ICTA being taken under the office of the Prime Minister when a senior ICTA official was appointed Secretary to the Prime Minister. Since that moment ICTA and e-Sri Lanka gained prominence in the media and Prime Minister Mahinda Rajapaksa also leveraged it in the run-up to his presidential election campaign.12 Prime Minister Rajapaksa’s election manifesto Mahinda Chintanaya13 had a section devoted to IT, which mentioned all areas that are targeted by the original e-Sri Lanka project, and specifically set a target of increasing IT literacy to 60% over 3 years. When he was elected President in 2005, ICTA was kept under his wing, and therefore moved under the office of the President. Moving ICTs away from a single ministry into the office of the Prime Minister and later the office of the President was justified based on the cross cutting nature of the e-Sri Lanka initiative, and the high level leadership demanded by certain e-Sri Lanka activities, specifically the reform of government processes using ICTs.

3.1.2 The regulator

The Telecommunications Regulatory Commission of Sri Lanka is the national regulatory agency. The Commissioners consist of the Director General of the TRCSL, the Secretary to the Minister of the relevant Ministry (policy maker) and three

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12 In fact the President’s website mentions “re-energizing the ICT Agency” and “Taking IT and computer literacy to rural areas under the Nenasala [telecenter] project” as key development projects undertaken during his tenure as the Prime Minister. See http://www.mahindarajapaksa.com/dev/index.php

13 Available at http://www.mahindarajapaksa.com/MahindaChinthanaEnglish.pdf (page 68)
members appointed by the Minister from the fields of law, finance and management, respectively. Since 2005, the TRCSL has been under the office of the President, therefore the policy maker (i.e. the “Ministry”) is the office of the President of Sri Lanka and the Chairman of TRCSL is the Secretary to the President. In light of the (previously discussed) prominence given to ICTs in the national level, and the importance of TRCSL to achieve certain goals specified in e-Sri Lanka, it was perhaps a natural progression for the TRCSL to be taken under the office of the President, though it is unclear if this was the only motivation.

The TRCSL was established in 1991 under the Telecommunications Act of 1991\textsuperscript{14}, which was later amended by the Sri Lanka Telecommunications (Amendment) act of 1996\textsuperscript{15}. It can regulate most aspects impacting on the sector including the allocation of spectrum (including broadcasting spectrum), tariffs, anti-competitive practices and quality of service. The only significant activity that the regulator cannot do is issue new licenses – this power lies with the Minister (i.e. the office of the President at present), though on the basis of the regulator’s recommendations.

TRCSL is an independent regulator in that it is autonomous from the incumbent operator. However, as in many countries, there are times that the TRCSL is accused of acting in the interest of only the largest operators or it appears that at times the regulator’s independence is compromised by the government itself.

\textsuperscript{14} See \url{http://www.customs.gov.lk/docs/25386.pdf} for the act.


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\textbf{Figure 3: e-Sri Lanka program components} (Source: ICTA)
3.1.3 The ICT agency

The ICT Agency of Sri Lanka (ICTA) was created through an act of Parliament in 2003 and mandated to be the “apex ICT-policy making body” in Sri Lanka. Its primary mandate was the implementation of e-Sri Lanka, the comprehensive and cross-sectoral development program with ICT at the center. The e-Sri Lanka strategy, and therefore ICTA’s activities focuses multiple facets of ICT-enabled development (Figure 3)\(^{16}\):

a) the supply of infrastructure for internet/broadband connectivity (through the provision of backbone networks, the provision of a government-wide broadband network and the installation of a network of telecenters to enable access in primarily rural areas),

b) re-engineering of key government process and the introduction of ICT into these processes to increase efficiency and enable online access,

c) developing human capacity in ICTs by introducing ICT into all levels of education (primary, secondary, tertiary) and all sectors (government, citizens, students),

d) development of a vibrant, export oriented IT and IT enabled Service (ITeS) industry in the country,

e) taking ICTs to rural masses and traditionally disadvantaged groups through innovative applications under the e-Society program and

f) creating the environment for ICT-enabled development through the enactment of relevant laws (e.g. e-Transactions, Computer Crimes Law, intellectual property laws) and the development of technical standards (e.g. local language fonts, internet domain names and interoperability frameworks).

The funding for ICTA is primarily from the World Bank and the Government of Sri Lanka (GoSL), with some funding also coming from the Korean Export Import Bank and several other countries and organizations. Some claimed results of the e-Sri Lanka Development project include the creation of 629 telecenters, an estimated 33,000 telecenter users, 112 on-line e-government services for the private sector in 2010 from zero in 2004, some 35,000 people trained in ICTs and the creation of Chief Information Officers in almost 600 government agencies.\(^{17}\)

3.2 Size and importance of the ICT sector

Sri Lanka’s growth is increasingly fueled by services (as opposed to manufacturing or agriculture) as seen in Figure 2, and the ICT sector is part of the services sector growth.

While the overall contribution to GDP made by the telecom sector is small at under 1.7 percent in 2009\(^{18}\) (and was around 3.04 percent in 2007\(^{19}\)), it is still the largest contributor to GDP growth. According to the Ministry of Finance and Planning, the post and telecommunications sector accounted for 11.7 percent of Sri Lanka’s GDP growth in 2009 (down from 36% in 2005 and 21.5% in 2007\(^{20}\)).

The regulator, TRCSL, is the organization that makes the single largest contribution to government revenue as a result of the fees and levies it collects from the sector. Today, contributions from the TRCSL account for 50% of total Government revenues from state owned enterprises (the number was higher in the past,


\(^{20}\) Ministry of Finance and Planning Sri Lanka. (2009). Annual Report 2009. http://www.treasury.gov.lk/FPPFM/fpd/pdfdocs/annualreports/annualreport2009-eng.pdf Note that GDP growth contribution figures are reported for the post and telecommunication sector combined. However, given that the Department of Post has reported a net loss for each of these years (according to the Ministry of Finance and Planning 2009 Annual report, page 58), it’s reasonable to attribute to all positive GDP growth contributions to the telecom sector
with TRCSL contributing more than all state-owned banks combined.

The telecom sector continues to be a primary target for foreign direct investment (FDI) into the country. In 2008, the services sector attracted US$ 362 million worth of investment, with telecommunications leading the way with US$ 290 million or 80%. According to the Board of Investment, telecoms and power usually account for over 60% of FDI into Sri Lanka though this percentage is expected to decrease as a result of increasing investment into the tourism sector after the end of civil war.

Apart from the importance of the telecom sector in terms of revenue generation to the government, the broader ICT sector is also experiencing growth and gaining prominence. The ICT Agency and the industry associations engaged in a strategic initiative to promote Sri Lanka’s export-oriented IT enabled Services (ITeS) sector (which includes Business Process Outsourcing (BPO) and IT). Developing human capacity in the IT/BPO industry (through financial assistance to IT professionals to achieve internationally recognized certifications and through the creation of educational standards for call-center operator training) and several years of industry promotion overseas have yielded positive results. Starting from USD 173 million in 2006, the export revenues from the IT/BPO industry grew to USD 392 million by 2010, a CAGR of 26%. Of this USD 294 million was from IT exports while USD 98 million were from BPO exports. According to the ICT Agency, in 2010, the sector was the fifth largest foreign exchange generator for the country.

A key enabler to the IT/BPO growth is the telecom sector itself, which makes it possible to engage in off-shoring to begin with.

3.3 Telecom Operators and services

Telecommunications services in Sri Lanka are competitive, with eight operators in the country making retail offerings at the time of writing. Sri Lanka Telecom (SLT) is the partially privatized incumbent (government owns 52%, Global Telecommunications Holdings N.V of Netherlands owns 44.9% and the general public owns the rest), and the only firm with a copper access network to reach homes and businesses. Of the five mobile operators, four (Dialog Axiata, Etisalat, Airtel and Hutch) are private companies that are part of large international or regional telecom operators, and one (Mobitel) is a fully owned subsidiary of the incumbent SLT. Two other operators (Suntel and Lanka Bell) primarily provide CDMA based (fixed-wireless) telecommunications services (Table 1).

The mobile market is highly competitive, with Sri Lanka having among the lowest prices in the world (Figure 4). Following an aggressive price war in anticipation of the arrival of new entrant Bharati Airtel, mobile operators saw margin erosion in late 2009: for example EBITDA margins which were over 50% fell to the 20-30% range with negative net profits. Heavy lobbying by the operators then prompted the regulator to impose termination rates on all calls (eliminating the sender keeps all interconnection regime that existed previously), in effect imposing floor (minimum) prices in the sector.

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21 Author calculations, based on Ministry of Finance and Planning, Annual Report, 2009, table 3.1
25 www.slasscom.lk
27 Largest operator Dialog’s EBITDA margin for the second half of 2007 was 50.3%. By Q3 2009 it was 29%. As reported on www.dialog.lk and by Wireless Intelligence/GSMA.
Table 1: Major telecom operators in Sri Lanka

<table>
<thead>
<tr>
<th>Operator</th>
<th>Markets</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sri Lanka Telecom (SLT)</td>
<td>Fixed, fixed wireless, fixed broadband, IPTV, mobile (through Mobitel), international connectivity</td>
<td>Incumbent operator. Partially privatized in 1997 through 35% sale to NTT, Japan. Mobitel started in 1993 as JV between SLT and Telstra, Australia. SLT bought out Telstra’s share in 2002, for full ownership.</td>
</tr>
<tr>
<td>Suntel</td>
<td>Fixed wireless</td>
<td>Owned by a combination of foreign (Swedish, Hong Kong SAR) and local companies as well as the IFC</td>
</tr>
<tr>
<td>Dialog Axiata</td>
<td>Mobile, fixed wireless, broadcasting</td>
<td>Subsidiary of Axiata Group Berhad of Malaysia (formerly TM International).</td>
</tr>
<tr>
<td>Hutch</td>
<td>Mobile</td>
<td>Owned by Hutchinson Whampoa Limited, Hong Kong</td>
</tr>
<tr>
<td>Etisalat</td>
<td>Mobile</td>
<td>Owned by Etisalat, United Arab Emirates. Purchased from Millicom in 2009.</td>
</tr>
<tr>
<td>Airtel</td>
<td>Mobile</td>
<td>Owned by Bharti Airtel, India</td>
</tr>
</tbody>
</table>

Figure 4: Total Cost of Ownership (in USD) for mobile services including data, 2010  
(Source: Nokia, 2010)

Note: Basket covers prorated handset cost and consuming the equivalent of the OECD “low use” mobile basket of minutes and SMSs per month as well as 2 MB data allowance per month.

4. The Broadband Sector

4.1 Retail broadband

Sri Lankan retail users (consumers and businesses) have a choice of broadband technologies and service providers to choose from. The retail service offerings can be summarized as described in Table 2.

In addition to the retail offerings shown above, businesses that need dedicated, higher speed Internet connectivity can obtain leased lines from most of the operators shown in Table 2.

All mobile operators have nationwide coverage of basic voice and GPRS services. Dialog and Mobitel also provide 3G/3.5G coverage in the majority of the country including the formerly war torn North East (3G coverage is still not available in low density population areas). Etisalat is in the process of investing to increase its 3/3.5G footprint. Airtel covers the major population centers of Colombo, Galle, and Kandy with 3G.

At the time of writing, both Dialog Axiata and Mobitel were engaged in LTE trials in Colombo. Mobitel had also signed agreements (on tax free concessions) with the board of investment to invest in its LTE network.

Table 2: Broadband market and operators in Sri Lanka, March 2011

<table>
<thead>
<tr>
<th>Type of broadband connectivity</th>
<th>Operators with retail-level services offerings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed wired broadband</td>
<td>1. ADSL through Sri Lanka Telecom (incumbent fixed operator)</td>
</tr>
</tbody>
</table>
| Fixed wireless (limited mobility) broadband | 1. WiMAX through 3 operators:  
- Dialog Axiata (largest mobile operator)  
- Sky Networks (subsidiary of Sri Lanka Telecom)  
- LankanBell (CDMA-based “fixed” phone operator)  
2. Microwave based broadband through SunTel (a CDMA based phone operator) |
| Mobile broadband              | 1. WCDMA based broadband from multiple operators:  
- Dialog Axiata (largest mobile operator)  
- Mobitel (mobile operator owned by fixed incumbent)  
- Airtel (new entrant, part of India’s Bharati Airtel)  
- Etisalat (pre-paid only mobile operator), about to enter the 3G broadband market at the time of writing.  
2. WiMAX (802.16e) based mobile broadband (with plug-and-play dongles) through Sky Networks (subsidiary of Sri Lanka Telecom). About the enter the market at the time of writing. |

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29 http://www.lankabell.net/fixed-broadband.htm and http://www.lankabell.net/broadband-technology.htm
30 http://www.suntel.lk/business/broadband.php
4.2 Wholesale infrastructure

4.2.1 In-country backbone infrastructure

While the retail broadband market is competitive and characterized by competitive and reducing prices, a few players dominate the wholesale market. At the time of writing, only two operators had an optic fiber based national backbone. Incumbent Sri Lanka Telecom (SLT) has the widest fiber coverage with some 8,000 kilometers of fiber connecting large areas of the country and another 4,000 kilometers planned by the end of 2011. SLT is also transitioning to a Next Generation Network (NGN) with around 20% of its customers served by this technology at the end of 2010. NGNs are the subject of a recent consultation issued by the regulator. SLT has also launched its “i-Sri Lanka” project placing fiber closer to the customer to reduce the length of copper loops. This will enable SLT to offer broadband speeds of over 20 Mbps to almost all its fixed line subscribers.

Despite the significant market power over such a key facility as the optic fiber backbone, SLT is not legally required by the regulator to sell access to competitors. As a result, competing operators were using microwave technology for backhaul where possible due to the high prices of SLT backhaul (for example, backhaul in Sri Lanka was the second most expensive in South Asia in 2010, surpassed only by the Maldives, an island nation that had many more geographical challenges to deal with than Sri Lanka - Figure 5). Several years ago Dialog began installing fiber optic rings starting in the populated cities and offering wholesale access non-discriminately.

Figure 5: Tail-link cost (in USD) for 2Mbps backhaul in South Asia (Source: LIRNEasia, Broadband Benchmarks Emerging Asia, February 2010.)

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The regulator and the Office of the President are currently planning for nationwide fiber backbone connectivity through a National Broadband Network (NBN). Initially planned by the ICT Agency under the e-Sri Lanka initiative, the procurement process was under way in 2008-2009 to competitively select a firm based on a least-cost-subsidy auction and to build and operate the network. The rights-of-way were to be obtained via the Ceylon Electricity Board (CEB) and the Sri Lanka Government Railway (SLGR). Geographically, the new network was to cover the Deep South as well as the North Central and North Eastern regions where fiber did not extend to at the time of design (Figure 6). According to stakeholders, the design was problematic in that rights of way from CEB and SLGR were not guaranteed and the winner of the bid would have to negotiate with each of these entities and there was uncertainty about the price they would charge to lay cable along their facilities. In any case, the competitive procurement process was halted, and in early 2011 it was decided by the Cabinet that SLT would be asked to build the NBN, using government funds (instead of World Bank funds which were previously allocated for the least-cost

![Figure 6: Proposed route for the NBN (Source: Spectrum Strategy Consultants & Value Partners. (2008), Consultation on Planning and Implementation of a National Fiber Backbone)](image_url)
subsidy). According to the Director General of TRCSL, SLT would be given the contract to build the NBN, with the condition that they then give non-discriminatory re-sale to other operators.

4.2.2 International connectivity
Sri Lanka has access to multiple international cables: SE-ME-WE 3 and 4, the SLT-Dhiraagu cable between Sri Lanka and the Maldives, the BSNL-SLT cable between Sri Lanka and India, and the FLAG cable (international cable system with over 16 countries). Landing stations for the first three are controlled by SLT while Lanka Bell owns the last. Although capacity on the SE-ME-WE cables is competitively priced, the landing point itself acts as bottleneck. For example, SLT does not allow operators to directly connect using their own fiber, forcing them instead to lease connectivity from SLT and charging high rates for this leased line. Non-price barriers are also reported, such as delays in implementing requests for increased capacity. According to operators, until recently, the cost of connecting to this international cable landing station. Operators still claim that if prices to connect to the landing station are cost-based, Internet connectivity prices could come down by 30%. This claim however has to be balanced by the fact that that only a low volume of traffic flows through the competing FLAG cable, primarily due to high prices (presumably prices higher than through SE-ME-WE, because otherwise the cheaper option would have the majority of traffic), even when no access problems or bottlenecks are reported at the FLAG landing stations. In any case, the FLAG cable does provide a useful point of redundancy in case of problems with the alternate.

SLT reported 8.3 Gbps of international backbone capacity in 2010. It appears that there may be insufficient international bandwidth in Sri Lanka that could be impacting quality. While Sri Lanka had the second highest international bandwidth per person in 2008 in South Asia (after Maldives), by 2010 it was ranked fourth in this metric (Table 3). Likewise, its average download speed (1.2 Mbps) only ranks fourth in the region and actually connecting to this international cable landing station was estimated to be over 10 times higher than on a reasonable cost-based basis and was even higher than Singapore. As a result, the regulator intervened and facilitated a 50% reduction in the fees to connect to the landing.

<table>
<thead>
<tr>
<th>International Internet bandwidth</th>
<th>Average download speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gbps</td>
<td>Bits per person</td>
</tr>
<tr>
<td>2010</td>
<td>2008</td>
</tr>
<tr>
<td>Bangladesh</td>
<td>15.4</td>
</tr>
<tr>
<td>Bhutan</td>
<td>0.3</td>
</tr>
<tr>
<td>India</td>
<td>535.0</td>
</tr>
<tr>
<td>Maldives</td>
<td>0.3†</td>
</tr>
<tr>
<td>Nepal</td>
<td>0.1†</td>
</tr>
<tr>
<td>Pakistan</td>
<td>9.0†</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>8.3</td>
</tr>
</tbody>
</table>

Table 3: International Internet connectivity, South Asia [Source: Adapted from World Bank and operator and regulator reports and OOKLA] Note: †2008
declined between 2009 and 2010.

4.2.3 Internet Exchange
Sri Lanka has an Internet exchange (IX) that is operated and managed by Lanka Com (a subsidiary of Singapore Telecomm International) with all major operators having a link to the IX.36 There is little locally hosted content, and email accounts used by a majority of users are international (Google mail, Yahoo, etc.). As such, the amount of traffic to be peered locally appears to be very little.

4.3 Penetration of broadband

There are acknowledged problems counting exact broadband subscriptions. First, TRCSL does not publish data on fixed broadband subscriptions and has only recently begun publishing data for mobile broadband subscriptions. Second, not all of the operators report the number of broadband subscriptions. Third, there are methodological issues related to the definition of mobile broadband. These include differences between the theoretical capability to use a mobile broadband network (through ownership of a mobile broadband enabled handset) and active use (through access to the Internet in a recent period using the mobile broadband network). Active mobile broadband users can be further analyzed through a breakdown between those using a mobile handset and those using a data card. There are also mobile broadband definitional and terminology issues with 3G often interchangeably used for different speeds and further nuances such as 3.5G. Some take a broad view—any network based on IMT-2000 standards (that would incorporate technologies such as EDGE and CDMA 2000 1x that operate at speeds less than 256 kbps). Others take a narrower view that the technology should be faster than 256 kbps such as High Speed Packet Access (HSPA) or EV-DO while others take a more restrictive view and consider only HSPA (sometimes referred to as 3.75G). There is a further complication of whether wireless technologies such as EV-DO or WiMAX can be used in both fixed and mobile modes. All of these issues apply to Sri Lanka that has a plethora of broadband technologies in use. As there is no internationally agreed upon solutions to these dilemmas, the context of the available broadband data is explained below.

Penetration of fixed broadband: In respect to the overall market for Internet subscriptions, TRCSL reported 280,000 fixed Internet and email subscriptions in 2010 or 1.4% of the population. In terms of fixed wired broadband connections, SLT is the only mass-market retail provider with 213,816 ADSL subscriptions at the end of 2010. It offers packages with speeds ranging from 512 kbps to 4 Mbps (leased lines using SLT's Metro Ethernet are also available for corporate users with speeds of up to 2 Gbps). Since neither the

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>Per 100 people</th>
<th>Source</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population</td>
<td>20,653,000</td>
<td></td>
<td>Dept. of Census and Statistics</td>
<td>Mid-year</td>
</tr>
<tr>
<td>Internet &amp; Email</td>
<td>280,00037</td>
<td>1.4</td>
<td>TRCSL</td>
<td>Provisional including dial-up, ADSL and fixed wireless</td>
</tr>
<tr>
<td>Subscribers – fixed</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADSL subscriptions</td>
<td>213,816</td>
<td>1.0</td>
<td>SLT</td>
<td>Provisional. Assumed to include only data cards and postpaid data subscribers.</td>
</tr>
<tr>
<td>Mobile broadband</td>
<td>294,000</td>
<td>1.4</td>
<td>TRCSL</td>
<td></td>
</tr>
<tr>
<td>subscribers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSPA connections</td>
<td>1,000,000</td>
<td>4.8</td>
<td>GSMA (Wireless Intelligence)</td>
<td>For Q4 2010</td>
</tr>
</tbody>
</table>

Table 4: Fixed and mobile broadband subscriptions, Sri Lanka, 2010 (Source: As noted in table)

36 [http://www.robtex.com/as/as45338.html#peer](http://www.robtex.com/as/as45338.html#peer) has list of companies peering at the SL-IX.
37 Includes ADSL, and fixed wireless (WiMAX) connections.
TRCSL nor the fixed wireless operators publish information about broadband subscriptions, the only certain fixed broadband subscription data is that of SLT. The resulting fixed broadband penetration is one percent of the population. ADSL accounts for 76% of the total Internet and email subscriptions. Almost one quarter of SLT’s fixed (copper) lines are connected to ADSL (Table 4).

Penetration of mobile broadband: In December 2010 there were 17.4 million SIM cards in Sri Lanka and the market penetration was 82% \(^{38}\). The number of reported mobile broadband subscriptions varies according to the source, reinforcing the methodological challenges discussed above. According to TRCSL there were 294,000 mobile broadband subscriptions in 2010.\(^{39}\) However TRCSL data only captures the connections that are counted through a sale of a HSPA dongle and/or have subscription to a data plan, therefore leaving out users who are using a pre-paid connection or connecting at HSPA speeds through their mobile phones without a formal data plan. As a result, secondary sources report higher figures. According to published GSMA figures, there were 546,811 mobile broadband subscriptions in Sri Lanka at 2010 Q1\(^{40}\) and this number had grown to 1 million connections for WCDMA HSPA by the end of 2010. The GSMA data is based on operator network software is capable of counting (at any given moment for any given location) the active data connections at various speeds.

The available statistics suggest that mobile broadband penetration in Sri Lanka was between 1.4% to 4.8% of the population in 2010 (Table 4). Therefore, while penetration is higher than in fixed, mobile broadband has a long way to grow.

<table>
<thead>
<tr>
<th></th>
<th>Q4 2009</th>
<th>Q1 2010</th>
<th>Q2 2010</th>
<th>Q3 2010</th>
<th>Q4 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Connections</strong></td>
<td>28.86%</td>
<td>25.94%</td>
<td>22.93%</td>
<td>17.74%</td>
<td>15.88%</td>
</tr>
<tr>
<td><strong>All WCDMA connections</strong></td>
<td>109.71%</td>
<td>102.46%</td>
<td>91.34%</td>
<td>79.53%</td>
<td>78.59%</td>
</tr>
<tr>
<td><strong>HSPA connections</strong></td>
<td>212.16%</td>
<td>199.65%</td>
<td>179.03%</td>
<td>153.45%</td>
<td>142.45%</td>
</tr>
</tbody>
</table>

Table 5: Year-over-year growth of mobile connections by speed\(^{38,39}\)

But it is happening – while overall mobile connection growth has reached a plateau, WCDMA based broadband connections are growing faster and the fastest HSPA connections specifically for mobile broadband data is growing even faster (Table 5).

In mobile broadband, Sri Lanka compares well with its South Asian neighbors, coming only behind the Maldives (a much richer country with over 100% SIM penetration) (Figure 7, left). Sri Lanka ranks third in the region in fixed broadband subscriptions per 100 people (based only on SLT’s ADSL connections) (Figure 7, right).

4.4 Retail broadband prices

There are a wide variety of pricing packages in Sri Lanka’s dynamic broadband market. Table 6 lists prices compiled by TRCSL as part of its broadband quality monitoring for February 2011. Mobile broadband is generally cheaper on a monthly basis but packages are capped whereas fixed broadband packages are unlimited. On a

\[^{38}\] The penetration number is in itself problematic, because of multiple SIM use.


price per Mbps, mobile broadband is theoretically a better buy. According to the plans tracked by TRCSL, the cheapest monthly rental is LKR 5.32 for mobile broadband. Pay per use packages for mobile broadband are available so that consumers can match usage to their purchasing power. For example Dialog Axiata provides time-based pay per use ranging from 30 minutes to 24 hours; a half hour of mobile broadband Internet access costs LKR 20 (USD 0.18).\footnote{http://www.dialog.lk/personal/broadband/hspa/packages/p repaid-broadband/}

Sri Lanka has the cheapest 3G entry-level prices in South Asia (Table 7). Its prices are also the best value in terms of price per Mbps and price per GB of usage.

Low prices relative to other countries or downward movement of prices over time are both good indicators of competitiveness in a sector. Sri Lanka’s broadband offerings have been doing both – particularly in mobile broadband. Nokia (2009) calculated the mobile data TCO for over 70 emerging economies in the world, and found Sri Lanka to be the 21st least expensive in absolute terms and 8th most affordable (affordability being defined as TCO as a share of GDP per capita, lower being better, with the best performing countries having TCOs less than 5% of GDP per capita). By 2010, Sri Lanka had become the least expensive in absolute terms (Nokia 2011).
Broadband in Sri Lanka: A Case Study

Terms and 8th most affordable (affordability being defined as TCO as a share of GDP per capita, lower being better, with the best performing countries having TCOs less than 5% of GDP per capita). By 2010, Sri Lanka had become the least expensive in absolute terms (Nokia 2011). Further, from August 2007 to February 2010, fixed broadband packages of 2 Mbps have reduced 27% while fixed broadband packages of 256 kbps have reduced by 31%.42

Table 6: Monthly broadband packages, Sri Lanka, US$, February 2011 (Source: TRCSL)

<table>
<thead>
<tr>
<th>Country</th>
<th>Operator</th>
<th>Technology</th>
<th>Speed (Mbps)</th>
<th>Monthly data volume (GB)</th>
<th>Monthly rental (USD)</th>
<th>Price per theoretical Mbps (USD)</th>
<th>Price per GB usage (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bangladesh</td>
<td>Grameen</td>
<td>EDGE</td>
<td>0.2368</td>
<td>1</td>
<td>4.39</td>
<td>18.54</td>
<td>4.39</td>
</tr>
<tr>
<td>Bhutan</td>
<td>BT</td>
<td>HSDPA</td>
<td>7.2</td>
<td>1.25</td>
<td>14.77</td>
<td>2.05</td>
<td>11.81</td>
</tr>
<tr>
<td>India</td>
<td>Airtel</td>
<td>HSDPA</td>
<td>7.2</td>
<td>1.25</td>
<td>12.68</td>
<td>1.76</td>
<td>12.68</td>
</tr>
<tr>
<td>Maldives</td>
<td>Dhiraagu</td>
<td>HSDPA</td>
<td>7.2</td>
<td>1</td>
<td>69.51</td>
<td>24.38</td>
<td></td>
</tr>
<tr>
<td>Nepal</td>
<td>NTC</td>
<td>WCDMA</td>
<td>0.384</td>
<td>1</td>
<td>69.51</td>
<td>24.38</td>
<td></td>
</tr>
<tr>
<td>Pakistan</td>
<td>Telenor</td>
<td>EDGE</td>
<td>0.2368</td>
<td>2</td>
<td>5.92</td>
<td>25.01</td>
<td>2.96</td>
</tr>
<tr>
<td>Sri Lanka</td>
<td>Dialog</td>
<td>HSDPA</td>
<td>7.2</td>
<td>2</td>
<td>4.34</td>
<td>0.60</td>
<td>2.17</td>
</tr>
<tr>
<td><strong>SOUTH ASIA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td><strong>17.19</strong></td>
<td><strong>32.88</strong></td>
<td><strong>15.83</strong></td>
</tr>
</tbody>
</table>

Note: Converted to US$ at 2010 annual average exchange rate.

256 kbps have reduced by 31%42.

Table 7: Entry level 3G prices, South Asia, March 2011, US$ (Source: Adapted from tariff information on operator web sites)

<table>
<thead>
<tr>
<th>Country</th>
<th>Operator</th>
<th>Technology</th>
<th>Speed (Mbps)</th>
<th>Monthly data volume (GB)</th>
<th>Monthly rental (USD)</th>
<th>Price per theoretical Mbps (USD)</th>
<th>Price per GB usage (USD)</th>
</tr>
</thead>
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<td>0.60</td>
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</tr>
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<td><strong>32.88</strong></td>
<td><strong>15.83</strong></td>
</tr>
</tbody>
</table>

Note: WCDMA networks in Bangladesh or Pakistan and HSDPA services in Nepal not available. Converted to US$ at 2010 annual average exchange rates.

<table>
<thead>
<tr>
<th>Operator</th>
<th>Technology</th>
<th>Speed (Mbps)</th>
<th>Monthly data volume (GB)</th>
<th>Monthly rental (USD)</th>
<th>Price per theoretical Mbps (USD)</th>
<th>Price per GB usage (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIALOG</td>
<td>WiMAX</td>
<td>0.512</td>
<td>unlimited</td>
<td>15.51</td>
<td>30.30</td>
<td></td>
</tr>
<tr>
<td>LANKA-BELL</td>
<td>WiMAX</td>
<td>0.512</td>
<td>unlimited</td>
<td>17.73</td>
<td>34.63</td>
<td></td>
</tr>
<tr>
<td>SLT</td>
<td>ADSL</td>
<td>0.512</td>
<td>unlimited</td>
<td>14.18</td>
<td>27.70</td>
<td></td>
</tr>
<tr>
<td>SUNTEL</td>
<td>WiMAX</td>
<td>0.512</td>
<td>unlimited</td>
<td>17.73</td>
<td>34.63</td>
<td></td>
</tr>
<tr>
<td>DIALOG</td>
<td>WiMAX</td>
<td>2</td>
<td>unlimited</td>
<td>44.33</td>
<td>22.16</td>
<td></td>
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<tr>
<td>LANKA-BELL</td>
<td>WiMAX</td>
<td>2</td>
<td>unlimited</td>
<td>48.76</td>
<td>24.38</td>
<td></td>
</tr>
<tr>
<td>SLT</td>
<td>ADSL</td>
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<td>unlimited</td>
<td>48.76</td>
<td>24.38</td>
<td></td>
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<tr>
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<td>unlimited</td>
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<td>12.95</td>
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<td>HSDPA</td>
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<td>3</td>
<td>5.32</td>
<td>1.48</td>
<td>1.77</td>
</tr>
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<td>DIALOG</td>
<td>HSPA</td>
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<td>15</td>
<td>26.51</td>
<td>3.68</td>
<td>1.77</td>
</tr>
<tr>
<td>MOBITEL</td>
<td>HSPA</td>
<td>3.6</td>
<td>8</td>
<td>11.44</td>
<td>3.18</td>
<td>1.43</td>
</tr>
</tbody>
</table>

**Country**

<table>
<thead>
<tr>
<th>Operator</th>
<th>Technology</th>
<th>Speed (Mbps)</th>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>17.19</td>
</tr>
</tbody>
</table>
5. Driving the Demand for Broadband

Sri Lanka has made extensive progress in introducing a competitive broadband market with a wide array of options and prices. Despite this advance, usage remains less than expected. For example, the Network Readiness Index, which measures a country’s ICT environment along three broad dimensions, finds that Sri Lanka lags in usage compared to other components (Figure 8).

According to the Sri Lanka Department of Census and Statistics Computer Literacy Survey, 13.1% of the population aged 5-69 used the Internet in 2009 or some 2.3 million people. This is a significant improvement over the 3% reported in 2004 and there is noticeable rise since the previous survey carried out in 2007 (Figure 9, left). Nevertheless, current Internet penetration is insufficient particularly when compared to other lower middle-income nations that carry out similar surveys (Figure 9, right).

A number of demand stimulation policies are being pursued to raise Internet usage in Sri Lanka.

Some are spearheaded by the government, in partnership with the private sector and civil society. Others are classic competitive responses by operators who want to attract new customers and keep them.

5.1 Public access

Not everyone can afford home broadband access. Therefore it is critical to provide other options such as public facilities with broadband access. These can also serve as venues to provide training.

Nenasala program: Nenasala (or “knowledge center”) is the name given to a series of telecenters that are being installed as a part of the e-Sri Lanka initiative and represents the government’s primary public access initiative. According to http://www.nenasala.lk/, the 605th Nenasala opened in March 2011. The initial design for these telecenters was based on a business model that included a government subsidy (anything from 25 – 100% of costs) that would be scaled down to 0% over 4 years, which was the time estimated to reach financial self-sustainability. Later a new type of telecenter (“community model” based telecenters, as opposed to the “business model” based or entrepreneurial telecenters initially envisioned) was introduced, where financial sustainability was traded for other development objectives. Over-time, several other community access initiatives (such as e-libraries and distance-learning centers) have also been brought under the Nenasala project, and the program has deviated from the exclusive focus on rural areas, and currently includes telecenters even in areas that are well served by other alternatives such as commercial “communication shops” - for example, the Colombo district (the most urbanized district that is the financial hub of the country which has numerous commercial “internet cafes”) reported 12 Nenasalas. Irrespective of location or model, the expected benefits of the Nenasala program are to: increase ICT literacy, provide affordable access to citizen services, provide access to e-commerce and ICT services leading to job growth in rural areas and

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44 According to http://www.nenasala.lk, 25 March 2011. Almost half of Nenasala users felt there were other locations in the vicinity providing similar services, according to a 2008 survey by the ICT Agency.
promote knowledge sharing. Provision of various training programs is a primary source of revenue for Nenasalas with only 9% reporting they do not engage in training.\textsuperscript{45} Use of computers, use of Internet, and facilities to obtain print-outs were the other services offered across the board, while a smaller percentage of Nenasalas provided fax, then the better solution is to provide a targeted subsidy to the desired user group. This was in fact the design of a pilot “voucher” scheme which was given to school children in rural areas so that they could get a specified number of hours at a telecenter. This scheme how was not scaled up.

**Easy Seva centers:** Starting in 2007, mobile


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46 USAID (n.d.), *Alliances in Action: Easy Seva Sri Lanka.*
Seva centers became the largest users of broadband outside the capital city of Colombo.\(^\text{47}\) The program is being scaled up.

5.2 Digital literacy
According to the Sri Lanka Department of Census and Statistics, “… computer literacy has become the fourth pillar to the traditional three tenets of education: reading, writing, and arithmetic, and that a failure to acquire the now requisite technical knowledge will prevent large segments of population from realizing the fruits of the Information Age…”\(^\text{48}\) In a 2009 survey, the DCS found that one fifth of the Sri Lankan population aged 5-69 was computer literate, defined as a person being able to use a computer on their own.\(^\text{49}\) Although this is a 25% increase from the previous survey in 2006, more effort is needed to raise digital literacy if Sri Lanka is to develop wide participation in the information society. The computer illiterate fall along familiar socio-economic classes and tend to be disproportionally older, less educated and non-English speaking.

\(e\text{-Sri Lanka}\) has launched multiple activities aimed at increasing ICT literacy:

a) Targeting ordinary citizens, the \(e\)-driving license certification was launched, enabling people to receive low cost, basic ICT training through a network of pre-approved private sector training partners.

b) Targeting government employees, a comprehensive program to develop the ICT skills has been launched, covering basic computer literacy to highly technical skills. By Q1 2009 around 3,125 government employees were given the basic ICT Certification training, with over 2,000 more in the pipeline.\(^\text{50}\)

c) Targeting the private sector, over 5,000 non-ICT sector employees had received training by 2010.

d) The \(e\)-Sri Lanka PC program provided easy financing for citizens to purchase a computer

e) A weekly program broadcast on a popular television channel covered a broad range of topics related to basic computer literacy including the use of simple software packages and simple hardware maintenance.

The Ministry of Education also worked in parallel to increase digital literacy through several initiatives starting with the launching of the National ICT Education drive in 2005.

f) Through various ICT-capacity building initiatives of the Ministry, it is estimated that at least 74,000 teachers had received one or more types of ICT-related training.\(^\text{51}\)

g) ICT was introduced into the school curriculum and General Information Technology (GIT) as a subject was introduced for the G.C.E Advanced Level students. The first GIT exams were conducted in 2005.\(^\text{52}\)

h) In 2006, SchoolNet\(^\text{53}\), a wide area network connecting schools and other institutions that are engaged in education (such as zonal education offices, the Ministry of Education (MoE), the National Institute of Education (NIE), etc.) was launched with funding from the Asian Development Bank. Implemented in various stages (and still ongoing), schools were initially provided with a computer lab and an Internet connection under this program. Today, any school that has a


\(^{53}\) http://www.schoolnet.lk/
computer lab with a LAN can apply for connectivity via SchoolNet. At present around 1,800 institutions (about 1,500 schools and 300 other institutions) are linked up via SchoolNet. Of these around 1,100 have ADSL Internet connectivity, about 400 have CDMA based connections and the rest are connected via WiMAX, though at present the majority are being converted to ADSL. Most have 128Kbps connectivity, while bigger or central schools have 256-512 Kbps. The MoE and the NIE have higher bandwidth of 6 Mbps and 4 Mbps respectively. Sri Lanka Telecom and Dialog Telekom are the primary providers of connectivity. Conversations with the Network Operations Center for SchoolNet revealed that the majority of traffic generated is for web browsing, though there is evidence of provincial level use of the various collaboration tools that are offered as part of the SchoolNet. Web hosting (of web pages for schools) and domain name assignment for schools are also widely requested services. Actual usage of facilities (the lab, or Internet) is governed by the policies of each individual school, and therefore highly variable: some allow relatively easy access while others have more restrictive opening hours and policies on which students can use the facilities.

While internet access at primary and secondary schools is still emerging, the universities and research institutions have traditionally had better access.

1) Internet connectivity for universities and research institutions is through the Lanka Education and Research Network (LEARN). The majority of national and regional level universities and some private ones are connected to the Internet through LEARN. Operating funding comes from the government (via the University Grants Commission), while capital investment (e.g., for increased network capacity) has been funded through international donors in the past. International connectivity is through two paths: the incumbent SLT (120 Mbps) and also via the Trans-Eurasia Information Network (TIEN 3) which provides dedicated high capacity Internet to research and education institutions in the Asia Pacific region (45 Mbps). LEARN operates as a non-profit entity owned by the members and has a small staff operating the network operating center. The majority of traffic generated by the network is international.

5.3 Converged and bundled offerings

Operators are taking a classic approach of product bundling in order attract consumers, increase revenues and decrease churn. Some of these are helping drive the adoption of broadband. For example:

- Dialog’s broadband and voice bundle products (SmartHome and BoxOffice) demonstrated significant growth in 2009 (with 162 and 64 percent customer growth for each product, respectively), despite broadband-only subscriptions growing only marginally. Revenue contribution from customers of these two products grew from 35 to 41 percent between Q3 2009 to Q4 2009 whereas revenue contribution from broadband-only consumers fell from 65 to 59%.

- LankaBell offers free narrowband Internet services to its 1.2 million subscribers. In July 2009, the company announced that its customer base for high-speed Internet had grown by over 300 percent in less than 18 months.

- SLT launched its IP based television service PEO TV and reported over 26,000 subscriptions in 2010. While pricing for TV channels offered on PEO TV is less competitive than alternatives, it is an attractive option for consumers who have access to copper connectivity (within a short distance

54 www.ac.lk
55 See http://www.tein3.net/upload/pdf/TEIN3_Topology_04.10_low_res.pdf for TEIN3
57 http://www.lankabell.net/lanka_bell_one_step.htm
5.4 Content and applications
Access to content that is relevant to users helps to drive broadband uptake. This includes access to popular global sites as well as the development of local content including e-government applications.

<table>
<thead>
<tr>
<th>Rank</th>
<th>Name</th>
<th>Site</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Google</td>
<td>google.lk</td>
<td>Search</td>
</tr>
<tr>
<td>2</td>
<td>Facebook</td>
<td>facebook.com</td>
<td>A social utility that connects people, to keep up with friends, upload photos, share links and videos</td>
</tr>
<tr>
<td>3</td>
<td>Google</td>
<td>google.com</td>
<td>Search</td>
</tr>
<tr>
<td>4</td>
<td>YouTube</td>
<td>youtube.com</td>
<td>YouTube is a way to get your videos to the people who matter to you. Upload, tag and share</td>
</tr>
<tr>
<td>5</td>
<td>Yahoo!</td>
<td>yahoo.com</td>
<td>A major internet portal and service provider offering search results, customizable content, etc.</td>
</tr>
<tr>
<td>6</td>
<td>Blogger</td>
<td>blogspot.com</td>
<td>Free, automated weblog publishing tool</td>
</tr>
<tr>
<td>7</td>
<td>ESPN cricinfo</td>
<td>espncricinfo.com</td>
<td>ESPN Cricket portal</td>
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of the exchange, in order experience high quality) and do not want the hassle of maintaining a separate satellite TV subscription.

- At the time of writing, new broadband operator Sky Networks was in talks with one of the CDMA fixed line operators to offer a bundled voice+broadband offering to consumers.
5.4.1 Browsing habits of users

A ranking of the top twenty web sites in Sri Lanka shows that global applications such as search portals (e.g., Google, Yahoo!, Bing) and social networking and peer to peer applications (e.g., Facebook, YouTube, Twitter, Blogger, eBay) are popular (Table 8). Local content, particularly news sites, rank in the top twenty as do sites of particular interest to many Sri Lankans such as cricket (ESPN cricket at #7). Like everywhere around the world, Sri Lanka has joined the social networking revolution with over 900,000 Facebook users in March 2011 or some 4.4% of the population and around 40% of Internet users (based on the DC&S Computer Literacy Survey). Elakiri.com is a popular website that allows users to upload (and download from other users) popular content such as music videos, pictures and mobile ring tones. It provides a facility for hosting blogs and contains several forums that are popular. At the time of writing, the various forums on Elakiri.com claimed to have over 9 million posts under 874,000 different threads with over 348,000 users.60

5.4.2 E-government applications

Government can be a driver of increased broadband penetration through its own ICT activities including the development of online applications to facilitate citizen interaction. One of the main components of the e-Sri Lanka program was the development of e-government services. According to an evaluation of the program, Sri Lanka has progressed in e-government since 2004 when there were no Internet-enabled services and only a single central government portal providing static information.61 By 2010, 290 agencies had

![Figure 10: Services provided by various types of government organizations (Source: ICTA)](http://www.ictDATA.org)

web site and there were 112 online services for the private sector. More detailed analysis reveals that the even though many government offices had a web presence, only 10% provided some kind of interactive service. The others provided information and at most allowed the download of forms (Figure 10). Yet the download of government forms should not to be underestimated. Simply having information about how to access government services and providing the necessary application forms online provides a huge benefit to users who otherwise may have to travel several hours just to obtain these (and travel again to actually obtain the service).

A separate survey of citizens who walked into selected government offices revealed their most-used e-government service. Top ranked was obtaining information from government websites (47.3%), with making inquiries from the Government Information Center (GIC) ranking next (46.6%), making inquiries via e-mail from government organizations (7.5%) and online applications for government services (6.0%).

Indeed the availability of government information and forms appears to be a driver of Internet services, at least for those citizens that access the Internet at the Nenasalas (the government’s telecenters). A 2008 survey reveals that 70% of users of Nenasalas had accessed government websites for information and services and that 24% of them said access to government services through the Nenasala’s had contributed positively towards their life.

There is room for improvement. As noted, more government transactions enabled online (instead of simple information) could prompt more demand. Further, some of the most widely used e-government services implemented by ICTA are ones that use ICTs at the backend, but rely on citizens using simple old fashioned phones (in the case of the Government Information Center, which gives information about applying for various government services through a call center), traditional counter-services (in the case of certified copies of birth, death and marriage certificates being available under 30 minutes by walking-into the relevant government office, achieved through a huge document digitization initiative) or “drive-through” services (in the case of the payment of motor vehicle road tax in a few minutes thanks to backend computerization of the process). According to the UN e-government survey, Sri Lanka ranks third in the Southern Asia region. However its rank dropped ten points between 2009 and 2010 and the country’s overall e-government index has remained stagnant.

5.4.3 Content offerings from operators and emergence of “App Store” models

Private sector is also entering the mobile-application market. The models adopted by the operators vary. Some are creating educational content from scratch, hoping people will be willing to pay for useful content in a culture where education of children is the primary goal of most families, and majority of secondary schoolers (or their parents) pay for “private tuition” that helps with additional coaching on top of what they learn at school. Operators have also started online application stores, inspired by the iPhone App Store or Nokia’s Ovi. However the difference is that the applications are within a walled garden of the operator, and operator-centric (unlike the phone-centric models such as the iPhone app store which are accessible from any operator as long as the phone is an iPhone). At the time of writing Etisalat was offering application developers standardized contracts that provided them with a development environment (to develop and test the software), revenue share of 70% and non-exclusivity (i.e. the developer could make the app available to other operators, but had to do the marketing)). As with all user driven innovation, it is hoped that a large number of applications will be generated, with a few becoming extremely popular due to consumer demand. However, smart phones that can run these apps are still only a small percentage of the market. Therefore what is required are

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65 The GIC information is both available online at www.gic.gov.lk and via phone by dialing 1919. However the GIC 2009 Annual Report states that between 2007 – 2009 a total of 1.719 million calls were answered while the website only recorded a total of 635,928 visits as at March 2011.
applications that can run on basic (feature) phones and deliver utility to the masses.

5.4.4. Online Payments

As with many developing nations, the use and availability of credit cards is low. Therefore, online payments via credit card for the purchase of goods and services is only possible for a small percentage of the population. However, an alternate payment mechanism exists through mobile telecom companies – for example, citizens make appointments with doctors at various hospitals by dialing a 225 from their telephones and speaking to an operator. The doctors’ charges (and hospital charges) plus a fee for the appointment booking service are added to the consumers bill at the end of the month (in the case of post-paid mobile users) or deducted immediately from the users available credit (in the case of pre-paid users, who are more than 90% of the market). Therefore, any vendor wanting to engage in “e-commerce” will have to tie-up with phone companies for the payment mechanism if they want to go mass-market.

5.5 Regulatory measures to protect the consumer

5.5.1 Online security

Proper security and other assurances are necessary to help some citizens overcome their resistance to use broadband services. This includes, for example, legislation that legitimizes electronic transactions and makes computer crimes illegal. It also includes initiatives to raise awareness about how users can limit access to sites they consider undesirable and how they can protect themselves against harmful content.

Several key pieces of legislation have been enacted:

- Intellectual Property Act No. 36 of 2003: Under this law, computer programs are protected under the existing Copyright Regime
- The Electronic Transactions Act No. 19 of 2006: It aims to “recognize and facilitate the formation of contracts, the creation and exchange of data messages and other communications in electronic form in Sri Lanka and to provide for the appointment of a certification authority and accreditation of certification service providers”. The law was brought into operation in October 2007 and is based on the United Nations Commission on International Trade Law (UNCITRAL) Model Law on e-Commerce (1996) and Model Law on e-Signature (2001).
- Payment and Settlement Systems Act No. 28 of 2005: This legislation was introduced to enable transaction of checks and negotiable instruments in digital form.
- Computer Crimes Act No. 24 of 2007: This law covers two categories of offences: a) computer related crimes, and, b) hacking offences which affect integrity, availability and confidentiality of a computer system or network and deals both with unauthorized access and unauthorized modification and damage. This law was brought into operation in July 2008.

In addition to the above, other laws related to Data Protection (and approaches other than laws, such as self-regulation) are being considered.

Apart from the legal framework, simple awareness and perceptions with regards to security on the Internet has a direct impact on demand. In particular, access to unsuitable material by children can impact the parent’s decision to purchase Internet access. Operators are addressing this. For example, at the time of writing, Etisalat was planning the sale of mobile broadband dongles that included pre-installed content filtering software. Dialog has also

launched a “Child Safe Internet” account that filters access to inappropriate web sites.\(^{67}\)

The government’s response to pornographic content online has been haphazard – with the topic gaining prominence at regular intervals, but then disappearing from the radar, without concrete policy or regulatory action in between. In July 2009 it was reported that based on a petition by the Inspector General of Police the courts had ordered TRCSL to ban twelve local Internet sites identified as containing pornographic material. In August 2009, it was reported that the TRCSL was about to force all Internet cafes to register and be monitored closely to ensure they do not provide access to pornographic content.\(^{70}\) But as of today, how it is unclear how these rules/orders are being enforced.

5.5.2 Broadband quality

Consumer assurance can be enhanced through quality of service testing of broadband services. TRCSL has commenced carrying out broadband tests to measure advertised speeds against actual

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\(^{70}\) “No sex please, we’re Sri Lankans”. *The Sunday Times.*

speeds. It conducts tests for both fixed and mobile broadband, for all operators, for different advertised speeds. The tests are based on download results from servers in different countries. A January 2011 test for mobile broadband found that speeds were above the 1 Mbps threshold and generally above a 1.5 Mbps threshold (Figure 11).

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6. Assessing Performance: Glass Half Full or Half Empty?

On one hand, Sri Lanka’s fixed broadband penetration leaves much to be desired, with only a small portion households being served by fixed copper broadband, and an even smaller portion of the served households adopting ADSL. Whether fixed wireless (especially newly emerging WiMAX) will prove successful is unclear because these technologies/services are only just entering the market. However mobile broadband has stepped in to fill the void – Sri Lanka has the second highest level of mobile broadband penetration in South Asia (only behind Maldives, a much richer country) and it has the lowest prices. Though overall adoption is still low, mobile broadband is experiencing phenomenal growth. Many factors contributed to this success, as discussed below.

However, the path for continued growth for mobile broadband is far from certain, given the socio-economic conditions of the country and competitive dynamics between operators.

These factors are discussed in the following section.

6.1 What worked

6.1.1 Early availability of 3G spectrum

The Sri Lankan regulator was one of the first in the Asian region to make 3G spectrum available back in 2004 when it authorized its use for testing. By 2006, this spectrum was allocated for commercial use to all operators at a charge of around USD 5 million. Not only was 3G spectrum made available at the time, but was thereafter available to any operator who paid the same price. This eliminated “land-grab” type behavior that would have been otherwise created by a one-off spectrum auction and enabled operators to enter the 3G market when it made most sense to them – based on their assessment of trade-offs between early entry vs. waiting for the right time in their capital investment cycle. Though the government arguably lost potential income through this allocation method, it did make spectrum available on a non-discriminatory basis to all operators, and at a relatively low price. Once the primary barrier to mobile broadband investment was removed (i.e. spectrum was made available), operators were quick to invest. Dialog launched South Asia’s first commercial 3G network in 2006 and other Sri Lankan mobile operators have followed suit. Availability of 3G spectrum and 3G services is in sharp contrast to the situation in many of Sri Lanka’s neighbors, most notably India which did not allocate it till until 2010.

Sri Lanka is keeping up this track record, and has made spectrum available for LTE networks, which are currently being tested by two operators.

6.1.2 Innovations by operators

The second key driver of mobile broadband stems from dynamics of an extremely competitive mobile industry in Sri Lanka. Market entry has been liberal with a relatively high number of operators. Once the market got beyond the duopoly situation, and disruptive third and fourth operators entered, serious competition set in, driving down prices. In order to maintain margins and grow the market, operators could not continue to “cream skim” (service the rich or those at the top of the socio-economic pyramid who have high ability to pay) but had instead to reach the masses and the poor. The operators innovated by moving towards a high volume, low cost network business model characterized by, a) outsourcing of network operations, leading to significant reduction in network costs, b) sharing of passive and active infrastructure, without regulatory obligation, further reducing operational costs, c) eliminating credit risk and cost of printing invoices by offering pre-paid service, d) catering to variable incomes of the poor by enabling extremely small re-charge amounts on pre-paid services (as low as USD 0.50 top-ups) and e) even eliminating scratch cards used for topping-up pre-paid services by moving to electronic re-charge, saving more costs. This business model is characterized by extremely high network utilization and low Average Revenue per User (ARPU) and has enabled those at the bottom of the income distribution to access mobile broadband, signaling a transition to a more equitable distribution of the benefits of information and communication technologies.

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the socio-economic pyramid to become mobile voice and SMS users.\textsuperscript{73}

The same model is now being extended to mobile broadband. Faced with high competition in voice, operators are moving to other services, and data is the first target. While many rich or some middle classes households may have access to copper wire (and therefore ability to get ADSL connections), most other do households do not. Therefore wireless is the only option for many. Operators are meeting the demand with reasonably priced HSDPA dongles (at under USD 50 per dongle) and data plans (unlimited plans ranging from USD 4 to USD 27 per month). By enabling pre-paid top-ups, operators are eliminating the need for a monthly contract, further removing barriers to entry by those on low or irregular incomes. And by targeting students (e.g. Dialog offered them HSPA dongle and package discounts of up to 50\% in the early days) they have managed to capture early adopters.

Sri Lanka has also traditionally been a leader in mobile telephony in South Asia and often the first to launch innovative new networks and applications. Dialog was the first 3G operator in South Asia and Mobitel the first 3.5G. This trend continues today – HSPA was first launched in South Asia by Dialog and Mobitel was first with HSDPA and HSUPA. At least 2 operators are running LTE trials at the time of writing, with plans to invest and launch LTE within 1 – 2 years. The mobile operators are on a constant innovative cycle, by matching each other’s investments into faster, more cost-efficient technologies in each iteration.

6.1.3 Creating the ecosystem: e-Sri Lanka

We highlighted earlier the \textit{e-Sri Lanka} initiative funded by the World Bank, Government of Sri Lanka and several other agencies. As an integrated, cross-sector ICT-enabled development program, \textit{e-Sri Lanka} created extremely high expectations in the country. Seven years after it started, a number of the projects are still being implemented and others have been abandoned. However, most stakeholders agree that the impact of \textit{e-Sri Lanka} is not in the individual pieces, but rather the holistic eco-system it envisioned, and that even activities that are as-yet-completed contribute to that eco-system and general sense of “excitement” about ICT’s created by the program.

6.1.4 Tax relief

Sri Lankan consumers have been plagued with high taxes on their telephone bills. Given the ease of collecting taxes through the telecom operators, it was common for the government to impose a variety of taxes, and sometimes taxes on taxes, on phone services, both mobile and fixed (besides VAT, a Nation Building Tax, an Environment Levy, etc.). As a result, Sri Lankan consumers were paying roughly 31\% tax on their phone bills. This is in addition to the corporate taxes (and other levies such as spectrum fees) paid by the operators themselves. In November 2010\textsuperscript{74}, the government made drastic changes to the tax structure and, effective from 2011 imposed a reduced, flat tax of around 20\% on phone consumers. This was a laudatory action – now instead of only getting browsing-time of 70 rupees on every 100 spent, consumers get 80 rupees of browsing-time (operators do not think the reduced taxes would result in the consumers reducing the total amount they spend each month). It is hoped that this will increase consumption of mobile services including mobile broadband.

6.2 Challenges

Though Sri Lanka has achieved much and looks poised to continue its growth, operators face major competitive challenges and there are several areas of regulatory concern.

6.2.1 Reaching the mass market

Compared to fixed, mobile broadband is enjoying high growth in Sri Lanka. However, unlike mobile voice (which enjoys 82\% SIM penetration), mobile broadband reaches far less than 10\% penetration (counting all types of terminal devices – phones (“small screens”) to computers (“big screens”)\textsuperscript{75}). LIRNE\textit{asia} (2008\textsuperscript{76}) shows that over

\textsuperscript{73} Samarajiva, R. Leveraging the budget telecom network business model to bring broadband to the people, Information Technology and International Development, 6, special issue: 93-97. http://itidjournal.org/itid/article/viewFile/630/270

\textsuperscript{74} 2011 budget speech at http://www.news.lk/category-table/16732-salient-features-of-the-budget-2011

\textsuperscript{75} The distinction is important because big screen users generate higher revenue for operator through higher consumption.
88% of Sri Lanka’s poorest citizens (those at the bottom of socio-economic Pyramid (BoP)) in both urban and rural areas are telephone users (primarily mobile phone). 73% of the BoP also owned a phone (again, primarily a mobile phone). However the same survey shows that only 3.2% of the BoP had used the Internet, that 74% had heard of the internet but never used it and worse yet that 23% had never heard of the Internet.

Mobile broadband has a long way to become a mass-market technology in Sri Lanka. The industry claims that 10% – 15% penetration of big screen mobile broadband – i.e. a mobile internet dongle connected to a computer- is possible at current prices without too much effort. Up to that point the mobile operators are still serving mostly early adopters, or those who do not need much convincing about the utility of high speed Internet access (i.e., those that are already aware of the Internet, use it at the office, probably have the funds to even get an ADSL connection to their home, and need a mobile dongle for convenience or personal use). But after that market is saturated (which will happen soon), a truly “new” market, of users who are not convinced about the utility of broadband has to be reached. This will eventually include those at the BoP with low ability to pay. But with prices already relatively low (“unlimited” packages range from USD 4.50 – 277, depending on when the Fair Usage Policy (FUP) becomes active78 with majority of users spending around USD 10 per month; or limited pre-paid broadband is about USD 3 per GB79), there is likely not too much room for prices to continue dropping.

Operators worry that increased mobile broadband competition will result in behavior similar to that in the mobile voice space where price reductions were so drastic that operators requested regulatory intervention (in the form of floor prices for interconnection), claiming that their viability was threatened. Even if this does not happen, EBITDA margins for mobile broadband is already low, making it harder to justify the investment needed to move to 4G island-wide.

Even if the operators can continue with these margins and invest, the bigger question of reaching untapped markets or having to “create” the market (of those as yet unconvinced about the utility of broadband) is the true challenge for the sector. According to some operators, not only is the utility something users need be educated about, but fear of the negative impacts of the Internet is also a barrier that has to be crossed.

It appears that operators are already acting. For example, the days of “unlimited” data packages are gone. Now the operators are clearly advertising FUPs or publishing the additional charges when the monthly data limit is reached. Others are offering “minute-based” plans – i.e., pre-paid plans where the users buy credit and are then able to use the Internet for a certain number of hours or minutes. This is because it has been shown that for an average pre-paid user, the minutes spent online is easier to keep track of and make more “sense” of than how much data was downloaded. Some operators are willing to engage in rural awareness building, and to offer mobile broadband dongles that come pre-loaded with content-screening software (with parental controls for what content is viewable, for example) and they think this will help bring some reluctant users into the market.

6.2.2 The language barrier
Sri Lanka uses three languages – Sinhalese, Tamil and English. The majority of Internet traffic is for content hosted overseas, in the English language. Except for government websites and several newspapers, there isn’t sufficient local content in local languages; certainly not content that is dynamic and varied, in the way English content is. Tamil content (though not Sri Lanka specific content) is at least widely accessible on the Internet thanks to the presence of the large Tamil-speaking population in South India. There is of course a blossoming Sinhala language blogosphere in Sri Lanka – however the readers and bloggers

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76 Published reference to LIRNEasia’s T@BOP data that contains these data points, if possible. If not reference to slide-set online.
77 February 2011 prices for Dialog Axiata, largest mobile operator (http://www.dialog.lk/personal/broadband/hspa/packages/unlimited-postpaid-broadband/)
78 Unlimited packages have a Fair User Policy (FUP). Once a user reaches a certain download/upload limit per month, the service quality downgrades (speeds slow down), but no extra amount is changed. This is differentiated from packages that charge additional fees for additional downloading.
are often the young and educated and many could read English content anyway. There are few websites other than newspaper sites for a Sinhala-only speaker, or a Tamil-only speaker who wants locally relevant content. As a result, the non-English-speaking citizenry appear to be kept out of the Internet.

This key challenge has to be addressed if the operators are to move beyond the low penetration levels they currently have in mobile broadband. The technical groundwork has been laid with the adoption Unicode Sinhala fonts.

On the other hand, one could argue that the language barrier is increasingly insignificant – even children of some non-English speaking parents are conducting their basic education in English as a result of the government introducing the option of English medium education. This is the generation that will drive Internet adoption (by convincing their parents to purchase Internet subscriptions). Therefore perhaps over time the importance of local language sites may become less important.

6.2.3 Regulating broadband quality

The budget telecom business model yields exactly what the name implies – low prices, but also low quality. Actual throughput delivered to the user is less than what is promised. Compared to users in North America, Sri Lankan broadband users receive less value for their money (as measured by actual experienced throughput per USD spent) as seen in Figure 12.

![Figure 12: Actual download speeds (kbps) per US$, 2009](Source: LIRNEasia)

The quality of service issue has caught the attention of the TRCSL since 2010. It now carries out its own tests and is about to enact regulation regarding minimum quality standards. One form the regulation may take is setting a minimum speed that must be met at all times at all locations. This is technically possible on a mobile network – the operator has to add extra capacity so that the required speed is experienced at all times, irrespective of whether 1 user or 500 users are connected. However the result would be an expensive network that provides optimum performance. This is not feasible for networks that are run to optimize network load factors and keep costs to a minimum. Alternatives are needed. One possibility would be to require
average speeds (for the country or a particular geographic area) allowing operators to make the decisions on where to increase capacity to meet the average target. Light regulation could also be pursued where operators offer quality-differentiated pricing. There is sufficient competition in the market to encourage operators to differentiate themselves in such ways.

6.2.4 Special dispensation for the telecom sector

As noted, the government of Sri Lanka reduced the tax consumers pay on mobile services recently. At the same time, the government exempted the telecom operators from Value Added Tax (VAT). When this announcement was made suddenly, operators who had just ordered multi-million dollars worth of equipment were faced with a situation of not being able to claim back the VAT on their purchase. This is perhaps a one-time occurrence. However the broader question is why the telecom sector should be specially targeted (even in this “helpful” way, as deemed by the government). It seems that instead of giving the sector special favorable (or unfavorable) treatment in relation to other sectors, what’s more appropriate is to provide a stable and predictable regulatory and policy regime. Given the high level of competition, most other issues would then be taken care of by the market.

6.3 Has Sri Lanka achieved enough, given favorable conditions?

Sri Lanka has an adult literacy rate of over 90%, and has benefitted from a strongly supported ICT4D program over the past seven years (e-Sri Lanka). Both Internet supply (through telecenters, national backbone networks, mobile broadband) and demand (through the development of e-government and other applications, creating awareness, capacity building) have been addressed as part of the e-Sri Lanka program. Therefore, it is reasonable to expect that Sri Lanka should achieve more in ICT connectivity and adoption than other developing countries that did not receive such targeted ICT funding and attention.

Vietnam provides a sharp contrast. In 2002, Sri Lanka and Vietnam had similar internet penetration rates. But between 2002 and 2009, Vietnam increased its Internet penetration by a factor of 14, while Sri Lanka only did so by 7. By 2009 Vietnam’s intent penetration was more than twice as much as Sri Lanka’s. In the World Economic Forum Network Readiness Index (NRI), Vietnam’s ranking was 17 spots below Sri Lanka in 2002; by 2009 Vietnam was 18 positions ahead. One would have also expected Sri Lanka to gain on its neighbors. But in 2009, Sri Lanka’s NRI was behind India and just ahead of Pakistan.

Viewed in this light, it appears Sri Lanka should have been performing better, even with the toll of the 30-year ethnic war.

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80 http://www.networkedreadiness.com
Sri Lanka has some ways to go to before it can be declared a broadband success story. It should be further ahead of the broadband adoption curve than it is today, given the favorable conditions it faced - a highly literate populace and a national level e-development program. However, it has made significant achievements, under less than ideal regulatory conditions and under less than stable socio-economic conditions including a prolonged ethnic conflict. And its mobile broadband has compensated for the somewhat lackluster fixed broadband performance - it is the best performer in mobile broadband compared to all its South Asian neighbors, many of who have more advantages in terms of larger markets (economies of scale) and better regulatory regimes. And the growth of mobile broadband doesn't appear to be slowing down anytime soon.

Best practice can be identified from Sri Lanka's successes and cautionary tales drawn from its failures. These are summarized as follows:

- **If nothing else, enable competition in the market by facilitating entry:** Sri Lanka is a poster child for what a competitive telecom market can achieve, even under less than ideal market-entry conditions. When enough players enter a country (certainly more than two, ideally more than three), disruptive competition takes place yielding business models that enable affordable mobile broadband, especially when voice revenues are declining.

- **Ensure that availability of spectrum is not a barrier:** Spectrum is the primary resource required for mobile broadband that is not within the control of the operators. The regulators should make this available early, and on a non-discriminatory basis, regardless of the allocation method. This is doubly important for developing nations, because most don’t have wide-spread copper networks (or copper connections of sufficiently high quality to run xDSL).

- **Creating “the buzz” is as important as specific ICT4D projects:** e-Sri Lanka’s biggest contribution is arguably the enthusiasm and energy it created for ICT-enabled development. This creates an ecosystem of innovation and even energized the private sector into action (due to the threat of the government becoming a major player in the sector). Therefore if funds are limited, they are better spent on awareness building and promotion at the nationwide level, than on individual projects, which may or may not succeed.

- **The need for “Light touch regulation” in the early stages:** The approach to broadband QoS regulation that appears to be emerging in Sri Lanka is an example of the regulator attempting to do the right thing by the consumer (delivering good quality) at the expense of creating un-achievable targets for operators (regulation based on a guaranteed minimum speed per connection, instead of average speeds across the network or even average speeds for a local region. The former is achievable in the long term, of course. But in the in the immediate term, it’s only achievable at great expense and the risk of not serving the poor).

- **Race to the bottom with prices, without growing the market is dangerous:** The natural response of Sri Lankan operators when faced with stagnant market-share has often been to slash prices. While this is good for consumers in the short term, lower prices that lead to lower profits that don’t allow for investment hurts them in the long term. This is likely in the mobile broadband space, where penetration in the early adaptor and the top-of-the-pyramid consumer segments will reach saturation soon. Unless operators growth the market by breaking barriers and reaching the lower income groups (by creating local language content, addressing fears of safety on the Internet, providing more services through broadband connections and by increasing the perceived utility of a broadband connection), the industry could stagnate. The balance between lower prices and market growth has to be found by operators.
About infoDev

infoDev is a global development financing program among international development agencies, coordinated and served by an expert Secretariat housed at the World Bank Group, one of its key donors and founders. It acts as a neutral convener of dialogue—and as a coordinator of joint action among bilateral and multilateral donors—supporting global sharing of information on ICT for development (ICT4D), and helping to reduce duplication of efforts and investments. infoDev also forms partnerships with public and private sector organizations who are innovators in the field of ICT4D. infoDev is housed in the Financial and Private Sector Development (FPD) Vice Presidency of the World Bank Group.

For additional information about this study or more general information on infoDev, please visit www.infodev.org/publications.
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Access to affordable broadband has become a priority for many countries, which is perceived as important for social and economic development. The interaction of individuals, communities, and organizations with broadband has contributed to the development and enhancement of social networks, access to and generation of new knowledge, and the creation of diverse innovative processes.

The World Bank commissioned this study of the Information and Communication Technology (ICT) sector and specifically broadband within the Federation of Saint Christopher and Nevis. It forms part of a series of case studies carried out to analyze broadband in a representative sample of developing economies as background research for the World Bank Broadband Strategy Toolkit.

The study analyses the environment within the small island developing state that facilitated the uptake of broadband technologies and applications, to the extent that St. Kitts and Nevis has the highest fixed broadband subscription rate among all countries of the Latin America and Caribbean region, and even higher than some developed economies.

This achievement can be attributed in part to the small physical size of St. Kitts and Nevis that has enabled faster rollout of the physical infrastructure, facilitated more effective marketing, and promoted maximum impact for government-led ICT initiatives. Among the Caribbean islands however smallness is certainly not unique. The study therefore explores other factors that have contributed to high broadband penetration.

The phrase “strength in depth” is borrowed from the world of soccer, the most popular sport on the island. The phrase is used to underscore the point that the strength of the island’s achievement in the broadband sector, lies in its commitment to nurturing the foundational components of the broadband ecosystem. Promotion of basic education and digital literacy, building technology awareness, facilitating access to ICT, and encouragement of a competitive telecommunications environment are but a few examples of the country’s core strengths.

However, as in any ecosystem, sustainability and growth can be threatened by internal weaknesses. As of the date of this report, mobile broadband has yet to be launched and the lack of appropriate legislation is holding back the development of interactive e-commerce and e-government applications. Other challenges included the high cost of services, an unstable power supply and quality of service issues.

Chapter 1 of the report provides a socio-economic overview of St. Kitts and Nevis. Chapter 2 examines key policies and laws that govern the ICT sector, identifies key institutions and service providers and presents data on the size of the telecommunications market. Chapter 3 looks at the broadband market including penetration, pricing and quality. Chapter 4 reviews factors that have an impact on broadband demand. Chapter 5 summarizes the country’s success factors as well as remaining challenges impeding the realization of a sustainable broadband ecosystem.

In order to provide regional context, the report provides comparative data for other Eastern Caribbean countries, specifically Dominica, Grenada, Saint Lucia, and Saint Vincent and the Grenadines.
This report was drafted by Diana Anius based on interviews conducted in St. Kitts and Nevis between December 2010 and January 2011 as well as the documents referenced in this study. The author wishes to acknowledge the support of Ms. Cheryl Hector of the Eastern Caribbean Telecommunications Authority (ECTEL) and Mr. Christopher Herbert of the Department of Technology, Government of St. Kitts and Nevis. The report was drafted with significant contributions by Michael Minges, who directed the case studies for the Broadband Strategies Toolkit. The project was carried out under the supervision of Tim Kelly (infoDev) and Carlo Rossotto (TWICT), with the Telecommunications Management Group Inc. (USA) providing overall project coordination. Philippe Dongier, Sector Manager (TWICT) and Valerie D’Costa, Program Manager (infoDev), provide overall management guidance for the development of the toolkit. Samhir Vasdev edited the report and prepared it for publication.

This case study is one of an initial series of seven that will contribute to the Broadband Strategies Toolkit, an online resource for policy-makers and regulators, especially in developing countries (see www.broadband-strategies.org). The case studies are generously funded by the Korean Trust Fund (KTF) on Information and Communications for Development (ICT4D). The KTF is a partnership between the government of the Republic of Korea and the World Bank Group whose purpose is to advance the ICT4D agenda to contribute to growth and reduce poverty in developing countries.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADSL</td>
<td>Asymmetric Digital Subscriber Line</td>
</tr>
<tr>
<td>CARICOM</td>
<td>Caribbean Community</td>
</tr>
<tr>
<td>ECTEL</td>
<td>Eastern Caribbean Telecommunications Authority</td>
</tr>
<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
</tr>
<tr>
<td>GOSKN</td>
<td>Government of St. Kitts and Nevis</td>
</tr>
<tr>
<td>GPRS</td>
<td>General Packet Radio Service</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communication Technologies</td>
</tr>
<tr>
<td>ISP</td>
<td>Internet Service Provider</td>
</tr>
<tr>
<td>Kbps</td>
<td>Kilobits per second</td>
</tr>
<tr>
<td>LIME</td>
<td>Landline, Internet, Mobile, Entertainment</td>
</tr>
<tr>
<td>Mbps</td>
<td>Megabits per second</td>
</tr>
<tr>
<td>NTRC</td>
<td>National Telecommunications Regulatory Commission</td>
</tr>
<tr>
<td>OECD</td>
<td>Organisation for Economic Co-operation and Development</td>
</tr>
<tr>
<td>OECS</td>
<td>Organisation of Eastern Caribbean States</td>
</tr>
<tr>
<td>SKN</td>
<td>St. Kitts and Nevis</td>
</tr>
<tr>
<td>UNDP</td>
<td>United Nations Development Programme</td>
</tr>
<tr>
<td>USF</td>
<td>Universal Service Fund</td>
</tr>
<tr>
<td>UWI</td>
<td>University of the West Indies</td>
</tr>
<tr>
<td>VoIP</td>
<td>Voice over Internet Protocol</td>
</tr>
<tr>
<td>Wi-Fi</td>
<td>Wireless Fidelity</td>
</tr>
</tbody>
</table>
1 Background

1.1 Geography

The twin island Federation of Saint Kitts and Nevis is located in the northern part of the Leeward Islands of the Caribbean (Figures 1-1 and 1-2).

Figure 1-1: Map of the Eastern Caribbean

![Map of the Eastern Caribbean](source: World Bank.)

The country has a total landmass of 267 square kilometers making it the smallest independent country in the Western Hemisphere. St. Kitts, formally known as Saint Christopher, is the larger of the two islands. The island of Nevis is located southeast of St. Kitts across a two mile wide channel and can be reached by ferry in 15 minutes.

 Administratively St. Kitts is divided into nine parishes, and the island of Nevis into five parishes. The administrative capital for both islands is Basseterre located on St. Kitts with a population of around 13,000. The capital and main town of Nevis is Charlestown. Both St. Kitts and Nevis are fairly easy to navigate with each island having one main road that passes through the major communities usually located on the coastline.

Figure 1-2: Map of St. Kitts and Nevis

![Map of St. Kitts and Nevis](source: The World Factbook.)

1.2 History

European settlement of St. Kitts and Nevis began in the early 17th century. In 1623 St. Kitts became the first British colony of the Caribbean region, and was nicknamed “the mother colony of the West Indies.” The Treaty of Paris awarded both islands to the British in 1783. In 1967 Saint Christopher-Nevis-Anguilla became a self-governing associated state of Great Britain. In 1980 Anguilla seceded and became a separate

---

1 The island of St. Kitts was the first on which an English settlement was made, and served as the base for colonization of the other Caribbean islands. Some historical texts refer to St. Kitts as the “mother colony”, see: J.O. Cutteridge. 1947. Geography of the West Indies and Adjacent Lands. Other texts refer to the island as the “cradle” of the British West Indian colonies, see: Rev. C. Jesse. 1964. Outlines of St. Lucia’s History.
St. Kitts and Nevis, the only federation in the Caribbean, gained independence on 19 September 1983. In 1998, 62 per cent of Nevisians voted for secession but narrowly fell short of the required 67 per cent.

### 1.3 Population

The most recent estimated population was 51,970 in 2009.\(^2\) Demographic statistics from the 2001 Census are shown in the table below:\(^3\)

<table>
<thead>
<tr>
<th>Table 1-1: Demographic statistics, 2001</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
</tr>
<tr>
<td>Population</td>
</tr>
<tr>
<td>Households</td>
</tr>
<tr>
<td>Household size</td>
</tr>
<tr>
<td>Population distribution (%)</td>
</tr>
<tr>
<td>Population density (per km(^2))</td>
</tr>
<tr>
<td>Population under 20 years (%)</td>
</tr>
</tbody>
</table>


The majority of the population is of African descent and the official language is English. Some Kittitians and Nevisians also speak an English-based creole.

The federation has historically had high rates of emigration. This has led to a large Diaspora residing in the United States, Canada, and the United Kingdom. There were around 20,000 people born in St. Kitts and Nevis living in those three countries in 2000-01 or almost 40% of the country’s population.\(^4\) It is therefore no surprise that remittances account for a significant portion of the economy. St. Kitts and Nevis accounted for 20% of all remittances among Eastern Caribbean Currency Union members during 1991-2009 and they contributed 7.1% of the country’s GDP in 2009.\(^5\)

### 1.4 Education

The literacy rate for the federation is 98%, highest in the Eastern Caribbean (Figure 1-3). The implementation of universal secondary school education in the 1970s—where all final grade primary school students, irrespective of ability, are transferred to a secondary school—has contributed to high literacy.

Figure 1-3: Adult literacy rate (% aged 15 and above), 2010

Source: United Nations Development Program.

There are twenty-four public primary schools and seven public secondary schools. St. Kitts and Nevis has the best teacher to student ratios in the Eastern Caribbean.

The Student Education Learning Fund (SELF) provides textbooks to students at no cost and also covers secondary school examination fees. Students may withdraw from secondary school in the fourth form (grade 11) and enroll in a program at the National Skills Training Programme (NSTP) or at the Advanced Vocational Centre (AVEC).

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\(^2\) See the Caricom Regional Statistics at: http://www.carcostats.org/Files/Databases/Population/MP.htm


Graduating secondary school students can pursue post-secondary studies at the Clarence Fitzroy Bryant College located in St. Kitts or the Sixth Form College in Nevis. The two-year program prepares students for the Caribbean Advanced Proficiency Exam.

The University of the West Indies (UWI) Open Campus provides distance education programs to students in St. Kitts and Nevis. Approximately 130 students attend the Open Campus in St. Kitts and 30 on Nevis with video conferencing to other campus sites. The country is also home to several offshore higher educational institutions.

1.5 Economy
The economy has traditionally been agriculture-based and particularly the production of sugar. In July 2005, after successive losses in the sugar industry due to low global prices, high production costs, and changes in the European Union Sugar Protocol, the government shut down the St. Kitts Sugar Manufacturing Corporation and the production of sugar for export virtually halted.

The country has since diversified into other sectors such as light manufacturing, fishing, and non-sugar agricultural production and the services sector particularly tourism and financial services.

St. Kitts has the largest electronics assembly industry in the eastern Caribbean region. Five electronics manufacturing companies, most established in the Government Industrial Park, produce a range of electronic components for export.

St. Kitts and Nevis has a well-developed offshore banking and financial services sector. It is estimated that more than 15,000 offshore companies are registered in Nevis alone where they are free from taxation and privacy is protected under the 1985 Confidential Relationship Act.

There is no tax on personal income. A 17 per cent Value Added Tax (VAT) was introduced in November 2010.

The IMF estimated Gross Domestic Product (GDP) per capita at US$ 9,918 for 2011 (12,502 in purchasing power parity).

The Federation is home to the Eastern Caribbean Central Bank (ECCB). Established in 1985, the ECCB is responsible for the common currency used on the region. Also located on St. Kitts is the Eastern Caribbean Stock Exchange (ECSE), a regional securities market established by the ECCB.

Almost 550,000 tourists visited St. Kitts and Nevis in 2009. Recent investment has fuelled growth of the tourism sector with a 57 per cent increase in visitors between 2006 and 2009.

1.6 Government
The Federation of St. Kitts and Nevis has a unicameral National Assembly consisting of eleven elected members and three senators. The ruling Labour Party led by Dr Denzil Douglas, the longest-serving Prime Minister among the Eastern Caribbean islands, occupies six of the seats and has been in power since 1995.

The island of Nevis has its own administration, legislation and premier; three elected representatives from Nevis serve in the National Assembly. As a member of the Commonwealth, the Queen of England is the formal head of state of the federation.

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6 The UWI Open Campus is an online campus with over 40 physical locations throughout the English-speaking Caribbean. See: http://www.open.uwi.edu.

7 International Monetary Fund (MF), World Economic Outlook Database. April 2011.

8 See “Tourism Data” on the ECCB web site at: http://www.eccb-centralbank.org/Statistics/index.asp#tourismdata
2 ICT Sector

2.1 Policy and regulatory environment

The National ICT Strategic Plan was published in 2006 covering sector goals over the next five years.\(^9\) The Plan outlines a road map for leveraging ICT for social and economic progress including the development of human resources, promoting the integration of technology within government, and facilitating public-private sector partnerships. Other policies are specific to key areas such as a ten-year strategic outlook for integrating ICT within the educational curriculum outlined in the 2009 White Paper on Education Development and Policy.\(^10\)

Commitment extends to the highest level of government with the Prime Minister consistently emphasizing the use of ICTs for socio-economic development and to universal Internet access:

“...I want to emphasize the pledge of my Government that Internet access must become a human right for the people of St. Kitts and Nevis...every citizen of this country, every resident and every visitor of this country must have the right to access the Internet once they are here in St. Kitts and Nevis.”\(^11\)

A number of institutions are involved with ICT policy and regulation. Policy development and implementation rests with the ministry responsible for Information Technology and Telecommunications.\(^12\)


\(^10\) Available at: http://www.moeskn.org/index.php?option=com_docman&task=doc_download&gid=17&Itemid=138


The Eastern Caribbean Telecommunications Authority (ECTEL), established in 2000, is the joint regulatory authority for Dominica, Grenada, St. Kitts and Nevis, St. Lucia, and St. Vincent and the Grenadines. The three executive branches of the regional body are: (a) the Council of Ministers comprised of the five Ministers responsible for telecommunications in the respective territories; (b) the regional directorate headquartered in St. Lucia, acting in an advisory capacity to member states on regulatory issues; and (c) the National Telecommunications Regulatory Commissions (NTRCs) established in each member state.

The NTRC in St. Kitts and Nevis consists of five government-appointed Commissioners who are non-full time staff and the regulator’s staff headed the Director. The NTRC is mandated to monitor compliance of telecommunication licensees, manage the universal service fund, monitor anti-competitive practices, provide support to the sector minister, approve interconnection agreements, and liaise with ECTEL on relevant telecommunications issues.

The Telecommunications Act of 2000 is the principal legislation governing the sector.\(^13\) A key regulatory event was full liberalization of the telecommunications sector in 2001. This ended the exclusive rights of Cable & Wireless to operate telecommunications facilities and services in the ECTEL states.\(^14\)

ECTEL has drafted a regional Electronic Communications Bill intended to reform legislation under the original Telecommunications Act such that all electronic communications will

\(^13\) Saint Christopher and Nevis. 2000. The Telecommunications Act. The Act and other relevant legislation governing the telecom sector are available from the ECTEL web site at: http://www.ectel.int/actsandregulations.htm

\(^14\) See the “Agreement” of April 7, 2001 between the ECTEL member states and Cable & Wireless available at: http://www.ectel.int/aboutectel_agreement.htm
be covered (excluding content regulation). The draft Bill is currently undergoing public consultation throughout the region.

2.2 Service providers
The following service providers are present in the telecommunications market in St. Kitts and Nevis:

- **LIME (Landline, Internet, Mobile, Entertainment)**, formerly Cable & Wireless, is a regional telecommunications service provider offering mobile, fixed line, broadband, and cable television services in both St. Kitts and Nevis and throughout the Caribbean. Cable & Wireless has a long history in the country. St. Kitts and Nevis Telecommunications Ltd. (SKANTELE) was formed in 1985 as a joint venture between Cable & Wireless and the government and rebranded as Cable & Wireless in 1999. In 2007, the government sold its shares and under an agreement made with Cable & Wireless, five per cent of the shares were sold via public offering to citizens, residents and domestic corporate entities of St. Kitts and Nevis. In 2001 Cable & Wireless was issued a 15-year non-exclusive license under the new Telecommunications Act terminating its existing 25-year exclusive license.

- **The Cable** offers broadband, cable television, and telephone services to consumers in St. Kitts. Established in 1984, The Cable is partly government-owned.

- **Caribbean Cable Communications** provides telephone, cable television and broadband Internet services on the island of Nevis. Established in 2006 the company is headquartered on the neighboring island of Anguilla. In 2009, after contentious discussions over proposed rate increases, the Nevis Island Administration moved towards nationalization of the company. As of May 2011 the dispute has not been resolved.

- **Wireless Ventures (Digicel)**, a pan-Caribbean mobile operator, launched in 2005 and provides service in both islands.

- **Winstreme** offers fixed wireless Internet services on the island of Nevis only. It is a privately owned company that launched in 2007.

- **UTS-Cariglobe (Chippie)** offers mobile telecommunication services in both islands. It is a joint venture between UTS (Netherland Antilles) and CariGlobe (a local company) and launched services in 2005.

- **21st Century Telecoms** was issued a license to provide mobile services within the federation; however as of January 2011, the company has not as yet launched its network.

<p>| Table 2-1: Service providers in St. Kitts and Nevis |</p>
<table>
<thead>
<tr>
<th>Launched</th>
<th>Services provided</th>
<th>Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIME/C&amp;W</td>
<td>1985 fixed, mobile, broadband</td>
<td>77% foreign; 23% public</td>
</tr>
<tr>
<td>The Cable</td>
<td>1984 broadband, cable tv</td>
<td>69% Government; 31% foreign</td>
</tr>
<tr>
<td>Caribbean Cable</td>
<td>2006 broadband, cable tv</td>
<td>(move to nationalization)</td>
</tr>
<tr>
<td>Digicel</td>
<td>2005 mobile</td>
<td>100% foreign</td>
</tr>
<tr>
<td>Winstreme</td>
<td>2007 broadband</td>
<td>100% local</td>
</tr>
<tr>
<td>UTS-Cariglobe</td>
<td>2005 mobile</td>
<td>60% foreign; 40% local</td>
</tr>
</tbody>
</table>

Note: The Cable operates in St. Kitts while Caribbean Cable and Winstreme operate in Nevis. All others operate on both islands.

2.3 ICT in the economy
The telecommunications services sector was worth EC$ 120 (US$44) million in the year ending March 2009 (ECTEL 2010). It contributed about 8% to GDP, a figure that has fluctuated between 7.7% and 9.4% over the last five years (Table 2-2). The telecommunications services sector directly

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15 The draft Electronic Communications Bill is available at: http://www.ectel.int/elec_communication_bill_pr.html
16 See company website at http://www.time4lime.com/kn
17 See company website at http://www.thecable.net
18 See company website at http://ccc2.caribcable.com/nevis
19 The case was taken before the Eastern Caribbean Supreme Court – see http://www.caribbeanlawonline.com/index.php?option=co
20 See company website at http://www.digicelstkittsandnevis.com
21 See company website at http://www.uts.an

Table 2-2: Telecom services sector, St. Kitts and Nevis

<table>
<thead>
<tr>
<th>Years ending March</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telecom revenues EC$ million</td>
<td>98</td>
<td>91</td>
<td>123</td>
<td>125</td>
<td>120</td>
</tr>
<tr>
<td>Telecom revenues US$ million</td>
<td>$36</td>
<td>$33</td>
<td>$45</td>
<td>$46</td>
<td>$44</td>
</tr>
<tr>
<td>Telecom revenues as % of GDP</td>
<td>9.1%</td>
<td>7.7%</td>
<td>9.4%</td>
<td>9.0%</td>
<td>7.8%</td>
</tr>
<tr>
<td>Investment EC$ million</td>
<td>38</td>
<td>23</td>
<td>22</td>
<td>23</td>
<td>8</td>
</tr>
<tr>
<td>Investment US$ million</td>
<td>$14</td>
<td>$8</td>
<td>$8</td>
<td>$9</td>
<td>$3</td>
</tr>
<tr>
<td>Direct employment</td>
<td>140</td>
<td>159</td>
<td>157</td>
<td>178</td>
<td>136</td>
</tr>
</tbody>
</table>

*Note: GDP data from IMF. Converted to US$ using exchange rate of EC $2.7169 = US $1.00.*

*Source: Adapted from ECTEL.*
3 Broadband market

3.1 Retail services

Four service providers offer broadband services: LIME, The Cable, Caribbean Cable Communications, and Winstreme. The latter two companies operate solely in Nevis, The Cable offers service on St. Kitts and LIME provides service on both islands.

LIME is the only Internet service provider serving both islands. It introduced dial-up access in the 1990s. In 2001, Asymmetric Digital Subscriber Line (ADSL) service was launched. Around one percent of businesses still subscribe for dial-up Internet access primarily for the purpose of retaining prior email addresses. LIME also offers Wi-Fi through several hotspots and has installed WiMAX for rural locations in Nevis.

In 2003, The Cable launched cable broadband Internet services to subscribers in St. Kitts. The company has seen a gradual increase in the number of broadband subscribers to almost 4,000 as at the end of December 2010 (Table 3-1). The Cable is installing a fiber-to-the-home network in a new property development at Christophe Harbor, the first of its kind in St. Kitts. The project is due for completion at the end of 2011.

<table>
<thead>
<tr>
<th>Year</th>
<th>Cable basic subscribers</th>
<th>TV Cable tier subscribers</th>
<th>TV Tier subscribers</th>
<th>Broadband subscribers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>8,304</td>
<td>6,517</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2000</td>
<td>8,599</td>
<td>7,449</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2001</td>
<td>8,912</td>
<td>8,456</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2002</td>
<td>9,076</td>
<td>8,728</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2003</td>
<td>9,721</td>
<td>10,158</td>
<td>1,562</td>
<td></td>
</tr>
<tr>
<td>2004</td>
<td>10,016</td>
<td>10,586</td>
<td>1,805</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>10,275</td>
<td>11,037</td>
<td>2,213</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>10,545</td>
<td>11,789</td>
<td>2,089</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>10,485</td>
<td>13,194</td>
<td>2,220</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>11,238</td>
<td>14,942</td>
<td>2,906</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>11,871</td>
<td>17,028</td>
<td>3,429</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>11,974</td>
<td>17,196</td>
<td>3,761</td>
<td></td>
</tr>
</tbody>
</table>

Source: The Cable.

Caribbean Cable Communications, the sole cable television service provider on the island of Nevis, provides broadband Internet services using cable modem technology.

Winstreme provides fixed wireless broadband service for residents of Nevis. The subscriber base is less than 200 customers (including a significant number of medical students who reside on the island). The company has installed three towers on the island where the customer premise equipment consists of an outdoor directional antenna to the base station.

As of March 2010, the number of fixed Internet subscribers in St. Kitts and Nevis was 14,577 of which 99% were broadband connections. This puts the fixed broadband subscription rate at 28 per cent. In 2009, St. Kitts and Nevis had the highest fixed broadband penetration in the Latin America and Caribbean region and even surpassed the OECD average (Figure 3-1).
Three mobile operators, LIME, Digicel, and UTS-Cariglobe (Chippie) provide mobile service. LIME has the largest market share at just under 50%.

In March 2009, St. Kitts and Nevis registered a mobile penetration rate of 148 per cent, the highest rate among the ECTEL member states. This is up from 60% in March 2005. Prepaid service far surpasses the number of post-paid mobile subscriptions.

Despite the high cellular penetration, mobile broadband services have not been launched with mobile data service provided through EDGE and GPRS technologies. LIME is in the process of upgrading to Enhanced Data for GSM Evolution (EDGE). Both Digicel and Chippie have deployed General Packet Radio Services (GPRS) networks.

According to Digicel, approximately 22 per cent of its subscriber base use Internet services. This is typically through mobile handsets that are data enabled. The company also estimates that almost 80 per cent of Blackberry users utilize data services. Blackberry users account for approximately 30 per cent of the subscriber base. In January 2011, Digicel launched its “Data Bundle of Joy” package which gives non-BlackBerry prepaid customers with a data compatible handset the opportunity to purchase weekly, fortnightly, or monthly data packages.

### 3.2 National and international backbones

Both The Cable and LIME have deployed fiber rings around the island of St. Kitts. Nevis is connected to St. Kitts via microwave. According to service providers the establishment of a wireless link presented a more cost effective option than laying fiber between the two islands. In 2011 LIME applied for a license to implement a second microwave link between the two islands due to limited capacity. Towers are located on the southeast peninsula of St. Kitts offering direct line-of-sight to an antenna on the north end of Nevis at the narrowest point separating the two islands (approximately one mile). Attenuation from factors such as the effects of severe weather and mist (due to the mountainous topography of the island) and the passage of a cruise ship impacts service quality.

Cable & Wireless (along with France Telecom and AT&T) installed the Eastern Caribbean Fiber System (ECFS) in 1995, an undersea system that connects all of the islands of the Eastern Caribbean including St. Kitts and Nevis.

In 2007 Global Caribbean Network (GCN), was awarded a contract to build an undersea fiber optic cable network between Guadeloupe and Puerto Rico supported by financing from the European Union. Total overall network capacity of the cable is 1.2 Tbps. The Cable leases an STM-1 (155 Mbps) from GCN.

Both the ECFS and GCN cables land at the same site at Lime Kiln in St. Kitts.
3.3 Pricing

An entry-level ADSL subscription from LIME costs US$ 37 per month for a 2 Mbps download/512 Kbps upload connection (Table 3-2). Cable modem prices are higher; for example Caribbean Cable charges US$40 for a 512 kbps download subscription.

Table 3-2: ADSL broadband monthly subscription, St. Kitts and Nevis, April 2011

<table>
<thead>
<tr>
<th></th>
<th>EC$</th>
<th>US$</th>
<th>Down-load Mbps</th>
<th>US$ per Mbps</th>
<th>Upload kbps</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEGA</td>
<td>99</td>
<td>$37</td>
<td>2</td>
<td>$19</td>
<td>512</td>
</tr>
<tr>
<td>MEGA PLUS</td>
<td>149</td>
<td>$56</td>
<td>3</td>
<td>$19</td>
<td>512</td>
</tr>
<tr>
<td>MEGA MAX</td>
<td>249</td>
<td>$93</td>
<td>6</td>
<td>$16</td>
<td>768</td>
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<tr>
<td>MEGA EXTREME</td>
<td>309</td>
<td>$116</td>
<td>8</td>
<td>$14</td>
<td>1,024</td>
</tr>
</tbody>
</table>

Source: LIME.

Fixed broadband prices are more affordable in St. Kitts and Nevis compared to other East Caribbean nations (Figure 3-2). However prices are relatively high by international standards especially when adjusted for purchasing power parity (PPP). For example the average monthly subscription price for connections below 2.5 Mbps advertised download speed was USD PPP 27 in the OECD in September 2010 compared to USD PPP 46 in St. Kitts and Nevis. 22

Consumers can also access the Internet through Wi-Fi enabled laptops or handsets. Data packages are offered through service providers Consumers typically pay about US$ 20 per month for 25 MB daily usage, and US$ 0.10 for each additional 1 MB used over this base amount.

3.4 Quality

Tests are not carried out by the NTRC to measure the quality of broadband services. OOKLA reported that the average download speed for St. Kitts and Nevis was 2.2 Mbps in December 2010 only average when compared to other East Caribbean countries (Figure 3-3).

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23 http://www.netindex.com/
4 Demand

4.1 Current demand

St. Kitts and Nevis has a relatively high degree of Internet penetration. There are an estimated 38,000 Internet users or almost three quarters of the population at March 2009. Penetration has more than doubled since March 2002.

4.2 Computers

As far back as 2001, (the latest year for which data is available), a relatively high proportion of households already had computers – 20 per cent on the island of Nevis and 18 per cent in St. Kitts.

In 2001 Cable & Wireless launched a bundled PC package for consumers in order to make it easier for individuals to get onto the Internet. As part of the package computers (with high-speed Internet access at discounted prices) could be acquired from the company on hire purchase. This led to an upswing in computer penetration and according to Cable & Wireless, resulted in an almost 30 per cent increase in the number of Internet subscriptions.

Another factor impacting computer ownership is the exemption of customs duties on data processing equipment.

4.3 Education

In 1998, the government embarked on a program to implement computer labs in every school. The program was initially targeted at secondary school students preparing for the school-leaving examinations, but was subsequently extended to all levels. Both LIME and The Cable offer free Internet access to primary and secondary schools. One of the challenges to the project remains on-going maintenance and upgrade of the equipment.

In line with the Prime Minister’s call for the provision of a computer to every student of high school age in order to promote digital literacy, the government launched the I-literacy one-2-one laptop initiative in 2010. During the first phase of the project (scheduled for completion in 2011), Hewlett Packard devices will be provided to fifth form secondary school students. The government has also received proposals from service providers for the implementation of a community wireless (Wi-Fi) network where students would have access to broadband Internet from their respective homes on a ‘pay-as-you-go’ basis.

Secondary school students typically use the labs as part of the educational curriculum, particularly in preparation for the secondary school leaving examination in Information technology. However the full integration of ICT into the teaching curriculum remains unfulfilled. The Ministry of Education has indicated that a curriculum is being developed which in part aims to integrate computers as teaching tools.

4.4 Training

Community residents have access to ICT training through several initiatives. One focuses on adult training at community centers or schools (typically after school hours) throughout the islands. The centers are typically outfitted through public private partnerships. The government typically

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24 The number of estimated Internet users is based on multiplying the number of subscribers by three.

25 There is a central Support Unit within the Ministry of Education for basic maintenance and troubleshooting of computer issues. However, staff at the unit is limited.

develops the physical infrastructure, local businesses provide the needed hardware and software (or provide financial support), and service providers such as The Cable and LIME provide free broadband access. The programs are designed to improve digital literacy of participants particularly adults and seniors within rural communities.

Training is usually provided by community development officers and/or facilitated by the National Skills Training Programme (NSTP).\(^{27}\) Computer training ranges from a general introduction course to instruction in business application software such as QuickBooks. According to the NSTP, demand for computer training with the organization was particularly high during the period 1998 – 2004. A subsequent downturn in computer training classes is partly attributed to the provision of training by other entities.

The International Computer Driving License (ICDL) is a widely used standard for assessing individuals in various computer skills including word processing, spreadsheets and databases. The courses, typically four to six weeks long, are designed to provide end-users with the skills necessary for “proficient use of information and communication technology.”\(^{28}\) In St. Kitts, ICDL training is offered by a number of organizations including the National ICT Centre, private companies, the Clarence Fitzroy Bryant College, and community access centers. The National ICT Centre estimates that on average more than 50 users complete ICDL training per month.

The government has promoted the training of government employees for achievement of the ICDL certification as a complement to further development of e-Government services. Students of the Government Youth Empowerment through Skills (YES) programme have also received certification training.

### 4.5 Universal access

The Universal Service Fund (USF) was established by ECTEL in order to promote access to affordable telecommunications services “including voice telephony and Internet access, as well as broadband connectivity at the community, household and individual levels.”\(^{29}\) The fund is financed by contributions from telecommunications service providers.\(^{30}\) A pilot USF project for the disadvantaged community of Dieppe Bay is expected to upgrade access to ICTs in the area’s community center (located within a school).

Individuals have access to computers at community centers where service providers provide broadband access at no cost. Computer and Internet facilities are also provided in public areas such as the Charles A. Halbert Public Library where broadband access is available to the public at a price of about US$ 6 (fixed) and US$ 2 (Wi-Fi) per day.

LIME has five Wi-Fi hotspots within St. Kitts with three in the Basseterre region including one at Port Zanté offering free service primarily targeted to arriving cruise ship passengers. Other hotspots can be found at the local airport (free service), the general post office located near Port Zanté (housing three computers and a paid service of US$4 per hour) and at most hotels (for a fee of, an average, US$10 per day).

---

\(^{27}\) The NSTP was launched in 1986 through a regional OECS project. The Programme was institutionalised in 1992 and falls under the Ministry of Education. See website at: http://ministryofeducationst kittsnevis.web.officelive.com/default.aspx

\(^{28}\) See the certification authority website at http://www.ecdl.org.


\(^{30}\) Contributions are as follows: (a) in the first year of license, 0.25% of gross annual revenue; (b) in the second year of license, 0.5% of gross annual revenue; and (c) from the third year of license onwards, 1.0% of gross annual revenue. See: Telecommunications (Universal Service Fund Contribution) Order, 2008. http://www.ectel.int/Telecoms%20Regulations/St.%20Kitts/Universal_Service_Fund_Order_4_of_2008.pdf.
4.6 IT Business

According to a 2008 ECTEL survey of 82 businesses in St. Kitts and Nevis (ECTEL 2009), 93 per cent used the Internet. Although broadband providers have installed fiber in high-density areas such as Basseterre, most small businesses indicated that an ADSL or cable modem connection is used as it was adequate for their processes and the cost of subscribing to fiber was too high.

Young entrepreneurs have launched ICT-based companies offering a range of services as resellers of hardware equipment to providers of more advanced software services such as online payment systems.

The Small Business Development Act was passed in 2009 to provide support to small and medium size enterprises including exemption from or reduction in customs duties on imported equipment or machinery such as computers. One priority activity identified under the Act involves support for small businesses engaged in ICT services.

Business process outsourcing is not extensive. There is one call center, Clear Harbor, located on the island of Nevis.\textsuperscript{31}

With little exception businesses host their servers outside of St. Kitts and Nevis. This is primarily attributed to: (a) high costs for local dedicated access for business and (b) the perception that the quality of service for advanced services is not adequate, and (c) an unreliable electricity infrastructure exists.

4.7 Services and content

St. Kitts and Nevis has a high level of international communications due to the large Diaspora and tourism. This has generated high demand for computers and broadband applications such as VoIP, instant messaging and social networking.

“...One of the things which I think prompted this (high uptake of computers) is the large Diaspora so persons took advantage of tools such as MSN Messenger which was cheaper than making a call...”\textsuperscript{32}

Voice over Internet Protocol (VoIP) is used extensively throughout the country as a cheap alternative to fixed telephone international calling. Over a fifth of SMEs use VoIP for international calls, the highest rate in the region (along with St. Vincent and the Grenadines) (Figure 4-1). Many small businesses also use low cost Internet Protocol private branch exchanges.

Facebook is popular with some 21,000 users at March 2011 or almost 40\% of the population. St. Kitts and Nevis has the highest Facebook penetration in the Eastern Caribbean (Figure 4-2).

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{Figure4-1.png}
\caption{Percentage of SME's using VoIP for international calls, 2008}
\end{figure}

\textsuperscript{31} The Clear Harbor call center (with two other centers in Dominica and Grenada) provides service to external companies and employs in excess of 100 individuals on the island of Nevis.

\textsuperscript{32} Interview with Glen Phillip, Minister of Information Technology and Telecommunications.
Video conferencing facilities are used by several organizations and businesses. For example, the Eastern Caribbean Institute of Banking (ECIB) provides professional development courses via video conferencing for persons in the financial sector within the region. The Government National ICT Centre also offers video conferencing services at reasonable rates to the general public.

One of the most popular local sites is SKNVibes.com, launched by a group of six Kittitians in 2002. The site serves as a community portal targeted to local residents as well as Nevisians and Kittitians of the Diaspora. A host of residential, community, and government information on St. Kitts and Nevis is accessible from the portal including news, music, classified ads, streaming videos, as well as services such as email. In 2003, the company signed up with the St. Kitts and Nevis National Bank as its merchant bank for online payment services such as top-up payments for mobile phones and community services such as online obituary notices. According to Greg Gilbert, the company’s CEO, the site registers more than two million visitors per month and its popularity has led some government agencies to block access to it by employees. The company employs nine people.

The St. Kitts and Nevis Visitor Channel launched in 2008 and offers residents and visitors information on local events, shopping, nightlife, accommodation and more. The one-hour program has been made available online.\(^3\)

### 4.8 E-commerce

Lack of requisite legislation governing electronic transactions and consumer protection serve as an impediment to electronic commerce. As a result, there are hardly any local sites offering e-commerce and the general population purchases products online from nearby markets such as the United States rather than locally. Likewise, people abroad cannot purchase from local sites since services such as electronic hotel reservations systems are typically outsourced to external companies.

There has been an uptake of online banking services including bill payment as most financial institutions do not provide physical locations outside of the central Basseterre or Charlestown areas.

**Box 4-I: PayKN**

Kittitian entrepreneur Dion Benjamin started PayKN, the first centralized online payment service in St. Kitts and Nevis. The company formally launched services in November 2009. In addition to online bill payment services (e.g., electricity, water, and phone), the company also provides services such as an online loan payment mechanism for students attending universities outside of St. Kitts to make loan repayments at local banks. On average more than 50 payment transactions are processed per week.

According to Benjamin: “Unfortunately we have not been able to convince banks of the necessity of the service...(in the case of one bank) we physically have to cross the street to the bank in order to make a loan payment for students who have made their online payment through us.”

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\(^{3}\) http://www.stkittsvisitorchannel.com/
4.9 E-Government

Most government departments are connected to a wide area network via a fiber optic network installed by The Cable. The establishment of the National Information and Communication Technology (ICT) Centre has centralized a number of services including hardware maintenance and hosting of government applications such as the email system. The Centre is also home to a small business incubator for start-up ICT-based businesses.

The government has several computerized back office applications. The Health Information System provides health providers online access to patient records at the primary hospital. It is expected that the system will be rolled out to other healthcare facilities such as community health centers. Other services include the Vehicle Registration System and the Human Resources application. These applications are accessible by the relevant government departments to facilitate service delivery.

The web site of the office of the Prime Minister has a wide range of resources including access to audio files of the weekly “Ask the Prime Minister” radio program, downloadable government application forms, and video files of events/speeches of the Prime Minister (also available on the Office’s YouTube channel). The Prime Minister has also committed to strengthening links to Kittitians in the Diaspora and utilizes technology through bi-monthly postings of his “Video Messages for the Diaspora” that are also available on the official Facebook page of the Office of the Prime Minister.

Transactional e-Government services are not widely available for the public. The central government portal (www.gov.kn) is primarily informational in nature, with some application forms available for download from individual agency sites. The lack of requisite legislation (such as an Electronic Transactions Act), low demand by the general public, and perceived costs for online payment services are factors that contribute to the lack of online transactional services. The government has placed emphasis on improved service delivery by providing training to employees to enhance their ICT capabilities.

The United Nations e-Government framework measures the delivery of online services. The rank of St. Kitts and Nevis is below other ECTEL members, ranking only above Dominica, (Figure 4-5). This reflects the lack of interactive e-Government services in St. Kitts and Nevis.

Figure 4-3: UN e-government Online Service Index, 2010

<table>
<thead>
<tr>
<th>Country</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grenada</td>
<td>0.187</td>
</tr>
<tr>
<td>St. Vincent</td>
<td>0.130</td>
</tr>
<tr>
<td>St. Lucia</td>
<td>0.111</td>
</tr>
<tr>
<td>St. Kitts</td>
<td>0.102</td>
</tr>
<tr>
<td>Dominica</td>
<td>0.051</td>
</tr>
</tbody>
</table>

Source: UN E-Government Development Database.

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34 [http://www.cuopm.org](http://www.cuopm.org)

35 The Online Service Index is based upon a four-stage model, which is ascending in nature and builds upon the previous level of sophistication of a state’s online presence. The model defines four stages of E-Government Development according to scale of progressively sophisticated citizen services. As countries progress, they are ranked higher in the Model according to a numerical classification corresponding to the four stages. See: [http://www2.unpan.org/egovkb/](http://www2.unpan.org/egovkb/)
5 Lessons learned

The success of St. Kitts and Nevis in the uptake of fixed broadband serves as an example for other developing countries and small island developing states. Some of this success can be attributed to geography: the small land area and population of the islands contributed to faster rollout of infrastructure, wider reach for marketing, and maximum impact of ICT policy initiatives. In addition broadband is more affordable than other countries in the Caribbean due to high per capita income coupled with lower broadband prices.

However geography and income alone do not explain the broadband success of St. Kitts and Nevis. This chapter reviews various supportive factors stimulating broadband growth in the country. It also identifies bottlenecks impeding the realization of a sustainable broadband ecosystem.

5.1 Success factors

Competition

Unlike other islands, more than one service provider existed in the market prior to full telecommunications liberalization giving the country a head start over other Caribbean countries. After liberalization in 2001, new entrants in the broadband market provided yet additional alternatives to the incumbent.

Regional Coordination

As a member of the regional regulatory agency, ECTEL, St. Kitts and Nevis has benefitted from mutual efforts for reform of the telecommunications sector. Examples include development of harmonized policies which ushered in liberalization of the sector in 2002, joint agreements with the incumbent service provider Cable & Wireless which ended its exclusivity in the market and negotiations with foreign investors which has led to the introduction of a second submarine cable system.

Education

At 98%, St. Kitts and Nevis has one of the highest literacy rates in the region. Universal secondary education has contributed to this achievement. The availability of computers at all primary and secondary schools and initiatives for teaching adults how to use ICTs have boosted digital literacy, raising awareness and driving broadband demand.

Diaspora

The large number of Kittitians and Nevisians abroad contributes to demand for international communications. This has stimulated usage of broadband services such as VoIP, instant messaging and social networking.

Access

Even prior to the advent of high speed Internet, citizens had access to other ICTs to the extent that the creation of a Universal Service Fund more than a decade later served to enhance existing informal universal access policies already in place. This included ongoing development of community centers outfitted with computer labs to provide access and training to rural communities and equipping every primary and secondary school with computers.

The Government of St. Kitts and Nevis promoted and secured funding for initiatives such as the construction of community access centers and installation of computer labs within schools. The goal of the recently launched I-literacy is to facilitate access to laptops by students within the school and home environment; it is anticipated that the presence of the technology within the home will promote awareness by other members of the household. Exemption of customs duties on computer equipment has also been a boost to the sector. The Government National ICT Centre
houses a small business incubator providing facilities such as access to computers and broadband for small start-up enterprises.

**Government as leader**

The Prime Minister of St. Kitts and Nevis has continuously emphasized the role of the Internet in supporting the economic development goals of the country. The government has promoted demand for services both by residents and the Diaspora through a range of multimedia content available for download from the government’s site, as well as availability of content on social networks such as Facebook and YouTube. The government has also invested in ICT training for its employees.

**Public-private partnerships**

Partnerships between the government and private sectors have gone a long way in developing computer literacy levels among the general population and in ensuring that persons even from a very young age had access to the Internet. Nearly every government-led ICT initiative has received support from the private sector. For example, service providers have ensured every school and public community center receive free Internet access. In training initiatives the private sector has provided equipment at little or no cost to government.

**5.2 Challenges**

While St. Kitts and Nevis has been successful in boosting fixed broadband penetration, this accomplishment is riddled by contradictions. The country has the highest fixed broadband penetration in Latin America and the Caribbean but has yet to launch mobile broadband. St. Kitts and Nevis has the highest Facebook penetration in the Eastern Caribbean but the UN ranks its online e-government level as the second lowest in that region. These contradictions serve as impediments to effective broadband growth. The following challenges need to be overcome to ensure a sustainable broadband ecosystem.

**Broadband prices** are a concern. Competition among service providers has reduced the cost of broadband. However, they are more than one and half times greater on a purchasing power basis than broadband prices in the OECD.

**Political uncertainty** impacts network investment affecting service quality and the competitive environment. Government ownership of The Cable and the ongoing dispute over Caribbean Cable Communications are but two examples.

**Quality of service** requirements for mass-market broadband has not been addressed. Greater confidence in the reliability of the network would enhance the types of services offered by businesses. In the case of Nevis, the use of radio links for backbone connectivity impacts service quality.

The **regulatory agency** (NTRC) suffers from a lack of resources, impeding its capability. For example it lacks a website and is unable to fulfill its mandate of administering the .KN domain. Perceived weaknesses of the agency may serve as a deterrent to investors.

The **policy and regulatory framework** needs continuous review as the environment changes. Legislation currently lags market developments. Laws covering data protection, privacy and electronic transactions are yet to be implemented. This is impeding the development of e-commerce and e-government applications.

**Implementation of national policy** by a central agency responsible for its execution is necessary for the government to achieve its long-term broadband strategies. Strengthening oversight is necessary in order to bring about change, particularly for monitoring quality of service, and ensuring that costs for Internet access are
reasonable. A balance between sector regulation and stimulating broadband development is crucial.

**Policies concerning innovation** are needed in order to facilitate greater demand for new and advanced services; this includes facilitating support for sectors that are dependent on broadband such as “software-as-a-service” companies. The enhancement of public private partnerships to involve higher education or tertiary institutions may encourage wider research and development activities. Implementation of education policies that serve to promote the use of the Internet as a tool for educational delivery and for fostering innovation can also support more advanced activities.

The **country domain name (.KN)** is important in branding St. Kitts and Nevis. The resource is currently under utilized as a marketing tool that would stimulate additional demand for new and advanced services at the local level.

The establishment of an **Internet Exchange point (IXP)** would facilitate better optimization of international bandwidth usage since most local Internet traffic is routed to North America. Discussions at the national level concerning the establishment of a domestic IXP have so far not been fruitful.

**Mobile broadband** has yet to be deployed. One reason is that most of the island of St. Kitts is well served by fixed line connections. However the availability of mobile broadband can serve to expand inter-modal competition, provide more convenience for consumers and increase the types of services offered by local businesses.

**Reliability of the supporting infrastructure,** particularly electricity has limited exploitation of the network for advanced services such as the provision of hosting facilities.
Bibliography


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About infoDev

infoDev is a global development financing program among international development agencies, coordinated and served by an expert Secretariat housed at the World Bank Group, one of its key donors and founders. It acts as a neutral convener of dialogue—and as a coordinator of joint action among bilateral and multilateral donors—supporting global sharing of information on ICT for development (ICT4D), and helping to reduce duplication of efforts and investments. infoDev also forms partnerships with public and private sector organizations who are innovators in the field of ICT4D. infoDev is housed in the Financial and Private Sector Development (FPD) Vice Presidency of the World Bank Group.

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BROADBAND IN TURKEY
COMPARED TO WHAT?
BROADBAND IN TURKEY COMPARED TO WHAT?

AN infoDEV PUBLICATION PREPARED BY:
Çagatay Telli
2011
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Turkey has throughout history been prominent as a center of commerce because of its land connections to the continents of Europe, Asia and Africa and the sea surrounding it on three sides. An Organization for Economic Cooperation and Development (OECD) member, it has been awaiting European Union (EU) membership since 1987. As an upper-middle-income economy, Turkey suffers from comparison with these mainly high-income groupings. Its fixed broadband penetration stood at 9.4 subscriptions per 100 inhabitants in June 2010 compared to the OECD average of 24.2 and 34% of Turkish homes had a broadband connection compared to the EU average of 61% in 2010.

These statistics disguise the fact that, compared to other countries in its income group, Turkey is doing relatively well. E-government initiatives have been a major driving force for development of the broadband ecosystem. This has triggered demand by enterprises in the ICT sector and motivated citizens to increase Internet usage. Ensuring a shared vision among political leaders and technocrats has also been an important factor in pushing e-government programs. Political leaders saw e-government as a central instrument that would support public reforms and larger changes in the political system. A central organizational structure was formulated to develop strategies and put public money into the pipeline for a set of strategically important projects with high value and high transaction.

The high tempo growth of Turkish economy in the last decade is another supportive factor. The various market-oriented reforms have been implemented complemented with a proactive foreign policy resulting in large sums of overseas capital flowing into the country.

Communications, software and hardware segments of ICT industries have expanded rapidly. This has included significant investment in upgrading mobile networks to broadband. Broadband mobile networks were only launched in 2009, yet by the end of 2010 around a quarter of the population were capable of accessing high-speed wireless services.

The Turkish population has also reacted to social networking in a major way. The country is the fourth largest Facebook market in the world. Turkey’s own social media content is growing and Turkish web sites are becoming more popular and increasingly diversified.

Nevertheless the country continues to face economic and social barriers to effectively absorb broadband technologies on a large scale and better utilize them for leveraging overall economic competitiveness. Fixed broadband competition is limited and dominated by ADSL technology. ICT skill gaps among small and medium enterprises and the less educated need to be adequately addressed with participation of private initiatives. The lack of a suitable national accounting framework for more detailed analysis hinders international benchmarking in ICTs and innovation.

If Turkey can overcome these barriers, the results could be considerable. According to the National Broadband Vision study, broadband could boost economic growth by 0.8-1.7 percentage points per year. This economic momentum enabled by an enhanced broadband ecosystem would create 180,000-380,000 new jobs each year.
1 Turkish ICT Sector: A General Assessment

1.1 Background

Geographically, the Republic of Turkey is located at a point connecting the continents of Europe, Asia and Africa. Because of its geographical location the mainland of Anatolia possesses an extraordinary geo-strategic value. In the past, it was an important expansion post to many great political powers including Hatti, Hittite, Ancient Greek, Urartu, Phrygia, Ionia, Persia, Roman, Byzantine, Arab, Seljuk and Ottoman. It has also been prominent as a center of commerce because of its land connections to three continents and the sea surrounding it on three sides (Figure 1-1).

Modern Turkey was founded in 1923 by Mustafa Kemal following the collapse of the 600-year-old Ottoman Empire. After a period of one-party rule, since the 1950 election, Turkey has experienced a democratic political system based on multi-party politics. Turkey became a European Union (EU) candidate country in 1999 and, in line with requirements, went on to introduce substantial political and economic reforms. After intense bargaining, EU membership negotiations were launched in October 2005.

Turkey has two levels of government and several types of administrations: National administration...
with ministries and agencies at the central government level and field offices in provinces and districts. Local governments include 3,225 municipalities in areas with dense populations and 81 special provincial administrations with jurisdiction beyond municipal boundaries. In the last few years Turkey developed another organizational structure to initiate a more diversified and flexible decision making system to support endogenous growth of its economic regions by introducing Development Agencies. Currently 26 Development Agencies have become fully operational.

With an increasingly urban population of around 75 million\(^1\) and a GDP per capita of around US$10,000 in purchasing power parity, the Turkish economy is largely developed. Benefiting from both a capable and young labor force\(^2\) and diverse natural resources the country is among the world’s leading producers of agricultural products; textiles; motor vehicles, ships and other transportation equipment; construction materials; consumer electronics and home appliances. Turkey has a rapidly growing private sector not only in industrial activities but also in competitive services such as banking, transport, tourism and communications.

Following the financial crisis in 2001 major economic reforms were launched and successfully fulfilled. The monetary, fiscal and financial reforms implemented in the 2000s made Turkey’s macroeconomic framework very robust. The economy rebounded rapidly and economic restructuring was transformed into strong and sustained growth. This profile of macroeconomic path was confirmed by impressive figures: real GDP growth leading the OECD and Euro area, inflation rates coming down to single digit levels sharply, strong fiscal adjustment and large inflows of capital rushing into the country.

Internalization and underlying dynamism of the economy can be best reflected by the fact that Turkey has lately become a major destination for Foreign Direct Investment (FDI) flows. According to the figures the Turkish economy started to absorb growing amounts of foreign capital and it ranks before many similar developing economies such as Chile, Greece, Korea, and Israel. The average level of FDI inflows was around just US$ 100 million throughout the 1990s. Today with an annual average of around US$ 15-20 billion, Turkey is the 15th most attractive destination for FDI in the world.\(^4\)

From a traditional agricultural and low value added industrial configuration Turkey has transformed into a dynamic and sophisticated economy. While services account the larger share in national value added with 43%, industry claims 11%, and trade, transport and communication sectors each have 8% shares. Agriculture accounts for only 5% of total production.

After its recent aggressive growth records, Turkey’s GDP doubled reaching above USD 650 billion in 5 years. Following the recent economic downturn Turkish economy proved to be resilient and showed a strong rebound. According to estimates GDP growth in 2010 should be very strong, and be probably among the highest in the OECD and EU areas at an annual rate between 7-8%.\(^5\)

A number of challenges loom in the horizon. In a world of highly connected economic and political interdependences and growing uncertainty, raising overall productivity and competitiveness is the key to Turkey’s economic success in the long run. For sustained economic performance, major elements of the policy mix are maintaining the predictability of macroeconomic policies, reducing capital and employment costs, supporting employment levels, and financing external imbalances with resilient resources such as FDI.

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\(^2\) The median age of the country is 28.8 indicating a concentrated structure of young population in the total. More than 60 percent of total population is below 35 age. Source: Turkish Statistics Yearbook (2009), Address Based Population Registration System Population Census Results.

\(^3\) For more information on general investment climate in Turkey also see The World Bank (2010), Turkey Investment Climate Assessment: From Crisis to Private Sector Growth. This report draws on the analysis of firm-level survey data collected during April 2008-January 2009, supplemented by other sources, to provide a comprehensive and up-to-date description of the investment climate facing Turkish firms of all size classes, including the impact of government regulations.

\(^4\) UNCTAD (2008-2010), World Investment Prospects Survey.

The Turkish economy needs microeconomic reforms to upgrade its productive potential. Information and Communications Technologies (ICT) have shown positive and significant effects on economic growth and are recognized to be among most critical general purpose technologies which have great transformative potentials. In the current economic environment, policies and investment that promote and accelerate ICT adoption can have an important role to play and improve the country’s competitiveness.

According to Global Competitiveness Index, (2010), Turkish economy is positioned between innovation and efficiency driven stages of development (Figure 1-2). It is an open market economy in structural transition facing fierce competition in traditional sectors like textile, agriculture, light machinery and automobiles from other developing countries like China and India. Raising productivity and supporting innovation in these sectors will be of critical importance to keep its competitiveness intact. Therefore in order to make a successful leap from an efficiency-drive to an innovation-driven economy, the Turkish economy needs to upgrade traditional sectors and harness the transformative potential of ICTs.

1.2 ICT Sector

In the Turkish case, the lack of a suitable national accounting framework for more detailed analysis hinders international benchmarking in most emerging policy areas notably ICT and innovation. There still remains a persistent information gap on this issue following many reforms in the national statistical system. The Turkish national accounts do not provide information about the size of ICT sector in terms of value added or jobs. Nevertheless utilizing other indicators, it is estimated that Turkey’s ICT sector accounts for a lower share of economic production activities compared to advanced industrial economies but has a very robust growth potential.

Market size and ICT spending are among the available indicators for comparison. Turkey was placed 13th in the list of highest spending countries within the OECD in 2007 with spending of USD 36 billion or 6.8% when compared to GDP. Various institutions put forward similar estimates concerning the Turkish ICT sector. However estimates vary and a commonly agreed figure is still unavailable. In the absence of official statistics analysts frequently rely on business intelligence data provided by different consulting companies.
Even the State Planning Organization (SPO) uses these estimates in its official documents and reports. According to the SPO the size of the ICT market in Turkey was around US$ 20-25 billion in 2009. 

Turkey ranks among the highest growth countries in ICT spending (Figure 1-3). The Turkish ICT sector has a great potential for growth. The ICT market experienced double-digit growth over the last ten years since the financial crisis the country experienced in 2001, but the share of software and services is significantly behind Western markets, indicating substantial growth potential.

The Turkish ICT market is dominated by communications, constituting approximately 70 percent of the total and the whole IT market, which constitutes the hardware and software categories, comprising the other 30 percent.

The computer hardware segment is the second largest part of the ICT sector with a 25% share following communications. The penetration rate of personal computers (PCs) has grown rapidly and reached levels of 253 per 1,000 people in 2009 from 92 per 1,000 in 2006. This figure is higher in European markets, being 519 per 1,000 people in Italy, 725 in Germany and 766 in France. The temporary value-added tax (VAT) reduction on consumer durables, introduced in March 2009 in the Turkish market to counter the impact of the financial crisis, augmented the sales of PCs and laptops in 2009.

Leading multinational enterprises, such as IBM, Hewlett-Packard, Dell, Siemens, Cisco, and NCR, have considerable shares in domestic IT market. These firms typically operate through their local subsidiaries, which assemble PCs and other IT hardware components imported from overseas. Sales are realized both domestically and for export to the EU, Eastern and Central Europe, and the Middle East.

Computer services and computer software have a much lesser role in the Turkish economy because of lower business use of ICTs and the rapid growth of mobile and other consumer communication services. In contrast more

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6 SPO (2010), Information Society Statistics, Ankara (Turkish).
9 Economist Intelligence Unit (2010). The reduction in value added tax (VAT) on consumer durables, introduced in March 2009 to combat the impact of the financial crisis, boosted PC and laptop sales. The number of PCs per 100 population is expected to rise to 38 per 100 population as of 2014.
sophisticated economies have a somewhat larger share of computer services and software.\textsuperscript{10}

While being relatively less important and at its early stage of progress, the software industry is among the fastest developing and most promising sectors in the country. Over the last two decades, the sector has gained great momentum in terms of capacity, production and usage. According to some analysts, the software industry accounts for a much larger share in the total IT market than previously thought. It is estimated that national software market reached US$ 1.6 billion in 2009 with double-digit growth over the last years.\textsuperscript{11}

Turkey has rapidly developed its international linkages in the ICT sector. Export and import volumes in the ICT sector have reached to US$ 3.27 billion and US$ 9.05 billion respectively as of 2009 (Figure 1-5). In terms of international trade balance, the Turkish economy is positioned to be a net importer of ICT goods and services due to mainly being a large market for consumer electronics and computer hardware. In 2009, while the Turkish economy exported US$ 472 million computer hardware products it imported US$ 4,444 million of the same goods leading to a US$ 3,972 million trade imbalance.

The ICT sector plays a significant role in terms of employment creation opportunities and generation of R&D demand in Turkish economy. According to the latest available data, direct employment by the ICT sector was 160,644 in 2006.\textsuperscript{12} Including employed people with ICT skills by other industries, a broader definition of “ICT related employment” indicates the sector provides much larger opportunities for job creation: the percentage share of ICT related employment in total employment was above 10 percent in 2006. A considerable and steady increase in this figure has been observed over the recent years and it reached to 10.8 percent of total employment as of 2009.

\textsuperscript{10} For further reading on market segments of ICT spending please see OECD (2008), Information Technology Outlook, Paris, pp. 56.


\textsuperscript{12} Source: TURKSTAT Annual Industry and Service Statistics Survey.
2 Turkey’s Broadband Ecosystem: A General Assessment

This section develops a country snapshot of the national broadband ecosystem in a historical, institutional and economic context. Different aspects of national broadband adoption will be covered such as infrastructure, services, market environment, applications and usage.

2.1 Synopsis of Recent Evolution of Markets and Public Sector Reform

Reform and structural change in the overall ICT and broadband sector started early with the most important segment of telecommunications. The growth and evolution of the Turkish telecom industry in the last 30 years had five separate phases:

1. **Infrastructure pickup (1980 to 1984):** Network infrastructure buildup was a priority and public investments played a major role in this period. As a result, the number of access lines grew by 14 percent on average; however, despite the acceleration in telecom investments and growth in the subscriber base, long waiting lines remained during this time.

2. **Fast wire line growth (1985 to 1994):** The late 1980s was a period of ongoing intense infrastructure investment and fast growth. During this period, the government’s annual telecommunications investments averaged US$ 656 million and access lines grew by an average of 20 percent annually. Also, the PTT (“Posta Telefon Telegraf”) was split into postal services and Turk Telekom. Two GSM 900 licenses were granted in 1993 to Turkcell and Telsim, with revenue sharing agreements with Turk Telekom.

3. **Wireless revolution (1995 to 1999):** The late 1990s were characterized by explosive growth in wireless phone subscriptions. In 2000, annual subscription growth exceeded 100 percent, and wireless phone penetration reached 25 percent. Average annual investment in the wireless subsector was more than US$ 1 billion. During this period, the government continued investments in wire line at US$ 560 million per year and wire line penetration reached 28 percent. There were several unsuccessful attempts to privatize Turk Telekom.

4. **Preparation for liberalization (2000 to 2004):** This period is characterized by maturity in wire line and decelerated growth and increased competition in wireless. Two GSM 1800 MHz licenses were auctioned in May 2000, at a substantially higher fee (close to US$ 3 billion including VAT, compared to US$ 500 million for the initial licenses bought in 1999) to end the revenue-sharing agreements. The Telecommunications Law in 2000 established an independent regulator, the Information and Communication Technologies Authority (ICTA) and predetermined full market liberalization starting from January 2004.

5. **The period of post liberalization and broadband revolution (2004-...):** The government maintained its full support for liberalization and privatization of the telecommunications sector. The ownership of Telsim, a privately owned telecom operator, was transferred to the government after its owners were convicted of fraud. The operator was afterwards privatized in an international tender won by Vodafone in December 2005. 3G mobile licenses were awarded to all three operators, Turkcell, Vodafone and Avea, in 2008 and services began in 2009. This period is also characterized with increasing competition, declining fixed line penetration and falling voice revenues. Broadband, both fixed and mobile, have become a major source of revenue and a general technological platform for overall communication services.

As a result of structural policies in order to liberalize the market competition flourished, new entrants emerged as strong operators and foreign capital flew into the country.13

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13 The incumbent operator of the telecommunication sector is Turk Telekom. The legal monopoly of Turk Telekom in
Nonetheless a distinction should be made between fixed and mobile segments of communications. As to the national market, the fixed and mobile subsectors have radically dissimilar configurations in terms of productivity, liberalization, and ownership. Mobile is more competitive and productive, with a more advanced regulatory structure. On the other hand, in the fixed subsector, productivity is relatively low.\textsuperscript{14}

As observed in many other developed and saturated markets, fixed-line penetration is in continuous decline since its peak period of 2001-2004. Consequently, the penetration rate is down to 23.3 percent in 2009, from around 28 percent in 2004. The penetration is low compared to EU countries, for example 37 percent in France, 43 percent in Germany, 46 percent in Greece and 31 percent in Hungary.\textsuperscript{15} The Turkish mobile telecommunications segment has achieved a considerable growth with a share of 60 percent within total sector revenue in 2008 and is expected to continue growing. Mobile number portability (MNP), launched in November 2008, as well as 3G mobile services introduced in July 2009, have accelerated the competition between the three market players.

Analysts forecast mobile virtual network operators (MVNO) are also expected to start operating in the market along with the three mobile operators. Mobile-phone subscribers are expected to grow at an annual rate of 5.5 percent between 2010 and 2014, following a fall of 0.5 percent in 2009. This will increase the mobile-phone penetration rate in Turkey to about 113 percent in 2014, similar to most EU countries, where penetration rates are generally around 100-120 percent.

\textsuperscript{14} McKinsey Global Institute (2003), Turkey: Making the Productivity and Growth Breakthrough

\textsuperscript{15} According to the analysts the outlook for fixed-line telephone penetration does not look promising. Fixed-line penetration is expected to decline to 19 telephone main lines per 100 people by 2014.

2.2 Institutional Setup: Current Policy, Legal and Regulatory Framework

Table 2-1 exhibits major institutions and establishments that are involved in the ICT and broadband sector. The State Planning Organization (SPO) is the leading institution regarding government policies and strategies for the overall ICT sector. It prepares pivotal national strategies and programs such as development plans, economic programs and sector strategies and action plans. SPO is also involved in resource allocation to e-government projects and applications and has access to private sector organizations through various mechanisms. The Office of the Prime Minister has lately become a significant coordinating and a consulting body in terms of e-government initiatives. In regards to ICT related research and determining the national agenda for general science and technology policies the Scientific and Technological Research Council (TUBITAK) is the main body.

The Ministry of Transport and Communication (MoTC) is responsible for sector oversight in the provision of public services including information and communications to the end users. The MoTC is also the top official body on issues of safety, quality, standardization and balanced development of the communications infrastructure. The Information and Communications Technologies Authority (ICTA), founded in 2000, has the overall regulatory responsibility over communications sector.

A number of non-governmental organizations are also involved in the general direction and structure of the ICT sector. The most influential establishments include the Turkish Informatics Association (TBD), Informatics Sector Association (TUBIDER) and Turkish Informatics Industry Association (TUBISAD).

Turkey’s public sector has a tradition of passing legislation rather than using secondary regulations to interpret basic laws. In an attempt to liberalize communications, to regulate provision, diffusion and usage of information and enable e-transformation different legislation was enacted throughout the 2000s. As to the legal framework in effect (or pending) the following documents constitute the fundamental architecture for the nation:
<table>
<thead>
<tr>
<th>Institutions</th>
<th>Abbreviations</th>
<th>Functions</th>
<th>Web pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Office of the Prime Minister</td>
<td>NA</td>
<td>Office of the Prime Minister coordinates numerous e-government projects, gives advisory services to implementing agencies, encourages the adoption of ICT by public institutions.</td>
<td>NA</td>
</tr>
<tr>
<td>Ministry of Transport and Communication</td>
<td>MoTC</td>
<td>MoTC is to provide the production and the control of quality, balanced, safe, environmental friendly, fair and economic transport, information and communication services for all users.</td>
<td><a href="http://www.spo.gov.tr">www.spo.gov.tr</a></td>
</tr>
<tr>
<td>The State Planning Organization</td>
<td>SPO</td>
<td>SPO provides general vision and strategies including ICT sector, integrates these specific visions into broader economic programs and coordinates the implementation process. SPO also approves public investment projects including ICT and e-government applications.</td>
<td><a href="http://www.tubitak.gov.tr">www.tubitak.gov.tr</a></td>
</tr>
<tr>
<td>Information and Communication Technologies Authority</td>
<td>BTK</td>
<td>BTK prepares plans in telecommunication sector according to Wireless, Telephone and Telegraph Law. Then BTK presents the plans to MoTC. BTK also regulates and audits telecommunication market.</td>
<td><a href="http://www.tk.gov.tr">www.tk.gov.tr</a></td>
</tr>
<tr>
<td>International Satellite and Cable Operator</td>
<td>TURKSAT</td>
<td>TurkSat A.S. is the only satellite operator company in Turkey. TurkSat manages and operates three satellites (Turksat 1C, Turksat 2A, Turksat 3A) and provides all types of satellite communications.</td>
<td><a href="http://www.turksat.com.tr">www.turksat.com.tr</a></td>
</tr>
<tr>
<td>The Scientific and Technological Research Council of Turkey</td>
<td>TUBITAK</td>
<td>The Scientific and Technological Research Council of Turkey (TÜBİTAK) is the leading agency for management, funding and conduct of research in Turkey. It was established in 1963 with a mission to advance science and technology, conduct research and support Turkish researchers.</td>
<td><a href="http://www.tubitak.gov.tr">www.tubitak.gov.tr</a></td>
</tr>
<tr>
<td>Turkish Informatics Association</td>
<td>TBD</td>
<td>TBD is a non governmental organization which was established in 1971 to expand Informatics Culture by members.</td>
<td><a href="http://www.tbd.org.tr">www.tbd.org.tr</a></td>
</tr>
<tr>
<td>Informatics Sector Association</td>
<td>TUBIDER</td>
<td>TUBIDER IT Sector Association was founded in November in 1999 so as to protect rights and interests of the IT companies operating in the informatic sector and to ensure vocational regulations are implemented. TUBIDER continues its operations having reached to 800 registered members and more than 1500 applicants.</td>
<td><a href="http://www.tubider.org.tr">www.tubider.org.tr</a></td>
</tr>
<tr>
<td>Turkish Informatics Industry Association</td>
<td>TUBISAD</td>
<td>Established in 1979, TUBISAD is the largest non-governmental organization of the Turkish private ICT sector, including industries and services, with a representation base of 95 % through its direct membership. TUBISAD has a group of members comprising of almost 180 leading ICT companies of which are Software Developers, Hardware Manufacturers, Hardware and Software Distributors, Telecommunication Companies, System Integrators, Local Subsidiaries of IT and Communication multinational companies and/or Consultants.</td>
<td><a href="http://www.tubisad.org.tr">www.tubisad.org.tr</a></td>
</tr>
<tr>
<td>General Directorate of Postage and Telegraph Organization</td>
<td>PTT</td>
<td>Postage and telegraph services are operated by General Directorate of PTT.</td>
<td><a href="http://www.ptt.gov.tr">www.ptt.gov.tr</a></td>
</tr>
</tbody>
</table>

Table 2-1: Major institutions and establishments in ICT sector
• In the field of Information Society:
  Right to Information Law (2003),
  Inclusion of cybercrime in the Criminal
  Code (2004), Electronic Signature Law
  (2004), Amendments in the Intellectual
  Property Rights Law, Universal Service
  Law (2005), Law No. 5651 on regulating
  broadcast in Internet and combating
  crimes committed through such
  broadcast (2007), Electronic
  Communications Law (2008), and
  secondary legislation on
  telecommunications.

• In the field of IT and e-government:
  Public Procurement Law (2008), Census
  Services Law, Law No.5942
  amendments in the Traffic Law
  No.2918, Circulars regarding the
  payment of taxes online, Draft Data
  Protection and Privacy Law (pending in
  the Parliament), e-Commerce studies
  regarding the harmonization of 2000/31
  EC, and Draft law covering partial
  amendments for various e-government
  services.16

Box 2-1 gives a quick snapshot of major national
strategies and initiatives targeting e-
transformation in the public sector and
broadband adoption at large. Evolution of
public policies with regard to Internet based
technologies and e-transformation can be
analyzed under four distinct periods:

• Data processing and computerization
  (1970-1990): During this period the
  focus of public policy was mainly on
  automating back-office functions, such
  as processing of the census and taxes.

• Building basic ICT capabilities (1990-
  2000): In the 1990s, there emerged an
  effort to provide basic ICT facilities and
  capabilities from a modernization
  perspective of the government sector.
  The “Turkey: Informatics and
  Economic Modernization” project of
  the World Bank in 1993 was an initiator
  in this sense. In the second half of
  1990s the National Informatics
  Infrastructure Main Plan of the Ministry
  of Transportation was an early example
  of the first organized action in the
  public sector. However the succession
  of governments; high inflation and
  recession; and political and economic
  instability prevented much
  implementation from taking place.

• The era of e-government (2000-2010):
  Political stability with Development and
  Justice Party rule following 2002 and
  negotiation process with the EU helped
  government agencies to devise more
  integrated and organized frameworks
  for action which included active
  participation of private sector and non-
  governmental organizations. The E-
  Transformation Project and the
  Information Society Action Plan are
  good examples of this period. The
  overall goal in these documents was
  defined as promoting Information
  Society polices to increase Turkey’s
  competitiveness. A further goal was to
  move from labor-intensive production
  to a higher-value-added production and
  from providing a source of low-cost
  labor to a highly educated workforce in
  a knowledge based economy. However
  going beyond rhetoric, the real focus
  was on implementing e-government
  applications and demand aggregation
  policies rather than promoting e-
  commerce and the digital economy.

• Beyond e-government (2010–...): With
  increasing diffusion of ICTs into
  business applications and government
  operations, there are now new signals
  calling for a shift in public policies.
  Growing businesses are in clear need of
  accelerated ICT adoption to leverage
  their competitive power. The high level
  of investment in e-government
  applications is clearly just one
  component of modernizing the public
  sector. To better harness the
  transformative potential of ICTs
  government agencies are now starting to
  look beyond e-government. The
  National Vision for Broadband Strategy
  and updating studies of the Information
  Society Strategy provide good
  illustrations of this process.

16 For a more detailed discussion please see OECD (2007)
Turkey faces a new window of opportunity with regard to upgrading competition and productivity by means of better ICT adoption. Promoting and creating a viable broadband ecosystem is the key to success. The country can either let the market determine the pace of development or promote a more rapid development of broadband infrastructure, as has been done in advanced countries. Defining, monitoring, and promoting the broadband ecosystem with effective means is an important area where more focus should be devoted.

2.3 Infrastructure Development

One of the fundamental aspects of broadband ecosystems is broadband infrastructure. As broadband technologies and applications flourish rapidly, providing good infrastructural capacity has been a key policy concern among government officials. Evaluating infrastructure developments require analysts to monitor a number of indicators at the same time since any single dimension will not be sufficient to provide a complete picture.

Broadband is typically defined as a “high-speed communications network” that offers internet connectivity with download speeds of at least 256 kbit/s. 17 This definition based on the minimum level of speed is a matter of debate though it is clear that broadband technologies

17 http://www.oecd.org/document/46/0,3343,en_2649_34225_39575598_1_1_1_1,00.html
are significantly different from dial-up lines in terms of functioning. No distinct definition for broadband exists in Turkey.

Three basic criteria are incorporated to provide an integrated picture of Turkish broadband development: **Penetration, technologies and prices**. A benchmarking technique is utilized in order to obtain a better picture of the relative performance of national broadband capacity both across countries as well as over time. In isolation, there is a tendency to view national growth rates as high, since, as with any new technology, growth is often in the double digits.

### 2.3.1 Broadband penetration

Overall performance in making broadband an essential part of daily life has been uneven and subject to significant variations among nations. The divide in performance of countries is best reflected by the concept of **broadband penetration gap**. The broadband gap is defined as the discrepancy between benchmark countries and that of host country in terms of adoption of broadband technologies generally measured in household or population penetration. In the case of Turkey, there is a significant fixed broadband gap as compared to other OECD members (Figure 2-1).

A number of factors are important in determining penetration rates but as a general observation countries with relatively high fixed broadband penetration rates tend to have relatively higher per capita GDP and well developed communications infrastructure.\(^{18}\) Studies indicate that, though the relationship is not necessarily casual, per capita income is correlated to fixed broadband penetration with a significant correlation coefficient of 0.70. Since the Turkish economy has depicted a strong rebound in the post crisis environment and medium to long-term outlook is promising, rising per capita income levels should establish a major driver force for broadband infrastructure development.

Turkey faces a challenge in order to catch up with OECD members in broadband technologies. Despite growth in broadband infrastructure, when compared to advanced countries, Turkey has recorded somewhat poor performance and has not been able to close the broadband gap. As of the second quarter of 2010, in terms of fixed broadband technologies the leading countries reached penetration levels above 35 percent while Turkey managed only a 9.4 percent subscription based penetration rate.

Turkey’s fixed broadband growth rate is lagging the OECD area. During 2010 Turkish fixed broadband growth was 0.83 percent compared to the OECD average of 1.72 percent (Figure 2-2). When compared to major developing economies, Turkish broadband growth is considerably lower; for instance India is expanding its broadband capacity with a growth of 62 per cent in 2010.

Nevertheless the fixed broadband penetration rate in Turkey still exceeds some European

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\(^{18}\) OECD (2008), Broadband Growth and Policies in OECD Countries, Paris.
countries such as Poland, Italy, Bulgaria and Romania, and is very close to the rates in Portugal, Hungary, Spain and Estonia. On the other hand, the personal computer (PC) penetration level in Turkey in 2009 was only about 25.3 percent, compared to 77 percent in the UK. Since broadband usage depends on PC penetration, increasing PC usage and ownership in Turkey are expected to create opportunities for the broadband market.19

Turkey’s relatively well-developed mobile network has a penetration level around 85 percent and provides another means for broadband access (Figure 2-3). Wireless broadband has shown a significant expansion

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19 Economist Intelligence Unit, 2010.
following the decision of Turkish government to issue 3G licenses during November 2008, making the market an appealing area for future investment. Since then 3G mobile Internet subscriptions using data cards have grown at a rapid pace and as of end 2010 reached 1.5 million subscriptions (total 3G subscriptions reached 19.3 million as of December 2010 according to ICTA). The annual rate of growth in this segment of broadband was 265 percent between 2009 and 2010. As a result mobile broadband is growing much faster than fixed broadband subscriptions (27 percent annual growth as of 2010). Total fixed and mobile broadband through data card subscriptions reached 8.5 million by the end of 2010.

A saturated voice market with declining revenues has motivated operators to rely on mobile broadband network investments for optimizing profits. There has been a considerable growth in the investments to mobile subsector and more importantly telecommunication operators have changed their strategy significantly by allocating increasingly far more resources to mobile investments. Building up of 3G communication infrastructures constitutes a determining factor for this shift in corporate strategies.

Experiences in many countries show that governments should leave the choice of technology and infrastructure expansion as much as possible to market forces while promoting a level playing field for different technologies. Turkey is implementing a policy of

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Table 2-2: Broadband indicators, Turkey, 2010

<table>
<thead>
<tr>
<th>Item</th>
<th>Subscriptions</th>
<th>Penetration (per 100 people)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total broadband</td>
<td>8,516,898</td>
<td>11.6</td>
<td>Fixed and mobile through data cards</td>
</tr>
<tr>
<td>Fixed broadband</td>
<td>7,068,878</td>
<td>9.6</td>
<td>ICTA, ADSL, Cable modem, FTTP</td>
</tr>
<tr>
<td>3G subscriptions</td>
<td>19,400,000</td>
<td>26.3</td>
<td>ICTA, Technical ability to access mobile broadband without consideration of whether actively using to access Internet</td>
</tr>
<tr>
<td>Mobile broadband data cards</td>
<td>1,448,020</td>
<td>2.0</td>
<td>ICTA</td>
</tr>
<tr>
<td>Households with computer</td>
<td></td>
<td></td>
<td>Turkstat</td>
</tr>
<tr>
<td>- Desktop</td>
<td></td>
<td></td>
<td>Turkstat</td>
</tr>
<tr>
<td>- Portable</td>
<td></td>
<td></td>
<td>Turkstat</td>
</tr>
<tr>
<td>Households with access to the Internet</td>
<td></td>
<td>41.6</td>
<td>Turkstat</td>
</tr>
<tr>
<td>Households with broadband access to the Internet</td>
<td></td>
<td>34</td>
<td>Eurostat</td>
</tr>
<tr>
<td>- of which DSL</td>
<td></td>
<td>30.5</td>
<td>Turkstat</td>
</tr>
</tbody>
</table>

(Source: Adapted from ICTA, Turkstat, Eurostat) (note: Subscription penetration calculated based on population of 73,722,988 reported by Turkstat at December 31 2010)
increased competition through the privatization of its incumbent telecom operator (55% was sold to the private sector in August 2005) and implementing rules to increase competition such as providing competitors access to telephone lines.\textsuperscript{21} Yet this policy was not transformed into increased competition and a high rate of growth in broadband infrastructure. Alternative operators accounting for only 7 percent, the level of competition in fixed broadband access is still very limited.\textsuperscript{22}

As the National Broadband Vision (2010-2023) highlights, if Turkey wants to develop its broadband ecosystem rapidly and close the broadband penetration gap with advanced economies the government should follow an integrated and strategic approach in terms of broadband policy.\textsuperscript{23} Waiting for growth in household demand for high-speed Internet access to encourage the development of broadband will take time. The public sector should consider taking a more pronounced role in stimulating the development of broadband infrastructure and using this capacity for modernizing the public sector.

\section*{2.3.2 Broadband technologies}

Penetration data does not deliver enough information about the quality improvements in the broadband infrastructure. While the growth rate is slowing down there may still be considerable internal changes as users upgrade their connections with faster speeds. This section helps to illuminate Turkish broadband development from a technological perspective.

\subsection*{2.3.2.1 Backbone network}

Until recently there have been two main technologies or platforms over which broadband services have been delivered to consumers. The first is Digital Subscriber Line (DSL) which entails upgrading the legacy public switched telephone network (PSTN). The second platform consists of the cable-modem technology, which entails upgrading the cable-tv network.

\subsection*{2.3.2.2 Local access technologies}

There has been an impressive shift away from dial-up Internet connections to broadband. In 2005, dial-up connections still accounted for 40 per cent of fixed Internet connections but had already fallen to just 10 percent by 2010. In Turkey, xDSL is the most widely used technology accounting for 94 per cent of broadband subscribers.\textsuperscript{24} While 3.9 percent of the subscribers use cable networks and 2 percent of subscribers have fiber technologies for broadband access the number of xDSL subscribers has touched to 6.6 million by end of 2010. When compared to EU countries Turkish broadband is relatively far more concentrated on conventional technologies like xDSL.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|c|c|c|c|}
\hline
\hline
xDSL & 5,009.135 & 5,292.840 & 5,616.697 & 5,894.522 & 6,000.174 & 6,056.519 & 6,057.986 & 6,216.028 \\
\hline
Cable & 43.072 & 48.725 & 57.525 & 67.408 & 80.211 & 98.792 & 114.264 & 146.622 \\
\hline
\hline
Satellite & 6884 & 6782 & 6742 & 7075 & 7063 & 6993 & 7117 & 7074 \\
\hline
\hline
\textbf{TOTAL} & 5,074.810 & 5,371.492 & 5,697.967 & 5,986.101 & 6,105.449 & 6,179.465 & 6,413.390 & 6,782.657 \\
\hline
\textbf{Increase} & %10 & %6 & %6 & %5 & %2 & %1 & %4 & %6 \\
\hline
\end{tabular}
\caption{Subscription indicators by technology [Source: ICTA]}
\end{table}

\textsuperscript{21} In March 2010, Oger Telecom declared its interest in acquiring an additional share of the Government’s stake in TT. The Turkish Government plans to divest a further 15-20 per cent of its stake via an initial public offering. The remaining 15 per cent stake in the operator is already listed on the Turkish stock exchange.

\textsuperscript{22} Source: SPO (2010) Information Society Statistics.


\textsuperscript{24} ICTA (2009), Electronic Communication Sector in Turkey, Market Statistics Report, February 2010, p. 20
According to the recent data there has been a rapid shift away from lower speed connections. The great majority of ADSL subscribers (64 percent) have an 8 Mbps connection. The share of the subscribers who have 1 Mbps connections has decreased dramatically from 42% to 26% in just six months of 2010.

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The incumbent Turk Telekom (TT) provides landline, mobile and Internet services. It launched ADSL services in 2003, and currently offers Internet services in selected regions through its subsidiary TTnet. In 2005 in a drive for privatization, the government sold a 55 per cent stake of TT to the Saudi-owned Oger Group. In March 2010, Oger Telecom declared its interest in acquiring an additional share of the Government's stake in TT. The Turkish Government plans to divest a further 15-20 per cent of its stake via an initial public offering. The remaining 15 per cent stake in the operator is already listed on the Turkish stock exchange.

One of the key benefits of TT’s privatization is the fact that it has lost the special status of a state-owned company and as a result is obliged to follow the same regulations as any other Turkish telecoms operator. TT is likely to remain aggressive within the telecoms marketplace and in the regulatory process as it tries to maintain its leading position. Thus, the low level of competition in the broadband internet is partly due to the strategic behavior of Turk Telekom to prevent the entry of alternative Internet service providers. In most countries incumbent operators such as Turk Telekom have been under the regulatory obligation of allowing new entrants to use the existing network to provide their own DSL service. In a landmark decision taken in November 2008, the Competition Authority has imposed a fine of 12.4 million TL (about €6.2 million) on Turk Telekom for abusing its dominance in the wholesale broadband Internet market through price squeeze in the retail Internet market. In its decision, the Competition Board stated that Turk Telekom and its Internet subsidiary TTNet endured operating without profits for long periods of time and implemented campaigns that would not cover losses in reasonable amounts of time and that these strategies were executed in order to monopolize the sector. In a recent decision the Competition Authority stated that Türk Telekom should provide naked DSL services. Provision of naked DSL means that Turk Telekom can no longer bundle voice and data services together and that the subscriber can subscribe to DSL services alone, without having to pay for voice services as well.

In recent years Türksat with its UYDUNET cable services has increased its market share by winning some 274 thousand broadband customers as of 2010. However since the cable TV infrastructure is operational mostly in urban areas and lacking somewhat more effective business models the company has not made a major breakthrough in the domestic market.

Another striking development was the introduction of 3G services which had a significant impact on the broadband sector. The three mobile operators, Turkcell, Avea and Vodafone, are trying to find new sources of revenue in anticipation of the difficulties associated with increasing subscriber numbers in the saturating market. All three won 3G licences in December 2008 and launched 3G services at the end of July 2009. Avea allocated TRY 1 billion to be spent mostly on 3G network development during 2009. Vodafone followed suit with a TRY 1.3 billion investment allocation. At the end of December 2010, there were 1,448,020 mobile broadband subscribers, showing a 265 per cent growth over the last 12 months. At the end of 2010, the number of customers on 3G networks reached 19.4 million.

With the emergence of alternative network technologies TT is now under pressure for adopting a more business oriented strategy rather than enjoying its domination in the fixed market. TT introduced its new Internet speed package days before 2011 which enables speeds of up to 32 Mbps with VDSL2 and up to 8 Mbps through ADSL. TT shall begin offering packages with speeds of up to 50 Mbps and 100 Mbps with VDSL2 technology, and shall increase the speed up to 16 Mbps with ADSL2+.

TT will need to work hard to retain its market dominance however, as mobile operator Turkcell is investing in considerable fibre infrastructure through its subsidiary Superonline. Vodafone Turkey also bought a major alternative operator in late 2009. Another point is that EU candidacy is prompting Turkey’s telecoms regulator to strengthen the regulation of the sector and curtail TT’s monopolistic powers.

Box 2-2: Leveling the field: The battle of broadband in national market

(Source: Afiyaz Izaq (2010) Regulation and Competition in the Telecommunications Industry: An Update; and interviews with Dr. Ramazan Altınoğlu, Dr. Ertugrul Karacuha, Emin Sadık Aydınlık, Furkan Çivelek, Ahmet Hasnbeseoglu and Uğur Terzioglu)
Turk Telecom is leading provider of DSL and owns all of fixed telephone infrastructure (16 million connections in 2010). As of 2009 the share of alternative operators reached to 6.3%. Compared to the previous year, alternative operators’ subscriber number increased by 29%. Currently two types of Local Loop Unbundling (LLU) namely ‘full access’ and ‘shared access’ have been implemented in Turkey. 163 central offices have been opened to access of alternative operators by the end of 2009 under the LLU regulations of the Authority. Currently alternative operators have technical access to almost 7 million PSTN and 2.6 million ADSL subscribers via the above mentioned 163 central offices. Besides LLU, operators can offer broadband Internet access services to their customers using Turk Telecom’s other wholesale broadband access services such as xDSL simple resale and xDSL bit-stream access (BSA) which enable ISPs to access the fixed broadband network at different levels. Some promotional campaigns including LLU in the above mentioned wholesale access services have been approved by the Authority upon Turk Telecom’s proposal in 2009.

Co-location areas and problems encountered at central offices opened to access have been observed within the central office surveys carried out in June. Moreover the outdoor DSLAM implementations of the incumbent operator are also observed.

In accordance with the relevant legislation and regulations, a Reference xDSL Resale Offer has been offered to the Authority by Turk Telecom at the end of June 2009. The public consultation process regarding to the draft offer has been completed and approval procedure of the reference offer is ongoing. Besides, some new re-sale tariffs proposed by Turk Telecom have been included in the existing offer upon approval by the Authority. In this context, ADSL 2 Mbit/s with 4 GB quota, ADSL 8 Mbit/s unlimited, MEB ADSL 2 Mbit/s, 4 Mbit/s unlimited, ADSL up to 8 Mbit/s unlimited, with 4 GB and 6 GB quota, ADSL 512 Kbit/s with 512 MB quota and ADSL2+ 16 Mbit/s unlimited resale tariffs have been approved in 2009 and included in Turk Telekom Reference xDSL Resale Offer.

Mobile broadband offers a competitive alternative to fixed broadband. Turkcell, Avea and Vodafone, the three operators in mobile segment had authorization from the government to provide 3G services as of December 2008, and became operational by July 2009. Since then mobile broadband subscriptions recorded an explosive expansion. With some 1.45 million subscriptions (December 2010) and a growth rate of 265 percent, mobile broadband holds great promise for Turkey, particularly given the limited competition on the fixed market. Mobile broadband provided over the UMTS platform with HSPA extensions came relatively late to Turkey. The 3G market is benefiting from the deployment of HSPA technology and by the introduction of new smartphones. Growth has been dramatic and mobile broadband accounted for 17% of all broadband subscriptions by the end of 2010.

Though the level of competition in fixed broadband is limited compared to more advanced economies, with a broader definition of broadband including the mobile segment, Turk Telecom as the incumbent operator is losing its market share rapidly. TT’s broadband market domination has been somewhat challenged by mobile operators’ (Turkcell, Avea and Vodafone) success in targeting mobile broadband customers and partly due to increases in cable and fiber subscriptions. TTNet’s market share in the broadly defined broadband market was down from 93% to 71% since early 2009. By contrast the market share of mobile broadband operators grew explosively up to 17% following the opening of 3G services in the country. It is estimated that mobile broadband subscribers will occupy an increasingly prominent place in Turkey’s broadband sector. These are broadband customers who use devices such as netbooks, smartphones and USB sticks to connect to the Internet wirelessly via a high-speed (3G/HSPA) network. The share of cable network operator Turksat has also augmented from 1.3 % to 3.2 % during the last two years and fiber connections expanded their share from 1% to 1.8 % since early 2010 (Figure 2-6).

Turksat provides both satellite and cable television services. It has around 1.2 million cable television subscribers.26 Turksat has upgraded its networks and made cable broadband services available to the majority of homes in urban areas. Nonetheless the cable network is in its takeoff phase and needs an effective management model for further expansion. The Turksat “Uydunet” service provides its subscribers with broadband Internet access through its cable infrastructure at speeds

Figure 2-6: Shares of technology in total broadband subscriptions, percent, 2010

Figure 2-7: Percentage of fibre connections in total broadband, June 2010 (Source: OECD)
ranging from 1 Mbps to 20 Mbps. One challenge for expanding cable broadband access is that most TV subscribers in Turkey have a preference for satellite delivery (some 10 million satellite dishes in mid-June 2010).\textsuperscript{27}

Fiber networks are ideal because the capacity is much higher than traditional copper lines and relatively easy to expand once the fiber is in place simply by adding additional lasers to a line. When compared to advanced Asian and European economies Turkey lags in fiber broadband penetration (Figure 2-7). However the recent expansion in fiber subscriptions is very promising and it indicates the demand for high bandwidth network access could possibly be ready in the country. During 2010, the share of fiber subscriptions in the total broadband market reached 1.8 percent.

In terms of technology deployment, though there have been outstanding market developments that reflect the overall potential in demand and supply sides, the majority of Turkish broadband infrastructure is based on traditional forms of connectivity devices which do not allow high bandwidth data services such as advanced e-health and multichannel television. Turkey shifted from a dial up network structure to a broadband dominated one at a very rapid pace. Turkey’s fiber Internet backbone provides for high-speed connections, but this has not translated to a high number of broadband users.

In the long run the leading policy challenge for the government would be facilitating the development of high speed broadband networks most notably fiber. High-speed broadband has strategic importance and should be promoted. Much as traffic expands to fill roadway capacity after the building of superhighways, having more broadband capacity will likely facilitate the delivery of government e-services, provide a foundation for e-government in whole sectors of government, and stimulate the development of e-business. Besides the recent rapid shift into high bandwidth subscriptions and explosive growth in mobile and fiber segments indicate that the future demand for broadband ecosystems will be strong. Turkish universities have already developed their own broadband network, as has the National Adjudication Network Project (UYAP). The e-health initiative is proposing to build its own network for exchanging data.

The lack of a complete and strategic approach would impair this great opportunity. There are signs of a better understanding emerging in government circles. The National Broadband Vision has urgently called on the public and private sectors for the development of a holistic government approach to broadband. SPO is getting ready to update the nation’s Information Society Strategy and disclosed publicly that it shall prepare a separate chapter on broadband. A more organized approach should prepare for harder policy designs to broadband challenges and ensure competition in the national broadband market since it is the best option and the main driver of continuous improvements.

The Turkish government should also ensure a more effective regulative approach for broadening competition in the broadband market. The development of competition in broadband has been extremely slow, primarily because the Ministry of Transport and the Information and Telecommunication Technologies Authority have been slow in adopting, implementing and enforcing the necessary secondary legislation. Analysts argue that Turk Telekom’s influence on the Ministry and the Information and Telecommunication Technologies Authority’s lack of full independence from the Ministry are to a large extent responsible for this state of affairs.

2.3.3 Prices

Prices are a crucial indicator in evaluating the state of broadband development in any given country. Analysis of prices, the level of service, and the range of choice available to users, can help inform questions about the take-up and use of broadband services as well as in assessing how competitive broadband access is in individual markets. While there is still not enough data to systematically examine price and performance changes, the trend in prices is very much downward; and the trend in performance is upward. Competition is the main driver of improvements in price and performance.

International comparison suggests that prices of broadband services in Turkey are among the highest in OECD and EU economic areas. The average broadband monthly price per advertised Mbit/s in Turkey is about 40 percent higher than the OECD average. When prices are corrected for purchasing power parity, prices in Turkey are the highest (). Turkey is also lagging behind in

\textsuperscript{27} http://www.eutelsat.com/products/broadcast-audience.html
high-speed connectivity prices. Prices in Turkey are relatively cheaper for low speed connections and relatively more expensive for high-speed connections.

Presenting the latest situation as of March 2011, Table 2-2 confirms that high prices and affordability are among main concerns in Turkish broadband market. Turk Telekom offers DSL services with different speed options. The baseline ADSL offer at 1 Mbps costs US$ 13.2 per month with a 1 GB cap on data transfer. Higher speed services are much more expensive than EU countries. The highest speed 100 Mbps service is priced at US$ 94.3 per month with unlimited data option and a fiber 32 Mbps service costs US$ 27.2 per month with a 10 GB Cap. Turk Telekom’s ADSL2+ 16 Mbps services are priced at US$ 37.3 and USD 20.9 with unlimited and 5 GB Cap respectively. Turk Telekom also offers ADSL technology to consumers with the highest speed option 8 Mbps going from US$ 69 per month with unlimited data transfer and decreasing prices for more limited speeds and data cap options.

Among independent ISPs offering broadband Internet services, Superonline provides DSL and fiber Internet access with different speed options. The baseline starts with a 1 Mbps speed service at USD 28.7 with unlimited data transfer, and 8 Mbps speed option goes from USD 24.7 and USD 18.3 with 6 GB and 4 GB Cap respectively. Among fiber connections the highest option is 100 Mbps costing USD 125.9 with unlimited data transfer.

As the largest cable TV service provider, Turksat runs its Uydunet to offer broadband services at different speed options. The baseline is the 1 Mbps speed service costing USD 18.3 per month with unlimited data transfer. However higher speed services are priced relatively higher than the average ADSL services. The 10 Mbps option costs USD 62.6 and the 20 Mbps service

![Figure 2-2: Broadband average monthly subscription price, Oct. 2009, USD PPP (Source: OECD)](image-url)
costs USD 125.9 per month without any cap on data transfers. Prices per Mbps offered are significantly higher than ADSL operators.

The three mobile operators, Turkcell, Vodafone and Avea are also offering mobile Internet services based on HSDPA technology and there are quite differentiated service packages for consumers. Table 2-4 presents a selection of these mobile packages most notably the baseline options. All three operators offer 1 GB cap mobile data options at around USD 18-19 as of March 2011.

Since the competition in fixed broadband market has been relatively limited in Turkey, the general downward trend in prices seems to be somewhat partial. The effect of taxes on broadband service pricing is another significant variable in assessing the affordability and performance of the market. As part of the need to augment the tax base during the economic crises of 2000-2001, Turkey raised taxes on telecommunication services. While these measures have increased tax revenues, they had a negative effect on e-services take-up. In 2008 the government considered ways to increase the affordability and thereby the use of e-services by reassessing telecommunication taxes but little has been achieved.

The tax rate applied for broadband products and services include the 18% Value Added Tax (VAT) and an additional 5% Special Communication Tax (SCT) calculated over the price of the related service including VAT. Compared to the other communication services, Internet services are taxed relatively lower: SPC rates on mobile and fixed line communication services are 25% and 15% respectively. Though taxes on Internet services are relatively low the fiscal burden still accounts for a major impact on a middle-income household.

One can expect that when Internet access requires a lower share of monthly per capita income, usage rates increase, everything else being equal. Internet access cost – measured as the Internet subscription cost as share of average monthly income – relatively high. According to analysts, middle-income consumers are generally ready for broadband packages costing less than 3 % of their per capita income. In Turkey the Internet access cost of an average broadband package has come down significantly in recent years but still exceeds 3% threshold with a rate around 5%.

National growth performance has created opportunities for broadband expansion and service affordability. The high growth in per capita income in recent years affected positively the broadband affordability by increasing the denominator. It is clear that rising incomes have supported the market and affordability of

Table 2-4: Prices of selected broadband service packages in Turkey, March 2011
(Direct source inquiry to author)

<table>
<thead>
<tr>
<th>Operator</th>
<th>Technology</th>
<th>Speed (Mbps)</th>
<th>Price per month (TRY)</th>
<th>Price per month (US$)</th>
<th>Price per Mbps (US$)</th>
<th>Note</th>
</tr>
</thead>
<tbody>
<tr>
<td>TTNet (TTelekom)</td>
<td>ADSL</td>
<td>1</td>
<td>20.9</td>
<td>13.2</td>
<td>13.2</td>
<td>1 GB Cap</td>
</tr>
<tr>
<td>TTNet (TTelekom)</td>
<td>ADSL</td>
<td>&lt;=8</td>
<td>29</td>
<td>18.3</td>
<td>2.3</td>
<td>4 GB Cap</td>
</tr>
<tr>
<td>TTNet (TTelekom)</td>
<td>ADSL</td>
<td>&lt;=8</td>
<td>32</td>
<td>20.2</td>
<td>2.5</td>
<td>6 GB Cap</td>
</tr>
<tr>
<td>TTNet (TTelekom)</td>
<td>ADSL</td>
<td>8</td>
<td>109</td>
<td>69.0</td>
<td>8.6</td>
<td>Unlimited</td>
</tr>
<tr>
<td>TTNet (TTelekom)</td>
<td>ADSL2+</td>
<td>&lt;=16</td>
<td>31</td>
<td>20.9</td>
<td>1.3</td>
<td>5 GB Cap</td>
</tr>
<tr>
<td>TTNet (TTelekom)</td>
<td>ADSL2+</td>
<td>&lt;=16</td>
<td>59</td>
<td>37.1</td>
<td>2.1</td>
<td>Unlimited</td>
</tr>
<tr>
<td>TTNet (TTelekom)</td>
<td>Fiber</td>
<td>&lt;=32</td>
<td>43</td>
<td>27.2</td>
<td>0.9</td>
<td>10 GB Cap</td>
</tr>
<tr>
<td>TTNet (TTelekom)</td>
<td>Fiber</td>
<td>&lt;=100</td>
<td>149</td>
<td>94.3</td>
<td>0.9</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Superonline</td>
<td>ADSL</td>
<td>&lt;=8</td>
<td>29</td>
<td>18.3</td>
<td>2.3</td>
<td>4 GB Cap</td>
</tr>
<tr>
<td>Superonline</td>
<td>ADSL</td>
<td>&lt;=8</td>
<td>39</td>
<td>24.7</td>
<td>3.1</td>
<td>6 GB Cap</td>
</tr>
<tr>
<td>Superonline</td>
<td>Fiber</td>
<td>&lt;=50</td>
<td>59</td>
<td>37.1</td>
<td>0.7</td>
<td>12 GB Cap</td>
</tr>
<tr>
<td>Superonline</td>
<td>Fiber</td>
<td>&lt;=100</td>
<td>199</td>
<td>125.9</td>
<td>1.3</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Uydunet (Turksat)</td>
<td>Cable</td>
<td>&lt;=10</td>
<td>99</td>
<td>62.6</td>
<td>6.3</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Uydunet (Turksat)</td>
<td>Cable</td>
<td>&lt;=20</td>
<td>199</td>
<td>125.9</td>
<td>6.3</td>
<td>Unlimited</td>
</tr>
<tr>
<td>Turkcell</td>
<td>HSDPA</td>
<td>7,2</td>
<td>29</td>
<td>18.3</td>
<td>2.5</td>
<td>1 GB Cap</td>
</tr>
<tr>
<td>Vodafone</td>
<td>HSDPA</td>
<td>7,2</td>
<td>30</td>
<td>19.0</td>
<td>2.6</td>
<td>1 GB Cap</td>
</tr>
<tr>
<td>Avea</td>
<td>HSDPA</td>
<td>7,2</td>
<td>29</td>
<td>18.3</td>
<td>2.5</td>
<td>1 GB Cap</td>
</tr>
</tbody>
</table>

28 Source: Interview with Ahmet Hasanbeseoglu from Cisco.
broadband services in a country where competition was somewhat imperfect.

Internet use will likely increase significantly if the cost of accessing the Internet can be reduced. The government should prompt action to reduce taxes on both telecommunication and broadband services. On the supply side the Information and Communication Technologies Authority should continue to actively stimulate competition in the telecommunications sector to promote faster and more affordable Internet access in line with EU initiatives in this area.

Mobile phones can provide an alternative, less expensive channel for delivery of e-services to citizens and businesses. Given the high number of mobile subscribers in Turkey, the government should consider this channel to provide information and services. In this regard a simple, flat and more affordable tax rate applied to communication services could be a good and less distortive option.
Government policies should ensure not only development of broadband infrastructure but also have to ensure that broadband technologies are adopted and used increasingly by the country’s businesses, households and public sector. The previous sections of the report focus on penetration, price, and speed of high bandwidth Internet networks in Turkey and highlight how the country tried to promote competition and encourage investment in order to increase connectivity. This part presents the content and applications created by private, civil and public agents over broadband platforms.

3.1 Government

The period of 2000-2010 can also be called the era of e-government in Turkey. The negotiation process with the EU and the rule of a single party government helped public agencies to design and manage more concerted efforts on e-government applications and infrastructure. Since then Turkey has made strong progress in implementing e-government. The number of services integrated with the e-Government gateway reached 139 (6 fold increase in one year) and the number of visitors increased over half million people (50 fold augmentation in one year) in 2010. While the central government allocated US$ 267 million for 203 e-government projects in 2002, the public investment budget rose to US$ 590 million for 244 projects in the pipeline in 2010. The number of web sites to provide access for public services grew explosively during this period and as of 2010 the total number was above 20 thousand (Figure 3-1).

The share of services provided through electronic channels in total public services reached 66% and the e-services user satisfaction rate was recorded as 95% in 2009. In a benchmarking study conducted by the EU in 2007, the maturity level of 20 basic public services in Turkey scored very much near the EU average and even overtaking slightly the EU score in the business services segment (Figure 3-2).

Table 3-1 presents leading e-government applications implemented in Turkey. These projects have been enablers of e-government and e-transformation in the Turkish public sector. Many of the projects are high volume and high value ones with important transactions on a daily basis such as MERNIS and UYAP. Turkey has also demonstrated good progress in terms of electronic tax returns. The Internet Tax Office has become operational and started to accept declarations and payments online. The Custom Modernization Project, one of the long waited initiatives, finally completed in this period and became effective in 2009. E-government applications also include some public portals to provide up to date information to targeted audiences or to the broader public. The Turkish Foreign Investment Portal, KOBINET and Tourism Portal are examples in this regard.

In the last ten years Turkey has made strong progress to develop e-government applications and infrastructure. Some main findings and policy lessons could be drawn from this transformation process to inform similar countries:

- **Strong political leadership:** One of the reasons for the rapid development of e-government in Turkey is its strong support within the high-level political leadership. E-government leadership is provided by the e-Transformation Turkey Executive Board, chaired by the Deputy Prime Minister. The new government’s modernization agenda considers e-government as a major tool for change.

- **Effective organizational management:** In terms of planning, financing and monitoring functions The Executive Board is aided by the State Planning Organisation (SPO), which is responsible for scrutinizing all public investments. From a broader perspective the SPO has provided necessary technical and organizational services to develop, implement and monitor a coherent strategy for e-transformation in the public sector organizations.

- **A strategic approach to e-government:** Together with line ministries and private sector agencies these organizations

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Figure 3-1: Number of public sector owned websites

Figure 3-2: The maturity level of selected public services, percent, 2007 (Source: European Commission 2007. The Use Challenge Benchmarking The Supply Of Online Public Services)
<table>
<thead>
<tr>
<th>Project</th>
<th>Explanation</th>
<th>Web pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Government Gateway</td>
<td>Launched in December 2008, one stop shop, integrated, multi-channel (internet, mobile, call center) service delivery platform for identification and payments. Mobile portal launched in October 2009 currently 119 public services are integrated.</td>
<td><a href="http://www.turkiye.gov.tr">www.turkiye.gov.tr</a></td>
</tr>
<tr>
<td>Central Census Management System (MERNIS)</td>
<td>Unique ID number for all citizens (over 130 million records</td>
<td><a href="http://www.nvi.gov.tr">www.nvi.gov.tr</a></td>
</tr>
<tr>
<td>Identity Sharing System (ISS)</td>
<td>ID data sharing platform through web services. More than 2,500 agencies, both public and private, signed 19 protocols to use the system. PM Circular dictates public agencies do not require citizens to submit ID records and address information and obliges them to acquire this information through ISS.</td>
<td><a href="http://www.nvi.gov.tr">www.nvi.gov.tr</a></td>
</tr>
<tr>
<td>Address Record System</td>
<td>Citizens address records are integrated with MERNIS through ID numbers.</td>
<td><a href="http://www.nvi.gov.tr">www.nvi.gov.tr</a></td>
</tr>
<tr>
<td>National Judiciary Informatics System (UYAP)</td>
<td>Aims to ensure fast, reliable and robust judicial system. Comprises all of the courts, public prosecutors, prisons, other judicial institutions and other government departments. Serves to some 40,000 officials and judges, 66,000 lawyers and for all citizens. Litigate online case, reach and examine case information. Informs citizens on their cases through SMS. Ministry of Justice announces 2.7 billion € savings with applications of YUAP.</td>
<td><a href="http://www.uyap.gov.tr">www.uyap.gov.tr</a></td>
</tr>
<tr>
<td>Internet Tax Office</td>
<td>Online tax declarations and payments. Online payment of motor vehicle taxes and traffic fines. 99% of tax returns are declared online. OECD study shows unit cost of tax revenue collection decreased from 2 $ to 0.35 $.</td>
<td><a href="http://www.gib.gov.tr">www.gib.gov.tr</a></td>
</tr>
<tr>
<td>Police Network and Information System (POLNET)</td>
<td>Covers 684 locations. Internal applications (26 main applications, 1 search programs and 26 local applications) and some online applications: passport application, driving license (application and information on penalty points), denounced on public order and security, search for lost persons.</td>
<td><a href="http://www.egm.gov.tr">www.egm.gov.tr</a></td>
</tr>
<tr>
<td>Informatics Sector Association</td>
<td>TUBIDER IS Sector Association was founded in November 1999 so as to protect rights and interests of the IT companies operating in the informatics sector and to ensure vocational regulations are implemented. TUBIDER continues its operations having reached to 800 registered members and more than 1,500 applicants.</td>
<td><a href="http://www.tubider.org.tr">www.tubider.org.tr</a></td>
</tr>
<tr>
<td>Accounting Office Automation Project (Say2000)</td>
<td>Network for communication and data transfer for over 6,000 users in 1,660 auditing branches and 39,500 budget offices throughout the country. All financial transactions are processed online and monitored real-time.</td>
<td><a href="http://www.muhasebat.gov.tr">www.muhasebat.gov.tr</a></td>
</tr>
<tr>
<td>Customs Modernization Project</td>
<td>Facilitates legal trade and prevents illegal trade by using ICT. Customs formalities are carried out in a computerized manner in real-time. 100% of customs transactions are processed electronically. Around 6.3 million import and export declarations were processed by using this system in 2009.</td>
<td><a href="http://www.gumruk.gov.tr">www.gumruk.gov.tr</a></td>
</tr>
<tr>
<td>Social Security e-Declaration Project</td>
<td>Social security premiums of employees are declared online. People pay the premiums electronically, verify payments made and outstanding balance. More than 90% of firms process declarations online.</td>
<td><a href="http://www.sgk.gov.tr">www.sgk.gov.tr</a></td>
</tr>
<tr>
<td>Turkish Foreign Investment Portal</td>
<td>Guide for foreign investors on: starting a business, cost of doing business, taxes and incentives, special investment zones, demography and labor force, business environment and business legislation, infrastructure, economic outlook, Investment Support and Promotion Agency assists investors in Arabic, Chinese, English, French, German, Italian, Japanese, Korean, Russian, or Spanish as well as Turkish.</td>
<td><a href="http://www.invest.gov.tr">www.invest.gov.tr</a></td>
</tr>
<tr>
<td>KOBINET for SMEs</td>
<td>Provides information about business environment (marketing, management, taxes, human resources, internet and technology, finance, insurance and labor regulations). Information about firms, online business opportunities, 22,915 members. Provides user ID, password, e-mail address, web pages in 7 languages as free of charge.</td>
<td><a href="http://www.kabinet.org.tr">www.kabinet.org.tr</a></td>
</tr>
<tr>
<td>Tourism Portal</td>
<td>Provides information on history, heritage, life-culture, travel guide, where to go and business.</td>
<td><a href="http://www.goturkey.com">www.goturkey.com</a></td>
</tr>
<tr>
<td>Electronic Signature and Certification Authority</td>
<td>Electronic Signature Law is effective since 2004. Electronic signature has the same legal effect as that of a handwritten signature. Public Certification Authority (PCA) for public agencies. 3 private electronic certificate service providers</td>
<td><a href="http://www.kamusm.gov.tr">www.kamusm.gov.tr</a></td>
</tr>
<tr>
<td>Mobile Electronic Signature</td>
<td>Introduced by a Turkish GSM operator. Initial applications in banking, customs, justice and some local administrations.</td>
<td><a href="http://www.btk.gov.tr">www.btk.gov.tr</a></td>
</tr>
</tbody>
</table>

Table 3-1: Major e-government applications in Turkey  (Source: Author’s compilation)
managed to develop a shared vision and a focused strategy including quantitative targets for outputs and outcomes in order to make e-government happen.

- **Prioritizing projects:** Instead of creating many e-government services Turkey with a clear focus, has managed to prioritize projects that have high volume and high transactions: e-procurement, making social security and health payments, and collecting customs, tax and social security payments etc. This selective list also included projects to establish e-government infrastructure and ICT network platforms to enable provision of e-services.

On the supply side the main challenge for Turkey now seems to be improving Internet access and broadband development. Turkey’s basic communications infrastructure is the telephone line network and the country clearly needs alternative technologies such as fiber networks for next generation broadband services. Internet access costs remain high causing the penetration rates to go flat. Public policy should assume a more pronounced role in terms of ensuring broadband infrastructure development.

Another supply side challenge is increasing the capacity of line ministries and local governments to develop and implement e-government within their respective sectors and in their subordinate agencies. A strong case is needed to make for co-operating rather than developing solutions in isolation. As e-government applications proliferate and the number of projects in the pipeline augment Turkey needs to transform its centralized organizational setup in e-government to a more horizontal and participative one.

An early study conducted by OECD (2001)\(^{30}\) defined lack of ICT skills as a hidden threat to e-government and e-transformation. Turkey’s e-government infrastructure and applications are relatively more advanced than her ICT skill base in public offices. To transform the government by means of e-government Turkey should focus on building appropriate skills and ensure people are willing to work in the public sector.

On the demand side, the results of the Household and Enterprise Use of Information Technologies Surveys carried out by TURKSTAT provides information regarding access to and use of online public services by citizens and enterprises. According to these results, enterprises use public web pages more than the household sector. As of 2008 while 68% of the surveyed enterprises responded that they use public web pages to get information only 26% of households replied the same question positively. During their visit to the public web pages, 91% of households spent time by getting information, 30% by downloading forms and 34% sending information and uploading forms in 2009. With a 92% response share, getting information is among the leading motivation for enterprises visiting public sector web portals. 83% of enterprises get involved in downloading forms whereas 70% responded positively that they filled and sent some forms through web sites. More interestingly 7% of enterprises submitted proposals for public tenders via public web portals.

Individuals who do not visit public web pages responded that the preference to carry out transactions face to face in public offices seems to be the chief reason for not using e-government services. 19% of the group replied the unavailability of online services has prevented them to use public web sites frequently. Likewise 74% of the enterprises not preferring to use public web sites state the major reason for this behavior to be the preference to meet face to face. 44.2% give the reason as the unavailability of the required services online whereas another 36.1% report delays of feedback. Surveys indicate that enterprises need more sophisticated services and the demand for e-government services becomes more developed in the case of business transactions with the public.

Another interesting finding is that a great majority of households and enterprises which do not prefer to use e-government applications report that they are motivated to meet face to face rather than making transactions online. This may be regarded as an indication of a cultural impact on the e-government applications since Turkish people are generally known to be socializers. However since broadband technologies have also transformed the social space and socialization process itself, the Turkish society seems to be in a period of continuing adoption to ICTs and e-government applications.

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Hence the chief policy challenge on the demand side is to provide and maintain good skill creation mechanisms and programs for increased ICT adoption by households and enterprises. Education policy should play a significant role through formal education and lifelong learning programs.

3.2 Electronic commerce
The abilities of enterprises to acquire, generate, and manage knowledge have become a main driver of economic growth. To do this, the adoption of ICT by business and its widespread and efficient use in enterprises has crucial importance. Electronic commerce (e-commerce)
applications have been at forefront of this transformation process.

Within the group of enterprises employing 250 or more employees, 85% have established their own web sites in 2009 (Figure 3-3). In the group of enterprises with 50-249 employees, web site ownership ratio decreases to 76% and in the group of 10-49 employees size, it further declines to 55%. The adoption of e-commerce is positively correlated to financial and managerial capacity of business units and Turkish enterprises have a growing interest in electronic commerce.

According to survey data by TURKSTAT, 77.9% of enterprises have provided product catalogs and price lists through web sites. It is the leading form of e-commerce activity exercised by enterprises. In 2008 44.8% of enterprises reported to engage in marketing of their products and services through internet and 28.4% responded of giving after sales support services. The share of enterprises conducting online purchase order, reservation and registration transactions is 16.3% as of 2008. As e-commerce activities get more sophisticated ability of adoption by enterprises is observed to decrease significantly (Figure 3-4).

E-commerce growth and adoption among Turkish enterprises is uneven and subject to significant variation among different sectors of economic activity (Figure 3-4). The leading economic sector to adopt e-commerce has been tourism services. 21.6% of hotels, motels and camping sites reported to place orders while 28.8% of the same group reported to receive orders via internet. Real estate, motion picture and video activities, wholesale and retail trade and transport and communication sectors are among leading sectors in terms of enhanced e-commerce applications. More industry oriented activities such as construction and manufacturing, by contrast reported somewhat poorer adoption rates of e-commerce than service based sectors.

Banking and financial sector is an interesting example where e-commerce systems have been developed and embedded into business models rapidly. Sayar and Wolfe (2007) found that Turkish banks offer a wider range of services from their internet branches compared to British banks, despite the fact that the UK has a more favorable environment for internet banking in terms of the level of sophistication of its banking sector and technological infrastructure.

While in most of the service-based industries the main motivation is to augment sales and increased market penetration, in the Turkish banking sector the main incentive is lower costs rather than increased sales. Analysts calculate

![Figure 3-5: The benefits reported through e-commerce, 2008](image)

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that an Internet transaction costs a Turkish bank around 5% of the cost of the same transaction in a traditional bank branch.\(^{32}\) Most of the larger commercial banks in Turkey offer Internet-based banking services. Other companies offer online services. The most active are airlines and retailers of books and electrical goods, largest supermarket chains also offer online services.

The data on benefits reported through e-commerce activities can also provide a good example in terms of assessing the relative degree of e-commerce adoption by Turkish enterprises (Figure 3.5). A great majority (70%) of surveyed firms have responded that penetration into new markets and increased sales potential were the foremost benefits after engaging in e-commerce activities. Lower transaction costs and increased turnover with a 60% response share each are among positive effects perceived by these firms. This clearly shows that enterprises are getting aware of the benefits offered by e-commerce applications.

There are also a number of challenges that limit increased adoption of e-commerce. According to the Survey data in 2008 enterprises reported to face following problems: Customers reluctance to use e-commerce applications (56.4%), difficulty to adopt products and services into internet based commerce systems (55%), security issues during payment (48%), uncertainties in legal infrastructure of e-commerce (45.5%), technical issues and problems (42.4%), difficulties to reorganize business models (42.2%), and negative experiences on electronic sales (14.2%).

In other parts of the Survey, enterprises gave increased attention on security issues related to e-commerce applications. More than 17% reported to experience some security problems during their electronic activities in Internet. There are also some indications that the share of enterprises having some problem on security issues is on the rise. Enterprises started to introduce necessary measures to overcome these challenges on two fronts:

- Having installed secure servers (94.9% of the group reported to have at least one server) and software (37.9% reported to have installed firewalls).
- Having employed information specialists (48.6% of the group with 250 and more employees reported to employ information specialists) or even creating their own divisions for this purpose.

E-commerce is growing rapidly in both demand and supply sides. However the degree of adoption differs among enterprises significantly and the size of firms plays a major role in enhancing e-commerce applications. Larger firms with expanded financial and managerial capacity are in favorable condition to develop e-commerce solutions and online services. Smaller enterprises with fewer resources are finding difficult to get involved in these next generation commerce activities.

Government policies should address more rapid and balanced development of e-commerce applications in the enterprises sector. KOSGEB, the agency in charge of assisting small and medium-sized enterprises (SMEs), should increase its efforts and design additional programs to address this challenge. In the past KOSGEB established 55 Internet cafes with instructors to assist SMEs in using the Internet. But this is not sufficient; much more could be accomplished by, for example, working with universities to provide courses in using the Internet, as well as providing counseling and training services in e-commerce to SMEs.

### 3.3 Other Applications: The Rise of Social Media

The development of social media has been rapid in Turkey. While the country is lagging behind in terms of broadband penetration than more advanced economies, Turkey’s youthful population structure makes it a very vibrant market for most social media applications and services. In Turkey, where 70 percent of the population is under 35, online communications is very appealing to young people.

With more than 26 million users, Turkey is one of the 15 largest Internet populations in the world and roughly the size of the Spanish, Italian or Canadian markets. Turkey’s mobile penetration is larger than Internet penetration, which means that people increasingly access social network applications from mobile phones.

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\(^{32}\) Source: Economist Intelligence Unit, news at http://www.ebusinessforum.com/index.asp?layout=rich_story&doc_id=11173&title=Turkey%E2%80%A8%27s+Overview+of+e-commerce&channeldId=4&categoryDId=31
Turkey has the fourth highest Facebook population in the world.\textsuperscript{33} According to one source, Istanbul has been ranked as the city with the second largest number of Facebook accounts in the world with over 9.6 million people. Following Facebook, the most popular social networking services are Mynet Eksenim, Netlog and MySpace.\textsuperscript{34} Twitter and personal blogs have also gained in popularity.

Turkey’s own social media content is growing day by day. According to a recent study conducted by a consulting firm, Turkish websites are getting popular and increasingly diversified. Figure 3 presents a snapshot of the social media landscape in Turkey categorized around different activities (e.g., photo, video, document and music sharing, news services, e-commerce, business networking, social networking, social bookmarking, blogging and micro blogging, customer tracking, etc.). The figure demonstrates that social media are increasingly popular in society and Turkish content creation is at its emerging stage except for news services where there is a natural tendency to utilize the mother language. In the electronic commerce services segment the leading companies are domestic with uniquely designed and developed web applications.

Istanbul recently hosted the World Social Media Forum providing a meeting place for sharing global experiences and knowledge in this regard.\textsuperscript{35} Turkish experience with social media applications presents a useful example for other countries with similar economic and cultural backgrounds.

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
\textbf{#} & \textbf{City} & \textbf{Country} & \textbf{Total Users} \\
\hline
1. & Jakarta & Indonesia & 17 484 300 \\
2. & Istanbul & Turkey & 9 602 100 \\
3. & Mexico City & Mexico & 9 339 320 \\
4. & London & United Kingdom & 7 645 680 \\
5. & Bangkok & Thailand & 7 419 340 \\
\hline
\end{tabular}
\caption{Top cities on Facebook (Source: Socialbakers.com)}
\end{table}

\textsuperscript{33} http://www.ictdata.org/2011/03/monaco-tops-in-facebook-penetration.html


\textsuperscript{35} http://www.worldsocialforum.info/news/european-social-forum-turkey-make-them-pay-for-their-crisis
Figure 3-6: The Turkish social media landscape, 2010
(Source: Ticktock Boom at www.ttboom.com/index.html)
Since the Internet can be viewed as a public good necessary for economic and social development, governments should take part in fostering nationwide internet access. A competitive private sector needs to develop the capability to use e-commerce. E-commerce will develop slowly if there are few Internet users, and users will not develop if charges for connections are high, coverage low, and the Internet provides negligible content and services. This section draws analysis on Internet usage and diffusion by people and enterprises. Discussion herein progresses around issues of how individuals and enterprises in Turkey use the Internet and differences in usage as to gender, age, and where people live – the so-called digital divide.

4.1 People
Household broadband access is relatively low in Turkey compared to European Union members. In 2010 more than three out of five households living in EU countries had a broadband connection while in Turkey the ratio was 34% (Figure 4-1). This relatively low share of broadband access represents a barrier to the take-up of online government services as well as the development of e-commerce.

Significant differences exist within Turkey: between urban and rural areas, men and women, young people and individuals aged 55-74, and individuals with higher education and people without higher education. In 2009 urban areas have 32.5% broadband household penetration whereas rural areas have only 11%. However it is observed that the rural broadband connections are growing at a superior rate than that of urban areas which means the digital divide is getting smaller (another factor is because of the restrained growth of broadband infrastructure nationwide and particularly in largely populated urban centers).

The Internet usage proportion is the highest in the 16 – 24 age group (59.4 %) according to the results of the survey applied to the 16 – 74 age groups. The usage of Internet by women (46%) significantly lags behind the usage of men (74.1%) in 16 – 24 age group and all age groups. Consequently, it is important for the government to seek to increase the proportion of individuals using the Internet through better geographical coverage and by reducing the cost of accessing and using the internet.

The level of education and Internet usage are highly correlated. Internet usage of individuals increases in parallel with their education levels. Internet usage by women with college,
university, and higher education (85.8%) is quite close to the usage levels of men with the same educational background (89%). Those using the Internet most, according to employment status, are students (88.2%), employers (66.1%), waged/salaried employees (56.8%), and the unemployed (41.6%).

A great majority of users (68.2% for females and 51.6% for males) report using the Internet at home. The proportion of home usage by females is significantly surpassing the usage by males. The workplace usage is among the top forms of Internet connection activities among households and more interestingly Internet cafes continue to offer a wide mean for internet in particular for male groups (31.8%). Individuals also report that they are using internet during social activities and visits. (Figure 4-2).

Though home access have greatly increased recently Turkish people still account for a different structure of access type by place. Internet cafe use is much higher and public libraries are not used at all. This finding shows that Internet access from home or workplace is not always the most revealing measures of actual individual internet access for comparison between countries.

Survey data indicate basic Internet activities such as sending email (73%), reading online news (59%), surfing the web and making social connections (64%) are among the leading forms of Internet usage. Usage rates for more sophisticated Internet activities are still relatively low: Internet banking (17%), looking for a job (10%), online education (6%) and selling goods or services (4%).

Analyses show that Turkey faces a number of challenges in Internet usage. First and foremost improving Internet access and broadband development should be a priority on the supply side. Turkey needs to promote a high degree of broadband coverage using appropriate technologies. Initiatives to reduce the digital divide in Turkey should also include expanding the number of computers and computer classes in primary and secondary schools, and providing increased access to the Internet through community use of school computers. Turkey has demonstrated an ambitious case in trying to close the divide in digital literacy between urban and rural areas by means of education policy. The Ministry of National Education (MNE) and local governments have taken part in this collective effort to foster education in digital skills. The number of students per computer is 30.8 in primary schools and 25.1 in secondary schools nationwide. 27,999 information technology (IT) laboratories were established.

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The data come from the Survey results by TURKSAT and figures are for 2009.
1,850 Public Internet Access Points (PIAP), to provide ICT access and ICT competency to citizens, have been completed by the MNE.

Since the early take up of information society and e-transformation initiatives Turkey has launched a motivated program for teaching computer and information literacy in primary and secondary schools, but more is needed. Turkey should provide means to increase computer and information literacy for people who are not in school. Online distance learning programs and new incentives and programs for Internet cafes to provide a social training base for households living in rural areas may constitute the essence of an effective policy mix. The government should also find means to further motivate citizens to use the Internet by demonstrating and informing citizens about the benefits and advantages of accessing information and government services online.

4.2 Business

The business sector has shown somewhat more success in ICT adoption than households. The Turkish business sector has become heavily computerized in the last ten years. Computer usage has become a standard nationwide even in micro sized business units. In 2009 computer penetration rates are as follows: In enterprises with 250 or more employees 99.3%, in enterprises with 50-249 employees 97.7%, in enterprises 10-49 employees 89.5% and in enterprises with 10 or more employees 90.7%.

Similarly Internet access by the business sector has grown explosively and reached a level almost identical to that of computer penetration rates. In January 2010, 90.9% of enterprises with at least 10 persons employed used the Internet. This rate was 98.4% of enterprises with 250 or more employees, while enterprises with 50-249 employees was 96.9% and enterprises with 10-49

Table 4-1: Internet activities of individuals who have accessed the Internet in the last 3 months, by private purposes, %, 2010
(Source: TURKSTAT, Results of the ICT Usage in Households and by individuals, 2010)
employees was 89.7%. 88.8% of enterprises had Internet access in January 2009.

The business sector has demonstrated a major achievement in adopting and utilizing ICTs and broadband. Turkish enterprises have high rate of broadband usage and as compared to EU 27 countries Turkey slightly surpasses the EU averages (Figure 4-3). In terms of connection type the most frequently used access technology in enterprises was DSL with a 94.6% proportion in 2009. However 19.5% of enterprises reported to have access via traditional dial up connections also. Mobile technologies accounted for 13.5% and cable technology had a proportion of 10.2%.

Figure 4-4. portrays how firms are integrating internet usage into internal business process. Two points can be drawn from data: The trends are similar between years and a major change is not observed. Secondly, business units are utilizing online connections most for getting financial services (76.3%) and assessing relevant market trends (78%). Diffusion of internet based
applications into education and training services accounts for lower but still a significant proportion (31.6%) in 2009.

Lack of sufficient number of candidates with the required qualifications and job experience (39.4%) stood out as the main difficulty faced by enterprises when employing information specialists in 2007. While 68.3% of enterprises reported that the salary expectation of specialists were high, a greater proportion of 74.4% stated that the work experience and competency of specialists as being insufficient. Similarly even a greater proportion of 84.5% reported there was very limited number of candidates with required qualifications in 2007. According to the Survey, enterprises, with a proportion of 8.9 % in 2007, had started to run internal training programs to address the skill gap in ICT technologies.

Though the broadband penetration has been somewhat limited compared to more advanced countries, Turkish businesses have adopted a high level of Internet usage, motivated to a large degree by the desire to use government e-services and penetration into new markets. One exception to this fact is the banking sector where the main motivation is cutting costs rather than demand aggregation.

However, this has not resulted in a fully competent business sector with a high level of broadband usage and applications within integral business processes. A large share of small and medium-sized enterprises (SMEs) selling in local markets with few resources find it difficult to learn and develop new marketing channels. These business units are slow to adapt broadband technologies. Industrial structure is increasingly fragmented and innovative collaboration frameworks and programs are needed. This is where the public policy should engage in effective mechanisms and incentive structures to enable a favorable environment for technological take up.

Given that broadband technologies have a very strong stimulus for economic growth, the government might consider means to stimulate business usage through infrastructure development, as well as providing content and e-services over the Internet through various mechanisms. Requiring firms to interact electronically with e-government services should increase private sector use of the Internet. Additionally, increased broadband availability will allow faster development of Internet usage and serve as an important factor in attracting foreign domestic investment in the Turkish economy. Stronger efforts to foster human resource development and to address the ICT skill gap are needed also.

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5.1 The Likely Impacts of High Bandwidth Networks on the Turkish Economy

According to the National Broadband Vision Study of Turkey, through fostering broadband development the Turkish economy could gain US$ 4.9-10 billion extra value added each year thereby boosting its economic growth by 0.8-1.7 percentage points. This economic momentum enabled by an enhanced broadband ecosystem would bring 180,000-380,000 new jobs and provide new income opportunities. This implies that employment creation in new broadband-related activities would eventually compensate for job loss due to process optimization and structural displacements.

Through help of a toolkit the Broadband National Vision Study reports to find a significant growth impact for the Turkish economy fueled by broadband enhancing public policies. In the baseline growth scenario Turkish economy would take off by an annual rate of 5.0 per cent as depicted in Figure 5-1, and it would reach the US$ 1,216 billion GDP level by the end of 2023.

Under the broadband enhancing growth scenario in which a set of active government programs to boost broadband impact are introduced, the economic growth forecast is much faster, with an additional 2.3 percentage points, reaching to 7.3% on annual basis. Government policies targeting enhanced broadband infrastructure and ecosystem will boost economic growth significantly. By 2023 the Turkish economy would have a GDP at USD 1,652 billion rather than USD 1,216 billion of the baseline scenario. This is a GDP level 36% greater than the baseline. It may accurately be called the broadband effect.

The broadband effect encompasses two distinctive categories: Industry benefits (measured as USD 289 billion during 2010-2023) comprising of the overall broadband productivity impacts within and beyond the ICT industry; and pillar effects (measured as USD 147 billion during 2010-2023) which might directly be associated with broadband enhancing policies of the government. Since industry benefits are nearly two times larger than pillar benefits for Turkish economy, broadband enhancing policies should trigger a multiplier effect within the economy and their indirect impacts could potentially outpace the direct effects.

The study also analyzes detailed impacts of enhanced broadband polices on different economic sectors, the so called pillar effects. Pillar effects can be decomposed into different sectors as follows:

- 7 per cent of total pillar effects will come from revitalized small/medium business;
- 6 per cent contribution will arrive from improved government services;
- 4 per cent to come from the benefits of broadband-enabled education;
- 16 per cent to come from a more attractive business environment;
- 67 per cent to come from other sectors, as well as multi-factor productivity and the benefits of collaboration across the economy.

Analyses indicate forecast benefits from increased ICT adoption by the SME sector will be large and e-government applications would provide a significant amount of contribution through cutting costs and improving productivity. Another important policy area that should be focused is education. The main benefit seems to be improvements in the general business

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38 Turkish Prime Minister’s Office (2011), From Silk Road to Broadband: Enabling Economic Growth and Competitiveness, Ankara.
39 Broadband Dynamic Value Assessment (BDVA) is a toolkit that fills a niche between the macroeconomic models that link broadband to aggregate economic growth and models that take a wholly microeconomic approach, measuring specific benefits of broadband by sector or type of usage. The BDVA focuses on broadband implementation objectives of public policy that link broadband penetration rates to “pillars”, which in turn, drive GDP growth. The pillars are essentially proxies for broadband implementation objectives. In this manner, the model user can identify which of these pillars have the greatest impact on GDP growth and use this information to formulate a national policy mix for achieving the greatest benefits from wider broadband usage.
environment. Under the broadband enhanced scenario policies to foster the business environment, 16% of total pillar effects will come from improvements in the business framework alone. The largest one is the multiplier effect. Broadband adoption will bring benefits diffusing beyond the ICT sector through channels of multifactor productivity.

5.2 Factors Contributing to Turkey’s Broadband Development

E-government initiatives have been a major driving force for development of the broadband ecosystem. Turkey has implemented a highly motivated e-government program that created the necessary demand for enterprises in the ICT sector and motivated citizens for increased Internet usage. In this regard Turkey has demonstrated an interesting example that countries with relatively lower level of Internet penetration and usage ratios can exploit e-government programs as a means to ignite development of the broadband ecosystem.

Ensuring a shared vision among political leaders and technocrats has also been an important factor in pushing e-government programs. Since the coming of the new national government into power in 2002, political leaders saw e-government as a central instrument that would support public reforms and larger changes in the political system. A central organizational structure was formulated to develop strategies and put public money into the pipeline for a set of strategically important projects with high value and a high transaction volume.

The EU candidacy of Turkey and the membership negotiation process has provided a good opportunity for the country to reform its ICT and broadband legal and regulative frameworks. This process helped bureaucrats and top-level managers get closer to European institutions, policies and initiatives, and market developments in these sectors.

The high tempo growth of Turkish economy in the last decade is another factor supporting in the Internet revolution. The new national government has implemented ambitious market oriented reforms complemented with a proactive foreign policy which resulted in large sums of overseas capital flowing into the country. Communications, software and hardware segments of ICT industries have expanded rapidly.

5.2.1 Lessons learned
The Connectivity Scorecard is a composite index to assess the relative development level of ICTs (Figure 5-2).\textsuperscript{40} Turkey was found to have a robust consumer infrastructure due to its high mobile and PSTN penetration and also the recent progress in broadband networks. It also scores strong on consumer usage and skills metrics such as frequent Internet usage and uptake of voice services. According to the Scorecard the country’s business infrastructure is above average, with high penetration of secure Internet servers, and substantial business investments in ICT. Turkey also impresses on government-related metrics such as government spending on ICT and provision of government services online.

However the Scorecard points out that Turkey ranks somewhat poorly in business usage and skills, where its score is considerably lower than one might expect given the state of its business infrastructure. Turkey has made considerable progress in developing a robust ICT infrastructure but its weaker usage and skills scores indicate that the country is yet to fully realize its benefits. Therefore, it needs to place greater effort on ensuring the adoption and diffusion of ICTs to leverage competitive power.

Turkey faces a strategic opportunity in terms of broadband infrastructure development. The majority of the national broadband network is based on slower speed connections which do not optimally support advanced applications of next generation connectivity such as e-education, e-health, etc. There are signals suggesting the current broadband network has become somewhat overloaded.

To enhance a rapid take up of high bandwidth broadband networks the government should play a more effective and active role. First and foremost is ensuring effective regulation. The public stake in the incumbent operator should not prevent authorities from enforcing rules for fostering competition in the broadband market. Secondly, Turkey should design a complete and integrated broadband strategy for coordinating various individual pieces in the same direction.

To enable increased ICT and broadband adoption by businesses the government should exercise greater efforts to design effective

\textsuperscript{40} The Connectivity Scorecard is the first index to examine the quality and quantity of ICT usage and infrastructure and to link it to a country’s social and economic prosperity. 25 ‘Resource and Efficiency Driven’ and 25 ‘Innovation Driven’ economies are studied (as defined by the World Economic Forum (WEF)) in this first phase. The first step taken is to divide the economy into 3 ‘pillars’, business, consumer and government and assign weights to these pillars. The greatest weighting is given to the business pillar since it is a key contributor to productivity growth. For each component of the scorecard countries are benchmarked against the best-in-class in their tier. Low scores reflect gaps in a country’s infrastructure, usage or both. For more information see “Connectivity Scorecard” at: http://www.connectivityscorecard.org/methodology/
programs and incentives. In particular skill gaps should be identified and adequately addressed with participation of private initiatives.

The lack of a suitable national accounting framework for more detailed analysis hinders international benchmarking in most emerging policy areas notably ICTs and innovation. Turkey should take measures to address this problem and ensure reliable and timely indicators are developed and made available to the public.


Prime Minister’s Office. 2011. *From Silk Road to Broadband: Enabling Economic Growth and Competitiveness*.


5.1 Online Resources

www.carelink.se/en/mission/sjunet
http://www.dtc.umn.edu/mints/home.php
http://econ.worldbank.org/
www.oecd.org

The Central Bank of the Republic of Turkey at www.tcmb.gov.tr
The Undersecretariat of the Treasury at www.treasury.gov.tr
Invest in Turkey at http://www.invest.gov.tr

Export Promotion Center (IGEME) at www.igeme.org.tr
http://www.turkstat.gov.tr/PreHaberBultenleri.do?id=8450.

Economist Intelligence Unit, news at
view+of+e-commerce&channelid=4&categoryid=31

Ticktock Boom at http://www.ttboom.com/index.html
http://www.connectivityscorecard.org/methodology/
http://www.socialmedia-forum.com/
About *infoDev*

*infoDev* is a global development financing program among international development agencies, coordinated and served by an expert Secretariat housed at the World Bank Group, one of its key donors and founders. It acts as a neutral convener of dialogue—and as a coordinator of joint action among bilateral and multilateral donors—supporting global sharing of information on ICT for development (ICT4D), and helping to reduce duplication of efforts and investments. *infoDev* also forms partnerships with public and private sector organizations who are innovators in the field of ICT4D. *infoDev* is housed in the Financial and Private Sector Development (FPD) Vice Presidency of the World Bank Group.

For additional information about this study or more general information on *infoDev*, please visit [www.infodev.org/publications](http://www.infodev.org/publications).
BROADBAND IN VIETNAM
FORGING ITS OWN PATH

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BROADBAND IN VIETNAM
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AN infoDEV PUBLICATION PREPARED BY:
Tran Minh Tuan
2011
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With some 86 million inhabitants, Vietnam is the 13th most populated country in the world. Its land area is larger than Italy and almost the size of Germany. Wireline broadband has grown over 1,000 percent since 2005 and with 3.6 million subscriptions in 2010, it had the ninth largest network among developing counties. Its wireline broadband penetration is the sixth highest among lower middle-income economies with 4.4 subscriptions per 100 people.

Solid economic growth has coincided with increased broadband usage. Liberalization of the telecommunications sector has led to growing competition with 11 enterprises providing infrastructure. Service providers have developed modern IP-based networks with extensive fiber optic backbones. Incomes have risen so that more people can afford broadband. This in turn has created a virtuous circle with explosive demand creating a larger market, resulting in economies of scale and lower prices. Another factor driving fixed broadband growth is that Vietnam was a latecomer to the IMT-2000 WCDMA mobile broadband technology. Major mobile operators did not launch their networks until 2009 with around 15 percent of mobile subscribers having WCDMA capability towards the end of 2010.

Despite these successes, Vietnam faces challenges broadening broadband access, particularly in rural areas where some 70 percent of the population resides. Young people in urban areas “live” with high-speed Internet access; however, less than one percent of rural households had any type of Internet access in 2008.

Most businesses are focused on using the Internet for basic needs such as email and finding information while more advanced applications such as e-commerce are not used as widely. Despite rising Internet access in households, many users have yet to fully exploit broadband applications. Survey data indicate that the use of a computer’s Internet connection in Vietnam is to search for personal information and serve children’s learning. The lack of relevant content and fragmented information are problems; a public information network with a unified portal, equipped with an automatic translation engine and rich multimedia content covering health, education, culture and agriculture is lacking.

The cost of fiber optic access is only economical in new urban areas and for large enterprises so DSL remains the fixed broadband choice of households. But copper lines provide less quality than fiber and it is difficult to upgrade the transmission capacity. At the same time, telecom enterprises have been lately focusing on developing mobile broadband subscribers to the detriment of the fixed network.

The large number of operators has led to overlap in investment in the access network. Interconnection is difficult because operators use a variety of technologies, impacting standardization of the national telecommunications infrastructure. Intense competition has resulted in price wars threatening long-term sustainability. Service providers are looking to reduce duplication by cooperating on shared infrastructure but so far no specific measures have been implemented.

While Vietnam has made tremendous achievements in broadband, there are challenges arising from its rapid growth: (i) development of the width (e.g., the number of subscribers) needs to be coupled with development of depth (e.g., service quality); (ii) differences in the level of broadband between regions can contribute to widening gaps; and (iii) the rapid development of broadband can cause policy problems affecting social life, security, and politics.
1.1 Geographic and population conditions

The Socialist Republic of Vietnam is located in Southeastern Asia. Its eastern and southern boundaries are largely coastline. To the north is China; Laos and Cambodia are to the west. Vietnam is approximately 331,688 km² in area (not including the Hoang Sa and Truong Sa islands), larger than Italy and almost the size of Germany. The topography consists of hills and densely forested mountains, with level land covering no more than 20%.

The result of the 2009 Census found the population of Vietnam to be 85.8 million on April 1. The Kinh are the dominant ethnic group numbering 73.6 million, accounting for 85.8% of the population. Their population is concentrated in the alluvial deltas and coastal plains of the country. There are 54 ethnic minority groups throughout the country. Most ethnic minorities, such as the Muong, closely related to the Kinh, are found mainly in the highlands covering two-thirds of the territory. The Hoa (ethnic Chinese) and Khmer Krom are mainly lowlanders. The largest ethnic minority groups include the Hmong, Dao, Tay, Thai, and Nung.

There are 63 provinces and centrally administered cities grouped into eight regions: Red River Delta, Eastern North Vietnam, Western North Vietnam, Northern Central Vietnam, Southern Central Vietnam, Southern Central Highlands, Eastern South Vietnam and Cuu Long River Delta. Some 70% of the population resides in rural areas. The lowest administrative division is the commune of which there are 9,121.

The 2009 Census found the literacy rate for the population aged 15 and older to be 94.0%, up from 90.3% in 1999. This ranks Vietnam fourth among the Association of South East Nations (ASEAN) (Figure 1-2, top). However the United Nations Development Programme calculates that Vietnamese ages 25 and older have on average only 5.5 years of schooling, one of the lowest rates in ASEAN (Figure 1-2, bottom).

1.2 Macro-economic environment

Historically, Vietnam has been an agricultural civilization based on wet rice cultivation. The Vietnam War destroyed much of the country’s economy. Upon taking power, the Government created a planned economy for the nation. Collectivization of farms, factories and economic capital was implemented, and millions of people were put to work in government programs. For a decade, united Vietnam's economy was plagued by inefficiency, underproduction and restrictions on economic activities. It also suffered from the trade embargo by the United States and most of Europe after the Vietnam War. Subsequently, trade partnerships with the Communist bloc began to erode.
In 1986, the Sixth Party Congress introduced significant economic reforms with free market economy elements as part of a broad economic reform package called "đổi mới" (Renovation), resulting in a Socialist-oriented market economy. Private ownership was encouraged in industry, commerce and agriculture.

In 2010, the nominal GDP reached US$ 104 billion, with per capita income of US$ 1,100. Vietnam achieved around 7.5% annual GDP growth from 1993 to 2002 and continued between 5.3-8.4% a year between from 2003 to 2010, making it one of the world's fastest growing economies. Growth was 6.8% in 2010. Foreign investment and domestic savings have grown dramatically. Manufacturing, information technology and high-tech industries form a large and fast-growing part of the national economy. Vietnam is a relative newcomer to the oil business, but today it is the third-largest oil producer in Southeast Asia with output of 400,000 barrels per day. Vietnam is one of Asia's most open economies: two-way trade is around 160% of GDP, more than twice the ratio for China and over four times India's.

As a result of several land reform measures, Vietnam is now the largest producer of cashew nuts with a one-third global share, the largest producer of black pepper accounting for one-third of the world’s market and second largest rice exporter in the world after Thailand. Besides rice, key exports are coffee, tea, rubber, and fishery products. However, agriculture’s share of economic output has declined, falling as a share of GDP from 42% in 1989 to 20% in 2006, as production in other sectors of the economy has risen.

Deep poverty, defined as a percent of the population living under $1 per day, has declined significantly and is now smaller than that of China, India, and the Philippines. Much can be attributed to equitable economic policy that aimed at improving living standards and preventing the rise of inequality; this included egalitarian land distribution at the initial stages of đổi mới, investing in poor remote areas and subsidizing education and health fees for the poor.

Vietnam has applied sequenced trade liberalization, using a two-track approach by opening some sectors of the economy to international markets while protecting others. Vietnam was accepted into the World Trade
Among steps taken in the process of transitioning to a market economy, Vietnam has updated its intellectual property legislation to comply with the WTO’s Trade-Related aspects of Intellectual Property (TRIPS).

2 Broadband policy, regulatory framework and institutional framework in Vietnam

2.1 Policy framework

There is no specific definition of broadband in Vietnam. The concept of broadband therefore can vary depending on the circumstances and level of development. When narrowband connections are no longer used as a regular service, there will certainly be a changing of broadband concept.

Currently, Vietnam does not have specific legal documents related directly to broadband. However, telecommunications and Internet development strategies often refer to building the information society based on a modern broadband network infrastructure to meet the economic, political, national security and welfare needs of society.

The legal framework is being modified to institutionalize the market-opening policy and create a fair, just and equal competition environment to match the convergence trend of technology and service.

Major telecommunications and broadband related legal documents are:

- Telecom Law No. 41/2009/QH12 dated December 04, 2009 of the National Assembly and effective from July 01, 2010;
- Radio Frequency Law No. 42/2009/QH12 dated December 04, 2009 of the National Assembly and effective from July 01, 2010;
- Decree No. 25/2011/ND-CP dated April 06, 2011 of the Government detailing and guiding the implementation of a number of articles of the Telecom Law;
- Decree No. 97/2008/ND-CP dated August 28, 2008 of the Government on managing, supplying and using of Internet service and e-information on the Internet;
- Decision No. 158/2001/QĐ-TTg dated October 18, 2001 of the Prime Minister approving of The Vietnam Post and Telecommunications Development Strategy to 2010 and through 2020;
- Decision No. 246/2001/QĐ-TTg dated October 06, 2005 of the Prime Minister approving The Information and Communications Technology Development Strategy to 2010 and through 2020
- Decision No. 1755/QĐ-TTg dated September 22, 2010 of the Prime Minister approving The Project “Making Vietnam to soon become a strong country in the field of information technology and communications”;
- Decision No. 32/2006/QĐ-TTg dated February 07, 2006 of the Prime Minister approving The Master Plan of Telecommunications and Internet Development to 2010;
- Direction No. 04/2008/CT-BTTTT dated May 22, 2008 of the MIC Minister on Management and development telecommunications infrastructure.

2.1.1 Direction of ICT development

In recent years, Vietnam has issued several breakthrough directives to promote the development of the ICT field. In that respect some have been institutionalized, including Decision No. 1755/QĐ-TTg dated September 22, 2010 of the Prime Minister “Approving the Scheme to Early Make Vietnam a Country Strong in Information and Communication Technologies.” This decision sets out the country’s vision and goals for becoming a leading ICT nation by 2020. It envisions several economic and social goals including:

- Internationally recognized ICT human resources
- Software and Digital Content Industry becoming a key driver of the economy
- Nation-wide broadband infrastructure
- ICT usage in all aspects of life, contributing to sustainable development

3 http://lawfirm.vn/?a=doc&id=2083
and enhancing the transparency of the government agencies.

- Annual ICT revenue growth rate doubles the GDP growth rate.

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<td>- 80% of students of ICT graduated from universities qualified in both English and professional skills to join international labor market.</td>
<td>- Formed research institutions - to develop a strong ICT.</td>
<td>- Broadband network to almost of the villages throughout the country;</td>
<td>- Most households have telephones.</td>
<td>- Improving the performance of Vietnamese ICT enterprises and corporations in both service and manufacturing sectors.</td>
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<td>- Total number of people working in ICT industry reaches 1 million including domestic and international markets.</td>
<td>- Vietnam is among 10 leading countries providing outsourcing services and digital content.</td>
<td>- Mobile broadband coverage to 95% of the population;</td>
<td>- 50-60% of households across the country have computers and broadband Internet access.</td>
<td>- Vietnamese ICT businesses operate at ASEAN and world scale, of which some having total revenues up to $15 billion.</td>
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<td>- 70% population using the Internet</td>
<td>- The software industry and IT-based services become the industry’s fastest growing industries in the economic - technical high proportion of GDP.</td>
<td>- Vietnam ranks 55 or higher in the rankings of the ITU (group of one third leading countries).</td>
<td>- Most households have television capable of watching digital channels in different ways.</td>
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Table 2-1: Objectives for making Vietnam a leading ICT country

In 2020, ICT share in GDP reaching 8-10%
• Up to 2015: Basically complete the broadband network to communes nationwide, connect all schools to Internet; mobile broadband signal to cover 85% of the population;
• Up to 2020: Complete the broadband network to most of the villages; mobile broadband signal to cover 95% of the population;
• Up to 2015: 20 - 30% of households have computer and broadband Internet access;
• Up to 2020: 50 - 60% of households have computer and broadband Internet access, in which 25 - 30% use fiber optic cable;
• Up to 2015: provide most of basic online public services to citizens and enterprises at level 2 and level 3 (download forms, interchange information and send/receive records through the network);
• Up to 2020: Most of basic public services are online provided to citizens and businesses at level 4 (service fee payment, receive results of service online).

### Table 2-1: Objectives for making Vietnam a leading ICT country

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<th>Human resources</th>
<th>ICT Industry</th>
<th>Broadband Infrastructure</th>
<th>Universalizing Information</th>
<th>ICT Usage</th>
<th>ICT Business and Market Development</th>
</tr>
</thead>
<tbody>
<tr>
<td>– 80% of students of ICT graduated from universities qualified in both English and professional skills to join international labor market.</td>
<td>Formed research institutions to develop a strong ICT.</td>
<td>Broadband network to almost of the villages throughout the country.</td>
<td>Most households have telephones.</td>
<td>Vietnam is in the group of one third leading countries in the ranking of the United Nations about e-government readiness.</td>
<td></td>
</tr>
<tr>
<td>– Total number of people working in ICT industry reaches 1 million including domestic and international markets.</td>
<td>Vietnam is among 10 leading countries providing outsourcing services and digital content.</td>
<td>Mobile broadband coverage to 95% of the population.</td>
<td>50 - 60% of households across the country have computers and broadband Internet access.</td>
<td>Improving the performance of Vietnamese ICT enterprises and corporations in both service and manufacturing sectors.</td>
<td></td>
</tr>
<tr>
<td>– 70% population using the Internet.</td>
<td>The software industry and IT-based services become the industry’s fastest growing industries in the economic-technical high proportion of GDP.</td>
<td>Vietnam ranks 55 or higher in the rankings of the ITU (group of one third leading countries).</td>
<td>Most households have television capable of watching digital channels in different ways.</td>
<td>Vietnamese ICT businesses operate at ASEAN and world scale, of which some have total revenues up to $15 billion.</td>
<td></td>
</tr>
</tbody>
</table>

- 70% population using the Internet.
2.1.2 Policy of broadband development
Vietnam does not have a separate broadband development policy. However, through the directions of ICT development, broadband is covered in the specific policies relating to network infrastructure, technology of providing services and contents for socio-economic development.

2.1.3 Operator ownership guidelines
Decree No.25/2011/ND-CP provides enterprises regulations in the field of telecommunications. The decree specifies new guidelines for the execution of several articles of the Telecommunication Law relating to ownership ratios, foreign investment, fees and authorized capital. The ownership ratio limitation has impacted the two large mobile networks in Vietnam.

Pursuant to this new decree, an organization or individual who owns over 20 percent of the charter capital or stake in one telecommunications company will not be allowed to hold more than 20 percent of the charter capital or stake in other telecommunications firms operating in the same services.

Due to this regulation, one of the major telecommunications operators in Vietnam, the Vietnam Post and Telecommunication Group (VNPT), is in a dilemma. VNPT Group, which currently owns 100 percent capital of the two big mobile networks Mobifone and Vinaphone, may be forced to sell one of the two networks or merge its two affiliates into one in order to be in accordance with the new rules. At present, there still has not been an official plan or solution submitted by VNPT to the Ministry of Information and Communication (MIC) on this matter. While the merger plan has not been proposed, it is said that schedule of equitizing Mobifone has been determined and VNPT is going to announce and implement the plan that has been delayed for quite a long time.

As per Clause 4.2 of Decree No.25/2011/ND-CP, although full foreign ownership of an operator in the Vietnamese telecom sector is not allowed, overseas investors can enter into business cooperation contracts or joint ventures with licensed Vietnamese operators.

2.1.4 Technology guidelines
Regulatory policies related to broadband infrastructure are relatively neutral. Nevertheless, Vietnam is not a technology producer but rather a technology-applying nation, so it prefers technologies that have global mass deployment. One of the most important deployment success factors is that the network equipment is inexpensive and advanced and that terminal devices are diverse with a reasonable price. In addition, application of common technologies will allow Vietnam to have better and deeper international exchange and cooperation (roaming from Vietnam to other countries and vice versa).

For new technologies, the MIC reviews trends applied in the world, develops appropriate frequency planning and make standards and recommendations for enterprises to follow. MIC suggests that enterprises apply new technologies used in advanced countries. There will be a trial license issued by MIC for a certain period in specified areas before allowing mass deployment. There is a risk in wasted investment or even bankruptcy if the selected technology does not achieve widespread market acceptance. One example is Hanoi Telecom that has to

Hanoi Telecom launched its CDMA network in November 2006 and started deploying its services in January 2007. The operator has installed about 800 base stations throughout the country and has invested US$656 million towards its platform, making it one of the largest telecoms projects in Vietnam. By the end of 2007, Hanoi Telecom’s mobile service, HT Mobile, was reported to have just fewer than 200,000 customers. Disappointed with its progress, Hanoi Telecom started to migrate its subscribers to a GSM network offering from April 2008. The operator signed its single largest contract with Ericsson in September 2008, to migrate its network from CDMA to GSM/EDGE technology at a cost of US$450 million. As part of a three-year agreement, the vendor will be responsible for the management, operation and network design of Hanoi Telecom’s mobile network. The operator re-launched its mobile services under the name of Vietnamobile.

Customers choosing to stay with HT Mobile will receive a new GSM handset. However, those who choose to retain CDMA service will be switched to the CDMA network of mobile operator S-Fone. HT Mobile decided to implement the transition after failing to reach its target of 1 million customers by the end of 2007.


Box 2-1: Hanoi Telecom: From CDMA to GSM
Hanoi Telecom launched its CDMA network in November 2006 and started deploying its services in January 2007. The operator has installed about 800 base stations throughout the country and has invested US$656 million towards its platform, making it one of the largest telecom projects in Vietnam. By the end of 2007, Hanoi Telecom’s mobile service, HT Mobile, was reported to have just fewer than 200,000 customers. Disappointed with its progress, Hanoi Telecom started to migrate its subscribers to a GSM network offering from April 2008. The operator signed its single largest contract with Ericsson in September 2008, to migrate its network from CDMA to GSM/EDGE technology at a cost of US$450 million. As part of a three year agreement, the vendor will be responsible for the management, operation and network design of Hanoi Telecom’s mobile network. The operator relaunched its mobile services under the name of Vietnamobile.

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**2.1.5 Service guidelines**

Services based on broadband infrastructure are regulated by the content of the service. Regulations differ depending on the service such as: online gaming, distance learning, banking and e-commerce transactions, etc.

Online gaming services are being managed carefully regarding content and technical conditions to ensure that the youth are not addictive and it matches recreational needs of users.

Content services are not diverse and abundant at the present. This relates to promotion policy of the enterprise and also relates to the improving ICT skills for users policy.

**2.2 Institutional structure**

**2.2.1 Government institutions involved in broadband**

As with most governments, setting policy for a complex sector like telecommunications requires action from multiple ministries and agencies. Given the complexity of the telecommunications sector and its impact on the entire economy, Vietnam’s policy-making includes multiple organizations (Table 2-2).

**2.2.1.1 The Ministry of Information and Communications (MIC)**
The Ministry of Information and Communication (MIC) was created in 2007 from its predecessor, the Ministry of Post and Telecommunications as well as several departments from the Ministry of Culture and Information. The MIC is responsible for both policy and regulation. Its mandate covers a range of fields including press; publishing; posts; telecommunications and Internet; radio frequency; information technology; electronics; broadcasting and management of public services on behalf of the government.

MIC’s main functions include submitting drafts of laws, ordinances, regulations, strategies and development plans to the Government. It also provides guidance on the implementation of laws, ordinances and regulations as well as development strategies and plans.

The Viet Nam Telecommunications Authority (VNTA) was established under the MIC by merging two units under the former Department of Telecommunications and Authority of Information and Communications Technology Quality Control, in August 2011. The VNTA assumes regulatory activities including advice on management of the telecommunications sector on a national scale. Specifically, the VNTA will focus on monitoring the implementation of the commitments of operators and supervision of infrastructure development. The VNTA will also be the focal point for management, supervision and inspection of regulations on tariffs and quality of service as well as telecommunications sector promotion. Competition issues, disputes and complaints between operators in the telecommunications sector shall also be reviewed by VNTA.

The Vietnam Internet Network Information Center (VNNIC) is a government agency under the MIC established in 2000. It manages the country’s Internet resources including domain names, addresses, and autonomous system numbers as well as the Vietnam National Internet eXchange (VNIX).

2.2.2 Major telecom operators

Vietnam has a high degree of competition in its telecommunications sector with a number of operators providing services (Table 2-3). Eight provide fixed telephone services, seven offer 2G mobile services and five offer 3G services. In addition there are 90 licensed Internet Service Providers (ISPs) although the top five control 99% of the market. Most operators are owned by the government or state-owned corporations. Some have foreign partners although the structure of the investment is often not straightforward.

2.2.2.1 Vietnam Posts & Telecommunications (VNPT)

Wholly owned by the government, Vietnam Posts and Telecommunications (VNPT) is the country’s main service provider. The group’s holdings span a range of activities ranging from telecom services to equipment manufacturing as well as postal and financial services (Figure 2-1). VNPT operates the national backbone network.

Table 2-2: Allocation of major responsibilities in telecommunications policy

<table>
<thead>
<tr>
<th>Responsibility</th>
<th>Agency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Draft laws, ordinances, strategies</td>
<td>Vietnam Telecommunications Authority (VNTA)</td>
</tr>
<tr>
<td>Draft development plans</td>
<td>Vietnam Telecommunications Authority (VNTA)</td>
</tr>
<tr>
<td>Management of public services</td>
<td>Vietnam Telecommunications Authority (VNTA)</td>
</tr>
<tr>
<td>Management of telecommunications sector</td>
<td>Vietnam Telecommunications Authority (VNTA)</td>
</tr>
<tr>
<td>Management of Internet resources</td>
<td>Vietnam Internet Network Information Center (VNNIC)</td>
</tr>
</tbody>
</table>

5 Viet Nam Telecommunications Authority.
that connects the provincial operating companies in 63 cities and provinces and
<table>
<thead>
<tr>
<th>Agency</th>
<th>Responsibilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deputy Prime Ministers (DPMs)</td>
<td>Of the five DPMs, one holds the portfolio for telecommunications as an economic sector, one holds the portfolio for ICT as science and technology sector.</td>
</tr>
<tr>
<td>Office of Government (OOG)</td>
<td>This office serves as the PMs and DPMs secretariat and clearing house, and also coordinates interdepartmental policy and institutional initiatives. OOG also has one department holds the portfolio for telecommunications as an economic sector, one department holds the portfolio for ICT as science and technology sector.</td>
</tr>
<tr>
<td>Ministry of Information and Communications (MIC)</td>
<td>Sets policy for and regulates the ICT sector, representative of the State’s capital interests in facility-based operators.</td>
</tr>
<tr>
<td>Ministry of Industry and Trade (MoIT)</td>
<td>Sets policy and develops legislation and programs for e-commerce and trade.</td>
</tr>
<tr>
<td>Ministry of Science and Technology (MOST)</td>
<td>Develops R&amp;D programs for telecommunications and ICT, sets ICT standards. Was formerly the chief policy actor in ICT, but this role was changed with the creation of MIC.</td>
</tr>
<tr>
<td>Ministry of Planning and Investment (MPI)</td>
<td>Ensures sufficient and timely investment is available for approved development in IT (defined broadly to include telecommunications).</td>
</tr>
<tr>
<td>National Steering Committee on ICT</td>
<td>Monitors implementation of the national IT plan (which covers telecommunications, ICT, and the ICT projects, functions and responsibilities of all ministries and agencies).</td>
</tr>
<tr>
<td>Operator</td>
<td>Date est'd</td>
</tr>
<tr>
<td>---------------</td>
<td>------------</td>
</tr>
<tr>
<td>VNPT</td>
<td>1995</td>
</tr>
<tr>
<td>Viettel</td>
<td>1998</td>
</tr>
<tr>
<td>Vietnam Mobile Telecom Services (VMS) “Mobifone”</td>
<td>1996</td>
</tr>
<tr>
<td>Vinaphone</td>
<td>1996</td>
</tr>
<tr>
<td>S-Fone (S-Telecom)</td>
<td>2003</td>
</tr>
<tr>
<td>Hanoi Telecom</td>
<td>2001</td>
</tr>
<tr>
<td>EVN Telecom</td>
<td>2006</td>
</tr>
<tr>
<td>FPT</td>
<td>2003</td>
</tr>
<tr>
<td>GTEL</td>
<td>2009</td>
</tr>
</tbody>
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**2.2.2.1 Vietnam Posts & Telecommunications (VNPT)**

Wholly owned by the government, Vietnam Posts and Telecommunications (VNPT) is the country's main service provider. The group’s holdings span a range of activities ranging from telecom services to equipment manufacturing as well as postal and financial services (Figure 2-1). VNPT operates the national backbone network that connects the provincial operating companies in 63 cities and provinces and that connects the provincial operating companies in 63 cities and provinces and directly controls the country’s two leading mobile operators, Vietnam Telecom Company (VinaPhone) and Vietnam Mobile Telecom Services (MobiFone), both operating GSM networks. VNPT controls 63% of the fixed telephone market, 54% of the mobile market (through VinaPhone and MobiFone) and 69% of the Internet market.

VNPT owns eight state-affiliated companies, eight joint ventures (with other state-owned enterprises as well as with private entities) and 13 other subsidiaries. In addition to VinaPhone and MobiFone, the state companies include Vietnam Telecom National (domestic services), Vietnam Telecom International (international long-distance services) and Vietnam Data Communication Company (data services).

### 2.3 Conclusions

Vietnam has made important fundamental changes to its legal environment with the objective of creating a robust and competitive telecommunications sector, which in turn provides the foundation for economic growth for telecommunications and IT-enabled business. However, Vietnam’s reform process remains incomplete. There are concerns that the country’s policies limit private sector and foreign investment. In terms of transparency of regulations, the current regulatory environment does not fully meet international norms of independence, and this effects licensing, non-discriminatory interconnection and cross-subsidies in tariffs. These issues produce uncertainty and risk for new market entrants and investors, which in turn limits network expansion, the introduction of new services and overall economic growth.

Fully liberalizing Vietnam’s telecommunications sector, however, is not a short-term proposition; rather the process requires a long-term approach that impacts on three primary government activities: developing a strategy and policy; providing the legal foundation for action, for example, through laws and regulations; and ensuring efficient implementation of a consistent and transparent regulatory environment that will ensure effective policy implementation and compliance.

---

**Table 2-1: Allocation of major responsibilities in telecommunications policy**

**Table 2-3: Main telecommunications operators in Vietnam**
**Figure 2-1: VNPT Group**

<table>
<thead>
<tr>
<th>Operator</th>
<th>Date established</th>
<th>Ownership</th>
<th>Services</th>
<th>Market share (2009)</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>VNPT</td>
<td>1995</td>
<td>Government</td>
<td>Fixed Internet</td>
<td>63.2% - 68.6%</td>
<td>Controls mobile operators Mobifone and Vinaphone</td>
</tr>
<tr>
<td>Viettel</td>
<td>1998</td>
<td>Government</td>
<td>Fixed GSM Internet 3G</td>
<td>21.4% - 33.8%</td>
<td>The operator is looking to expand its presence overseas. Already active in Cambodia, Haiti and Laos, Viettel aims to expand its reach into 15 countries by 2015.</td>
</tr>
<tr>
<td>Vietnam Mobile Telecom</td>
<td>1994</td>
<td>Subsidiary of VNPT</td>
<td>GSM 3G</td>
<td>37.2%</td>
<td>Comvik International under the Sweden Kinnevik had a Business Cooperation Contract (&quot;BCC&quot;) with the government to operate Mobifone. The BCC expired in May 2005 and Comvik was unsuccessful in negotiations to convert the BCC to an equity stake. Mobifone plans for a public offering of the company’s shares.²</td>
</tr>
<tr>
<td>S-Fone (S-Telecom)</td>
<td>2003</td>
<td>Saitien Postal Corporation (SPT)</td>
<td>CDMA (fixed wireless) CDMA (mobile) Internet</td>
<td>9.9% - 4.7% - 1.8%</td>
<td>S-Fone was a BOT between Saigon Postel and SLD, a Singapore based- consortium comprising Korea’s SK Telecom, LG Electronics and Dong Ah. In April 2010, SPT acquired control of S-Fone. SPT and SK Telecom changed their business cooperation contract into a JV for managing the Vietnamese operator. SPT will refund the capital invested by SK Telecom and the Korean operator will hold a minority stake in the JV.</td>
</tr>
<tr>
<td>Hanoi Telecom</td>
<td>2001</td>
<td>Hanoi People’s Committee and the Vietnam Science Institute</td>
<td>GSM 4G (with EVN Telecom)</td>
<td>4.1%</td>
<td>Offers mobile through the brand Vietnamobile in partnership with Hutchison Group of Hong Kong, China.</td>
</tr>
<tr>
<td>EVN Telecom</td>
<td>2004</td>
<td>Electricity of Vietnam (E VN)</td>
<td>CDMA (fixed wireless) CDMA (mobile) Internet 4G (with Hanoi Telecom)</td>
<td>14.3% - 0.9% - 9.2%</td>
<td>EVN is the largest CDMA operator in Vietnam using the 450 MHz band.</td>
</tr>
<tr>
<td>FPT</td>
<td>2003</td>
<td>Corporation for Financing and Promoting Technology</td>
<td>Internet</td>
<td>13.7%</td>
<td>Operates GSM network in partnership with</td>
</tr>
<tr>
<td>GTEL</td>
<td>2009</td>
<td>Affiliated</td>
<td>GSM</td>
<td>2.2%</td>
<td></td>
</tr>
</tbody>
</table>

² “Mobifone to hold IPO this year.” TeleGeography, February 17, 2011.
Table 2-2: Main telecommunication operators in Vietnam  
(Source: Adapted from operator and MIC information)

<table>
<thead>
<tr>
<th></th>
<th>with Ministry of Public Security</th>
<th>Vimpelcom of Russia</th>
</tr>
</thead>
</table>
3 Broadband technologies and market in Vietnam

3.1 Broadband infrastructure

In Vietnam, telecommunications operators are gradually building and completing Next Generation Network (NGN) infrastructure. This makes competition in Vietnam's telecommunications market increasingly vibrant and provides customers many new services at reasonable prices.

The backbone network has great reliability by using multiple fiber optic cables and microwave. The inter-provincial transmission network has been liberalized in all provinces and cities.

In 2008, Vietnam successfully launched the Vinasat I satellite opening a new chapter in the history of the country’s telecommunications sector. Information can be transmitted to all regions of the country: mountainous area, border and sea, island and all means of traffic on the territorial waters. Information exchange with other countries is enhanced. Many new information services can be provided such as e-commerce, e-customs, e-banking, e-library, remote health, remote education, remote meeting, etc.

However, legacy systems continue to operate. Ring configuration has not been completed to ensure the redundancy of the network. Equipment comes from many different providers making it difficult to manage and develop the network.

3.1.1 Structure of broadband network in Vietnam

Vietnam has not built a unique and shared national broadband network yet. According to the MIC, eleven enterprises have been granted licenses to build network infrastructure. However, in practice, only three major companies have built telecommunications network infrastructure on a national scale (Viettel, VTN (VNPT), EVN Telecom). These networks are interconnected with each other.

In terms of physical structure, the Vietnam telecommunications network is divided into two main layers:

- The core/transmit layer: includes transmission and switching systems;
- The access layer: Wireline access systems include copper and optical cables access. Wireless access systems include mobile communication and fixed wireless access.

The backbone network in Vietnam is built on fiber optic technology using DWDM and SDH. The backbone system is basically divided into three levels: (i) International level, including satellite earth stations, submarine landing stations and overseas switching, (ii) National level (inter-province), including backbone route and national transit exchange, (iii) Provincial level, including inner-provincial transmission lines, host exchanges, branch exchanges and inner-provincial exchanges (tandem).

Vietnam's large coastline is an advantage for connecting to submarine fiber optic cable systems. The country's international Internet bandwidth has grown dramatically, increasing 36 times between 2005 and 2010 and stood at 194 Gbit/s in July 2011 (Figure 3-1). The Vietnam National Internet Exchange (VNIX) was launched in 2003. The leading ISPs are connected with 95 Gbit/s of capacity. The exchange handled 89,195,660 Giga bytes of traffic in July 2011.

The voice and data networks converge on the NGN common network. To meet market needs, all facilities-based telecommunications enterprises are changing their network to the NGN model based on the existing backbone network. This involves building a new core NGN and adapting the existing Public Switched Telephone Network (PSTN) into the NGN architecture. Operators are exploiting new services based on NGN, such as Internet TV (MegaWan of VNPT), virtual private networks, prepaid VoIP services, etc.
3.1.2 Fixed broadband technologies
When the Internet began to be offered in Vietnam, accessing it via dial-up had low speeds, high tariffs and poor quality. Broadband Internet allows users to connect to the Internet easily with access technologies such as ADSL, leased line and FTTH (Fiber to the home). Dial-up is now no longer growing and tends to decrease due to low speed.

At present, most Internet users are using ADSL. Fiber to the Premise (FTTx) is a new technology deployed by service providers. Although FPT, VNPT, NetNam, Viettel and SPT have deployed FTTx broadband access technology, it is currently not a viable mass solution for broadband access due to the high price. Telecom companies provide FTTx broadband service in major cities such as Hanoi and Ho Chi Minh. However, clients are mainly institutions, businesses and apartment buildings.

To meet the business demand for broadband Internet access, Vietnam telecommunications enterprises are now deploying MetroNET access services (Metropolitan Area Network – MAN broadband service). MetroNET broadband service links industrial zones, big commercial centers, software parks, hi-tech parks, new urban areas, etc. with significant data transmission traffic.

3.1.3 Wireless broadband technologies
Mobile networks now cover the entire country (to the center of provinces/cities). Vietnam was one of the early countries to deploy GSM technology. Since 2002, CDMA technology has also been used, and from late 2009, 3G mobile networks based on WCDMA technology are being deployed with four licensed operators: Viettel, Vinaphone, MobiFone and a partnership of EVN and HT Mobile.

Up to now, Vietnam has granted trial WiMAX licenses using the 802.16e standard in the 2.3 - 3.3 GHz band (compared to 800-1800 MHz for 2G and 1900-2100 MHz and 2200 MHz for 3G). WiMAX service was first implemented in Lao Cai province in 2006. Until now, WiMAX is still considered to be in “trial” even though pilots have been going on for a number of years. Although the pilot programs were intended to be a precursor to the official selection of a number of WiMAX service providers, the government ultimately decided to postpone its decision due to unfavorable market conditions; these included the high cost of the WiMAX CPE equipment, delays in the 3G licensing schedule, and the regulatory change caused by the creation of the MIC.

Accessing the Internet via satellite is also deployed although it is mainly offered for large enterprises that have need of leased lines.

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In April 2010, Vietnam’s Ministry of Information and Communications (MIC) announced its intention to invite proposals for a 4G plan in the country. Given that several operators had already conducted trials of WiMAX services, it is thought that WiMAX would emerge as the preferred technology for developing 4G networks. The MIC sought to ensure that either WiMAX or LTE technology could be used for deploying 4G wireless broadband.

In September 2010, the MIC granted trial LTE licenses to five operators: VNPT, Viettel, FPT Telecom, CMC and Vietnam Television, Technology, Investment and Development Company (VTC). According to the terms of the license, the companies will be allowed to operate LTE networks over a trial period of 12 months. The MIC’s Telecommunications Department director said that operators will be required to participate in an auction in order to be granted a 4G license.

Also in September 2010, it was announced that Vietnam Data Communication Company (VDC) and Russia’s Antares had reached an agreement to build a trial LTE network. The Russian firm plans to invest US$2 million while VDC will be responsible for obtaining the license and securing the infrastructure and equipment. Testing with 15 LTE base transceiver stations began on October 20, 2010 in Hanoi.

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**Table 3-1: 4G trials (Source: MIC 2011)**

<table>
<thead>
<tr>
<th>Operator</th>
<th>4G license date</th>
<th>Pilot launch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vietnam Post and Telecom (VNPT)</td>
<td>Mar-06</td>
<td>Trials carried out in Hanoi, Ho Chi Minh City and Lao Cai</td>
</tr>
<tr>
<td>Vietnam Multimedia Corporation (VTC)</td>
<td>Mar-06</td>
<td>Trials carried out in Hanoi and Ho Chi Minh City</td>
</tr>
<tr>
<td>FPT Telecom</td>
<td>Mar-06</td>
<td>To carry out trials of both wireless and wireline WiMAX</td>
</tr>
<tr>
<td>EVN Telecom</td>
<td>Jan-07</td>
<td>To carry out trials of both wireless and wireline WiMAX</td>
</tr>
<tr>
<td>Viettel</td>
<td>Mar-08</td>
<td>To carry out trials of wireless WiMAX</td>
</tr>
<tr>
<td>Saigon Postel Corporation</td>
<td>Mar-08</td>
<td>Trials to be carried out in Ho Chi Minh City and one neighboring province</td>
</tr>
<tr>
<td>VNPT, Viettel, FPT Telecom, CMC and VTC</td>
<td>Sep-10</td>
<td>To carry out trials of LTE for 12 months</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Operator</th>
<th>4G license date</th>
<th>Pilot launch</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vietnam Post and Telecoms (VNPT)</td>
<td>Mar-06</td>
<td>Trials carried out in Hanoi, Ho Chi Minh City and Lao Cai</td>
</tr>
<tr>
<td>Vietnam Multimedia Corporation (VTC)</td>
<td>Mar-06</td>
<td>Trials carried out in Hanoi and Ho Chi Minh City</td>
</tr>
<tr>
<td>FPT Telecom</td>
<td>Mar-06</td>
<td>To carry out trials of both wireless and wireline WiMAX</td>
</tr>
<tr>
<td>EVN Telecom</td>
<td>Jan-07</td>
<td>To carry out trials of both wireless and wireline WiMAX</td>
</tr>
<tr>
<td>Viettel</td>
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<td>Sep-10</td>
<td>To carry out trials of LTE for 12 months</td>
</tr>
</tbody>
</table>

Table 3-2: 4G Trials
(Source: MIC)

3.2 Status of broadband market in Vietnam

3.2.1 Fixed broadband
The fixed broadband Internet market in Vietnam is dominated by ADSL technology and has shown rapid growth. By the end of 2010, Vietnam had 3.6 million ADSL subscribers (increasing 17 times compared to 2005, Figure 3-2, top). FTTX and cable TV broadband also exist but so far account for less than 5% of total fixed broadband subscriptions. With a fixed broadband subscription penetration of 4 per 100 people, Vietnam ranks in the middle of comparisons with other Asian nations (Figure 3-2, bottom). Its fixed broadband penetration is the highest of any middle or low-income economy in the region.

With decreasing dial-up subscribers, the broadband Internet service is dominant and favored by customers for its flexibility, convenience, and speed. The types of service are diverse and there are different packages suitable to a variety of different clients. For example VNPT, the largest ADSL provider offers five different packages ranging in speed from 1.5 to 8 Mbit/s with the lowest speed available on a prepaid basis (Figure 3-2, top). Vietnam’s ADSL tariffs are the lowest in comparison to other countries analyzed for the World Bank’s broadband case studies (Figure 3-2, bottom).

The quality of Internet services is increasingly improving to meet market requirements. However, there are some service providers competing on the number of subscribers rather than the quality of services. In 2010, Vietnam’s fixed broadband subscriptions increased 26.7%. In 2009, the broadband market grew by 44.8% and, in the previous year, it increased by 58.3%. The slowing growth reflects the impact of competition from the 3G mobile sector, where the major operators are offering affordable mobile broadband services.
Fiber-to-the-Premises (FTTP) services were first trialed in Vietnam in December 2006. The fastest FTTP service delivers speeds of 100 Mbit/s, but the service costs VND 16 million (US$846) per month. However, prices are expected to come down once the technology matures and competition kicks in.

3.2.2 Wireless broadband

As discussed earlier, a number of trial WiMAX licenses have been issued and pilots are being carried out throughout different locations in the country. However, WiMAX has yet to be deployed on a major commercial basis.

The country’s CDMA operators have introduced mobile broadband using the EV-DO technology. EVN Telecom launched EV-DO in February 2006, S-Fone in October 2006 and Hanoi Telecom (Vietnamobile) in January 2007. One example of the technology’s use is to provide wireless broadband for connecting schools to the Internet.

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The objective of “Training Online Programs and Incubation for Communities - 64 Provinces” is to provide IT skills training and improved communications to underserved portions of the country by equipping 64 community technology and learning centers (CLTC) throughout Vietnam with computers, software, Vietnamese textbooks and, wireless CDMA2000 1x and 1xEV-DO service for Internet access (in 450 MHz).

The partners are Hanoi Polytechnic University’s Center for Research and Consulting on Management; EVN Telecom; Microsoft Corporation and the United States Agency for International Development.


Box 3-1: TOPIC64

In August 2009, the four winners of Vietnam’s third generation (3G) WCDMA mobile concessions were issued licenses. The recipients were military-owned Viettel, VNPT subsidiaries Mobifone and Vinaphone, and a joint venture between EVN Telecom and Hanoi Telecom. Although applications were received from six operators, a lack of available spectrum in the 1900-2200 MHz frequency band was the deciding factor behind 3G licenses being limited to four. The operators have to accomplish coverage and investment targets (Table 3-3).

The other license applicants were GTel (a Russian-Vietnamese Joint Venture) and Saigon Postel, which is a major shareholder in Vietnam’s fourth largest mobile operator, S-Fone. Although GTel and S-Fone were not granted a concession, they were permitted to partner with one of the four winners to provide 3G services in the country. GTel is understood to be partnering with rival Vinaphone to build a 3G network and provide the relevant services. Two other companies are reportedly planning to provide 3G services over the network of one of

<table>
<thead>
<tr>
<th>VIETTEL</th>
<th>VINAPHONE</th>
<th>MOBIFONE</th>
<th>EVN TELECOM &amp; VIETNAMOBILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invest</td>
<td>800M</td>
<td>600M</td>
<td>350M</td>
</tr>
<tr>
<td>Security</td>
<td>280M</td>
<td>93M</td>
<td>93M</td>
</tr>
<tr>
<td>Network deployment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 9 m: 87% population (5000 Nodes B)</td>
<td>• Q3'09: 20% population</td>
<td>• 3 m: 2000 Nodes B</td>
<td>• 9 m: 50% population (2600 Nodes B)</td>
</tr>
<tr>
<td>• 1 yr: 9000 Nodes B</td>
<td>• 3 yr: 54% population</td>
<td>• 1 yr: 100% big suburbs</td>
<td>• 3 yr: 5000 Nodes B</td>
</tr>
<tr>
<td>• 3 yr: 100% population</td>
<td>• 6 yr: 75% population</td>
<td>• 3 yr: 98% population</td>
<td></td>
</tr>
<tr>
<td>Deployed technology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HSUPA</td>
<td>WCDMA</td>
<td>HSUPA</td>
<td>HSUPA</td>
</tr>
<tr>
<td>Service launch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q3 '09</td>
<td>Q3 '09</td>
<td>3 months after license allocation (i.e. Oct. 2009)</td>
<td>Q1 '10</td>
</tr>
</tbody>
</table>

Table 3-3: 3G (WCDMA) obligations of mobile operators
the market’s established telecommunications operators: they are state-run Vietnam Multimedia Corporation (VTC) and local company Dong Duong.

The first 3G WCDMA-based network was commercially launched in October 2009 by Vinaphone followed by Mobifone in December. To encourage subscribers to upgrade from 2G to 3G, Mobifone launched a three-month special promotion, which allowed customers to make video calls at the same tariffs applied to normal calls, and offering a 50% discount for mobile Internet and mobile TV. By September 2010, all of the licensees had launched their networks and there were some 8.5 million 3G subscriptions, exceeding fixed broadband within one year of launch. Three operators have launched HSDPA with download speeds up to 14.4 Mbit/s.

The tariff for 3G services is freely set and does not differ much between operators. Mobifone offers packages depending on the speed (3.6 Mbit/s or 7.2 Mbit/s). Within those two speeds, daily, weekly or monthly options are available with each having a different amount of data included (Figure 3-4, top). The price of a monthly 3G package (including 1 GB of data) is the second lowest in Vietnam in comparison to other countries analyzed for the World Bank’s broadband case studies (Figure 3-4, bottom).

Table 3-3: 3G (WCDMA) obligations of mobile operators

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The gap between rural and urban areas in access to the Internet, especially broadband Internet service is quite large. Broadband in Vietnam is considered saturated but in reality, saturation occurs only in the cities and major centers. Vietnam has about 89 million people including 72% living in rural areas and the market of potential customers has not been fully exploited. This is a huge gap in the development of telecommunication services including broadband Internet. Vietnam has adopted various policies in an effort to minimize the broadband divide between urban and rural areas.

From now until 2015 and further to 2020, Vietnam will give priority to the development of broadband in rural areas, especially to bring broadband to rural districts and poor communes. In addition to the general policy priorities for rural broadband development, the government also has special offers to help people in poor regions have access to technology and help develop production and improve quality of life. Broadband can contribute to poverty reduction, maintain social order and national security, raise education levels and create conditions for accelerating the modernization of agriculture and rural areas. Besides priority policies of broadband development for poor rural regions, the government is encouraging investment in broadband for schools and public hospitals in rural areas aimed at uniformly developing and narrowing the digital gap between regions.

### 5.4.1 Delta and midland rural areas

Due to relative geographical and socio-economic advantages, such as proximity to cities, economic centers and industrial parks, Internet in the delta and midland area has developed rapidly. The broadband network basically connects to the district level, towns and some communes. Specific results as follows:

- Most communes have an access point providing telecommunications and Internet services for the community.
- The broadband transmission network has come to more than 84% of communes nationwide, in which:
  - Number of communes using fiber optic transmission accounts for over 56%.
  - Number of communes using microwave transmission accounts more than 25%.
  - Number of communes using satellite transmission (VSAT DAMA, VSAT IP) accounts 3%.

The development of broadband services in the delta and midland areas compared to municipalities is shown in the statistical table below.

<table>
<thead>
<tr>
<th>Region</th>
<th>Broadband Internet penetration (subscribers per 100 inhabitants)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2006</td>
</tr>
<tr>
<td><strong>SONG HONG (RED RIVER) DELTA REGION</strong></td>
<td></td>
</tr>
<tr>
<td>Hanoi</td>
<td>8.63</td>
</tr>
<tr>
<td>The rural of Song Hong delta</td>
<td>0.47</td>
</tr>
<tr>
<td><strong>THE CENTRAL REGION</strong></td>
<td></td>
</tr>
<tr>
<td>Da Nang city</td>
<td>4.07</td>
</tr>
<tr>
<td>South-central Coast</td>
<td>0.79</td>
</tr>
<tr>
<td><strong>THE SOUTHEAST REGION</strong></td>
<td></td>
</tr>
<tr>
<td>Ho Chi Minh city</td>
<td>6.47</td>
</tr>
<tr>
<td>The Southeast area</td>
<td>1.15</td>
</tr>
<tr>
<td><strong>MEKONG RIVER DELTA REGION</strong></td>
<td></td>
</tr>
<tr>
<td>Can Tho city</td>
<td>1.38</td>
</tr>
<tr>
<td>Cuu Long river delta area</td>
<td>0.49</td>
</tr>
</tbody>
</table>

*Table 4.1: Telecommunications services development in delta and midland areas*
The rural telecommunications market promises great potential and there should be significant competition because broadband has developed close to saturation levels in urban areas while rural markets are in the initial development period. On the other hand, rural areas are now developing towards urbanization and there are many new industrial zones recently built.

Although it achieved some initial results, rural Internet network infrastructure and quality of service still significantly lags urban areas—Hanoi and Ho Chi Minh City account for 65% of total broadband subscribers—and faces several challenges:

- Network capacity is still weak and there is not a common master plan for network and technology. Except for the mobile sector, most telecommunications services and particularly broadband Internet in rural areas are being developed based on extended cities-city and towns networks.
- Low income and awareness inhibits broadband affordability and capability.

5.2.4.2 Extreme poverty rural communes

Communes in remote, border and island areas and the 62 poorest districts and communes under “Program 135” are referred to as “extreme poverty communes”. The extreme poverty communes have common characteristics:

- Tough geographical conditions and harsh weather;
- Difficult transportation;
- Underdeveloped infrastructure and economic and social conditions;
- Construction and maintenance of telecommunications infrastructure is costly and slow capital recovery and low profitability discourages enterprises from investing in these areas.

To develop infrastructure and universalize telecommunications and Internet services for extreme poverty communes, the State has been supporting supply and use of services for inhabitants and enterprises through two special programs: developing communal access points and providing universal telecommunication services.

5.2.4.2.1 Communal P&T and Cultural Points

VNPT had a program to develop so-called Communal P&T and Cultural Points (CPCP) during the period 1998 – 2007. The objectives of the program were to provide telecommunications service at the commune level; to narrow the digital divide between rural and urban areas, and to promote socio-economic development.

Up to 2007, VNPT built and put into use some 8,000 CPCPs serving 76% of the rural population, in which 1,535 were located in extreme poverty communes (out a total of 1,644 extreme poverty communes). In addition to postal and culture services such as books and magazines, the CPCPs have played an important role in providing telephone, Internet and information technology services for rural and especially for extreme poverty areas. The CPCPs also played an important part in completing the task of bringing telephones to 100% of communes nationwide in 2005. In 2003, VNPT started supplying mainly dial-up Internet access to around 3,000 CPCPs at a cost of 35 billion VND (US$2.3 million).

After 10 years of operating, besides the notable achievements, the CPCPs also faced obstacles that limited effectiveness:

- Cost of operating, repairing and upgrading has risen due to age of the system.
- Turnover in some points is too low and does not cover operating costs. Broadband Internet has not been set up in a large number of CPCPs so quality of services is low, content is poor and hence it is more difficult to attract people.
- Some CPCPs are built in places that are located far from residential areas and inconvenient for people, whereas some others are built near urban areas or developed socio-economic region where

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13 The English term used by VNPT but also referred to as Cultural Post Offices, Communal Post Culture Points and Village Post and Cultural Points.
there is less demand due to other options.

- Remuneration for the manager of the CPCP is often low. The general educational qualification and expertise of the majority of managers is limited and they sometimes do not receive adequate training.

### 5.2.2.4.2 Universal telecommunication services program

Universal service and access goals are outlined in Decision No 74/2006/QD-TTg of the Prime Minister and called “Program 74”\(^{(15)}\). The public utility telecommunications area is announced annually by the Ministry of Information and Communication, including most communes of the 62 poorest districts, communes under Program 135, and communes in remote and island areas where teledensity is below 2.5 subscribers per 100 inhabitants.

The Program’s overall objective up to 2010 was to implement universalization of basic telecommunications services for extreme poverty rural residents including providing 70% of communes with a public Internet access point.

The Vietnam Public Utility Telecommunication Service Fund supports the implementation of State’s policies on provision of public utility telecommunication service throughout the whole country. Mechanisms include:

- Supporting development of telecommunications network infrastructure and public telecommunication services access points in the form of grant assistance and preferential loans.
- Supporting people to use telecommunications services in the form of reduced service charges and VAT exemption.

After more than four years of implementation, Program 74 has mobilized financial resources and technical capacity of telecommunications enterprises in Vietnam to develop network infrastructure and services for extreme poverty rural areas. Through Program 74, the State has made a balance between rights and obligations among telecommunications enterprises in universalization of public utility telecommunications services. While the Program of developing the CPCPs was taken care of only by the VNPT Group, Program 74 has the participation of major telecommunications companies such as the VNPT Group, Viettel, EVN Telecom and the Vietnam Maritime Communication and Electronics Company (VISHIPEL). VNPT, Viettel and EVN Telecom are ordered by the State to provide phone and Internet services and VISHIPEL is ordered to provide public utility telecommunications services for fishermen at sea.

Thus Program 74 not only provides an opportunity to access and use telecommunications services for more than 20 million people in rural areas for economic and social development, but this Program also supports and encourages enterprises to aggressively invest in infrastructure networks and service development in order to provision the rural market. Some specific results of Program 74 up to June 2010 are:

- Most people of 4,240 communes in the 62 poorest districts and communes under Program 135, in the remote, border and islands areas with about 22 million people (accounting for 26% of the national population) have received benefits from the public utility telecommunications support policy of the State.
- Support to develop more than 75,623 new Internet subscribers.
- Support to maintain the network for 275,307 Internet subscribers.
- Support for 4,054 public Internet access points.
- Raise the Internet subscription density in public utility regions rose from 0.018 (late 2004) to 0.32 subscribers per 100 inhabitants (late 2009).

The program has faced some difficulties and limitations:

- The development of infrastructure has not kept up with demand. There are many differences in infrastructure and subscriber density between extreme poverty rural and urban areas. At the end of 2009, Internet subscriber density in the public utility telecommunications region was only 0.3 subscribers per 100 inhabitants (although it is nearly 18 times higher than in 2004). Meanwhile

Hanoi has 13.9 subscribers per 100 inhabitants, Da Nang has 8.8 subscribers per 100 inhabitants and Ho Chi Minh has 10.5 subscribers per 100 inhabitants.

- The development of infrastructure and types of services among public utility regions is unbalanced. Communes in Region 1 and Region 2 with favourable conditions have overheated development that exceeds plan targets, while communes in Region 3 far from the district centers have levels that do not meet targets. The development of Internet subscribers and public Internet access points have not met targets.

- Support in the form of preferential loans to build public telecommunication services access points is not realistic because these areas have difficult geographical and socio-economic conditions, low investment efficiency and are unlikely to recover capital so they do not encourage enterprises’ investment. Up to now there are 3,130 communes without public Internet access points, and Internet subscriber density is very low and does not meet the target.

- Regarding developing new individual and household Internet subscribers, and new public Internet access points, only VNPT has exceeded the plan while other enterprises focused investment in urban areas.

5.3.4.3 Future plans

Decision No. 119/QD-TTg on 18/01/2011 by the Prime Minister approving the project for rural communications during the period 2011 – 2020 identifies a number of goals relating to Internet and broadband access and services:

- 100% of communes are connected by broadband transmission lines.
- 100% of communes having People's Committee offices, schools and health centers are providing Internet broadband services.
- Internet subscriber density in rural areas reaches 30% to 40% national average density.
- The state agency from the district level, departments, sectors or equivalent or higher should have e-portals or websites providing all public online services to residents and enterprises in rural areas.
- The offices of the Party and government authority from the central to commune level to have their e-mail address for receiving and publicly responding to feedback of the people.
- The electronic information websites of the Party, State, political and social organizations in central and local levels have programs to receive and reply to comments reflecting the people.
Analysis of broadband success and challenges in Vietnam

Given its status as a lower-middle-income economy, Vietnam has made impressive strides in broadband development. It has the highest fixed broadband penetration among low and lower-middle income countries in Asia. Though IMT-2000 WCDMA 3G networks were only introduced in 2009, the number of mobile broadband subscriptions already exceeds fixed broadband. Rapid economic growth and relatively high literacy levels have contributed to this achievement. Incomes have risen so more people can afford broadband services while many people, at least in urban areas, have the skills and awareness to access and use content and applications delivered over high speed networks.

In terms of policy and regulatory tools for developing broadband, Vietnam has forged its own path. This has often run contrary to typical recommendations for achieving ICT growth. There is no separate sector regulatory entity, the largest operators are government owned and direct foreign investment in the telecommunications market has been limited for political reasons. Nevertheless the country has developed a high-level of competition among mainly state-owned enterprises.

6.15.1 Social-economic characteristics

When the Internet started to appear in Vietnam in 1997, prices were high and speeds slow, and only a few people had the need and conditions to access the Internet. However, the opening of the economy and enhanced integration with other countries in the region and the world, and the abolishment of monopoly in telecommunications, has significantly improved the ICT market sector.

Parallel to this, the demand for Internet and especially broadband increased and this opportunity was well exploited by the service operators. In addition to improving service quality, the price for Internet access and value added services also improved. With access charges declining, service quality improving, variety in the number of services offered increasing and incomes rising, favorable conditions have been created for sustained broadband growth in Vietnam over the coming years.

On the other hand, telecommunications providers are developing new services but most of these services are only suitable for high-speed fiber optic transmission. The cost of installation and use of these services is high and only suitable in new urban areas and large enterprises. Fiber to the Home (FTTH) is quite expensive, so ADSL is the first choice of the household even though it is difficult to upgrade the transmission capacity.

6.25.2 Technological capability

Vietnamese telecommunications service providers now have a system of modern telecommunications equipment with thousands of broadband Internet connection ports. Each service provider has developed the network infrastructure with modern IP-based networks. The transmission system is built with extensive fiber optic and digital microwave transmission technology to support multimedia data services. The new broadband services exploiting NGNs meets the needs of advanced users for voice, video and data. However, with diverse forms of services provided, price pressure is a challenge for service providers today.

With continuous investment in new technologies to improve and update technology to keep pace with world trends is a requirement of the market as well as goals for telecommunications businesses. Pressure on traditional service prices have led to disparities in investment in telecommunications infrastructure. Telecom enterprises are focusing on developing mobile subscribers and mobile broadband subscribers networks without development of the wired network; meanwhile the wired network is critical to build long-term telecommunications infrastructure.

On the other hand, due to competition in Vietnam’s telecommunications market today (there are around a dozen enterprises providing telecommunications infrastructure), providers have a common need in sharing, but sharing telecommunications infrastructure is very difficult, leading to overlap in investment in

the access network. This causes problems of wasted resources, difficulties for users, visual pollution, etc. There are too many businesses providing infrastructure development making it difficult for interconnection because every operator applies different technology. This does not lead to synchronization and harmonization in national telecommunications infrastructure and is not sustainable to meet the development needs of the country in the future. The service providers are now trying to develop a shared cooperation network infrastructure but so far no specific measures have been implemented due to disagreement on the benefits as well as a lack of management and regulatory guidelines from the MIC.

Internet today is associated with modern life. Young people in urban areas, especially Hanoi and Ho Chi Minh "live" with Internet because of their favorable condition and because network access is better than in the provinces. They can find everything they need with the Internet and actively choose their favorite entertainment. An emerging issue is the management of harmful information in conflict with Vietnamese traditions. High-speeds, rich content and reasonable prices are urgent needs for Internet users in general and students in particular. Especially in the present moment, when the Internet is being deployed in schools and expanded to rural, mountainous areas, the policy for development of the Internet in general and broadband in particular should ensure rational development of infrastructure and services as well as the ensuring quality and increasing number of subscribers.

Besides, the lack of relevant content, as well as fragmented information, calls for a public information network through a unified portal, equipped with an automatic translation engine, with rich multimedia content such as health, education, culture, agriculture, libraries, etc.

6.3 Conclusion and lessons learned

The following points summarize Vietnam’s broadband development:

- There is a need for direction and consistency of the Government for broadband development; investment in broadband in particular and ICT in general should be considered as investment in social economic infrastructure, laying the foundation for development in other sectors.
- There is a need to develop strategies, planning, programs and innovative projects and it is important to mobilize all possible resources to promote the development of broadband.
- Government policy is needed to encourage broadband investment by operators (priority, infrastructure incentives, land, tax exemptions, etc.) and to stimulate users to use the service (free or reduced cost, subsidized terminal equipment, training, etc.).
- Encourage competition among service providers should be encouraged, creating incentives for development, while allowing businesses to set prices and introduce services.
- There is a need to focus broadband development evenly between regions especially rural areas because this is the most concentrated area of the population, having long-term growth potential.
- Challenges arising from the broadband development process also need to be considered:
  - Development of the width (the number of subscribers) should be coupled with development of depth (service quality) for sustainable, long-term development.
  - The difference in the level of broadband between regions is contributing to widening gaps.
  - The rapid development of broadband can create problems, affecting social life, security and politics.
About infoDev

infoDev is a global development financing program among international development agencies, coordinated and served by an expert Secretariat housed at the World Bank Group, one of its key donors and founders. It acts as a neutral convener of dialogue—and as a coordinator of joint action among bilateral and multilateral donors—supporting global sharing of information on ICT for development (ICT4D), and helping to reduce duplication of efforts and investments. infoDev also forms partnerships with public and private sector organizations who are innovators in the field of ICT4D. infoDev is housed in the Financial and Private Sector Development (FPD) Vice Presidency of the World Bank Group.

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