

Broadband Policy Guidelines in High-Growth Economies

Governments, market analysts and policy makers all over the world now acknowledge that broadband is a necessity to delivering the social and economic benefits of ICT to high growth economies.

Broadband's potential can be used as a key driver for economic growth, attracting foreign investment, developing territory attractiveness, and enabling a thriving community. Yet barriers to broadband mass adoption such as affordability, accessibility, awareness, and literacy still prevail.

This paper focuses on key ingredients for building efficient broadband policies and highlights the importance of broadband to reach sustainable development targets. It reviews the reasons why and how governments should get involved in developing broadband policies. It outlines the role the public sector can play in the development of an effective broadband infrastructure, by fostering the growth of eight enabling applications that will benefit citizens and businesses:

- > e-business
- > e-science
- > e-agriculture
- > e-employment
- > e-health
- > e-education
- > e-government
- > e-environment

Introduction

Governments, market analysts, and policy makers all over the world now acknowledge that broadband is a necessity to delivering the social and economic benefits of ICT to high-growth economies.

Broadband is not just the Internet made faster. The definition of broadband is a matter of semantics; what should be emphasized is the deployment of a technology that supports sufficient bandwidth connections to the Internet for the service intended. It provides the ability to support many applications on the same, always-on, access line: from voice to data, from sound to video, from wireline to wireless, and from location-based to global communication services.

Broadband's potential can be used as a key driver for economic growth, attracting foreign investment, developing territory attractiveness, and enabling a thriving community. Yet barriers to broadband mass adoption such as affordability, accessibility, awareness, and literacy still prevail. Greater public policy involvement is needed to stimulate development of nationwide broadband infrastructure. Public policy, it is argued, will help devise adequate strategies and policies that address community needs while facilitating and complementing the primary role played by the private sector.

This paper focuses on key ingredients for building efficient broadband policies and highlights the importance of broadband to reach sustainable development targets. It reviews the reasons why and how governments should get involved in developing broadband policies. It outlines the role the public sector can play in the development of an effective broadband infrastructure, by fostering the growth of eight enabling applications that will benefit citizens and businesses:

- e-business
- e-science
- e-agriculture
- e-employment
- e-health
- e-education
- e-government
- e-environment

This paper also outlines how effective public broadband policies can be structured around four key pillars:

- Policies and regulation
- Adequate and relevant content
- User awareness and expertise
- Service affordability and accessibility

Finally, it provides examples of how this approach has been successfully applied in high-growth economies around the world.

1. As defined in the Information Society programs led by the International Telecommunications Union (ITU) in Geneva

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Why is Broadband Important?

Broadband is important because it helps capture the economic and social benefits of information and communication technology (ICT).

Broadband is an enabling technology that provides the ability to support many applications on the same, always-on access line: from voice to data, from sound to video, from wireline to wireless, and from location-based to global communication services.

Broadband is not just the Internet made faster. The definition of broadband is a matter of semantics; what should be emphasized is the deployment of a technology that supports sufficient bandwidth connections to the Internet for the service intended.

With broadband, new applications and services can be delivered to the general public and to enterprises. These applications enable communities, businesses, and governments to achieve economic and social growth, thus breaking the poverty cycle and eliminating the social divide.

Where broadband is available, it is seen as a key driver of gross domestic product (GDP) growth. It enables governments and local authorities to attract local and foreign investments that stimulate the local economy by infusing it with a high-growth, broadband eco-system (e.g., content providers, gaming companies, customer premises equipment (CPE) vendors, web design agencies, web hosting companies, web server vendors).

For example, in South Korea ICT drove 27% of GDP growth from 1999-2002 and 17% of that ICT growth (which accounts for 5% of GDP growth) was related to broadband.²

In Egypt, a national broadband initiative launched in May 2004 drove the ICT contribution to GDP above 3.5% versus 1.5% in 1998 (a 100% increase in six years). Broadband is now a key component of the Egyptian Regional ICT Leadership Plan and the country's Smart Village Business Park now hosts 25,000 to 30,000 jobs that can be directly attributed to broadband.³

Perhaps the benefits of broadband are best expressed in a recent statement by Yoshio Utsumi, who was Secretary General of the International Telecommunication Union (ITU):

“With this widening of the communication horizon, we are able to build bridges across cultures as never before, generating a cross-flow of ideas, empowering people with information and knowledge, and promoting meaningful dialogue between different regions and communities, between nations and between civilizations. We now have the technological capacity to reach out to vulnerable and displaced communities and close the digital divide that deprives millions from the benefits of information and communication technologies. These powerful tools have the potential to help achieve the development goals and aspirations of people across the planet, such as reducing poverty and illiteracy, increasing agricultural production, and improving health care and environmental protection.”

In short, broadband brings a paradigm shift to the way people run their lives. It increases competitiveness and productivity and generates unimagined new products and services. It also changes the way public administrations at the national and local levels interact with their citizens and deliver public services.

2. Broadband Wales Observatory

3. Ministry of Communications and Information Technology, Arab Republic of Egypt

As a result, “broadband for all” is now considered a necessity to deliver the social and economic benefits of ICT to high-growth economies. In fact, digital inclusion is a key element of the United Nations Millennium Development Goals on poverty reduction and was emphasized at both the first and the second sessions of the World Summit on the Information Society. With that in mind, the action plan of the Tunis 2005 World Summit of Information Society identified eight digital applications as key enablers for all economies⁴:

- e-business, which extends an enterprise’s market reach to an increased number of customers and suppliers, and creates efficiency through direct distribution and more efficient supply chain/payment mechanisms
- e-science, which enables access for researchers, students, and teachers to scientific information around the world and fosters participation in international research programs (e.g., grid programs, climatology, health)
- e-agriculture, which provides solutions for access to information about the price of products, facilitates the establishment of direct relationships with buyers and the collection and dissemination of agricultural information to the rural population, as well as educational, weather and health information
- e-employment, which eliminates geographical and time barriers and allows contacts and business relationships that facilitate employment and develop a skilled ICT work force
- e-health, which improves people’s life by providing cost-effective medical services (e.g., remote diagnostics and tele-radiology, interconnected ambulatory services in remote areas), enables access to medical specialists located in another city, allows for secure transmission of patient records for public health monitoring, and supports efficient training of health professionals
- e-education, which can enhance educational activities for youth in remote areas, provide access to a wide range of information, provide access to life-long training opportunities, and expose the younger generation to information technologies that will be useful to them in the labor market
- e-government, which enables governments (at national and sub-national levels), citizens and businesses to communicate efficiently, increases government processes’ efficiency, delivers enhanced services to remote populations where the physical administrative infrastructure does not exist, and provides secure networks for accessing and disseminating sensitive government information
- e-environment, which provides individuals, businesses, and institutions with sustainable solutions to the challenges they face in their attempt to maintain the fragile equilibrium between economy, ecology, and society

Increased public policy involvement that complements the primary role the private market plays in the development of a broadband infrastructure will help develop these applications and ensure digital inclusion in high-growth economies.

Why Governments Should Get Involved

Low Broadband Penetration

Broadband penetration in high-growth economies is still at the early adopter stage. Out of a worldwide population of 6 billion people, 2 billion have a subscription to a cellular service, 1.2 billion have a fixed telephone line, but only 210 million people have a broadband subscription.⁵ In many countries of the world broadband is still seen as an early adopter service and market penetration is often below 1%.⁶

4. Source ITU-D & World Bank

5. IDATE, 2006 estimates

6. IBID

An understanding of the status of broadband in high-growth economies can be gleaned from the Digital Access Index (DAI) maintained by the ITU. This index scores practically every market on the planet based on a mix of ICT-development metrics, such as:

- Fixed and mobile penetration
- Internet access pricing
- Internet and broadband penetration
- International bandwidth capacity
- Adult literacy and school enrollment

A high DAI rating (maximum = 1) based on these and other metrics means a high degree of access for ICT. A DAI below 0.55 means sufficient access to ICT has not yet been achieved.

Today, 129 countries have a DAI below 0.55, 62 score a DAI under 0.35, and 67 score a DAI between 0.35 and 0.55. The highest rated country is Sweden with a DAI of 0.85.

Barriers to Broadband Mass Adoption

There are four barriers to broadband adoption in high-growth economies:

- **Affordability:** It is estimated that there are 700 million people in the world without access to broadband services due to cost barriers. As defined by the European Information & Communications Technology Association (EICTA), affordability is a function of disposable income and the total cost of ownership of communications (the device itself plus the running costs and taxation). Lowering the total cost makes communications affordable to people with lower disposal incomes.

Costs continue to be higher than needed in many high-growth markets because of inadequate policies (regulation and tax), inefficient business models, and service delivery issues (since international fees are high and the market base is low, service providers are not able to benefit from the economies of scale on fixed costs that are available in larger markets, so variable operating costs cannot be kept low).

A study by the London School of Economics analyzed key factors that account for access barriers. According to this study there are two major influences on affordability⁷:

- *Overall income levels:* The study found that the greatest barrier to access is personal income. The research shows that income levels account for 80% of the correlation to high penetration.
- *Overall price levels:* The study found that affordability is driven by:
 - efficient service delivery as it relates to business models, innovation in services (e.g., micro-payments) and technology (e.g., broadband wireless, IP)
 - regulation and taxation policy on devices and network services and incentives to broadband investment such as infrastructure sharing
 - ICT device affordability (e.g., PCs, mobile phones, gateways)

- **Accessibility:** which is determined by the availability of cost-effective infrastructure, equipment, and access. Broadband accessibility is a territory management issue and goal. It can be used as a lever to diminish rural depopulation and prevent urban overpopulation. It can bring acceptable life conditions through services like e-health and e-education, and it can set the boundary conditions for economic activity (access to markets for micro, small and medium enterprises) in rural and remote areas. In mature markets, DSL is still the main technology with which service providers deliver broadband access, even though national

7. LSE@Media, Telecoms Demand: Measures for improving affordability in development countries, January 2006.

strategies to evolve toward very high-speed broadband based on fiber is gaining political momentum. In contrast, the copper footprint that can support DSL is far too limited in many high-growth economies, especially in rural areas. Therefore, it is expected that wireless broadband will play a key role in providing broadband access in emerging markets, especially in low-density areas.

- **Availability of adequate and relevant content and applications:** In high-growth economies there is little local content available. With a small market base, there is little or no incentive for local content to be developed and delivered, which means service providers have to go abroad for content. However, in these areas, imported content, which is less effective socially and economically, is generally accessible to and consumed by an elite. Even if local content was available, the visual, sound, and cognitive tools and devices do not exist to allow service providers to meet the needs of the population. Despite these facts, shifting demographics dictate the need for further improvements in accessible design and content. The number of people aged over 65 will rise from 390 million now to 800 million by 2025, reaching 10% of the total population.⁸ By 2025, increases of up to 300% of the older population are also expected in many developing countries, especially in Latin America and Asia.⁹
- **Awareness and broadband literacy:** There is little end-user awareness and insufficient broadband literacy for all segments of the population (women, children, elderly, disabled, civil servants, skilled ICT employees) in emerging markets to sustain demand and/or make use of broadband.

Hence, massive broadband uptake in high-growth economies requires strong public involvement to devise adequate strategies and policies that will eliminate the barriers to broadband development and accelerate availability and adoption.

Ingredients of an Effective Broadband Policy

Fostering synergy across the entire ICT broadband value chain is a basic requisite to good broadband policy. To be effective, the national policy-maker needs to bring together the views and interests of a wide variety of stakeholders — service providers and end users — from both the public and private sectors. Thus, governments need to mobilize indispensable and complementary market forces:

- Public sector stakeholders:
 - Communications Ministry or equivalent
 - e-application user ministries (e.g., education, health, administration)
 - National telecom sector regulatory authorities
 - Spectrum, broadcasting and content regulators
 - Networked utilities with infrastructure (e.g., electricity, roads, gas, water, sewers, rail, waterways)
 - Institutional investors
- Private investors and service providers:
 - Incumbents
 - Alternative operators
 - Broadcasters
 - Internet service providers (ISPs)

8. World Health Organization 50 Facts: Global Health Situations and Trends 1955-2025

9. IBID

- Content providers (e.g., studios, web builders)
- Application designers
- Network and service suppliers
- End-user representatives

By creating synergy between all these players, governments can ensure that everyone works toward common objectives and shares the overall up-front financial and resource burden of broadband deployment.

An effective public national broadband policy can be built on four key pillars

1. Policy and regulation
2. Adequate and relevant content
3. User awareness and expertise
4. Service affordability and accessibility

1. Policy and Regulation

An effective national broadband policy should be built around public initiatives and policies that promote broadband within the local, regional, or national context.

Governments must adapt legal and regulatory policies to encourage broadband up-take. To do this, public stakeholders initiating and leading broadband policy development must ensure that national decision-makers are aware of the benefits and challenges linked to deploying broadband access. With this awareness, they can trigger early adopters and key investors to take advantage of favorable conditions for developing broadband infrastructures.

BROADBAND POLICY PROGRAMMING

Awareness is built by:

- Setting national broadband penetration objectives and statistics monitoring (broadband market observation and mapping is a basic policy implementation tool) both in terms of coverage and up-take, but also minimum speed requirements. This could include creation of a National Broadband Forum and identifying the correct actions and applications for digital up-take
- Benchmarking for geographic and urban areas within a country, between countries and regions, and analysis of best practices
- Organizing national events (broadband conferences, workshops, demonstrations, pilot showcases and media coverage)
- Driving public sector e-application projects, which are based on broadband access and usage

MARKET REGULATION: CLARITY AND CERTAINTY

Market regulation should foster the right balance between the need for competition and the need to encourage private sector innovation/investment, especially by regulated players (i.e., the incumbent). It should do so with clarity in its definition of how services and market players should compete to deploy broadband applications.

Since competition is an important element for full-scale broadband deployment, the right level of awareness will ensure that government policies do not hinder competition. Competition prevents high pricing that would slow the rate of adoption. At the same time it accelerates commitment to broadband deployment by all players.

For example, IP-based next generation networks and access application markets should only be subject to minimal or no ex ante regulation, leaving time for new markets to emerge. At the same time, a fair wholesale model for xDSL bitstream offers can be a tremendous boost to broadband deployment because fairly priced wholesale can generate profit for both the access provider and the reselling service provider.

In a competitive, regulated environment, public authorities can choose from a large array of legal mechanisms that provide certainty to competing market players. They can develop fair competition rules that will attract new capital investments, protect those investments, and enable innovation in service packaging.

These mechanisms can present different approaches to market-driven areas of competition versus risk- or policy-driven areas. They can relate to regulation for new service models and the shift to innovation and investment in new generation networks and applications (e.g., VoIP), or next generation access (e.g., FTTx, WiMAX, 4G) with the split between infrastructure and competition issues.

RELEVANCE OF UNIVERSAL SERVICE OBLIGATIONS ASSESSMENT (USO)

USO can be a tool to enhance massive broadband up-take. It creates visibility and accountability for primary infrastructure investments designed to expressly meet public policy objectives, such as access extensions to isolated, rural or low-income populations. USO also guarantees minimum service obligations to all parts of a country on an equal basis. It can help avoid digital divide effects by addressing adequate levels of broadband Internet accessibility at the community level.

Some countries are reviewing their broadband policy regarding USO and possibly extending it from voice to broadband, either through public tenders or through innovative models that leverage public/private partnerships.

The purpose of a USO is to upgrade the well-known and acknowledged right to a telephone to a more multipurpose, multidimensional right to communications (e.g., leading in some countries to e-inclusion programs). The goal is to enable various stakeholders from the public and private sectors to collaborate in order for operators to facilitate their rollout plans into under-served and unserved areas, which are currently not economically viable. The key is to build a sustainable model that can be replicated and scaled up for larger implementation.

PUBLIC DEMAND AGGREGATION

Demand aggregation may trigger broadband deployment to reach a critical mass of up-take.

Any public initiative and policy related to broadband should be based on the analysis of user needs and expectations in both the private and public sectors (the public sector being traditionally the largest investor and user of ICT). This analysis should be aimed at determining the economies of scale and critical traffic thresholds that are required to justify high up-front investments in new forms of content, applications, and especially new infrastructure. By satisfying public sector demand and accessibility requirements, the ICT industry is much better positioned to meet general public needs thanks to greater levels of connectivity and reach. To do this, community resources should be “open access” in nature. This will encourage and stimulate further private sector investments in services and networks.

Therefore, the aggregation of content and access should be planned and developed on a nationwide basis through networks of well-defined, standard public sector initiatives for e-health, e-education, e-government, e-agriculture programs (e.g., tele-centers, public sector interconnection).

FLEXIBLE SPECTRUM MANAGEMENT

Spectrum is necessary for broadband wireless access technologies and next generation network services and applications to reach the market. With the right spectrum, a broadband wireless network can bypass costly wireline infrastructure buildouts, and considerably improve the speed at which broadband access is made available to users.

An effective spectrum policy should be flexible enough to allow for new technologies and usage modes to address the market with sufficient amounts of spectrum to provide broadband services to end users. It should support:

- Flexibility versus harmonization, to enable fixed and mobile convergence whenever technically and financially applicable (technology-neutral, usage/service-neutral, secondary trading)
- Licensed versus unlicensed bands, to enable “light licensing” methods (e.g., spectrum swapping/trading, self-coordination processes)
- Broadband wireless access (BWA) using the full potential WiMAX technology, to increase the amount of spectrum allocated to broadband wireless access:
 - support and promote WiMAX version “16e”, universal access based on technology and usage/service neutrality in all BWA bands (3.5 GHz, 2.5 GHz, 2.3 GHz and possibly 700 MHz for greater rural coverage)
- Digital dividend, which allocates the dividend spectrum to deploy broadband applications in rural areas and to offer increased competition in populated areas (in frequencies around 700 MHz [e.g., for rural WiMAX])
 - a national frequency plan release program (re-farming) based on the transition to digital TV and which aims at freeing under-used military or analog broadcast spectrum for commercial communication uses
- Mobile TV:
 - designation of the S-band for mobile satellite service allowing for deployment of hybrid (satellite/mobile terrestrial) networks supporting unlimited mobile TV offers
 - flexibility to operate complementary ground component prior to satellite launch
 - satellite exclusivity in the upper part of the S-band (2170 MHz to 2200 MHz) that makes extensive use of in-band terrestrial repeaters co-located with mobile cell sites

SUPPORT FOR RESEARCH AND INNOVATION CENTERS

Public authorities can intensify funding for innovation that targets solutions tailored for emerging markets and under served areas. Here public procurement, grants and state aid can help foster the new knowledge society (the case of strong and effective national R&D efforts are well illustrated by the C-DOT BWA terminal program in India and the WiMAX program in Taiwan).

Also, support for national research and innovation networks that provide advanced ICT facilities for teachers, students and researchers can foster innovation, enable testing of new technologies and facilitate technology transfer.

2. Adequate and Relevant Content

Local content adapted to local needs is a key driver for broadband adoption. Therefore, an effective public broadband policy must ensure that there is adequate and relevant content for users by supporting the development of content and applications adapted to local needs.

Obviously, there should be a critical number of subscribers and sufficient subscriber demand for local content to attract new content providers and generate sustainable business for a local content industry. Until that time, the government plays a key role in not only promoting local content development, but also creating content that addresses the issue of cultural and language diversity (e.g., e-government programs, local content support).

3. User Awareness and Expertise

Since broadband adoption is low wherever end-user awareness and broadband literacy are also low, an effective public broadband policy must ensure that there is adequate awareness and expertise related to the benefits and usage of broadband applications and services.

To achieve this objective, public stakeholders should support and enable targeted programs for capacity-building and broadband literacy that will create end-user awareness and buy-in, and also support the creation of a local ICT industry. These programs should relate to three key categories of users:

- end users, which include the general public or business users who will be exposed to the Internet through tele-centers (e.g., the Asia Pacific Economic Cooperation Program in Telecommunications has supported tele-center programs for training in broadband usage in Indonesia, such as “Thais Advance Forward...With Heart in the Net,” a nationwide Internet training program that started in 2003)
- civil servants, who are at the heart of the implementation of e-government programs at national and regional levels (e.g., a partnership between the United Nations Institute for Training and Research and Alcatel-Lucent has created the center for information and training to develop capacity-building for local authorities.) The partnership supports workshops that enable local authorities to build their e-agenda, share best practices, and benefit from the broadband expertise available from Alcatel-Lucent and academia. Workshops have been held in Shanghai, Durban and Poland.
- skilled ICT workers, who will develop the technical capabilities to provide and maintain ICT infrastructures and related ICT services, and to adapt new technologies for local requirements

4. Service Affordability and Accessibility

Finally, since the high up-front costs associated with infrastructure and cabling are the single biggest reasons for low adoption rates, an effective public broadband policy must ensure that broadband infrastructure provides secure, inclusive, and affordable access for all.

To achieve this objective, policy makers should distinguish between:

- market-driven areas of concern, such as dense urban/business zones with potential alternative access infrastructures (e.g., wired/DSLAM versus wireless/WiMAX), where market incentives are developed for faster access to higher speeds and new services
- risk- and policy-driven areas of concern, such as semi-urban, secondary city and rural districts without alternative access and lacking market incentives to attract broadband service providers, where the focus will be made on infrastructure, content, and access

Once these are identified, policy-makers can spur investment and stimulate the development of a broadband infrastructure with:

- fiscal and tax incentive policies that foster citizen, business and private sector investment. In order to lower total cost of ownership and make technology more affordable, public authorities can reduce the tax burden placed on ICT services and devices. This could include tax rebates for new computers, tax relief for citizens and businesses investing in broadband services, or reduced sales taxes on services.
- public initiatives that foster PC penetration and broadband access.

These efforts could be similar to the One Laptop per Child (OLPC) initiative. This is a non-profit association dedicated to research that will lead to the development of a \$100 laptop — a technology that could revolutionize how we educate the world’s children. The initiative was launched by faculty members at the MIT Media Lab. It was first announced by lab co-founder Nicholas Negroponte, now chairman of OLPC, at the World Economic Forum in Davos, Switzerland in January 2005, and presented to the Tunis World Summit on Information Society in November 2005. It has United Nations support. The laptop will not be sold to consumers; it will only be distributed to schools directly through large government initiatives.

- PC allocation programs for schools with relevant content
- reference designs for local PC production
- infrastructure projects with long-term return (e.g., over five years). Such projects can be devised and implemented at the regional, national or local authority level either through direct public investment or public/private partnerships, via public leasing contracts or long-term concessions in order to attract investments:
 - leveraging local and overseas funding
 - encouraging multiple operator projects for primary infrastructure that lowers the risk and shares the cost, especially where civil engineering is required
 - ensuring all players get a commercial return on investment

Project definition for these initiatives should be performed as a complete process that includes user needs, an approach to content, accessibility, sustainable business cases, a clear understanding of service and network availability issues, clear timeframes, a confirmed investment plan, an understanding of the impact on related ICT projects, and expected economic and social benefits.

Public sector funding should be used as seed money in the field on project aggregation, content development, and access deployments and should be limited to non-commercial (e.g., education, health) or primary infrastructure projects (e.g., masts, trenches).

Public sector provider and user aggregation of content and access should be planned and developed on a nationwide basis. All projects should include proof of concept and a solid business case description.

Figure 1 shows the broadband market- and policy-driven areas that should be addressed by regulators to meet national ICT/broadband objectives.

Figure 1. Broadband Market-Driven and Policy-Driven Areas

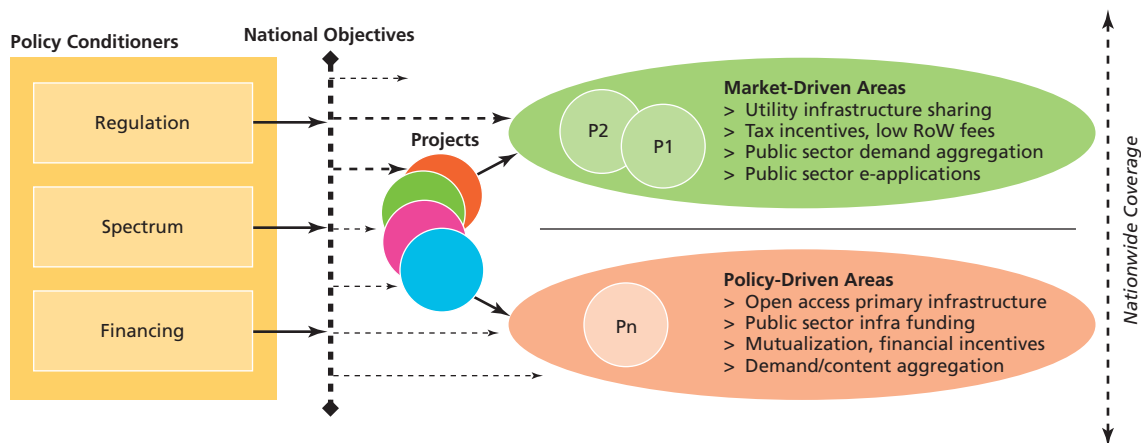


Table 1 outlines how an effective broadband policy can be structured with a balance of market-driven and policy-driven mechanisms to provide affordable access.

Table 1. Policy Mechanisms for Market-Driven and Policy-Driven Areas

MOTORS TO STIMULATE BROADBAND	MARKET-DRIVEN AREA MECHANISMS	POLICY-DRIVEN AREA MECHANISMS
Public Policy for Broadband (implementation program)	<ul style="list-style-type: none"> • Right of way incentives (low fees, improved accessibility rules) • Infrastructure sharing incentives • Improved coordination with utilities 	<ul style="list-style-type: none"> • Publish national broadband strategy • Define national coverage planning programs (national broadband access map) • Publicly funded projects (rural, regional)
Private Sector Projects (incumbents, utilities, new entrants)	<ul style="list-style-type: none"> • Flexible, multi-infrastructure optimization rules to accelerate broadband • No ex ante broadband retail regulation, lightweight bitstream constraints only 	<ul style="list-style-type: none"> • Content/access, aggregation • Flexible mono-infrastructure sharing rules for trenches, ducts, masts, coverage • Ex ante broadband access retail and wholesale constraints
Public Sector Projects (regional, city, public/private partnerships)	<ul style="list-style-type: none"> • Priority on public content & applications • Open access 	<ul style="list-style-type: none"> • Content, open access aggregation, priority on under-served areas

Examples

There are several examples of emerging markets that have successfully developed policies that promote the development of an effective broadband infrastructure.

Jordan

In Jordan, a broadband e-learning application provides an excellent illustration of the benefits broadband can deliver in education.

HIGHLIGHTS

- In 2000, King Abdullah II of Jordan launched an initiative called Connecting Jordanians
- In 2002 the Jordanian Ministry of Education embarked on the “broadband to the schools of JORDAN” project
- Jordan Telecom, partnered with Alcatel to build the nationwide broadband access network

KEY ELEMENTS

- Project financing provided partly by Jordan Telecom and partly subsidized by Ministry of Education
- \$70 million capital cost will be recovered within five years for universities, and within eight years for schools
- Business model:
 - Charge paid directly by school: none
 - Charge paid to Jordan Telecom by Ministry of Education: special package

RESULTS

Jordan is now engaged in an upward spiral for economic growth. With the introduction of broadband access in the schools, students are getting used to the use of high-speed Internet and state-of-the-art network access. This creates:

- demand for e-learning media and content locally, and hence more space for the local economy to grow in these fields
- demand for highly skilled technology professionals to support and implement this growth in infrastructure
- a supply of a better educated, better skilled future workforce for the country

“The Kingdom has emerged as a shining example in taking giant leaps toward connecting Jordanians...” — Experts at Davos World Economic Forum Panel; January 25, 2004, Jordan Times

India

In India, the Indian Government and Alcatel-Lucent have invested in broadband technologies to create a Broadband Wireless Global Research Center.

HIGHLIGHTS

- 51% Alcatel-Lucent investment
- 49% C-DOT investment (leading telecom R&D organization of Government of India)

KEY ELEMENTS

- Manpower of 200 expected by end of year 2006
- Reference designs for WiMAX solutions, especially low-cost WiMAX CPEs for mass production
- Revenue model based on royalties

RESULTS

- Focused R&D
- Joint venture to develop WiMAX end-to-end solutions to bring broadband to rural areas
- Joint effort to bring the cost of the CPE down to make the business case sustainable
- Reference designs to enable mass production of CPE locally
- WiMAX will be the technology to bring broadband and VoIP services in India to rural communities to serve schools, cooperatives, Internet cafes, remote health centers

India: Andhra Pradesh E-Seva

Another example from India is found in the e-services area in India Andhra Pradesh E-Seva.

HIGHLIGHTS

- Earliest and largest integrated services project in India for rural areas
- Adapted local public services

KEY ELEMENTS

- Provide a single face of the government across:
 - different levels of government
 - federal, state and local governments
 - different departments and agencies
 - different jurisdictions
- Provide ALL services at one place
- Introduce a factor — enhancement in convenience of citizens
- Citizens need not go to traditional government agencies

RESULTS

“The Government of Andhra Pradesh has a clear vision to create a knowledge society by using information technology in all aspects of development and governance. Pioneering efforts are being made to reach the benefits of IT to the citizens — urban and rural, rich and poor, literate and illiterate. The Government is conscious of the dangers of the ‘digital divide’, and is making special provisions for reaching the ‘information have-nots’” — Andhra Pradesh Government website (<http://www.esevaonline.com/htmlpages/abouteseva.htm>).

Fiji e-Government Project

In Fiji, the government has championed an e-government program for economic and social benefit as well as government efficiency.

HIGHLIGHTS

- Several government applications:
 - E-learning
 - E-Scholar — Scholarship Management System
 - Crime database system
 - Case registration system
 - Prisoner administration system
 - Social welfare system
 - Human resource system
 - Document management system

KEY ELEMENTS

- Chinese EXIM bank loan
- Government investment of US\$20 million
- Data centers
- Information and communications infrastructure
- ICT competency development and training

RESULTS

“The project is not only visionary, but also comprehensive and tailored to answer the needs of Fiji today” -Ratu Jone Kubuabola, Fiji Minister for Finance and National Planning

Canada

In Alberta, Canada, the provincial government has launched a broadband initiative called SuperNet.

HIGHLIGHTS

SuperNet is a high-speed, fiber-optic and wireless data network designed to:

- Provide equal access at equal costs
- Promote competition and rural development
- Foster a sustainable and scalable infrastructure
- Encourage open and equal participation opportunity
- Ensure services are reasonably priced
- Eliminate the gap between rural and urban

KEY ELEMENTS

- Ten-year arrangement with a three-year build
- Government of Alberta investment of \$193 million
- Bell West investment of \$102 million
- Serves 429 communities
- Extended area network serves 27 communities where competition exists
- Base area network

RESULTS

- Rural community coverage
- High-speed residential service at competitive urban rates
- High-speed business services at competitive urban rates
- E-learning applications:
 - access to online databases and media rich content
 - distance learning for remote communities
 - Internet access for learners and teachers
 - collaborative and interactive learning opportunities
- E-health applications:
 - secure health records
 - cross-region collaboration
 - learning for physicians
 - tele-health
 - tele-psychiatry
 - tele-ultrasound
 - tele-radiology
 - tele-surgery
- High-speed broadband services available to service providers at competitive rates:
 - at point of presence (422 communities)
 - to provide services to businesses and residences
 - to facilitate services being made available outside the SuperNet communities (e.g., wireless)
 - to enable small firms/ISPs to compete on an equal basis

Conclusion

Broadband brings a paradigm shift to the way people run their lives. It increases competitiveness and productivity and generates unimagined new products and services. It also changes the way public administrations at the national and local levels interact with their citizens and deliver public services.

Where broadband is available, it is seen as a key driver of economic growth. It attracts local and foreign investments that stimulate the local economy by infusing it with a high-growth, broadband component.

An effective broadband infrastructure fosters the growth of eight enabling applications:

- e-business
- e-science

- e-agriculture
- e-employment
- e-health
- e-education
- e-government
- e-environment

In emerging markets, the benefits of broadband can only be realized with increased public policy involvement. Regulators in these markets must strive to complement the primary role the private market plays in the development of a broadband infrastructure. To do this they must focus their efforts on regulation that is built on four key pillars:

- Policy and regulation
- Adequate and relevant content
- User awareness and expertise
- Service affordability and accessibility

With the right policies an effective broadband infrastructure can evolve that breaks the poverty cycle and eliminates the social and digital divide.

Glossery of Terms and Acronyms

TERM	DEFINITION
GDP	Gross domestic product. An economic indicator that measures the total value at current prices of the goods produced and services rendered by the people and enterprises of a country during a given period, generally one year.
ICT	Information and communication technology. A general term that designates the converging Information (computer equipment, data networks, Internet) and communication (wireline and wireless telephony networks) technologies and the services and applications they offer to their end users. The widespread deployment and use of ICT is considered as an essential prerequisite for the advent of the information society that will impact all aspects of economic and social life.
DSL	Digital subscriber line (DSL) technology works on the existing copper telephone line already in a house, also known as a "twisted pair." It uses sophisticated digital coding to utilize more of the existing space on the wire, without interfering with the normal phone conversations. It is extremely fast. With asymmetric digital subscriber line (ADSL) download speed at up to 8 Mb/s, it is 200 times faster than traditional analog modems. DSL technology comes in different flavors, with ADSL and very high-speed digital subscriber line (VDSL) the best known.
WiMAX	The Alcatel-Lucent WiMAX offer, compliant with the IEEE 802.16e-2005 ("RevE") standard, enables mobile, nomadic and fixed wireless broadband access, thus is called "Universal WiMAX." It enables mass-market services including high-speed Internet, VoIP, mobile TV and video streaming, under a cell grid coverage architecture.

About the Author

Nicole Hill is part of the Corporate Marketing Organization, in charge of Public Stakeholders and Public Sector, within the Broadband for All and Business Critical Communications Top Marketing Programs (TMPs).

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