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Internet broadband for an inclusive digital society

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1.0 Introduction

The Commission on Science and Technology for Development (CSTD) has repeatedly called attention to the growing digital divide in Broadband connectivity, both between and within countries. On the recommendation of the CSTD, the Economic and Social Council, in its most recent resolution on assessment of the progress made in the implementation of and follow-up to the outcomes of the World Summit on the Information Society,² noted with concern that “there is a growing digital divide in the availability, affordability, quality of access and use of broadband between high-income countries and other regions, with least-developed countries and Africa as a continent lagging behind the rest of the world.” The Council called upon all stakeholders to keep the goal of bridging the digital divide an area of priority concern and to continue to focus on pro-poor information and communications technology (ICT) policies and applications, including access to broadband at the grass-roots level, with a view to narrowing the digital divide among and within countries. The Council also urged all stakeholders to “prioritize the development of innovative approaches that will stimulate the provision of universal access to affordable broadband infrastructure for developing countries and the use of relevant broadband services.”

At the 15th session of the CSTD, in May 2012, the Commission held a special panel on extending rural access to broadband and decided to examine a priority theme on “Internet broadband for an inclusive digital society” during its 16th session in June 2013. The Commission will explore this priority theme in depth at its inter-sessional panel to be held in Lima, Peru, from 7 to 9 January 2013.

As a contribution to the work of the Commission in its inter-sessional panel, this paper provides an overview of certain key issues relating to broadband ICTs in the context of international objectives for socio-economic development. The discussion summarizes recent research, policy developments, and practices associated with broadband ICTs around the world, and offers a set of frameworks for considering and developing new public and private initiatives to promote broadband development.

2.0 Broadband ICTs and Development

There has been a growing consensus in recent years that access to broadband information and communication technology networks, services, and applications represents an increasingly essential requirement for socio-economic development goals in the 21st century. The term “broadband ICTs,” in this context, is shorthand for a range of capabilities enabled by the convergence of computers, the Internet, “smart” devices, high-speed wireline and wireless networks, and the plethora of innovative applications and services that these technologies make available. These elements are described further below, together with an overview of the status of broadband development.

² Economic and Social Council resolution 2012/5

2.1 Broadband status and trends

2.1.1 Technology and Service Evolution

The precipitous growth of broadband networks and services over the past decade has been sparked by a combination of continuing rapid technological developments across the ICT landscape, and the commensurate spectacular rise of popular applications and services that are made possible by broadband connectivity. These trends have been well documented, and don't require extensive elaboration here, but a summary of the key elements is useful:

- Fixed networks and service providers: Traditional wireline telephone networks have become something of an anachronism in the age of cellular mobile dominance. However, these fixed networks are starting to make something of a comeback by providing dedicated broadband connections to businesses, institutions, and homes in many countries. There are a variety of “last mile” options available. Existing (copper) infrastructure can often be utilized to provide Asynchronous Digital Subscriber Line (ADSL) connections, which can deliver reasonable broadband capacity in many areas. Where coaxial cable television systems have been established, these have become a preferred option for broadband Internet connections as well. And the most robust option, fiber optic links directly to the customer (fiber-to-the-home or FTTH, along with other fiber-to-the-premises configurations) delivers virtually unlimited data transmission capacity.

All of these platforms are widely deployed in developed markets, and are finding new openings in developing countries, at least within relative dense and higher income urban areas. Established incumbent telecommunications operators, along with a variety of new competitors, are seeking to expand the market base for broadband services, by delivering a combination of options, so-called “multi-play” packages that include local and long-distance telephone calling, high-speed Internet access, and television entertainment, among other features.

- Wireless broadband: The most significant trend contributing to the worldwide spread of broadband ICT has been the rapid and dramatic increase in the capacity and functions of wireless telecommunications services. The mobile revolution was driven by availability of flexible, convenient, and increasingly affordable voice telephony to billions of users who never had the privilege of owning fixed telephones. As basic mobile service has upgraded to second (2G), third (3G), and now fourth (4G/LTE) generation technologies, the broadband revolution is following a similar trajectory. These technological innovations show no signs of slowing down, as more and more users worldwide are gaining their first and primary exposure to the broadband universe through wireless connections.
- Devices: As much as the underlying networks and transmission technology, the broadband revolution has been driven by an ongoing mass transformation in the market for end-user devices that connect to these networks. The separation between computers and phones is entirely obsolete, and the range of consumer and business equipment that

now qualifies as “smart” – i.e., can connect to the Internet, and to other devices, and perform multiple interactive functions – continues to expand. Smart phones and tablets, led initially by Apple Corp’s innovative iPhones and iPads, and since rivaled by myriad competitors running Google’s Android platform, have become the fastest growing element of the hardware market. Personal computers and laptops remain vital, especially in the business world, but even these are tending to merge with the mobile and tablet domain. Meanwhile, a host of other devices are signing up for the “Internet of Things” from smart TVs, game consoles, and countless other consumer toys, to security devices, automobiles, and nearly all links in the chain of business processes.

- Applications: The combination of broadband networks and accessible devices has similarly yielded an explosion in new “killer apps”: ICT applications that have become virtually ubiquitous. The most prevalent of these are in the realm of Social Media, and constitute the interactive, user-driven phase of Internet development known as “Web 2.0”. Facebook, the single most widespread on-line application, was launched only in 2004, and in less than a decade has grown to over a billion users, half of whom access the service primarily via mobile devices. Numerous other such services, from Twitter and Google+ to Chinese QZone and Sina Weibo, reach hundreds of millions of users worldwide. Other types of social media allow limitless sharing of videos (YouTube), photos (Flickr), and ideas (Weblogs). Virtually all of these infinitely popular Internet applications were created in the middle to late 2000s, in sync with the spread of broadband communications.

Meanwhile, conventional on-line computer-oriented applications have recently been heavily augmented, and to a great extent displaced, by the newest wave of “apps”: those designed explicitly for mobile devices. Apple’s App Store and Google’s Android Market (now “Play Store”) boast millions of applications, a large number of them available for free download and use by any user. These can offer highly innovative features unique to the mobile broadband world, further reinforcing demand for wireless services and devices.

2.1.2 Status of Broadband Development

Measurement of the status of broadband-related deployments, usage, and activities has only come into fashion in the past few years. Many governments in developing countries still do not closely track indicators of broadband ICTs, as opposed to traditional telephony and mobile phone penetration. More reliable and detailed data are becoming available all the time, however, enabling researches and policymakers to evaluate trends in broadband availability and uptake with increasing precision. More recently, however, the international Broadband Commission, under the sponsorship of ITU and UNESCO, has compiled some of the most complete and useful data on broadband and Internet penetration throughout the world.

The following figures are from the Broadband Commission’s September 2012 report, based upon the most recent available ITU data:

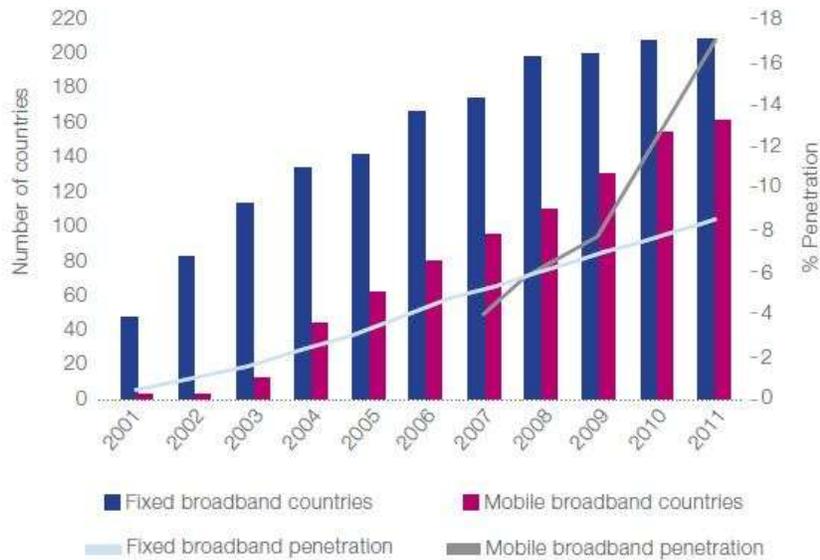


Figure 1: Broadband Penetration Worldwide

Figure 1 demonstrates both the growth in broadband generally, and the rapid increase in mobile broadband in particular, since only 2007. The combined aggregate penetration levels are now above 25% of the world's population.

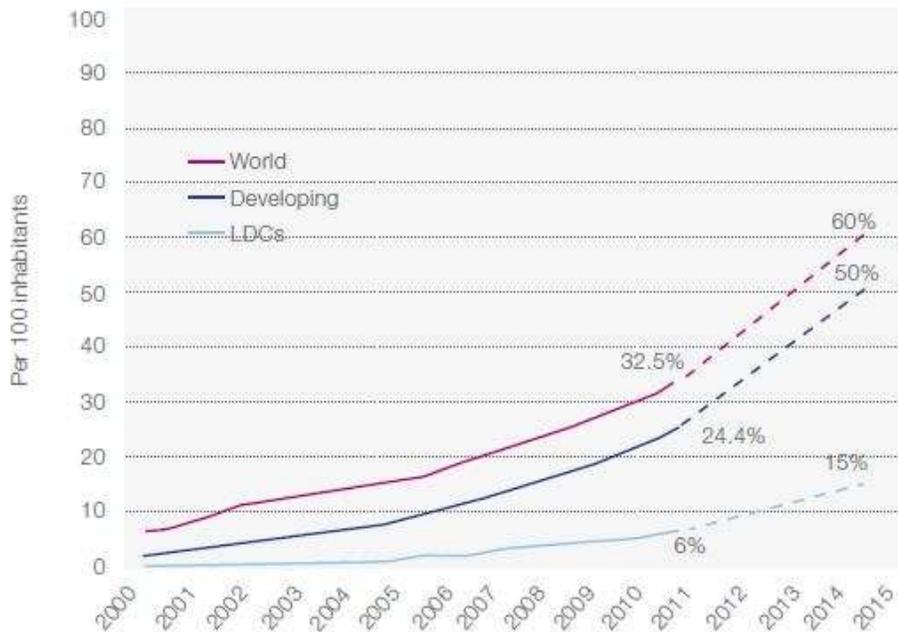


Figure 2: Internet Penetration and Forecast

The disparities between less developed countries and the rest of the world in terms of Internet penetration are clear, with only 6% of LDC populations on-line as of 2011. This proportion is

expected to more than double by 2015, but the absolute gap with higher income countries is likely to grow even larger.

2.2 Importance and impacts of broadband

2.2.1 The Broadband Divide

The recent emphasis on broadband in the ICT development field arises from the emerging recognition that the nature and scope of interactive communications that can be accomplished via high-capacity data transmission and processing is fundamentally different from, and exponentially more valuable than that which was possible with older generation voice and low-speed data connections.

For those living in advanced economies, and for some in affluent segments of the developing world these vastly greater advantages of broadband are well known; indeed they have become all but indispensable. It is broadband that has enabled the rise of the omnipresent new habits of the Information Age lifestyle: down/uploading and sharing of photos, music, and videos via Facebook, YouTube, weblogs, and countless other social networking sites; “viral” distribution of news, fads, rumors, and amusements around the world virtually overnight; the meteoric growth of smart phone and tablet sales; the near ubiquity of on-line advertising, purchasing, politicking, and info-tainment; and the ever-widening cyber presence known simply as The Cloud.

However, for most people in the world, all of these wonders still remain unknown or unavailable. Concerns about the Digital Divide have been expressed since the first emergence of computers and the Internet. On the one hand, the mobile telephone revolution has dramatically expanded access to basic voice telephone service to nearly 6-billion persons worldwide, and lower-speed Internet access (dial-up and 2G mobile) has also made significant inroads among many lower to middle-income populations. Nevertheless, as these important developments have proceeded, the parallel explosive growth of the broadband universe has not yet penetrated much beyond the narrow centers of wealth and privilege: the very groups who, less than a generation ago, were the exclusive owners of telephones.

Research into the benefits and impacts of broadband ICTs for developing societies, and particularly for low-income, rural, and marginalized populations, is very much a new field. Nevertheless, it is already becoming apparent that the gap between telephony and broadband, and even between narrowband or low-speed data and true broadband, is potentially far more significant than the previous gaps between telephone service “haves” and “have-nots”. The sections below highlight perspectives on how bridging the Broadband Divide can yield transformative effects in economic, social, and political development.

2.2.2 Economic Development

The challenges of studying the economic impacts of access to broadband ICTs are many, but two major issues stand out: (1) since broadband is relatively new, and relatively few less developed communities have been exposed to broadband, reliable empirical data is hard to find; and (2)

where some experience with broadband and development can be documented, the impacts are very difficult to separate from those of other, concurrent initiatives and investments. Nevertheless, some important first-stage research, together with anecdotal studies, provide substantial evidence of broadband's positive economic benefits.

One widely cited study by the World Bank (Qiang, Rossotto, 2009) has calculated a set of general correlations between broadband penetration and income growth. This study found that, in high income countries, a 10% increase in broadband service penetration in a country correlates with (and implicitly helps *cause*) an increase of 1.21% in national GDP growth. For middle and lower income countries, the study found that the average increase in GDP growth was 1.38% for each 10% increase in broadband penetration. These results have established an initial benchmark for broadband related economic impact studies, as well as a strong incentive for governments to invest in broadband growth.

More recently, additional research and reports have evaluated the question of the economic impacts of broadband development in greater depth, and with increased focus on less developed economies. A comprehensive ITU-sponsored study (Katz, 2012) developed a framework for classifying broadband impacts across an economy as deployment and penetration increase. These include:

1. Contribution to economic growth
2. Contribution to productivity gains
3. Contribution to employment and output
4. Creation of consumer surplus
5. Improvement of firm efficiencies

Katz also notes that the impacts and benefits of broadband increase significantly after broadband adoption reaches a "critical mass" of about 20% of the population, a level that most low income countries have not yet come close to achieving. In terms of GDP effects, Katz's studies suggest significantly lower levels of effects than the Qiang analysis, especially for lower income countries, but positive impacts nonetheless. A set of international case studies showed that the impact of a 10% increase in broadband penetration on GDP growth ranges from 0.08% (Brazil) to 0.7%. For the region of Latin America as a whole, the study found the average effect of broadband penetration to be about 0.16% in GDP growth for each 10% in penetration.

Another recent study for the Inter-American Development Bank (García, López-Rivas, 2012) also focused on the impact of broadband penetration on economic growth in Latin America as well as the Caribbean. Using a larger data set, this study found a substantially higher effect, with the increase in GDP growth averaging 3.19% for each 10% of broadband penetration. Clearly, more data and studies will be required to refine these types of findings, but the strong lesson is that broadband has important positive economic effects, possibly very large for many economies.

2.2.3 Social Opportunity, Enrichment

Beyond economic impacts, the "social" benefits of broadband ICTs on developing societies can be potentially even more valuable. Such benefits are somewhat more intangible than GDP or

employment metrics, and their effects may be realized over a long time horizon, but the range of positive opportunities is undeniable. In many cases, in fact, the role of broadband directly serves to complement other, more traditional development objectives, while also creating new prospects for social inclusion and empowerment. Some of the most prominent examples include the following:

- Education: Integration of ICTs in the education sector has become a priority initiative for nearly all countries, in recognition of the profound level of information resources available via the Internet, and the critical role of computer-oriented skills in youth development. In less developed societies, the goal to employ broadband ICTs in the classroom, especially at secondary and higher education levels, ties directly to long-term social objectives, and the vital need for a technology literate population and workforce. There is a deficit of workers with computer and Internet experience throughout the developing world, a factor which directly inhibits overall ICT sector growth, and the upgrading of functions in all other business and government realms. The benefits of installing broadband connections to schools and universities, introducing computers and other advanced equipment, and providing teacher training and curriculum revisions, will generate social and economic gains across entire generations.
- Health Care: In contrast to the longer-term benefits of ICTs in education, the value of deploying broadband ICT resources within the health care sector of a developing society can be immediate and dramatic. Broadband networks can link doctors, clinics, and treatment centers in rural areas to national medical resources, allowing access to remote consultations and diagnostics, and tracking health conditions and epidemics much more effectively. Distribution of basic health and wellness information, such as pre-natal and maternal care, prevention and treatment of malaria and other common diseases, first aid practices, and many other topics, can directly improve the quality of life for previously isolated communities. ICTs also facilitate the integration of health related data into national databases and networks, which all more effective and efficient management of all aspects of a nation's health care services.
- Gender Equity: In many countries, advocates of ICT development have recognized an opportunity for these technologies to play a leading role in overcoming historical inequities between men and women, in employment, in social roles, and in political empowerment. Access to broadband, through both community facilities and individual devices, can create channels of communication, knowledge sharing, and mutual support for women who have often been isolated from mainstream social and economic structures. In many places, ICT-based entrepreneurial ventures have proven especially opportune venues for women to lead. These technologies also make it easier to provide equal education opportunities for girls in some societies, including access to broader sources of learning and support on women-focused concerns such as health and child bearing.
- Indigenous Cultures: Advanced ICTs can serve as a valuable resource to support and preserve the cultural heritage of indigenous peoples around the world. Although in some respects, ICTs have often contributed to diminishing indigenous cultures, by accelerating

assimilation, recently movements have begun to embrace and highlight unique cultural features in many marginalized societies. Some of these efforts utilize broadband ICTs to connect disparate members of tribes and ethnic groups, to share their stories and knowledge, and to reinforce dying languages or traditions. ICTs can also act as a preservation medium for arts, crafts, skills, mythologies, and almost any other cultural memory. Through these efforts, numerous groups have been working not only to support indigenous peoples, but to expand awareness of their lives to others through educational initiatives.

2.2.4 Political Empowerment

Some the most significant and dramatic examples of the transformative potential of advanced ICTs have been witnessed in recent years in the political arena. Expanding access to the ability to communicate ideas has contributed to growing populist trends in developed economies and emerging democracies alike.

- Information access: The most precious asset that ICTs can provide to enhance democracy is information. By expanding dramatically the range of information that citizens can readily obtain about their government, ICTs enable more knowledgeable and effective participation across the spectrum of political involvement. The forms of advanced, electronic information access are many and varied. Bloggers have emerged as the front lines of investigative and activist political advocates in many countries, while traditional journalism has extended its reach via on-line reporting. Political parties and other organizations have vastly more resources to connect with and influence voters, contributors, as well as politicians and government agencies. The presence of so many outside information sources also helps reinforce pressure on government itself to provide greater openness and transparency, to allow access to all manner of internal records and data, to investigate and publicize questionable practices, and to inform the citizenry in a politically neutral manner.
- E-Government: Beyond politics, the greater value of ICTs in the public sphere has emerged in the form of E-Government programs, covering a wide spectrum of activities. In addition to the prominent areas of education and health, “digitizing” government operations provides efficiencies, improved service, and greater value to citizens in countless areas: tax filings and payments, public contracts and procurements, record keeping, information dissemination, filing of all kinds of forms and applications, and much more.
- Political activism: Advanced ICTs have also played a pivotal role in activist, even revolutionary movements, contributing an essential component to popular uprisings and political reforms around the world. Despite the best efforts of some regimes to suppress dissent, Information Age means of communication are next to impossible to inhibit entirely. The combination of Facebook, Twitter, SMS texting, YouTube and other video channels, bloggers, and international media sources has allowed activists to share strategies and gain sympathetic support in numerous societies, including both repressive

regimes and open democracies. In several cases, including the recent “Arab Spring” uprisings in the Middle East, ICTs may have tipped the scales in favor of full-scale revolutionary change.

3.0 The Broadband Ecosystem

The structure and scope of advanced broadband-enabled ICTs differs fundamentally from traditional voice-oriented telecommunications. “Broadband” as a term of art implies not merely speed or capacity of network data transmission, but a wide array of capabilities, services, and applications, as well as technology configurations and platforms, all of which depend upon high capacity interconnectivity among all components. Thus, true access to broadband is measured by the usefulness of such access to end users – individuals, households, businesses, and institutions – and the specific activities that they are able to accomplish by utilizing broadband communications.

For these reasons, it is important to understand the features and components of what has been called the Broadband Ecosystem: the inter-related elements that must be in place at multiple levels for broadband services to deliver their potential. The following descriptions summarize the main components of this Ecosystem, particularly in the context of less developed economies and societies where broadband is still far from widespread.

3.1 Components of the Broadband Ecosystem

3.1.1 Public Policy and Regulation

Effective establishment and growth of broadband services and capabilities depends first of all on an enabling and supportive public policy environment. Laws, regulations, and government oversight must adapt to the rapidly changing dynamics of the broadband market. Policy regimes that were established, even in the recent past, to address more traditional communications and information industry conditions prove inadequate to support the transition to an integrated broadband setting. The range of adjustments and initiatives that policymakers should consider is quite extensive, but in general the following priorities should be addressed:

- National ICT and broadband policies, legislation: The foundation of public policy regarding broadband development will come from national policy and legislative frameworks, most of which have been at least partly established under a traditional telecommunications regime. Most countries, for example, have some form of Telecommunications Act in place, and a Ministry of Communications or equivalent, responsible for guiding development of the sector in the context of national objectives. As the scope and complexity of the broadband ecosystem becomes a more central focus, it is necessary to expand and coordinate existing national frameworks, beyond merely telecommunications and other technology-related policies, to encompass a wide variety of laws, decrees, and other policy initiatives. Section 5 below highlights approaches to integrated strategic which government policy and planning in relation to broadband.

- Telecommunications and other ICT regulation: Similarly, the regulatory apparatus that has applied to the telecommunications sector, and separate regulatory approaches affecting other realms, will need to be much more closely coordinated to support effective broadband ICT development. Most countries have a separate telecom regulatory agency, responsible for licensing, economic regulation, and frequency management relative to a defined group of legacy telecom operators. But other broadband and ICT related activities may be regulated under separate broadcasting authorities, cable TV and satellite rules, media and information content authorities, business and corporate regulations, and a variety of other regimes. Some countries have begun considering “converged” media or ICT regulators to address the overlap of these issues, while others have emphasized light regulation, focused mainly on fair competitive practices. Regardless of the approach, the implications of all multifaceted regulatory practices need to be understood and accounted for.
- Local Government roles and responsibilities: The impacts of policies and rules imposed by local and state-level government authorities can be at least as influential as national standards on broadband growth opportunities. Local government can bring important perspectives to ICT planning and implementation, whereas their opposition or exclusion can often lead to unforeseen impediments. Some of the key roles and functions played by local governments in the process of promoting rural ICT development include issuing permits and fees for infrastructure rights-of-way; imposing local taxes; providing e-government services and facilities, direct participation in community access projects, and contributions to local ICT education and awareness campaigns.

3.1.2 Infrastructure and Services

Broadband ICT infrastructure consists of several layers of transmission network and access facilities, which can be deployed in a variety of configurations. The broadband based services that end users obtain are delivered over this infrastructure, but should be thought of as separate elements of the integrated ecosystem.

- Backbone Networks: International and national network infrastructure and transmission capacity. These typically utilize fiber optic cables for most high-capacity inter-city routes and international connectivity. All broadband networks and services must ultimately be interconnected with the global Internet as well as national public and private data networks. The transmission capacity required on these networks will increase as more users are connected to broadband services, as will the costs of the national backbone network. These costs can be minimized, however, market incentives, technological innovations, and measures to encourage infrastructure sharing.
- Backbone Extensions: Expanding broadband access beyond urban centers requires extension of the national backbone infrastructure to reach remote areas. This is one of the principal challenges of achieving universal broadband: the costs of adding capacity to reach “hub” locations that are close to rural population centers. Such broadband hubs might include wireless transmission and/or fiber optics, and sometimes satellite

connections, all of which can be expensive to construct and maintain. These factors place significant constraints on commercial operators' willingness to extend backbone networks deep into rural regions, where revenues from local broadband services may be low and unreliable.

- Local Access Network and Connectivity: To complete the broadband connection requires wireline or wireless links between the backbone network and end users, often referred to as the "last-mile." Broadband wireless access solutions are likely to be the most common in many areas, including 3G and next generation (4G or LTE) cellular mobile networks, fixed wireless such as WiMax or WiFi, and a range of other options that continue to evolve. Note that, in many cases, the same operator may control both the backbone network as well as local access, but this need not always be the case. There may be incentives for smaller local companies to build out and operate "village networks" that interconnect with, but are independent from, national network operators.
- Retail Broadband Services: In a broadband environment, infrastructure and retail end-user services that are delivered over broadband networks are not always the same thing. Services can be offered by multiple providers, including network operators as well as independent providers, including Internet Service Providers (ISPs), Mobile Virtual Network Operators (MVNOs), cyber cafés and public telecenters, and other third-parties. The more diverse the service offerings, the more robust the broadband market and ecosystem.
- Public Access ICT Facilities: For many users in developing economies and especially rural regions, access to broadband is most likely to be available through public locations, which offer use of computers, Internet, telephone, and other ICT equipment and services. Typical models include both government sponsored Telecenters as well as private commercial Internet Cafés, along with ICT labs in schools, post offices, libraries, and other public places. In some places, public broadband access may be offered simply as a free wireless (WiFi) signal, managed or funded by the local government, allowing users to obtain connections for personal devices. By offering a combination of services, training, user assistance, and customized applications and content, public ICT access centers can also help increase awareness and demand for broadband services, which may ultimately extend to private and household connections.

3.1.3 Devices and Applications

With traditional telephone service, all a user required was a simple phone instrument, and the ability to talk and listen. The advances involved with broadband require far more sophisticated equipment, and a host of software and applications, for users to take advantage of this technology. While there are limitless choices and constantly evolving standards, the broadband ecosystem depends on a robust combination of hardware and software that, for many users in the developing world, is both unfamiliar and expensive.

- End-User Devices: As mentioned above, this category includes computers, laptops, smart phones, tablets, and an increasing variety of other broadband-enabled devices. The scope

of choices is expanding rapidly, while costs are generally declining, creating increasingly flexible options for accessing broadband content. In developing markets, most individual users will typically favor smaller, more affordable mobile devices, while larger, more robust computers are more often found only in offices, schools, and access centers. The cost of such equipment always represents a significant factor in the development of the local broadband market. Rapidly changing standards and obsolescence compound the challenge, as lower income customers are unlikely to be able to replace or upgrade devices very often.

- Software, Applications, and Content: The value and appeal of broadband services are fundamentally dependent on software platforms and operating systems, multimedia applications, and the wealth of information content that is made available via broadband connectivity. For many users in developing societies, the nature of information that can be obtained via the Internet, e-Government networks, mobile broadband applications, and other sources may be less relevant or interesting than for customers in more developed markets. The scope of information applications and content available continues to expand without limit, and in the context of the social networking revolution, users themselves are becoming the most significant source of such content. As developing populations become more connected to the global Information Society, their interests and needs will necessarily have to be more reflected in the knowledge bases that they can access, and to which they will contribute.

3.1.4 Financial Sector

The multiple facets of the broadband ecosystem all require a considerable degree of financial investment and economic support to establish and sustain them, and these resources will not come from any one sector. It is thus important to recognize that financial institutions, funding mechanisms, and a range of public and private actors together form another vital link in the ecosystem.

In the past, by contrast, the buildup of telecommunications services was financed initially by public funds in most countries, as telephone operators were state-owned enterprises. The shift to private, competitive market structures, and the rapid rise of the mobile industry, did not itself dramatically expand the role of outside finance in the sector, as most large telecom operators have the means to self-finance their capital investments in this profitable and healthy market. However, the new and highly diverse, as well as costly, components of the broadband world are creating a greater need for innovative financing sources and wider contributions to ICT sector investment.

This expansion of participation in the financial side of the ICT sector can be a healthy side benefit of broadband development. Diversification of investment sources, asset ownership, revenue streams, and business relationships across a larger portion of a nation's economy can help strengthen economic ties in general, and potentially ensure greater public and private commitment to the growth of the Information Society.

In most developing countries, the private financial and banking sector has been largely on the sidelines of ICT industry investments. However, there may be a new role for establishing financial instruments, such as domestic venture capital funds, to allow private and institutional investors to participate in the medium- to long-term prospects of broadband development. Similarly, smaller entrepreneurs, start-up ventures, and partnerships may be in a better position in the broadband market to contribute to, and benefit from, market growth, especially with incentives from public broadband policies.

In addition, the growth of broadband and mobile ICTs have helped to enable new initiatives within the financial sector itself, to utilize these technologies to help expand citizen access to banking, money transfer, and other financial services that have often been beyond their reach. By partnering with ICT companies, financial firms can have a stronger impact on sector development, and their own contribution to society can expand as well.

3.1.5 Human Resources

Finally, beyond all the technical facilities, infrastructure, equipment, software, and other components, an equally critical element of the broadband ecosystem involves human resources, in virtually every sphere of activity. This includes skilled personnel on the supply side, and users on the demand side, from business managers and employees to public officials to individual citizens. It is especially difficult for markets with a low supply of technical workers to ramp up the labor force needed to expand highly technical services, especially in remote locations, where installation, maintenance, technical support, and customer service will be especially important.

Similarly, many users will be unfamiliar with computers, the Internet, and other advanced ICTs, and local broadband providers will need to reinforce their operations with significant customer assistance, training, outreach, and publicity in order to encourage demand and ensure a viable market response. All of this implies a far more extensive and engaged level of local human resource responsibility than is necessary for basic telephone services. Key personnel may be part of the staff of a local telecenter or telecom service provider, or they may be engaged through schools, libraries, and local government offices to help support community ICT development. They may also contribute actively to the creation and dissemination of local information content, in cooperation with rural users, community groups, and businesses.

3.2 Broadband Stakeholder Matrix

Table 1 provides a matrix showing the intersecting roles of various stakeholder groups in relation to the multiple components of the broadband ICT ecosystem as described herein. While there are a variety of potential inputs and contributions, and this summary only highlights certain key areas of focus, the matrix demonstrates the mutually reinforcing responsibilities and interdependence of all aspects of the ecosystem. The broadband strategy development framework in Section 5 elaborates on how this approach requires coordinated participation by all stakeholders.

Table 1: Broadband ICT Development Matrix

Component	ICT Policy Setting			Private Market Investment, Competition		Public Financing, Government Programs		
	Ministry of Communications	ICT Agency	Regulatory Authority	National Operators, Suppliers	Local Entrepreneurs	Financing (PPP, SOE)	UA/US Policy, Fund	E-Govt, Ministries
National Backbone Network + Rural Backbone Extensions	Define national telecommunications policy framework, competition and licensing targets, international agreements	Develop national ICT strategy, implementation plans; oversee coordination among stakeholders	Define competition regime, Issue licenses assign spectrum; regulate pricing, inter-connection, consumer affairs, QoS	Network investment, construction, service operation (wholesale and retail); equipment sales and service	Purchase capacity from national backbone	PPP co-financing of infrastructure; and/or network investment by SOEs	Contribution to network financing through competition	Lease network capacity from licensed providers
Local Access Network					Local network investment, construction			
Retail ICT Services					Independent or affiliated local service	SOE rural service provision	Designated USO provider	
Public Access ICT Facilities	Manage national public telecenter program	Provide technical support to public telecenters	Regulatory standards for public telecenters	Provide services, equipment, discounts	Local ownership, operation; franchises	National Post Office, libraries; Local govt support	USF funding for Telecenter programs	Delivery of E-Govt services through telecenters
End User Equipment, Devices	Advocate policies on import fees, domestic development	Evaluate, support equipment procurement	Type approval, QoS review	Equipment Import, sale, manufacture	Local sales of equip, devices	Bulk contracts with suppliers for devices and software for rural projects	Support for device and software purchases, development under USF projects	Procurement and design of specialized devices and apps for schools, clinics, etc.
Software, Applications, and Content		Support software, app design, implementation	Consumer protection re harmful software	Large-scale software and app development, sales	SME and university apps and content programs			
Human Resources	Support ICT training programs	Support HR capacity building	Monitor and evaluate HR development	Employee and public training programs	Local training programs for rural citizens	Financing of national ICT training programs	Incorporate capacity building in USF projects	ICT in Education initiatives

4.0 Key Challenges and Opportunities for Broadband Development

The preceding sections highlight the wide scope of interrelated trends and interests that are involved in the rapidly evolving broadband development landscape. While most governments, industry participants, and international institutions recognize the importance of expanding and accelerating broadband ICTs in developing economies, there are a range of complex challenges that hinder such growth.

These challenges include intersecting needs among the full spectrum of ecosystem components:

- High costs of capital investments in infrastructure
- Lack of financial mechanisms and investor interest in marginal areas
- Low revenue potential from low income, low demand users
- High costs for broadband devices compared with simple phones
- Lack of awareness, skills, training in use and value of broadband
- Insufficient supporting infrastructure in many locations: electricity, roads
- Inadequate ICT training and knowledge among government officials
- Lack of digital content in local languages, of relevance to minority cultures

Different countries have approached these challenges. The discussion below highlights emerging international trends in broadband development policies, according to four main categories. For each policy area, a number of recent examples of initiatives are summarized. The categories are:

1. High-Level National Broadband Policy Framework and Coordination: The structure and coordination of the national broadband policy development framework.
2. Market-based development: Policies that enable competitive market forces to invest in and expand broadband services as extensively as possible, both by facilitating market entry and ensuring competitive access among providers.
3. Expanding beyond the market: Policies that augment market forces by focusing on non-commercial locations and customers, through both supply- and demand-side initiatives.
4. Enhancing broadband value: Policies that reinforce the benefits of broadband for rural communities, by helping develop targeted applications and content, promoting awareness raising and training, and delivering e-Government services.

4.1 High-Level National Broadband Policy Framework and Coordination

Effective broadband and ICT development policies are typically based on a high level strategic policy framework involving multiple agencies, and actively endorsed at the highest level of government, such as the Prime Minister and/or legislature. Policy leadership may be asserted by the relevant Ministry of Communications or ICT, by the national telecommunications regulatory authority, or by a specialized ICT Agency, with close coordination and participation among these and other offices. Key participating agencies generally include Ministries of Education, Health,

Local Affairs, Culture, and more, as well as State and Local Governments. There may be a national Coordinating Committee to develop policy goals and allocate implementation responsibilities. In addition, some countries have developed Broadband Stakeholders Groups, consisting of private sector operators and suppliers, user groups, academic and research institutions, NGOs, and others.

A coordinated national broadband policy framework typically incorporates a comprehensive vision of broadband as a critical contributor to national socio-economic development as well as a range of specific goals and action items, such as:

- Objectives for broadband expansion, including numerical targets for penetration within defined time-periods, to create incentives and momentum for growth;
- Implementation strategy for key components of the policy, including priority activities such as infrastructure funding, licensing, government networks, etc.;
- Stakeholder roles and allocations of responsibilities, for both public agencies and private sector operators;
- Funding sources, mechanisms, and amounts to be channeled to specific activities;
- Public relations strategy to engage citizens in contributing to the planning and implementation process, and to promote awareness and demand for broadband.

Note: See Section 5 for more detail on a proposed framework for developing National Broadband Policy and Strategies.

International Trends and Examples:

- In Malaysia, ICT policies are coordinated among several institutions, under the Communications and Multimedia Acts of 1998, with leadership by the Prime Minister's Economic Planning Unit. Other key participants include the National Information Technology Council, the Ministry of Information, Communications and Culture, the Malaysian Communications and Multimedia Commission, and the Multimedia Development Corporation. There has been a series of national ICT development plans since 1997, the most recent being the National Broadband Initiative (NBI), which has succeeded in expanding broadband access dramatically in the past few years.
- The Republic of Korea has implemented a series of strategic national ICT development plans for more than a decade, which combine public investment with incentives for competitive private investment. The most recent have included the Broadband IT Korea Vision 2007, and the u-Korea Master Plan. These plans have been supported by complementary industrial policies on research and development, venture capital markets, and other issues. Policies have been designed and implemented at the national level, under the Electronics and Telecommunications Research Institute (ETRI) and Korea Information Society Development Institute (KISDI).
- In Australia, policies and funding aimed at rural ICT and broadband development have also evolved, starting with the National Broadband Strategy Implementation Group, which oversaw the Coordinated Communications Infrastructure Fund (CCIF), the Higher

Bandwidth Incentive Scheme (HiBIS), and the Connect Australia program, among others. The latest initiative is the National Broadband Network, one of the most ambitious infrastructure development projects in the world.

4.2 Market-based development

Virtually all countries that have achieved high levels of broadband access have emphasized competitive, market-oriented policies as a foundation for ICT market growth and innovation. Market-based, technology-neutral policies help ensure that investors and customers keep up with rapidly changing technologies and applications, while vigorous competition ensures that cost savings are passed on to users. Even in rural areas, there are an increasing array of solutions that can potentially deliver commercially viable broadband services to many locations and user groups, given the flexibility to deploy cost-effective technology and targeted service options.

Facilitating market entry: Effective rural broadband development policies thus tend to facilitate market entry and competition in delivery of network infrastructure and services at all levels. This is accomplished, for example, by issuing multiple licenses via a relatively open regime that allows new competitors to establish service and build networks wherever they perceive a market opportunity. Such licensing policies also involve robust and strategic allocation of the frequency spectrum among different operators and platforms, including 3G mobile, WiMax, VSAT, and other broadband wireless options. In some cases, leaving new spectrum available on an unlicensed basis, as typically applies to WiFi technologies, can help accelerate deployments with minimal barriers.

For rural markets in particular, competitive market entry policies can also help promote targeted local investment in these areas by new investors, where established national operators might have less interest or incentives. In the context of broadband services, this is a relatively new model, particularly for developing countries, although the precedent of smaller, rural telephone companies has been followed in a number of countries in the past. With declining costs of broadband wireless access and innovative new “microcell” architectures, this concept of independent local communications operators is gaining interest as an option in a number of countries.

Ensuring competitive access: Effective competitive broadband market development depends upon fair and equal opportunities for all competitors. This requires that those investing in new telecommunications networks and services be able to interconnect with existing networks on equitable terms. More broadly, efficient provision of network access can be facilitated by measures to encourage shared use of common “passive” infrastructure, such as cell towers, telephone poles, underground conduit, and “dark” fiber, among other resources.

Many countries have adopted forms of local “open access” obligations, including Local Loop Unbundling (LLU), which require owners of last-mile networks to allow interconnection of such competing service providers to their access facilities. Non-discriminatory, cost-based access obligations for sharing backbone networks and passive infrastructure such as towers and telephone poles are also frequently adopted as part of a pro-competitive regime.

The regulator must ensure that pricing or cost-sharing arrangements between network operators are fair and equitable. In the case of rural communications infrastructure, this is especially important, as the costs to build into rural areas can be high, and interconnection to the national backbone should be as affordable as possible to encourage rural investments.

International Trends and Examples:

Competitive market development has been at the core of the most successful broadband policies around the world. Indeed, the foundations of the ICT revolution and the Internet itself have been based on entrepreneurial initiatives, typically by small, private innovators, together with government sponsored research and development. As mobile technology has come to dominate, numerous countries have witnessed the rapid take-up of 3G network services offered by competing mobile operators, while private global companies have developed countless options for smart phones and several world standard alternative operating systems to attract broadband mobile customers. The latest innovations, in mobile applications and tablet computers, continue to build on this global market-driven model.

Specific examples of relevant country policy experience include:

- Numerous countries have highly competitive broadband markets, especially in mobile 3G and emerging 4G/LTE services. The Republic of Korea, which has perhaps the most extensive broadband penetration in the world, achieved this status largely by encouraging competitive investment in both fixed and mobile broadband networks. Throughout the OECD countries, for example, consumers have choices among at least two or three fixed broadband providers, and four or five mobile operators. The European Commission has adopted stringent rules to enforce active competition in broadband services. Even tiny Singapore and Hong Kong each have licensed numerous full service fixed and mobile broadband operators.
- Among less developed countries, competitive models have also proven successful. In neighboring Cambodia, for example, there are currently nine licensed mobile operators, and broadband mobile service competition is quite widespread, resulting in very favorable prices for users.
- Competitive open access regimes have been a feature of many telecommunications development policies. The European Commission has also emphasized open access, including Local Loop Unbundling, among its key pro-competition initiatives.
- The concept of local rural and regional telecom operators also has precedents in a number of countries. The United States telephone system developed from small, often rural telcos, many of which are still in operation. In Finland and Bolivia, local telecom services are provided by separate regional and operators, often organized as cooperatives. Recent trial projects in Vietnam have demonstrated the potential viability of local village-based wireless broadband services.

4.3 Expanding Beyond the Market

Even where market-based development is fully encouraged, practical conditions may limit private firms' willingness to invest in broadband ICTs, especially in certain rural areas where likely returns will not cover costs. These conditions may arise from a combination of high costs to deploy infrastructure, as well as low incomes and sparse populations that may not be likely to generate sufficient revenue. Broadband services, equipment, and software may not be affordable to many rural users, further suppressing demand even where there may be growing interest in obtaining these services.

Many governments, together with the private sector and other stakeholders, have undertaken a range of policies to help expand broadband beyond these near-term market boundaries. Direct or indirect financial interventions to promote such expansion (or "universal access") are common components of nearly all broadband development policies. They include both supply-side initiatives and demand stimulation measures.

Supply-side approaches: Most such efforts aim at directly expanding the supply of broadband networks, especially infrastructure investments in to backbone network extension as well as rural broadband access connections. Various mechanisms utilized include:

- Direct public investment through state-owned enterprises: Where state-owned telecommunications companies still predominate, some Governments channel infrastructure investments directly through these operators. The difficulties with this model are well documented, as a lack of competition and inefficient operations often tend to result in lower coverage and higher costs than other markets.
- License rollout obligations: New licenses can include requirements that licensees roll out infrastructure and service to designated portions of the country, or even nationwide, over a period of time as a condition of granting the license, with sanctions for not meeting such obligations. Operators bidding for licenses, however, will take into account the projected costs of such investments in their bids or negotiations, with a resulting offset of license fees, so that these costs essentially represent an indirect form of Government subsidy. This may be a more efficient mechanism to apply such subsidies, but such obligations can also be difficult to enforce after the fact.
- Public-private partnerships and government-sponsored network investments: Projects in which governments arrange partnerships with private sector firms to deploy broadband infrastructure can take several forms. The critical decisions involve the ownership arrangements for the resulting facilities, and the financing mechanisms and allocations among the parties. Representative approaches include:
 - Government procurement of infrastructure or services through competitive bidding among private operators, which subsequently own and operate the resulting infrastructure;

- Establishment of non-profit public agency to manage planning and procurement for rural infrastructure, also obtained through competitive bidding;
 - Issuing of service contracts with private operators to provide e-Government network services;
 - Arranging a consortium among multiple operators to build and jointly own network infrastructure, with partial public funding, most often for international backbone cables.
 - Government broadband stimulus investments, designed both to increase circulation of money and spending in the economy generally, and also to improve and expand broadband networks, to help generate longer-term jobs and growth.
 - Partnership programs with major multinational suppliers, such as Intel, Cisco, Microsoft, Google, etc., which have corporate interests in helping expand the broadband market, and have created funding and support programs in numerous countries.
- Universal Service Fund (USF) projects: Numerous countries have established USFs or the equivalent, to channel funding from telecommunications industry earnings toward targeted investments in broadband access for unserved and underserved communities. These Funds, when effectively managed, can serve as an important source of seed financing to jump-start markets, while also helping provide critical connectivity to the most remote locations. Among the most prevalent types of projects supported by USFs are local access network infrastructures, as well as public community information centers, or similar public ICT facilities. In many countries, these centers have become a core resource for rural users to learn about and access the Internet, computers, and the opportunities afforded by the ICT revolution.

Demand stimulation: Unlike mobile voice service, user demand for broadband does not materialize as widely or rapidly, especially in rural areas. Barriers include costs of both equipment and service, unfamiliarity with the technology and lack of support in learning to use it, a perceived lack of value or relevance to people's lives and needs, and other factors. Many rural broadband policies thus seek to stimulate demand, by reducing end user costs, improving awareness and training, and helping integrate broadband ICT into rural life. Key initiatives undertaken in various settings have included:

- Providing free or subsidized access devices to select user groups (students, low income, rural or new subscribers)
- Subsidizing broadband subscription prices for targeted users (schools, community organizations, rural households)
- Public awareness and involvement campaigns, often sponsored by local telecenters, schools, or community groups
- Basic public training and "e-literacy" programs in ICTs

In addition, local government offices can generate significant demand themselves through their ICT purchasing practices. In this respect public offices can serve as “anchor tenants” for rural telecom networks by purchasing services on a long-term basis and helping to guarantee a consistent revenue stream for the local operator.

International Trends and Examples:

The idea of investing public resources in development of national and rural broadband networks and services is relatively new. Until recently, broadband Internet access and similar technologies were not looked upon by most governments as essential services worthy of allocating scarce public funds, even in wealthy economies. Universal Service in telecommunications had been considered necessary only for basic voice telephone service. As global ICTs and the Internet have come to dominate international commerce and socio-economic development, this view has shifted, and many countries have now begun to emphasize broadband access as a critical element of national growth strategies. As such, governments are allocating funds to help build out broadband access networks where market forces have been unable or unwilling to go, following the range of models and approaches identified above. In particular, Universal Access/Service Funds in many countries have begun to alter their focus from traditional basic public telephone service to pursuing full broadband access for rural communities.

Some specific examples of recent initiatives to promote broadband ICT growth beyond the market frontier include the following:

- In Australia, the national administration and regulatory authority have sponsored an extensive series of programs to support rural broadband access, including a Universal Service Obligation and Fund which has generated over \$200-million, the Connect Australia program, which has allocated over \$1-billion for extending broadband fixed and mobile networks to rural areas, and a new National Broadband Network (NBN) initiative to create a new national wholesale fiber backbone.
- The Korean broadband success story has also been aided by strategic public investments and partnerships. The Informatization Promotion Fund was used to finance projects, with contributions from government (39%) and the private sector, through spectrum licensing fees, operators levees, and earnings from Fund loans. The Fund was jointly managed and administered by the MIC and the Institute of Information Technology Advancement (IITA). A \$900 million Korea Information Infrastructure (KII) project invested in the national high-speed public backbone, development of ICT applications, and promotion of R&D and information technology pilot projects. Private sector carriers, both Korea Telecom and others, were contracted by MIC’s Broadband Planning Division, with Government funds leveraging private investment.
- In Malaysia, the government established a National Broadband Initiative to promote expansion of broadband services throughout the country, to achieve 50% household penetration of fixed or mobile broadband by 2010. Some \$4.2-billion was allocated from the Universal Service Provision Fund to finance ICT access for hundreds of rural schools, libraries, and clinics. Public access Community Broadband Centers (CBCs) and other

Telecenter projects have also become a successful component of the Malaysian strategy. Over 220 CBCs provide broadband access, ICT training, and on-line business/web site development. Government has also allocated \$305m from the Fund to provide free personal computers to qualified students and households, and discounted broadband subscription prices of \$6 per month for rural subscribers.

- Chile was one of the pioneers in promoting rural telecom access, through its Telecom Development Fund (FDT), which used open, competitive tenders achieved rapid expansion of rural networks and establishment of “Infocentros”. In 2008, the Government announced a new program to provide Internet access to 3-million people in 1,474 rural communities, through a \$70-million subsidy, expected to be based on Wi-Max technology.

4.4 Enhancing Broadband Value

The objective of establishing policies to promote broadband is to help citizens to achieve the many potential benefits of access to unlimited information and connectivity. An important element of such policies, therefore, involves programs and initiatives to help enhance the value of broadband services, particularly for underprivileged peoples, and those less familiar with ICTs. These activities may support creating customized ICT applications and content that will appeal to new users, while also reinforcing public awareness and capacity to take advantage of such resources.

Promoting relevant ICT content: Policies that promote development of relevant ICT content, especially focused on the interests of less advantaged users, can help reinforce broadband demand, while also contributing to creation of ICT-based businesses and jobs, potentially including IT software, Business Process Outsourcing (BPO), and on-line services. Successful broadband ICT policies help encourage the growth of domestic information content that is of value to diverse groups of citizens and communities, while emphasizing awareness, training, and economic opportunity.

The greatest needs for ICT content in developing countries are applications which address the interests of non-traditional users, from farmers to rural residents to indigenous peoples, and which reflect local community values and social conditions. Examples include:

- Content available in local languages, and which addresses indigenous culture and traditions;
- Applications focusing on ICT use in agricultural, fishing, forestry, tourism, and other country-specific economic sectors;
- Customized social networking services and programs to encourage user-generated local content;
- Mobile applications adapted to the devices and capacity levels of typical local users;
- Applications and services aimed at specific disadvantaged or special groups, such women, the elderly, the disabled, and non-literate users;
- Business management and support software for local SMEs.

- Entertainment content, including music and television programming, reflective of national values and interests.

Support for programs that focus on local content and application development can be provided through various Government initiatives that include partnerships with educational institutions, private corporations, NGOs, other public funding programs, and local activities within local communities themselves.

Public e-Government services: Many governments have recognized that there are a variety of opportunities to employ broadband ICT-based services and applications to improve and expand public services, and to encourage citizens to enhance the quality of their lives. Delivery of government services, including ICT education, training, capacity building, and public awareness programs can be a vital approach to enhancing value of broadband for citizens and government alike. In particular, many countries place a priority on creating widespread educational networks for public schools, to integrate e-learning, ICT training, digital curriculum, as well as nationwide educational resources. Public ICT networks and services for rural communities also often incorporate e-Health programs, access to local government web sites, documents and licenses, tax records, and many other citizen benefits.

While such services are sometimes provided independently (e.g., separate SchoolNet and HealthNet arrangements), the most cost-effective national e-Government networks connect multiple agencies and offices at the national and local levels under a unified system, providing public services more efficiently. This requires centralized procurement and management of e-Government network resources and services under a single body, which allocates funding and works with service providers to ensure delivery of adequate connectivity at designated locations.

International Trends and Examples:

The need to reinforce the value of ICT services, especially for previously unserved populations and regions, is a relatively new notion, which has accompanied the growth of interest in expanding broadband ICT access generally. As urban and wealthier users have discovered the substantial benefits attached to broadband Internet access, mobile broadband applications, and easy connectivity to public services, many governments have begun to recognize the opportunity to apply these technologies in improving the lives of rural and lower income citizens as well. Applications and information content aimed specifically at these users are still fairly new, although extension of e-Government networks and services into rural regions is becoming more commonplace. Examples of these types of policies and initiatives include:

- India has been a world leader in promoting value and opportunity from ICT deployment. The Digital Empowerment Foundation sponsors e-Content Awards for original projects in multiple areas, and helps develop and publicize the results from hundreds of submissions. The national e-Government Program under the Department of Information Technology brings together all public agencies, and includes State Wide Area Networks, Data Centers, National and State Service Delivery Gateways, and over 100,000 Customer Service Centers. India has also taken a worldwide lead in ICT training, led by the National Institute for Information Technology (NIIT), which has provided computer and

technology training for three decades, and is now one of the world's largest training institutes. As a result, ICT-based businesses have become a foundation of Indian economic development: BPO, software and engineering services generate over \$60b per year.

- In the Philippines, an extensive network of public access Telecenters helps provide key services to rural communities, including educational programs for students who have dropped out of the formal school system, a Farmer's Information Technology Service that provides access to extensive data on modern agriculture techniques and resources, as well as widespread ICT training programs available to the general public.
- Australia's government also provides extensive support to advanced ICT services and applications, especially for rural and indigenous populations. The Digital Regions Initiative is a \$60m program that co-funds projects with state and local governments in education, health, emergency services. The Indigenous Communications Program has allocated \$30m to provide ICT access and training in 300 remote indigenous villages. The Clever Networks Program has provided \$118m in grants for innovative delivery of public services and capacity building assistance in remote communities.

5.0 National Broadband Strategic Planning Framework

Many countries have recently embarked upon the process of creating a comprehensive framework for promoting development of broadband ICTs. These initiatives may have different labels, such as National Broadband Strategy or National Broadband Plan, and sometimes National ICT Strategy or Plan, although the latter may address a wider set of issues. Note that such a Strategy or Plan is typically different from a "Policy" on ICT or Broadband or Telecommunications. Policies represent principles, regulations, laws, and other normative legal frameworks, which create the foundation on which implementation strategies are built. A strategy or plan to promote Broadband goes beyond policy foundations, to identify specific tasks, activities, targets, responsibilities, and time frames to achieve concrete results.

A comprehensive Strategy Framework for promoting national development of Broadband-based ICTs must take into account multiple inter-related concepts. The discussions in these sections provide a foundation for examining these concepts, and developing an overall strategic approach. The issues addressed include:

- Principles and Objectives for a broadband strategy;
- Key Stakeholder Roles in developing and implementing the strategy; and
- A Planning and Implementation process, which brings together all key participants to produce a coordinated and comprehensive strategy and implementation plan.

5.1 Principles and Objectives

A National Broadband Strategy should be built upon a clear shared understanding of basic principles and concrete objectives. To achieve this common sense of purpose requires that all

major stakeholders understand and agree to the main goals and priorities of the Strategy, before the in-depth work of developing its policy and implementation components. Key considerations that need to be addressed at the earliest stages include:

- Definitions of key concepts: Terms such as “broadband” itself, as well as a variety of legal and regulatory definitions and parameters, which must be clarified to ensure that all parties understand precisely the meanings of these concepts when policy options are discussed.
- Fundamental Principles that should guide the policy and strategy: The Strategy must be grounded in a set of clear and legally established principles which dictate the boundaries and priorities of the ultimate strategic framework. These should address such matters as the range of market liberalization, foreign investment, transparency, the rights and responsibilities of consumers, and a variety of similar basic goals.
- Specific Objectives for the outcomes and impacts of the strategy: The broad set of goals and targets that the strategy is intended to achieve should be spelled out early in the process, although these may evolve as a result of consultations and other developments. These Objectives should be realistic and specific, beyond mere high-level goals, embracing both the quantitative outcomes of the strategy in terms of ICT access and penetration, as well as socio-economic impacts of broadband development on various sectors and groups throughout the society.

5.2 Stakeholder Roles

The Broadband Strategy must be created, planned, and implemented through the shared vision and coordinated initiatives of a wide range of stakeholders in the public and private sectors. All interested agencies, officials, companies, organizations, communities, and citizens must be able to contribute to the process of defining the Strategy itself, and must be responsible for executing those aspects of the Strategy that fall under their sphere of responsibility.

There are many groups of stakeholders with a strong potential interest in participating in the Broadband Strategy process. These can be mainly classified as follows:

- Government ICT policy and regulatory bodies: Ministry of Information and Communications, Regulatory Authority, ICT Agency, and other similar ICT-oriented agencies;
- Other Government agencies and institutions: Ministries of Education, Health, Public Administration, Agriculture, and others with direct and indirect interests in utilizing ICT to improve governance; also local and district government officials;
- ICT network and service providers: National and regional network infrastructure owners, telecommunications companies, resellers, ISPs, broadcasters;

- Other ICT industry suppliers: Computer hardware companies, other high tech equipment and facility supply firms;
- Financial sector representatives: Companies engaging in e-banking or m-banking and credit, e-commerce, and other electronic financial services;
- Information, applications, and content providers: Software developers and sales, newsmedia outlets, electronic publishers, e-commerce providers;
- Community organizations, NGOs: Organizations representing and supporting local communities and other development constituencies;
- Business and citizen consumers: Interests of the business sector as users of broadband ICTs; also representatives of private consumers, including disadvantaged groups.

Many of these groups and others may have multiple interests and involvement in various elements of the ICT and broadband sector. It will be critical, as indicated below, to include these key participants in the strategic planning process as much as possible. At the same time, they must be willing to provide information and inputs to the process, and to commit to firm actions to implement the resulting Broadband Strategy.

5.3 Planning and Implementation

Successful development of a Broadband Strategy depends as much upon the process itself as it does upon the decisions and proposals that come out of that process. With so many different stakeholders and activities required to achieve a comprehensive and coordinated result – and with political and financial interests inevitably highly concerned about the outcomes – it is crucial to ensure that all parties feel invested in the decisions, and that their concerns and perspectives are considered, if not always adopted entirely.

5.3.1 Key components of Broadband Strategy planning

The National Broadband Strategy development process should incorporate the following components:

- Steering Committee and Working Groups: The strategy development process depends upon high-level guidance and active collaboration among stakeholders. To ensure such collaboration, a Broadband Strategy Steering Committee should be established to oversee the process, under a Secretariat that can be set up within the Regulatory Authority, Ministry, or other appropriate agency. The Steering Committee should create Working Groups among its members and other stakeholders, which will address key topics of the strategy. (See following subsections.)
- Baseline research: To develop an effective and comprehensive National Broadband Strategy, it is important to establish a baseline understanding of the current market structure and status of all aspects of the ICT sector, as well as the existing gaps,

technology options, cost, demand and, revenue trends, and a range of other information. This should be compiled from the relevant stakeholders, under the supervision of the Steering Committee.

- Public Forum and Consultations: As part of the process, the Steering Committee should organize and host a Public Broadband Strategy Stakeholder Forum. The purpose of the Forum should be both to present the draft Strategy and its various elements, as developed by the Steering Committee and Working Groups, and to solicit comment, input, and ideas from all interested parties. The Forum should be widely publicized and open to anyone, whether citizen, business, government, or NGO. In addition, the Steering Committee should invite inputs via the web as well as through as direct consultations and questionnaires to identified stakeholders, to ensure the widest possible participation in the process.
- High Level Strategy: The National Broadband Strategy should be defined in reasonable detail at a high level, which addresses the cross-section of responsibilities, expectations, priority plans, funding mechanisms, and policy and regulatory initiatives that will be necessary to achieve the strategy's objectives. This document should be publically circulated and endorsed at the highest levels of government to ensure shared understanding of and commitment the goals and expected outcomes of the strategy.
- Implementation Action Plans: The Broadband Strategy document must ultimately be supplemented by Implementation Action Plans, which specifically define the inter-related activities of all stakeholders that will be necessary to give life to the Strategy's plans. These Action Plans should include timetables, roles and functions of key participants, and financing commitments for each segment. Their implementation must be carefully coordinated to ensure effective impact of all portions of the plan.
- Financial Sources and Obligations: The Broadband Strategy will inevitably require commitments of substantial amounts of funding from multiple sources, to cover the capital costs and initial investments necessary to stimulate widespread broadband development. The proposed sources and amounts of such funding, from a combination of public sector financing and private commitments, must be defined clearly as a vital element of the final Strategy.

5.3.2 Steering Committee Role and Activities

The Broadband Strategy Steering Committee should be responsible for guiding the overall development of the core strategic elements, and ultimately adopting a consensus Strategy that will be implemented cooperatively by all parties. Ideally, the Steering Committee should be composed of high-level representatives of a broad spectrum of stakeholders (see below), who will be prepared to commit serious attention and official inputs to the elaboration of the Strategy. Through the facilitation the Broadband Strategy Secretariat, the Steering Committee should undertake the following key activities:

- Establish the key principles and objectives that will underlie and guide the National Broadband Strategy, as outlined above.
- Agree on high-level targets for broadband-related development that the strategy should seek to achieve.
- Define and appoint the Working Groups responsible to address distinct components of the Broadband Strategy; identify key issues and questions to be addressed by each Working Group.
- Oversee and advise Working Group deliberations; review findings and recommendations of the Working Groups.
- Host and participate in a Public Forum on National Broadband Strategy; present and discuss key findings and outcomes from the Steering Committee and Working Groups.
- Develop a consensus agreement on how to harmonize the various inputs and recommendations into an integrated national strategy, including priorities for resource allocation and coordinated stakeholder initiatives, and a high-level implementation timetable.
- Prepare and adopt draft and final National Broadband Strategy document, based on the above processes, in consultation with the Secretariat.
- Oversee creation of Implementation Action Plans to define implementation steps and responsibilities for realizing the Strategic Plan agreements.
- Collaborate with Secretariat and stakeholders on establishing a follow-up regime and procedures to monitor and oversee execution of the Action Plans, and the ongoing review and updating of the National Broadband Strategy.

Among the first tasks of the Steering Committee, once it is constituted, should be refinement of these prospective activities, and determination of a realistic timetable for completing each stage of the process.

5.3.3 Working Groups Roles and Activities

The purpose of establishing Working Groups is to bring together stakeholders with particular interest and expertise in specific components of the broadband ecosystem, to allow them to work out proposed approaches to addressing the key issues associated with their separate areas of focus. Each Working Group should consist of representative persons and organizations with close knowledge of the sub-topics and challenges arising in their field, and with ideas as well as potential means for meeting these challenges.

The specific agendas for the Working Group will differ based upon the specific conditions relating to each group's main issues. In general, however, the main tasks of each Working Group should encompass the following:

- Define the general scope and focus of the issues covered by the Working Group;
- Identify key needs, gaps, and opportunities most pertinent to national broadband development;
- Identify high-level options, strategies, and solutions for addressing priority needs;
- Estimate costs, financial characteristics, other resource requirements of proposed strategies and solutions;
- Identify linkages between issues affecting the group's focus area and those of other groups;
- Propose the roles, responsibilities, mechanisms, and commitments of each stakeholder as required to actualize the proposed strategies and solutions;
- Prepare Working Group report and recommendations to Steering Committee;
- Upon adoption of overall Broadband Strategy, prepare Action Plans for implementing commitments under the group's focus areas.

The number, membership, and subject focus of the Working Groups should be determined by the Steering Committee as one of its first orders of business. The Committee should also prepare a preliminary scope of work and key questions for each Working Group to address, preferably in a standardized format for all groups. Each group should select its own chairperson and determine its schedule of activities as needed, but with guidance from the Broadband Strategy Secretariat.