

## *Chapter 4*

### **What Role Should Governments Play in Broadband Development?**

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*The World Bank's Information and Communication for Development 2009 report suggests that the contribution of broadband to economic growth is substantial, and may be more profound than comparable narrowband or voice-based ICTs.*

*Given its significant economic and social benefits, expanding affordable access is becoming a high priority for governments of developed and developing countries alike. How is this best achieved? This chapter discusses the principles that should underlie government efforts to increase broadband access.*

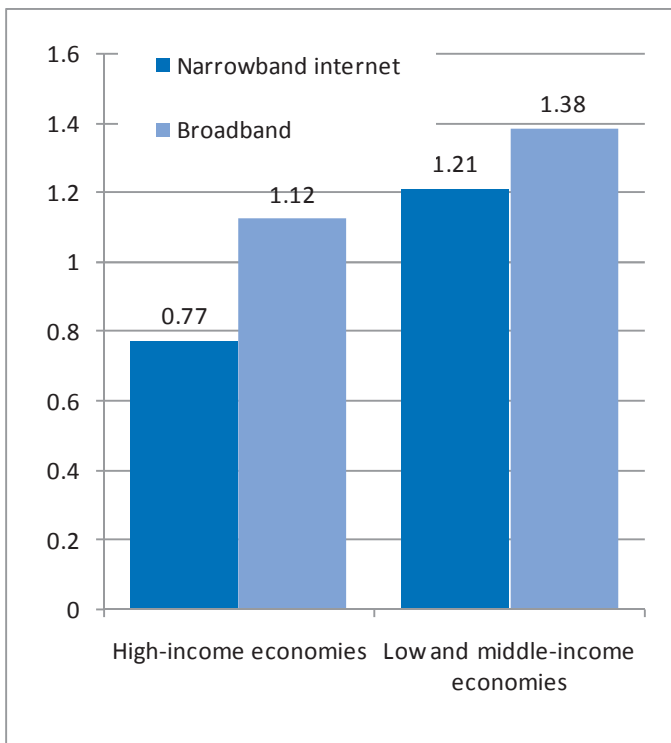
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## Why broadband?

Broadband is a key driver of economic growth and the competitiveness of nations. A boost of 1.38 percentage points on GDP growth in developing countries can be attributed to every ten percentage points' increase in broadband penetration (Figure 4.1).

**Figure 4.1: Impact of a 10% increase in penetration of selected ICTs on GDP per capita**



Note: Based on an analysis of 120 economies, 1980-2006.

Source: Adapted from World Bank (2009), *Information and Communication for Development: Extending Reach and Increasing Impact*.

Broadband is a General Purpose Technology (GPT) that is having a major impact on the way we live and work. Companies use broadband to improve productivity through remote monitoring, logistics management and

online procurement. It is also used to provide services such as media content, online shopping and electronic banking.

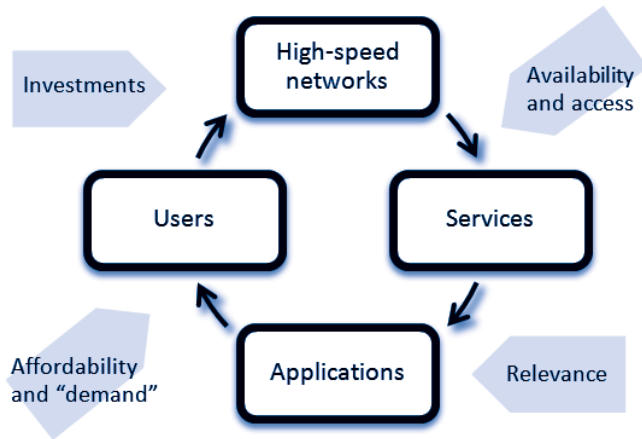
Increasingly, broadband is the primary mechanism for accessing information – a public good essential for all forms of economic activity and good governance. It provides access to new technologies and allows companies to explore new business opportunities, interact with customers and obtain information about market prices. Better access to information makes markets work more efficiently and raises producer incomes. Ready access to information about the performance of government and politicians helps improve government accountability and quality of service provision.

Finally, broadband networks are increasingly being used to deliver public services. Electronic voting, financial services, health care and electronic land registration are all examples of services that were previously delivered manually but are now being automated and delivered over broadband networks, often substituting online interaction for travel or the physical displacement of goods.

Despite rapid growth in broadband networks that has already taken place, broadband is still in the early stages of deployment. The future will see wider deployment, increased capacity and a shift towards a wireless platform which will enable mobility. Broadband in developing countries is likely to follow a similar path but with a greater emphasis on wireless networks.

## **Broadband as an “ecosystem”**

Broadband is typically defined as a “high-speed communications network” that connects end users at data transfer speeds greater than some minimum (e.g. 256 kbit/s). While this is a popular definition, it is incomplete. Rather, broadband can be considered as an “ecosystem” comprising different elements that use high-speed connectivity to interact in different ways (Figure 4.2). By contrast with relatively passive dial-up Internet users, broadband users have the ability to create and share multimedia content in a variety of formats. This interactivity is an important factor that differentiates broadband from other high-bandwidth, but essentially passive, networks such as multi-channel TV. It also creates many new opportunities for value creation and innovation.

**Figure 4.2: The virtuous circle for broadband: connecting the elements**

Source: World Bank (forthcoming) “Broadband Policy Development in Developing Countries”.

The growth of so-called *Web 2.0* services and applications that are dynamic and collaborative in nature depends on the ability of users to interact with each other, but also has implications for network development. For instance, networks previously offered uploads at lower speeds than downloads because this reflected typical use of applications such as e-mail and web-browsing. Users of today’s two-way multimedia services, however, demand high speeds in both directions. Worries about a deluge of bandwidth-hungry services overwhelming the Internet abound, but these dire predictions have only come to pass in isolated incidents. The global Internet seems remarkably robust in terms of scaling to a larger number of users, more demanding applications and higher speeds.

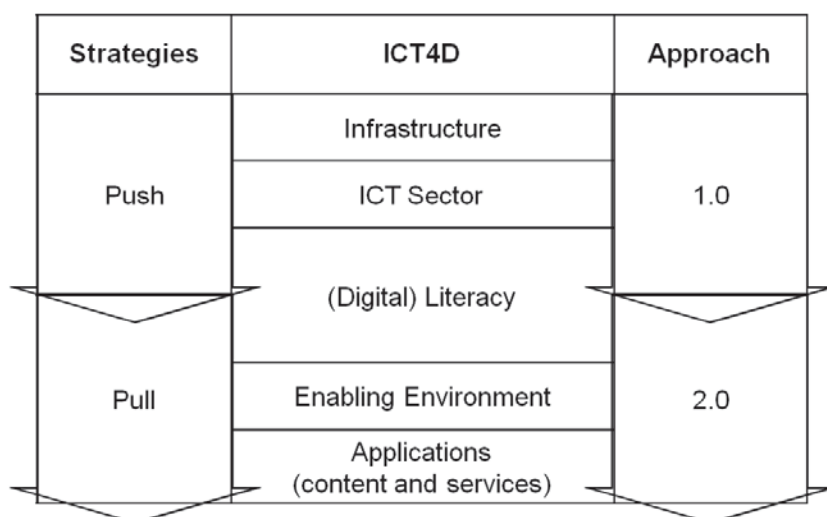
Hence, the network is part of an ecosystem that is evolving and includes more demanding users and applications. Simultaneously, users creating and sharing more content and applications that require more bandwidth should drive the supply of broadband, forming a virtuous circle. Thus, in this note the “broadband ecosystem” is defined as a multi-layered system of interconnected high-capacity communications networks, bandwidth-intensive services and applications, and users.

## The role of government

Defining broadband as an ecosystem rather than simply as a network

helps to assess the role(s) that governments will need to play in using broadband as a tool in ICTs for development (ICT4D). Traditionally, governments have played a “push” role, ensuring a favourable environment for the provision of ICT infrastructure and development of the domestic ICT sector. This might be characterised as *Policy 1.0* (Figure 4.3). Increasingly, governments will need to move towards “pull” strategies aimed at promoting digital literacy, establishing enabling environments, providing including local content. This might be characterised as *Policy 2.0*, corresponding to popular concepts such as *Web 2.0* or *Mobile 2.0*.

**Figure 4.3: Evolution of government approaches to ICTs for development**



Source: Adapted from Peña-López, Ismael (2009), “Measuring Digital Development for Policy-Making: Models, Stages, Characteristics and Causes”, unpublished PhD thesis, UOC, Barcelona.

Governments have taken very different views on whether or not to establish national broadband strategies. Generally, countries with coherent national strategies have tended to be more successful in fostering broadband diffusion. Most of the OECD countries that lead broadband penetration, including Denmark, the Netherlands, Norway, Korea, Sweden and Finland, have such strategies. But even pro-market economies that initially resisted defining a central government role have now crossed the fence. For instance, the UK government’s 2009 *Digital Britain* report included a radical proposal to charge a levy of GBP 6 (around USD 10) per year on fixed-line telephone subscriptions in order to generate a fund for high-speed broadband services

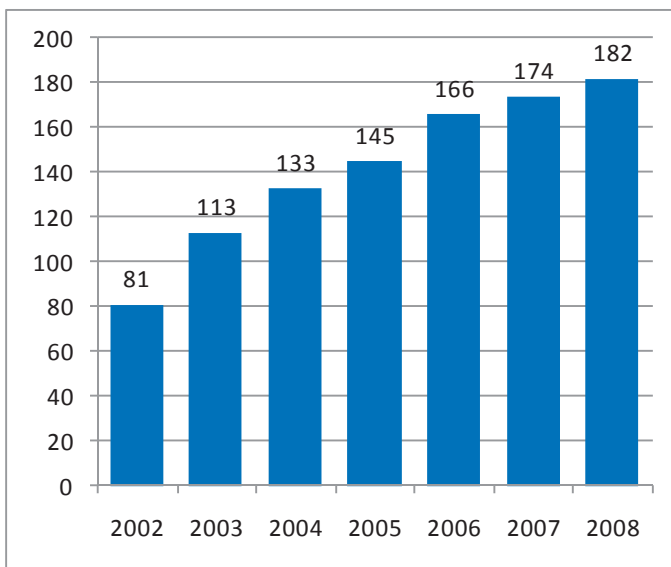
across the country. Similarly, in the United States, after ten years of debate – during which time the US has fallen from second to fifteenth in OECD broadband rankings – the new government has announced the development of a National Broadband Plan, kicking off with a series of discussions hosted by the regulator, the Federal Communications Commission (FCC).

What should be the role of government in the provision of broadband? The basic principle is that governments should intervene only based on sound economic principles and where the benefits of such intervention outweigh the costs. There are essentially two different roles for the public sector: making markets work more efficiently and ensuring equitable access for all.

### *Making markets work more efficiently*

Already by 2008, broadband service was available in 182 economies (Figure 4.4) and by the start of 2009 the combined total of global broadband users on fixed and mobile networks exceeded 1 billion. As the vast majority of these connections have been supplied by privately-operated companies, it could be assumed that the broadband market is working quite effectively with no market failures.

**Figure 4.4: Number of economies with commercially-available broadband, 2002-2008**



Note: Broadband is defined as speeds equal to or in excess of 256 kbit/s.

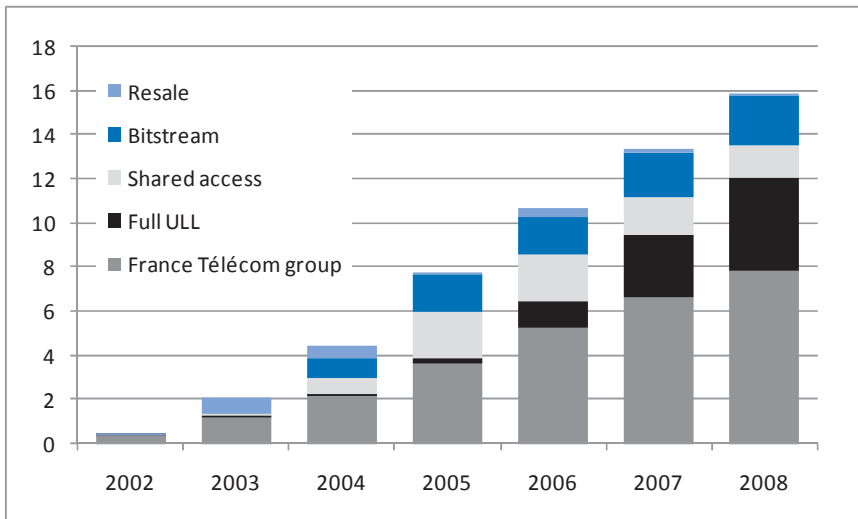
Source: ITU.

There are, however, market failures in broadband. As with many other markets, they concern the provision of public infrastructure. The structure of the broadband market itself has sometimes created problems for the development of service. The most common form of market failure is the persistence of monopoly-type structures in the provision of broadband infrastructure even when no legal monopoly exists. In many countries, the dominance of incumbent public telecommunications operators has been one of the key obstacles to the development of effective competition. Other market failures may be associated with lack of economies of scale. Difficulties in obtaining legal permission to operate, inefficient allocation of radio spectrum, poor information and limited capital markets are all further examples of market failures.

Market failures in the ICT sector have been widely recognised by governments around the world. They are typically addressed through regulatory policy: liberalising licensing regimes, facilitating efficient access to radio spectrum and regulating access to dominant operators' networks are all cornerstones of policies that have provided the foundation for the rapid expansion of broadband services. In Europe and some developing countries, key broadband policies have focused on providing regulated access to the incumbent operator's network ("unbundling the local loop"). Other economies have focused on providing low-cost access to existing infrastructure facilities such as energy and transport networks.

In France, for instance, a "ladder of investment" approach can be seen in the evolution of the broadband market. At the lowest "rung" is resale of the incumbent's capacity, which required interconnection at only one point in a network. Later, bitstream access was offered at a regional level, whereby the entrant interconnected at multiple regional points and constructed a backbone network between them. As full unbundling of the local loop was mandated, full-service operators such as Iliad (free.fr) further generated growth in direct competition to the incumbent, France Télécom (Figure 4.5) while building their own networks.

**Figure 4.5: Evolution of broadband subscribers in France, illustrating the “ladder of investment”**



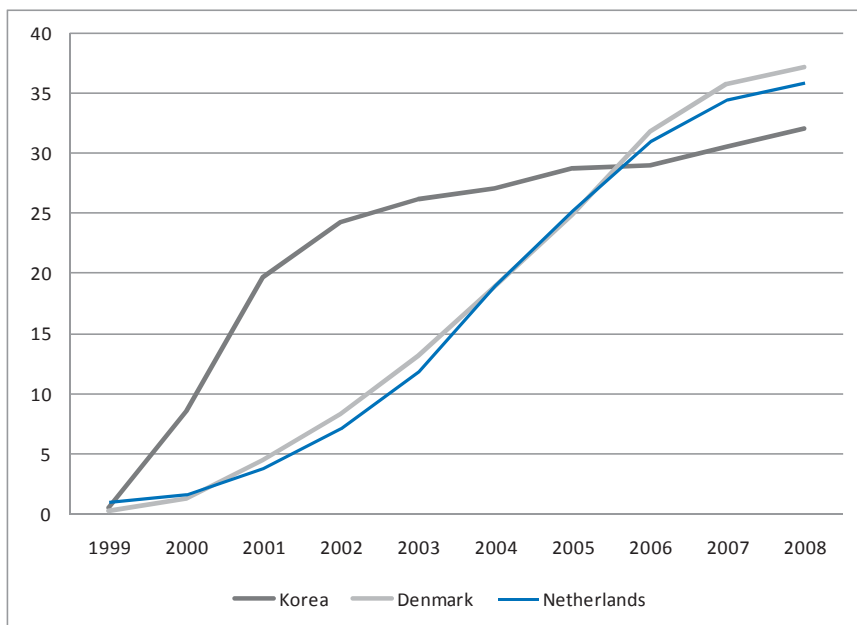
Note: this is not a uniform data series.

Source: Mulas, Victor (forthcoming), “Potential for Broadband Diffusion in Latin America”, based on EU data.

Some countries, such as the Republic of Korea, have gone further than this market regulation approach by providing financial incentives to operators to invest and compete. In the early days of broadband development, this allowed Korea to “defy the S-curve” and expand its market at a faster rate than might otherwise have been expected (Figure 4.6). The government of Korea has intervened consistently in both the supply and demand sides of broadband diffusion, with more than six major programmes since 1985. Initially, the government funded a backbone national network that connected public institutions throughout the country and provided incentives to operators to expand fibre optic networks. It developed an extensive e-government programme that digitised and connected public institutions. The Korean government also provided funds to foster demand through multiple policies such as ICT training and promotion of local applications.



**Figure 4.6: Defying the S-curve: broadband take-up in the Republic of Korea compared with other leading broadband economies**



Source: Mulas, Victor (forthcoming), “Potential for Broadband Diffusion in Latin America”, based on OECD data.

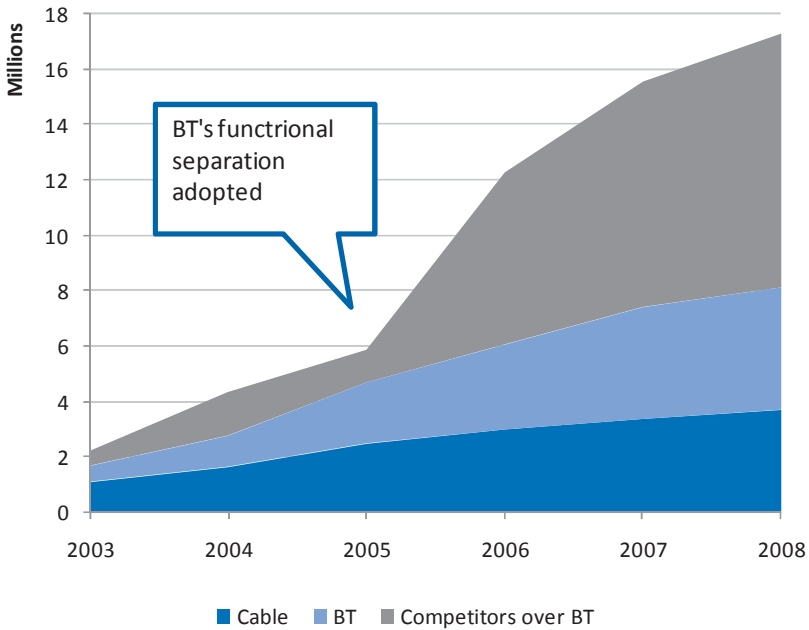
Although other economies, such as Denmark and the Netherlands, have subsequently overtaken Korea in per-inhabitant broadband penetration, Korea still leads in terms of household penetration, with 94% coverage by the end of 1998. This initial lead has helped Korea to realise economic and social benefits. For instance, since the late 1990s Korea has seen a doubling of the percentage of its national GDP coming from the ICT services sector. Korea has also emerged as one of the leading economies in terms of improved educational attainment in the OECD’s PISA (Programme for International Student Assessment) survey.<sup>1</sup>

The Korean case can be characterised as a public/private partnership in which the government provided administrative guidance to the private sector and worked via public/private institutions to foster national targets and goals. In other countries, the regulator set the tone by establishing an environment conducive to intensive competition.

In the United Kingdom, the structural separation of the incumbent, British Telecom, appears to have had an immediate beneficial effect on

broadband uptake (Figure 4.7). Interestingly, BT itself offered this solution in 2005, following Ofcom’s review of the market, perhaps as a way of heading off a more radical restructuring. BT and Ofcom agreed that a new and operationally separate division, Openreach, would be created, staffed with BT employees responsible for network operations, which would run at arm’s-length from BT management. Openreach would then provide services to all players on the basis of “equivalence of inputs”. An independent body, the Equality of Access Board, was created to ensure compliance. Although BT’s direct market share declined after 2005, the overall market boomed.

**Figure 4.7: Impact of BT functional separation on broadband take-up in the UK**



Note: this is not a uniform data series.

Source: Mulas, Victor (forthcoming), “Potential for Broadband Diffusion in Latin America”, based on EU data.

### *Ensuring equitable access for all*

In broad terms, the second major role of governments in the provision of broadband is ensuring equitable access for all. This focus on equity counterbalances the emphasis on efficiency just outlined. Most governments have taken a pro-active approach to stimulating network roll-out in rural and other underserved areas. This was traditionally done through internal cross-subsidisation by the state-owned monopoly operator. Following market liberalisation, this approach has been replaced by explicit subsidy mechanisms such as Universal Service Funds.

As an example, between 1998 and 2000, Canada achieved the world's highest broadband penetration levels despite very low population density. The problem of providing service in remote and rural Canada was studied by the Independent Telecommunications Review Panel, which, in an annex to their 2006 report, argued that the government should set a goal of providing affordable and reliable broadband services in all regions of the country by 2010. The panel mapped the availability of broadband and estimated that just under 90% of Canadians would have access by 2007, leaving around 3 million people without it. For the approximately 300 000 of these living in the most remote communities, satellite would be the most practical solution. Areas with fewer than 1 200 people living within a more than 5km radius from a broadband point of presence were found to be uneconomic to serve; this was further affected by terrain. WiMAX could help reduce the number that could not be served economically by 1.2 million, but for the remaining 1.5 million (plus the 300 000 to be served only by satellite) some form of targeted cross-subsidy would be necessary to achieve the goal of universal broadband service by 2010.

One of the most high-profile initiatives is a scheme to provide broadband to Canadians in the far North, in Nunavut and Northern Territories. The Nunavut Broadband Development Corporation has been established as a not-for-profit, federally registered corporation with multi-stakeholder membership whose goal is to bring broadband to 25 unserved communities. Under a five-year plan signed in January 2009 (as part of Canada's economic stimulus programme), matching funds from Infrastructure Canada and local customers will raise some CAD 43.2 million to bring broadband by satellite to the region.

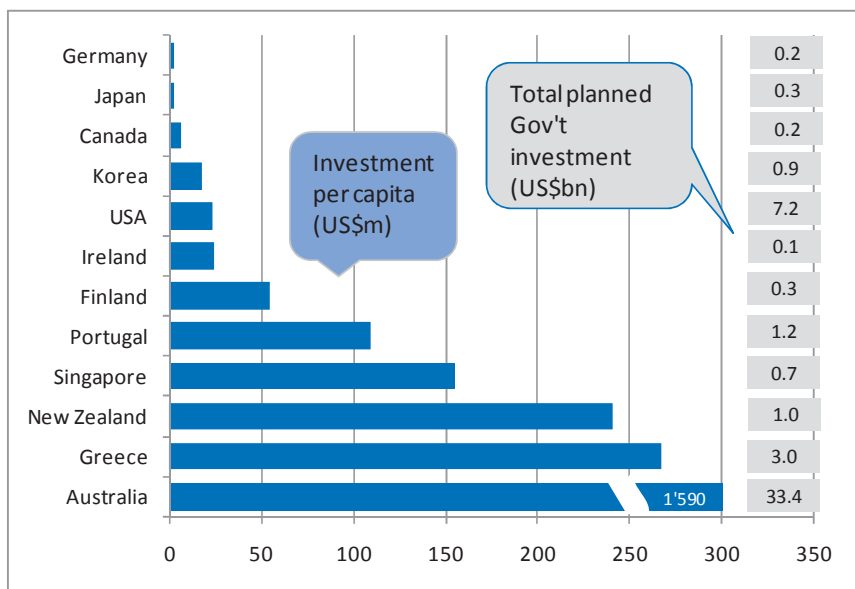
Providing broadband in rural areas poses significant economic and technical challenges. Costs in areas of low population density are higher and, unlike with other ICTs, the provision of broadband (*e.g.* digital subscriber line technologies) has technical constraints by which speeds diminish as distance from a central location increases. The rapid growth of the broadband market has therefore focused primarily on urban centres,

leaving the majority of people in rural areas underserved. As public and private services are increasingly provided online, the inability of some parts of the population to access broadband becomes more of a public policy problem. Once broadband usage reaches a critical mass (*e.g.* 25%) it will be considered indispensable if balanced development is to be achieved without discrimination based on geographical location.

This has led governments to consider a more active approach to ensuring broadband is available throughout their territories. In Korea, the government adopted a comprehensive strategy which focused on providing financial incentives to operators to invest in their networks. In Europe, countries such as Sweden and France have used a mix of demand aggregation, public/private partnerships and USO approaches to ensure broadband coverage. A government plan in Norway subsidises the roll-out of broadband infrastructure in areas where none exists. The Norwegian government's goal is to connect 99% of their population through fixed broadband coverage.

Most recently, broadband investment has featured in fiscal stimulus plans around the world. Australia has committed around USD 33 billion, while the US administration has set aside USD 7.2 billion for rural broadband (Figure 4.8). Broadband is seen as providing a quick win in these stimulus plans because on the supply side it stimulates investment and employment, while on the demand side it creates opportunities for entrepreneurship and spill-over effects that benefit the general economy.

**Figure 4.8: Government planned spending on broadband as a component of economic stimulus packages**



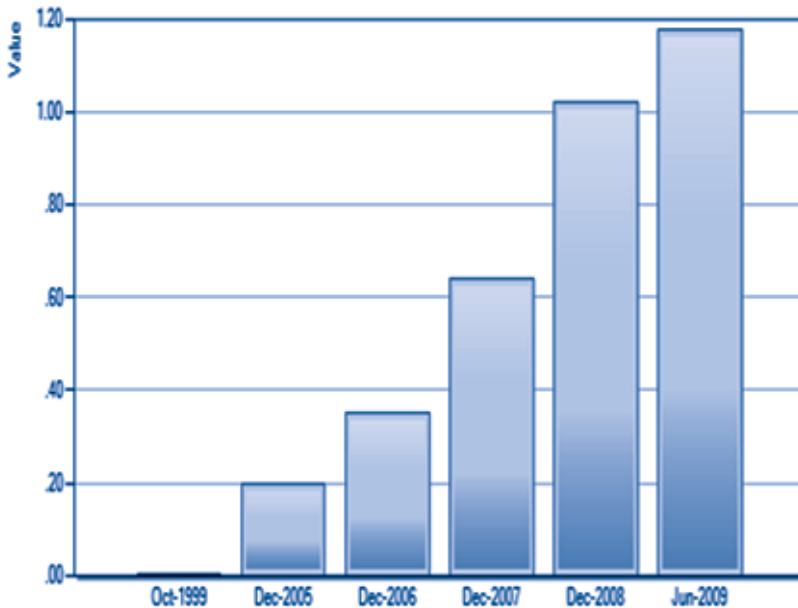
Source: World Bank, based on data from ITU, Booz and Co and OECD.

## Developing country case studies

Examples of developing country broadband development strategies are less evident than for developed countries because there remains a significant digital divide in broadband development between nations. Indeed, because mobile communication has leapt significantly ahead of fixed line communication in most developing countries, it is likely that broadband will develop on a wireless rather than fixed line platform. Egypt is a case in point. As of mid-2009, Egypt's 49.4 million mobile subscribers outnumbered its 11.6 million fixed-line subscribers by more than four to one. The number of fixed-line subscribers began to decline for the first time in the first half of 2009. Furthermore, whereas the fixed-line market is still largely a monopoly of the state-owned incumbent, Telecom Egypt, the mobile market is highly competitive, with a third entrant, Etisalat Misr, licensed in 2006. All three operators have 3G licenses allowing them to offer mobile broadband services. NTRA, the national regulator, estimates that as of 2008 just over half of Egypt's Internet users had broadband access, but there were fewer than one million ADSL subscribers in total (a

penetration rate of just over 1%: see Figure 4.9). By mid-2009, the number of mobile broadband subscribers had reached 170 201 and mobile operators had acquired several Internet Service Providers to help them sell services in competition to ADSL.

**Figure 4.9: Broadband subscribers in Egypt (per 100 inhabitants)**



Source: Presentation by Olfat Monseh (NTRA).

Egypt is working with a public/private partnership model whereby property developers are given the rights to install passive infrastructure (*i.e.* dark fibres) which can then be leased to different network access providers (*i.e.* Telecom Egypt and other ISPs). Property developers are then free to negotiate revenue-sharing agreements with service providers. On 30 Sept 2009, Egypt announced its intention to offer two triple-play licences with a view to attracting USD 1 billion in investment over five years.

A further developing country example is provided by Chile, the broadband leader in Latin America, with a penetration rate of just over 9 subscribers per 100 inhabitants in 2008. By the end of that year fixed line broadband subscribers had reached 1.4 million, but they are only forecast to grow by a further 50%. This is because the majority of future growth is

forecast to take place in mobile broadband, which is expected to overtake fixed-line broadband by 2012. The level of competition may be limited by the fact that the leading 3G mobile operator, Movistar, is part of the Telefonica Group and therefore tied to the incumbent fixed-line operator, but the other two players in the market, Entel PCS and Claro, are owned by competing companies. It is expected that additional 3G spectrum will be auctioned in 2009.

Mobile operators are having a particular impact on improving the affordability of broadband through lower priced packages and the option of pre-paid subscriptions. They are also offering discount priced netbooks with 3G capability bundled with post-paid subscriptions. This is particularly attractive in a market where some 60% of the population do not have a laptop.

### **The role of the donor community**

The donor community can play a role in helping developing countries to elaborate broadband strategies and develop their broadband services. By sharing information, benchmarking, providing technical assistance and support in regulation, international organisations can help governments improve the functioning of markets, stimulate investment and learn from the experiences of other countries. In this context, it is important to establish a baseline of broadband indicators for international comparisons. The OECD has set the pace in this area with its broadband indicators portal ([www.oecd.org/sti/ict/broadband](http://www.oecd.org/sti/ict/broadband)), but there is a need to expand this coverage to the developing world, especially for comparisons of prices and service offers.

The World Bank can help, for instance in providing financing for strategic investments to support the development of key parts of the infrastructure. International submarine cables, cross-border connectivity and high-capacity domestic backbone networks are all examples of areas in which World Bank investments can play a catalytic role, crowding-in private sector investment and improving service delivery. The World Bank currently supports governments in overcoming key infrastructure bottlenecks through public/private partnerships such as the EASSy cable along the East coast of Africa and the RCIP programme throughout Eastern and Southern Africa.

Broadband is an area of growth in the project portfolio of both public and private sector investment projects. The more than USD 1 billion currently committed to ICT investment projects has been a catalyst in raising some USD 7 billion in investment capital. The World Bank is

currently engaging in a major exercise to gather international experience of broadband policies and develop a toolkit which will be available to governments and regulators around the world. It would welcome collaboration with other organisations in this venture.



## Notes

- <sup>1</sup> PISA is a triennial survey of the knowledge and skills of 15 year-olds. The latest assessment presents 2006 results for some 400 000 students in 57 countries worldwide. The Republic of Korea scores above the OECD average and had the highest score in the OECD area for reading, was in the top two for mathematics and was one of the highest for science scores. More significant is the improvement in Korea's performance since 2000, which was the period of expansion in broadband both in schools and in homes.

## References

- Aker, J. C. (2008), “Does Digital Divide or Provide? The Impact of Cell Phones on Grain Markets in Niger”, University of California, Berkeley.
- Atkinson, R. D., D. K. Correa, J. A. Hedlund (2008), “Explaining International Broadband Leadership”, The Information Technology and Innovation Foundation, May.
- Besley, T. and R. Burgess (2002), “The Political Economy of Government Responsiveness: Theory and Evidence from India”, *Quarterly Journal of Economics*.
- Cave, M. (2004), *Making the Ladder of Investment Operational*.
- European Regulatory Group (2005), *Broadband Market Competition Report*.
- ITU (2003), “Broadband Korea: Internet Case Study”.
- Jensen, R. (2007), “The Digital Provide: Information (Technology), Market Performance and Welfare in the South Indian Fisheries Sector”, *Quarterly Journal of Economics*, Vol. CXXII, Issue 3.
- Kelly, Tim (2009), “International Broadband Benchmarks” and other papers presented at the FCC workshop on “International Lessons for Broadband Policy”, 18 August 2009, [www.broadband.gov/ws\\_int\\_lessons.html](http://www.broadband.gov/ws_int_lessons.html).
- Monseh, Olfat (2009), “Broadband Policy and Development in Egypt”, presented at OECD/infoDev workshop on “Policy Coherence in ICTs for Development”, [www.oecd.org/dataoecd/31/63/43760118.pdf](http://www.oecd.org/dataoecd/31/63/43760118.pdf).
- OECD (2008), *Broadband Growth and Policies in OECD Countries*, Paris.
- OECD (2008), “Broadband and the Economy”, ministerial background report prepared for the OECD Ministerial Meeting on the Future of the Internet Economy, 17-18 June 2009, Seoul.
- OECD Programme for International Student Assessment, [www.pisa.oecd.org](http://www.pisa.oecd.org).

Reinikka, R. and J. Svensson (2003), “The Power of Information: Evidence from a Newspaper Campaign to Reduce Capture”, World Bank.

Qiang, Christine (2009) “Broadband Infrastructure Investment in Stimulus Packages: Relevance for developing countries”.

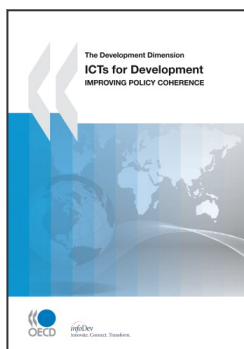
World Bank (2008), *Broadband for Africa: Policy for Promoting the Development of Backbone Networks*.

World Bank (2009), *Information and Communication for Development: Extending Reach and Increasing Impact*.

[www.broadband.gov](http://www.broadband.gov).

[www.culture.gov.uk/what\\_we\\_do/broadcasting/5631.aspx](http://www.culture.gov.uk/what_we_do/broadcasting/5631.aspx).

[www.nunavut-broadband.ca](http://www.nunavut-broadband.ca).



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