

Broadband Infrastructure Investment in Stimulus Packages: Relevance for Developing Countries

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The world economy has entered a major downturn caused by the biggest financial crisis since the 1930s. Financial crises tend to hit investment in infrastructure particularly hard. As the global recession unfolds, government revenue is shrinking as fiscal receipts diminish and yet there are demands for spending on social safety nets to increase. Private sector flows in infrastructure are also usually highly pro-cyclical and access to private capital is diminishing as a result of the financial crisis.

This time around, the crisis is more widespread and deeper, but there are also more forceful and better orchestrated responses. Most developed countries and a growing number of middle-income countries have announced countercyclical fiscal stimulus packages designed to increase demand, create jobs and expanding the output capacity of the economy. One strategy has found widespread support in these stimulus packages: Investing in ICT infrastructure, specifically broadband and next-generation networks, as a counter-cyclical tool to create jobs and provide the foundation for economic recovery and long-term sustained growth.

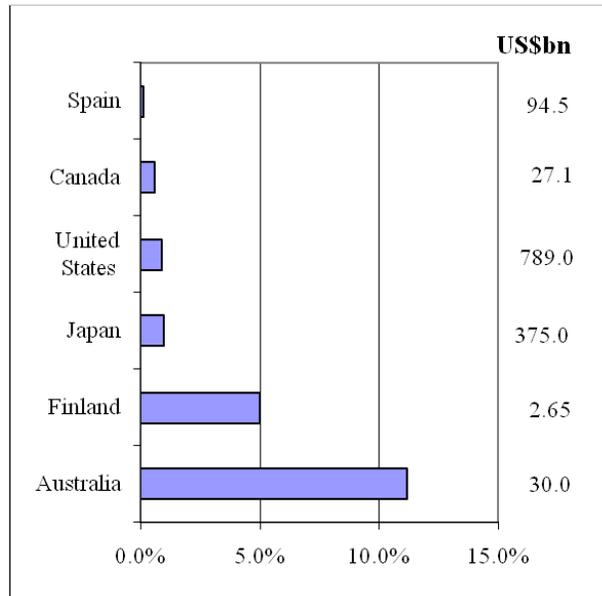
This note summarizes broadband initiatives of selected OECD countries recently launched during the economic downturn and argues that it is also relevant for developing countries as part of their economic recovery plans or of overall development strategies. It then presents several principles for policy makers in developing countries to reflect on when considering public investment in broadband.

Why Broadband Infrastructure in Stimulus Packages?

In recent months, the United States, Britain, Canada, Germany, Portugal and Finland have all included measures to expand broadband access and to bolster connection speeds in their planned economic stimulus packages. Australia, France, Ireland, Japan, Singapore and the Republic of Korea have announced separate broadband plans. Figure 1 shows the proportion of the broadband components in the overall stimulus package in selected countries.

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Figure 1. Broadband Component as Percentage of Total Stimulus Plans



Most of these plans seek to speed up existing links to build faster fixed-line and wireless next-generation networks. Another common goal is to expand broadband connections to rural areas where they are currently unavailable, in some cases considering turning broadband into a universal service (table 1). The annex of this note has more details.

Table 1. Targets of the Broadband Initiatives in Selected Countries

Countries	Timeframe	Speeding Up Existing Links
		or Expanding Connectivity to Rural Areas
Australia	8 years from 2010	To deliver broadband at speed of 100 megabits per second (Mbps) to 90 percent of Australian homes, schools and businesses through fiber-optic cables connected directly to buildings. The other 10 percent of people would get a wireless upgrade.
Canada	2009-2012	To extend broadband coverage to all currently unserved communities beginning in 2009–10.
Finland	7 years (2009-2015)	To provide ultrafast broadband to every household in Finland, with download speeds of at least one megabit per second by 2010, with a ramp-up to 100 megabits by 2016. Including households in rural areas.
France	5 years (2008-2012)	To provide ultra broadband networks and 4 million households through FTTH access by 2012. Moreover, 400 cyber bases will be created in schools over the next five years and schools which already have access will be modernized. Provision of universal access to broadband Internet at affordable prices is to be made available throughout France before the end of 2010.
Germany	10 years (2009-2018)	The second phase is to bring broadband access at 50 Mbps or above to 75% of the households by 2014. The first phase of the strategy is for all homes in Germany to have broadband access at 1 Mbps by the end of 2010.

Ireland	2 years (2009-2010)	To provide broadband coverage and services to the remaining 33% of the country and 10% of the population who are unserved with minimum download speeds of 1.2 Mbps.
Japan	2 years (2009-2010)	Broadband infrastructure rollout plan for the rural areas, in order to address the digital divide, and to enable broadband access for use by cable TV, telecenters, disaster prevention programs, etc.
Portugal	2 years (2009-2010)	For up to 1.5 million homes and businesses to be connected to the new fiber networks and improvements in high-speed internet, television and voice services. The Portuguese government had also set a goal of 50% home broadband penetration by 2010, and this latest investment should allow the operators to significantly surpass the target.
Singapore	5 years (2009-2013)	For homes and offices nationwide to be connected to Singapore's ultra high-speed and pervasive Next Generation National Broadband Network by 2013; and for 60 per cent of homes and offices to have access to this new, pervasive, all-fiber network in 2 years' time.
Republic of Korea	5 years (2009-2013)	High-speed Internet services to be upgraded to 1 Gbps by 2012; existing communications networks to be enhanced to Internet Protocol (IP)-based systems; subscriber capacity on 3G broadband services to be increased to 40 million.
Spain	4 years (2009-2012)	To have greater reach of broadband in rural and isolated areas. This is done by focusing on centers with dispersed populations and extending the reach of trunk fiber-optics networks.
United States	2 years (2009-2010)	To provide broadband service to unserved areas and improve service to underserved areas

Source: Author's compilation from various sources (see Annex)

While some of the plans have been in the works for months or years, and the share of the broadband components in the total stimulus package varies significantly from country to country, it is no coincidence that so many of the stimulus packages have a focus on building broadband networks.

In response to the financial crisis, infrastructure expenditure can play a major role as a fiscal stimulus by helping to create new jobs. In particular, new broadband infrastructure investment projects can be initiated relatively quickly, are labor intensive and hence have considerable short-term employment generation potential. Some estimations predict that \$5 billion stimulus would create almost 100,000 new jobs directly in short term and almost 2.5 million jobs as network effects (Communications Workers of America, 2008). Others announce almost 500,000 jobs retained or created directly under a broadband subsidy of \$10 billion (Atkinson, Castro, and Ezell 2009). Germany, Ireland, Republic of Korea, Spain and the US specifically mentioned job creation in their broadband plans.

More importantly, government spending in broadband infrastructure is expected to have impact on long-run productive activities in other sectors of the economy. Network investments are typical examples of productive government investment because of the positive externalities they provide. ICT especially is a General Purpose Technology that facilitates great leaps of innovation and results in substantial restructuring of the economy. It is proven to contribute to virtually every sector in the economy through productivity gains. Therefore, investments in broadband infrastructure may have spillover effects and

increase payoffs of investments in other sectors. In addition, broadband infrastructure, like all telecommunications networks, also has network effect (also referred to as positive network externalities) where the overall value of a network increases as the number of consumers goes up.

An increasing number of countries now see high-speed internet access as essential infrastructure to take a global edge in productivity and long-term competitiveness, and a prerequisite for a return to sustainable growth and prosperity. For instance, the British government considers digital networks as the “backbone of the economy in the decades ahead” (Daily Yonder, 2009). Other economic benefits of broadband, highlighted in these plans, include lower costs, new economic opportunities, significant consumer benefits, innovation, and increased trade and exports. Some feel that they “cannot afford the luxury of not making the telecommunications industry the main driver of economic recovery” (*International Herald Tribune* 2009).

Finally, broadband investment is more fiscally sound than other public spending stimulus options, in the sense of coming closer to, or in some cases actually being, self-financing. The financing of the broadband plans is mostly market-led—much of the advocated funding is expected to come from the private sector. In Britain, for example, a strategy group is being formed to assess the case how far the market will take the country in terms of rollout and likely take-up, and whether government funding would be required.

In the case of Australia and the Republic of Korea, the government will start with an initial investment, about 11 percent and 4 percent respectively of the estimated total investment, with the rest to come from private companies and issuance of government bonds. The Portuguese government is providing a credit line to the operators on the rollout of fiber networks. Although the terms can be favorable to the operators, repayment is expected after a specified time period. To the extent a country can mobilize private sector funding to finance and provide broadband services, it saves or frees fiscal spaces for other public spending priorities.

For the goal of universal coverage of broadband services, countries are spending larger public funding for rolling out high-speed networks to areas that are underserved or unserved by commercial internet service providers. The Finnish government plans to foot one-third of such costs. Others are contracting commercial providers to build the network with service obligations through a competitive bidding process (e.g. France, Ireland, Japan and Singapore). The EU and the US are adding resources to existing rural development or universal service funds. The stimulus perspective of such projects in developed countries—where broadband already has the potential for reaching more than 90 percent of the population—comes mainly from the demand side through employment creation and for concerns over balanced development, and probably less from the supply-side aggregate productivity growth given the limited number of people and firms that will be added to the network. But they do serve social objectives and improve equity in the country (OECD 2009).

Relevance for Developing Countries

Is broadband development relevant for developing countries? Should governments in developing countries invest in broadband rollout during economic downturn and in general?

The sharp global contraction is affecting both advanced and developing countries. Global industrial production declined by 20 percent in the fourth quarter of 2008, as high-income and developing country activity plunged by 23 and 15 percent, respectively (World Bank 2009). Developing countries are also facing the challenge as to how, with fewer resources, to pursue policies that can protect or expand critical expenditures, including on critical infrastructure, in order to sustain growth.

The stimulus effect that infrastructure expenditure is expected to have in developed countries on short-term job creation and immediate increase in aggregate demand applies to developing countries as well. This is not an insignificant consideration given falling real wages and employment in the developing world. The International Labor Organization (ILO) forecasts suggest that global job losses could hit 51 million, and up to 30 million workers could become unemployed as a result of the current crisis.

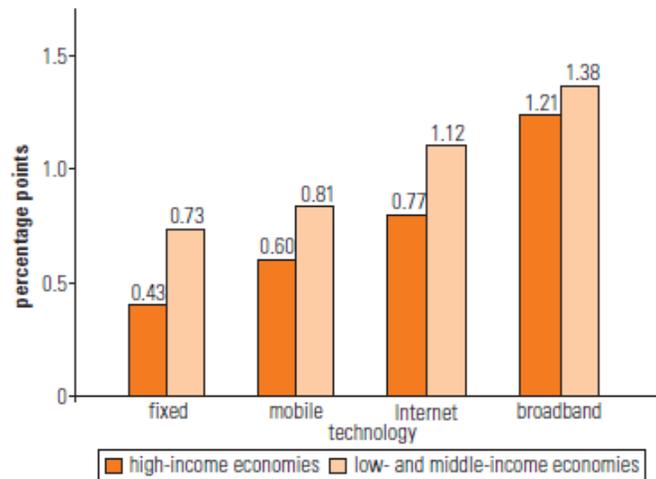
With respect to long-term impact on the economy, investments in telecommunications typically generate positive returns and growth in developing countries. A considerable amount of empirical work concludes a positive and significant link between telephone infrastructure and long-term growth (e.g. Hardy 1980, Madden and Savage 1998, Savage 2000, Röller and Waverman 2001, Datta and Agarwal 2004).

A recent World Bank study includes Internet and broadband, in addition to the fixed and mobile phones, in an econometric analysis of growth in 120 countries between 1980 and 2006. Results show that for every 10-percentage-point increase in penetrations of broadband services, there is an increase in economic growth of 1.3 percentage points (Qiang 2009). This growth effect of broadband is significant and stronger in developing countries than in developed ones, and higher than that of telephony and the Internet (figure 3). The impact is expected to be even more robust once the penetration reaches a critical mass. As most developing countries are at an early stage of broadband development, they are likely to gain the most from investing in these networks to reach the critical mass for higher impact and before the diminishing returns take effect.

Governments have two different options with respect to public network infrastructure: Policy makers can wait for serious bottlenecks and areas of insufficient investment to appear before investing, or choose to invest as a way to attract economic activity. In the case of broadband network, the significant time lag between identifying a bottleneck and building a network can forego large economic gains, given its positive spillover and network effects. Broadband platform has also proven particularly successful in facilitating and creating new private sector activities (Qiang and Rossotto 2009). Therefore, timely public spending in broadband infrastructure can realize immediate

network effects and bring forward long-term aggregate spillover effects which improve the productivity of the entire economy.

Figure 3. Growth Effects of ICT Infrastructure



Source: Qiang 2009.

Note: The y axis represents the percentage-point increase in economic growth per 10-percentage-point increase in telecommunications penetration. All results are statistically significant at the 1 percent level except for those for broadband in developing countries, which are significant at the 10 percent level.

Most developing countries are now facing diminishing access to private capital. As the US and European investors dispose of emerging market investments to shore up domestic balance sheets, net private capital flows to emerging markets in 2009 are expected to decline to \$165 billion, just one third of the 2008 level which itself was just one-half the peak level seen in 2007 (Institute of International Finance 2009). With credit conditions tightening, competition of attracting private investment is expected to increase, so is the cost of capital.

Telecommunications investment is one of the largest areas of capital expenditure in many countries. As a result, a reduction in telecommunications investment will have a significant impact on gross capital formation in the entire economy. Telecommunications investment has been sensitive to changes in the economic climate, although the effects have been less dramatic during this financial crisis than the *dot.com* crisis of in 2000-01.

The drying up of liquidity may threaten the viability of public-private partnerships (PPP), often used in broadband infrastructure investment projects, as a result of the inability of a private-sector partner to finance its originally agreed participation. Were such projects delayed or even cancelled due to the evaporation of expected financing, an important part of the foundation for future growth in output, employment and productivity would be lost. Recognizing this, policy makers may consider using public funds to replace financing no longer available from private partners or to provide extra incentives to attract private capital.

Promoting Broadband Infrastructure in Developing Countries

Currently few people in developing economies have access to broadband networks. In 2007, an average of less than 5 percent of the population of low-income economies was connected to broadband networks, mostly in urban centers. In this light, developing countries may be missing a great development opportunity of economic benefits broadband infrastructure can bring. Several factors highlight the potential of broadband infrastructure as an important area of public investment during economic downturn, including:

- (1) Delivering immediate employment and aggregate demand effects and network effects.
- (2) Bringing forward longer-term aggregate supply-side (spillover) effects which can improve the productivity of the entire economy.
- (3) 'Crowding in' private investment when access to private financing is decreasing and more expensive.

Investments in broadband networks should also be a key part of the overall development strategies in developing countries. Achieving distributional policy objectives of reducing digital divide and facilitating regional development through increased competitiveness are rationales for possible public intervention in broadband infrastructure.

There are several key considerations to take into account before and when public funding is used for broadband infrastructure, either as part of an economic stimulus or as separate plans, to maximize economic and social benefits.

Making market work first. Before making public investments in rolling out broadband networks, governments should first look at regulatory tools that might be able to increase entry and competition, and hence maximize what the market can deliver on its own. Licensing regimes, for instance, should become technology-neutral to allow service providers the flexibility to deploy the most efficient networks. Banning Voice-over-IP (VoIP) and IPTV services is one example of a restrictive approach that does not enable convergence of telecommunications, media and computing and reduces market entry.

Another relevant regulatory area is frequency liberalization. The switch-over to digital television broadcasting (and the switch off of analogue broadcasting), known as Digital Switch Over (DSO), may allow a large portion of ultra-high frequency spectrum to be released for use for other applications and technologies. Some countries are giving mobile providers a portion of the freed radio spectrum as wireless technology is increasingly the recognized choice to open up or expand broadband. The Republic of Korea plans to re-allocate spectrum in the 800 MHz and 900 MHz bands with preference given to new operators and latecomers to the market.

The benefits accrued from the release and reuse of spectrum also include additional government revenues. In the US, the Federal Communications Commission (FCC) held an auction for some of the released spectrum which ended March 2008 with close to \$20 billion promised in fees. Of course, DSO is not cost free: broadcasters will need to change their transmission and programming equipment while consumers will at a

minimum require a digital set top box in order to receive broadcasts on existing analogue sets. As a consequence, Government intervention could involve providing some funding for broadcasters and, in some cases, monetary incentives to viewers, to enable a DSO.

Open access. When considering investing public funds in broadband, policy makers must keep in mind the goal of assuring a level-playing field for competition. One risk of governments investing in telecommunications is that they tend to have to choose winners in the market—once one network is built or strengthened there is a relatively low chance of another infrastructure-based provider entering the market given the financial advantage already awarded to the incumbent via government funding. It would not be desirable for public funding to strengthen existing operators at the expense of new entrants.

Therefore, when governments do decide to intervene in markets by subsidizing broadband networks, the resulting network should be available via “open access” rules so that network providers offer capacity or access to all market participants on equal and non-discriminatory terms and conditions. This requirement holds a check on prices and quality of retail services, and on the efficiency of the subsidized scheme in general, through market mechanisms (Adamski 2009).

‘Crowding in’ private capital. The telecommunications sector has generally adopted a market-based financing approach. The most effective means of channeling public support is through PPPs which are able to harness the investment resources and technical expertise of the private sector to meet policy objectives.

Competitive subsidy or cost-sharing mechanisms are one type of PPP model that has traditionally been used to encourage the rollout of voice networks into underserved areas and has been recently applied in the rollout of broadband infrastructure. In France, for example, the broadband infrastructure project in Limousin, a rural region in central France with limited broadband services, is structured as a 20-year concession to build and operate a backbone network and to construct a broadband wireless network with the costs being shared between the public and private sectors (ICEA 2008). The Eastern African Submarine Cable System (EASSy), a project to build a submarine fiber-optic cable that will stretch from South Africa to Sudan with connections to all the countries along its route, is an example of a different type of PPP. EASSy is owned by a consortium of private operators but financed by development finance institutions with no subsidies or support from governments. The partnership has ensured that the cable will be operated on an open-access basis, allowing all operators and service providers in the region to obtain access to affordable capacity by having access to competing cables and providers of capacity (Khalil, Dongier, and Qiang 2009).

These PPPs in broadband networks are new, and governments are experimenting with different models. The key to the success of these projects will be ensuring that public investment ‘crowds in’ and does not substitute for private investment, and that the private sector has sufficient incentives to invest and operate networks efficiently.

Public investment in passive infrastructure may be another important area where governments could easily put people to work and build a platform for future economic growth with minimal market distortion. Rather than becoming a network owner, government funding could be used to install passive infrastructure (poles, conduit, etc)—representing the highest-cost portion of new network investment, often cited as close to 80 percent of total cost (Gauthey 2006)—which can then be used by various operators. Installation of passive infrastructure is highly labor-intensive and can start quickly, thus having a fast and large stimulus impact on the economy. Maintenance of the passive infrastructure could be written into the contracts of any operators using it. In addition, government investment in passive infrastructure may be more efficient than private sector because governments have access to all necessary rights-of-way.

Rural strategy. Many of the developed countries set universal service targets for broadband access to reach all or most of the households. But in developing countries, investments which bring high-speed backbone networks to rural communities may be more efficient than projects that pay for last-mile connections to homes. Policy makers may choose to invest in high-capacity backbone infrastructure to rural and remote areas and leave the last-mile connectivity to the private sector as a way to extend affordable, high-bandwidth connections to the largest number of inhabitants in these areas as possible. Public investment could be used to target spending on high-speed open-access networks providing connectivity to rural schools, hospitals and other public institutions as anchor points for high-speed connections in the community. Private ISPs could then interconnect at these points and distribute access directly to users on their own facilities and services (OECD 2009).

Demand stimulation. While addressing supply, public policies and investment for demand stimulation to facilitate broadband adoption are essential to the robust development of broadband infrastructure in the long run. The provision of information and services online by the government itself (i.e. e-government) can demonstrate the effects of online delivery and interaction and provide businesses and citizens incentives for the adoption of ICT. Other measures range from increasing access to broadband services at public points such as schools and libraries (see preceding paragraph), creating local content, providing support to ICT enterprises particularly SMEs to develop useful applications to be carried on broadband networks, to improving the confidence in users' trust in online services such as developing e-security policies and programs.

Demand stimulation programs for broadband were implemented as part of the stimulus plan to create jobs and boost economy in the Republic of Korea during the financial crisis in 1998 and the subsequent economic slowdown. The government set up the Internet Education to Ten Million People Project, aimed at providing IT literacy training for all citizens. In addition, the government vigorously promoted e-business incubation and e-government applications. Such programs raised awareness of the benefits of broadband services and aggregated demand among potential users (Qiang and Rossotto 2009).

Whatever the rationale for public interventions in broadband infrastructure, it is important that schemes and their associated financing consider the relative benefit and cost of

intervention. It is also important that the schemes are well-targeted and structured with clearly identified objectives, or they risk distorting competition resulting in bad use of public funds.

Conclusions

There is a clear need for countercyclical fiscal stimulus in both developed and developing countries in response to contraction in global demand. Getting the biggest value for the stimulus packages will be key to limiting the damage caused by the crisis.

Accelerating the implementation of broadband infrastructure may be one option that is open to policymakers in developing countries. Bringing forward future spending to a time when labor market conditions are particularly weak can help preserve jobs and head off a potential burden on social safety nets. Spending initiatives on next-generation telecommunications networks, particularly if they can be implemented quickly, are also consistent with enhancing longer-run growth and development.

However, with virtually all countries expected to be affected by the crisis, many developing countries are not in a position to expand their fiscal deficit to undertake significant countercyclical spending (World Bank 2009). Uncertainty about the length of the crisis, and the difficulty in obtaining longer-term financing commitments in current market conditions, suggest that some countries may require additional external support to finance increased spending.

The World Bank is establishing a Vulnerability Financing Facility to streamline its support to protect the poor and vulnerable during global and systemic shocks. One of the three priorities for this fund is investment in infrastructure that creates jobs while building a foundation for productivity and growth. A three-year Infrastructure Recovery and Assets (INFRA) Platform is being launched to increase support for infrastructure projects to \$15 billion a year over the next three years, in coordination with the IFC Infrastructure Crisis Facility. The scope of the platform includes stabilizing existing infrastructure assets, supporting public-private partnerships that will create jobs while improving the delivery of basic services, providing advice to governments launching growth and job enhancement programs, as well as new infrastructure projects (World Bank 2009).

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Annex. Selected Broadband Initiatives Worldwide as at April 2009

Prepared by Siou Chew Kuek with inputs from Siddhartha Raja, Kaoru Kimura and Jannina Flores Ramirez

Country	Background and Goals	Scope and Financing Approach	Amount
Australia	<p>The government announced in April 2009 plans for a national broadband network to make Australia one of the world's most wired countries. Broadband is seen as essential to boosting long-term economic growth in Australia and increasing the country's productivity and competitiveness. This plan is subject to approval by the country's Upper House¹, and would be the country's biggest infrastructure project².</p>	<p>To deliver broadband at speed of 100 megabits per second (Mbps) to 90 percent of Australian homes, schools and businesses through fiber-optic cables connected directly to buildings. The other 10 percent of people would get a wireless upgrade.</p> <p>A yet-to-be named company would build the network, funded by government money with private companies invited to invest and provide technical expertise and resources. Private sector ownership would be capped at 49 percent. The network is estimated to cost up to AU\$42 billion (\$30 billion) to build over eight years beginning next year. The government will start with an AU\$4.7 billion (\$3.4 billion) initial investment, with the rest to come from private companies and the issuing of government bonds. The government would sell its stake in the company five years after the network is completed if conditions allow³.</p>	<p>AU\$42 billion (~US\$30 billion) with government initial investment of AU\$4.7 billion (\$3.4 billion)</p>
Britain	<p>Part of a wider Digital Britain initiative outlined in January 2009 for stimulating the economy⁴. The government sees digital networks as the "backbone of our economy in the decades ahead."⁵ The goal of the initiative is to accelerate growth and cement the UK's position as a world leader in the knowledge and learning economy⁶. Relevant objectives include:</p> <ul style="list-style-type: none"> ▪ Upgrading and modernizing digital networks (wired, wireless and broadcast) so that Britain has an enabling infrastructure to remain globally competitive in the digital world; ▪ Fairness and access for all: universal availability coupled with the skills and digital literacy to enable near-universal participation in the digital economy and digital society; and ▪ Developing the infrastructure, skills and take-up to enable the widespread online delivery of public services and business interface with Government. 	<p>The scope of broadband-related Digital Britain initiative includes:</p> <ul style="list-style-type: none"> ▪ Next Generation Networks. A strategy group will be formed to assess the case for how far market-led investment will take UK in terms of roll-out and likely take-up; and whether any contingency measures are necessary. ▪ Universal access to broadband. The government is developing plans for a digital Universal Service Commitment to become effective by 2012, delivered by a mixture of wired and wireless means. Subject to further assessment of the costs and benefits, the government will set out their plans for the level of service which they believe should be universal and include speed options up to 2Mbps⁷. <p>The financing approach is by promoting investments and encouraging market competition. Ofcom, the regulator for the UK communications industries, has set up five supporting elements: pricing freedom, risk reflective of return, efficient networks, wholesale access for all, and encouragement of future competition. This will only be the first phase of the development, and Ofcom</p>	<p>Conducting assessment of whether government funding/support would be required.</p>

		will work with all stakeholders to understand whether there is need for further action to bring the benefits of broadband to a wider group of UK consumers, citizens and businesses ⁸ .	
Canada	Canada's 2009 budget announced in January accelerates and expands recent federal investments in infrastructure with almost \$12 billion in new infrastructure stimulus funding over two years. The goal of the broadband component is to close the remaining broadband access gaps, even though the country is one of the most connected nations in the world ⁹ .	The scope of the 3 year plan ¹⁰ is to extend broadband coverage to all currently unserved communities beginning in 2009–10 ¹¹ , and the financing approach is by encouraging the private sector to develop rural broadband infrastructure. Industry Canada provided funding to develop and implement a 3-year strategy for this purpose.	Estimated CA\$225 million (~US\$181 million)
European Union	In November 2008, as part of its European economic recovery plan, the European Commission proposed the mobilization of an additional € 5 billion of unspent money from the EU budget for investment in energy and broadband projects in 2009 and 2010. The goal was to speed up necessary investment, cushion the blow of the economic downturn on the construction sector and enhance the EU's longer term sustainable growth potential through a targeted stimulus into the EU economy. To this end, the extension and upgrading of high-speed internet infrastructure is an imperative because it has direct economic and social implications, especially for rural areas as they face additional difficulties in linking up to broadband ¹² .	To develop broadband networks for achieving full 100% high-speed internet coverage by 2010, including the extension and upgrading of high-speed internet in rural communities. Funding will be targeted via the existing EU's Rural Development Fund to cover the "white spots" on Europe's broadband map (30% of the population in rural areas who do not have broadband access, mostly in Eastern & Southern parts of the EU) ¹³ .	€1 billion (~US\$1.3 billion) earmarked for actions aimed at overcoming the "broadband gap" between urban and rural areas.
Finland	The government is strongly committed to developing an information society, and wants to promote productivity and efficiency. It sees high-speed internet access as essential infrastructure that will allow the country to take a global edge in competitiveness and productivity. The broadband strategy announced in September 2008 aims to boost national economic productivity ¹⁴ .	To provide ultrafast broadband to every household in Finland, including those in rural areas, with download speeds of at least one megabit per second by 2010, with a ramp-up to 100 megabits by 2016, the Finnish government would foot one-third of the cost of building a fiber-optic cable network in areas that are underserved by commercial internet service providers. Hence the government contribution from 2009 - 2015 ¹⁵ will make up about €67 million (\$88 million) out of the total 200-million-euro (\$265 million) budget for the project. Telecommunications companies, regional governments and financial support from the European Union are expected to make up the remaining cost of the project ¹⁶ .	Total €200 million (~US\$265 million) of which about €67 million (~US\$88) million is from the government

France	<p>Digital France 2012 was first mooted by President Sarkozy in March 2008, which sees the digital economy as the main factor in increased competitiveness. A primary objective of the plan is to provide universal access within France to high-speed broadband, currently at 54%, by the end of 2012 because “Each French citizen, wherever he lives, will have a right to high speed access,”¹⁷ and the government has subsequently announced that it would like to see blanket broadband coverage available two years earlier than it had first proposed¹⁸.</p>	<p>The scope is to provide ultra broadband networks, and to connect 4 million households through FTTH access by 2012¹⁹. In addition, it includes the provision of universal access to broadband Internet at affordable prices throughout France before the end of 2010²⁰. The government has unveiled action plans in October 2008²¹ to drive investments by the private sector. In addition, it has allocated the sub-band 790-862 MHz freed by the switch to Digital TV (the digital dividend) to new high speed mobile services on the Internet, which will reach rural communities that can not be served economically by fixed-line broadband networks²².</p>	<p>Total investments expected to be €10 billion (~US\$13 billion) for the next ten years²³</p>
Germany	<p>Chancellor Merkel announced at the 3rd Summit on ICT in November 2008 that the country would broaden access to broadband Internet into more remote rural areas because "China and emerging countries develop their road networks. Similarly, we must develop our broadband networks". Broadband digital networks are seen as key to the growth of European industrial societies and the government’s ambition is to ensure that not one inch of the territory, even rural, is denied of access to broadband Internet²⁴.</p>	<p>The first phase of the strategy is for all homes in Germany to have broadband access at 1 Mbps by the end of 2010²⁵. The second phase is to bring broadband access at 50 Mbps or above to 75% of the households by 2014. The government had also earlier hinted to include a third phase—to cover all households by 100 Mbps by end-2018—yet this has been dropped from the final version.</p> <p>The financing is based on a market-driven approach which uses a large portion of the digital dividend from frequency liberalization and self-incentivized partnerships to achieve the first-phase target. The government will focus on four areas: speeding up digital dividend auctions; push operators to seek synergy via joint infrastructure deployments; ensure growth-and innovation-oriented regulation, and give the necessary financial support²⁶.</p>	<p>Total investments, estimated at €50 billion (US\$67 billion)</p>
Ireland	<p>While Ireland has over 1.2 million subscribers to broadband, approximately a third of the country and 10 percent of the population are without coverage. Hence, the goal of the January 2009 plan is to deliver broadband coverage to all of Ireland, and for everyone to have high-speed internet, no matter where they live, by September 2010. The plan is also expected to create 170 jobs.²⁷</p>	<p>To provide broadband coverage and services to the remaining 33% of the country and 10% of the population who are unserved.</p> <p>Mobile and satellite broadband technologies, instead of fiber, will be used for the plan. Half the area covered will be based on HSDPA with minimum download speeds of 1.2 Mbps²⁸, although the use of such mobile technologies has been criticized as insufficient for long term rural development needs²⁹. A commercial provider, Hutchison 3, has been contracted to build the network and provide the service, and the plan will be funded by the Irish Exchequer with EU co-financing.</p>	<p>€223 million (~US\$297 million)</p>

Japan	Budget plan for FY 2009 and 2010 includes a broadband infrastructure rollout plan for the rural areas, in order to address the digital divide, and to enable broadband access for use by cable TV, telecenters, disaster prevention programs etc ³⁰ .	The budget is planned for the current fiscal year, and the broadband infrastructure is to be fully funded by the government, with construction by the private sector and contract award based on a competitive bidding process.	371 billion yen (~US\$371 million)
Portugal	The government announced in January 2009 that the first measure of the country's 2.18 billion euro stimulus plan to combat the economic crisis is to provide a credit line to the private sector for the development of Next Generation Networks (including broadband). NGNs are seen as an "urgent matter", as they will support employment and the boost the competitiveness of the Portuguese economy ³¹ .	The investment would allow up to 1.5 million homes and businesses to be connected to the new fiber networks and improvements in high-speed internet, television and voice services. The financing approach is to provide a credit line that forms part of an agreement between the government and the operators Portugal Telecom, Zon Multimedia, Sonaecom, and ONI on the roll-out of fiber networks. Although the terms of the credit line have not been disclosed, they are likely to be highly favorable to the operators, and represent a timely cash injection ³² .	€800 million (~US\$1.1 billion) credit line
Singapore	The government announced in January 2009 a stimulus plan of SGD20.5 billion (US\$14.5 billion), which is one of the most aggressive stimulus packages in the world as it represents 6% of the country's GDP ³³ . The plan will provide additional funding support (SGD183 million) to the Intelligent Nation Masterplan, with includes NGN as a key initiative. With speeds of 1Gbps and beyond, the NGN was originally announced in 2007 with the aim to propel the country to the forefront of broadband development internationally. Citizens and businesses will be able to access a ultra high-speed broadband with more choices and at affordable prices, and be able to use information and communications more extensively to boost productivity and competitiveness. The broadband is expected to be a strategic enabler that will transform the way the country works, live, learn and plays ³⁴ .	For homes and offices nationwide to be connected to Singapore's ultra high-speed and pervasive Next Generation National Broadband Network by 2013; and for 60% of homes and offices to have access to this new, pervasive, all-fiber network in 2 years' time ³⁵ . The approach involves structural separation of new national broadband network infrastructure from the operating company that will operate its switches and routers ³⁶ . The government has already allocated SGD750 million to OpenNet, the SingTel-led company that will manage the passive infrastructure on the fiber-to-the home network. It has also provided a grant of up to SGD250 million to Nucleus Connect to support the infrastructure deployment, which will have to start offering commercial services by the first half of 2010 "and be ready to fulfill its universal service obligations from 2013" ³⁷ .	SGD1 billion (~US\$650 million) plus part of SGD183 million funding for Intelligent Nation Masterplan ³⁸
South Korea	The plan announced in February 2009 aims to help Korea strengthen its position as one of the world's leading IT countries by increasing broadband speeds 10-fold by 2012. It will improve the nation's overall IT infrastructure	The plan aims for high-speed Internet services to be upgraded to 1 Gbps by 2012, and for wireless broadband services to be upgraded to 10 Mbps. Existing communications networks will also be enhanced to Internet protocol (IP)-based systems. With IP-based	Total of 34.1 trillion won (~US\$24.6 billion) of

	in order to cater to the public’s diverse IT needs, bring innovation to the public’s digital lives, and is expected to create 120,000 jobs ³⁹ .	networks, landline phones will be automatically converted to voice-over-Internet protocol, or Internet telephony. The central government will put up 1.3 trillion won, with the remainder coming from private telecom operators ⁴⁰ by promoting the homegrown WiBro standard as a way to boost speeds, and by reallocating spectrum in the 800 MHz and 900 MHz bands with preference given to new operators and latecomers to the market.	which the central government is putting 1.3 trillion won.
Spain	The Spanish government introduced Plane E in 2008 to boost the economy and employment. This plan represents the country’s most powerful stimulus to economic activity in the past decades ⁴¹ and includes broadband development through providing financing support for the existing Plan Avanza. Spain is already the EU leader in broadband - around 95% of Internet access is broadband ⁴² , and 19.5% of the population use mobile broadband. Phase 2 of Plan Avanza (submitted to the cabinet on January 30, 2009) seeks to further develop the information and knowledge society, with broadband development as one of the key goals ⁴³ .	Phase 2 of Plan Avanza promotes greater speed and reach of broadband to rural and isolated areas. This is done by focusing on centers with dispersed populations and extending the reach of trunk fiber-optics networks ⁴⁴ . The approach is for the government to stimulate the deployment of broad-band infrastructures ⁴⁵ , and increase demand for broadband by promotional activities to citizens and businesses. There is a budget for overall infrastructure development, which includes broadband, but actual budget depends on the additional funding from the European Fund for Regional Development (ERDF) ⁴⁶ .	Overall €89 million (~US\$118 million) for infrastructure measures, actual budget subject to further ERDF ⁴⁷ .
United States	On February 17, 2009, U.S. President Obama signed the American Recovery and Reinvestment Act. The \$789 billion package aims to create or save 3.5 million jobs over the next two years, over 90% in private sector. Of this investment, \$7.2 billion has been allocated for providing and extending broadband services in rural, suburban and urban areas. This is expected to create 10,000 additional jobs ⁴⁸ , and better access to broadband can “enrich democratic discourse, enhance competition, provide economic growth, and bring significant consumer benefits. Moreover, improving our infrastructure will foster competitive markets for Internet access and services that ride on that infrastructure ⁴⁹ ”.	<p>The scope is as follows:</p> <ul style="list-style-type: none"> ▪ Rural Utilities Service (\$2.5 billion): provide broadband service to unserved areas, improved service to underserved areas ▪ Broadband Technologies Opportunities Program (\$4.7 billion): To provide and improve access for consumers in unserved areas, provide support for public interest schemes facilitating access to broadband, improve broadband uptake by public safety agencies, and to stimulate demand for broadband <p>The current draft of the broadband part of the stimulus package focuses on providing grants, loans and loan guarantees based on basic conditions and guidelines some of which are still under development.⁵⁰ The bill also has no speed requirements but mandates operators to meet build-out requirements, operate basic and/or advanced services on an open access basis⁵¹. The stimulus money is being dispersed through various agencies, including the FCC, the National Telecommunications and Information Administration and the U.S. Department of Agriculture⁵².</p>	US\$7.2 billion ⁵³ , about 1% of the overall stimulus budget.

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