Productivity Commission Submission to the Senate Select Committee on the National Broadband Network

Introduction

On 7 April 2009, the Prime Minister announced that the Government would 'build and operate a new super fast National Broadband Network' (Prime Minister 2009). The Prime Minister said that the new network would connect up to 90 per cent of Australian homes, schools and workplaces with broadband of up to 100 megabits per second. This would involve fibre to the premise (FTTP), with the remaining 10 per cent of premises being provided with next generation wireless and satellite services of around 12 megabits per second.

The Government estimated that the project would cost up to $43 billion over 8 years. It said that the National Broadband Network (NBN) would be built and operated by a new company established for the purpose, with majority Government ownership. The Government expected significant private sector investment, with the Government's investment sourced through the Building Australia Fund and the issuance of 'Aussie Infrastructure Bonds'. The company would be permitted to offer wholesale services only.

Scope of this submission

For the purposes of the Committee's Reference, the Productivity Commission has taken as its starting point the decision by the Government to proceed with a rollout of FTTP. As such, this submission is designed to assist the Committee in its examination of the issues still open to consideration, such as timing, sequencing, financing and regulation.

The Commission's expertise in any area is principally a product of its more recent public inquiries, studies requested by the Government, and related research. As the Commission has not been tasked to undertake work in the telecommunications area

for some time, the submission is of a general nature, providing some 'best practice' policy and regulatory principles to assist the Committee. It has been derived from research and public inquiries likely to be of some relevance to the broadband issues.

Based on the Commission's work, the submission examines:

- the potential benefits from fast broadband;
- cost-benefit analysis;
- the financing of infrastructure; and
- pricing and access to infrastructure.

Potential benefits from fast broadband

By facilitating innovation, information and communications technology (ICT) can have pervasive economic and social benefits, whether advances arise from speed (eg: broadband), mobility (eg: fast wireless connectivity), or any combination of features. The internet has dramatically enhanced the efficiency of searching for information and has provided new, more convenient and often cheaper ways of delivering and paying for goods and services. As well as directly boosting productivity, the internet has also helped to empower consumers and thereby reinforced the competitive disciplines on suppliers. It has provided new avenues for learning and accessing advice on health matters, new sources of entertainment and new ways to engage with others in the community.

Previous Commission work on the link between investment in ICT and productivity found that an important contributor to Australia's improved productivity performance in the 1990s was a competitively driven acceleration in ICT use in many industries, including in the wholesale trade, finance and insurance sectors. By analogy, an efficient, well regulated and widely accessible NBN might be expected to facilitate further direct productivity benefits, enabling a greater volume of information and data to be transmitted over a specified time.

An equally important message emerging from a variety of Commission work is that the scope for Australia to reap the benefits potentially on offer from the NBN and other ICT innovations, such as higher capacity wireless connectivity, will depend critically on strong competition among users to drive the search for profitable applications, and on a supportive, flexible and responsive policy and regulatory environment. Hence, policies or regulations that unnecessarily inflate the costs of using new ICTs, or that limit competition among potential users, will reduce or at least delay uptake and the associated benefits. So too will prescriptive or otherwise inefficient regulations that limit the ways in which ICTs can be provided. For

example, in its report on broadcasting, the Commission commented on the deleterious impacts of the variety of restrictions on the broadcasting of digital television (Productivity Commission 2000).

As a recent CEDA (2008) report states, strong competition between the four 'digital doors' of internet service provision — copper telephone lines (ADSL and VDSL), wireless systems (mobiles, WiMax, satellite), hybrid fibre-coaxial and fibre optic systems — is likely to provide the best outcomes for the economy. The viability of any one of these forms of infrastructure should not be as a consequence of inappropriate constraints on the other modes of delivery.

Cost-benefit analysis

The Prime Minister's announcement of the new fast broadband network states that an implementation study will be conducted to

> determine the operating arrangements, detailed network design, ways to attract private sector investment – for roll-out early 2010, and ways to provide procurement opportunities for local businesses (Prime Minister 2009).

The proposed implementation study provides an ideal opportunity to undertake a thorough cost-benefit analysis, gathering the appropriate evidence to ensure the project best meets the nation's interest. In this context, evidence needs to be gathered from the perspective of the welfare of the wider community, and not just the interests of particular sectors.

Much of this evidence can be analysed within a cost-benefit framework. This is an important tool in ensuring that Governments make the best use of limited resources; it explicitly recognises the opportunity cost of investment. However, it is principally about determining the efficiency of various investment alternatives. The equity implications of the alternatives should be considered separately to inform the final decision.

The precise nature of the benefits and costs which should feed into the analysis will depend on the specific features of the project. In this respect, higher levels of local content in a project, or greater participation by small and medium enterprises, should not be regarded as 'self standing' benefits, and any multiplier analysis should be used with caution[1]. The costs of various practical procurement options should be factored into the overall analysis. Work by both the Commission and the OECD strongly suggests that it is access to cost-effective ICT services together with

[1] All spending options are likely to have 'multipliers'. It can be difficult to estimate whether the option under study has greater or lesser second-round impacts than other options.

competitive pressures to deploy them productively, and not the domestic manufacture of the constituent parts, that is primarily important for productivity and growth. In other words, there do not appear to be significant externalities from local participation in ICT projects that would warrant specific recognition in the decision-making process. Any such proposition should be tested and a value placed on those externalities. The full analysis should be open to public scrutiny.

Similarly, cost-benefit analysis can assist in contrasting 'gold plated' service provision and investment options motivated by short-term cost savings. Whereas the former can have high up-front costs, the latter may incur significant future expenditures, including those required to meet demand growth.

Discount rate

The use of the cost-benefit analysis framework also assists policy makers in identifying the drivers of the costs and benefits, thereby assisting in minimising costs and maximising benefits. As recommended in the Government's *Best Practice Regulation Handbook* (2007), costs and benefits, including money equivalents based on the willingness to pay, should be discounted using a real rate with appropriate sensitivity analysis[2]. The *Handbook* recommends a social discount rate of 7 per cent with sensitivity testing between 3 and 11 per cent; the higher end of the range encompassing projects with non-diversifiable risks.

A forthcoming Staff Working Paper on discounting also concludes that uncertain future costs and benefits should be estimated in terms of the risk-weighted averages (expected values) of all possible outcomes, including possible disasters and windfalls (Harrison 2009). That is, uncertainty in the estimates of costs and benefits should be addressed in the valuation of the costs and benefits rather than used to

[2] The best method for estimating 'willingness to pay' is through preferences that consumers reveal with their spending decisions in real or experimental marketplaces. Sometimes evaluators have not exploited marketplace or experimental tests (e.g. through pilot studies to observe real consumer behaviour in test markets). In such cases, surveys have often been used as a second-best method of estimating 'willingness to pay'. Survey designers need to be aware of the limitations of such estimates, as many examples in opinion polling show a significant gap between the stated initial preferences of those surveyed and their actual subsequent behaviour (whether in the market or at the ballot box). Reasons for such divergence include the use of 'leading questions', pressure to elicit a biased response arising from the context of the survey, or merely the preference of a survey respondent not to appear to the interviewer to be uncooperative, combative or 'self-interested' in a telephone or face-to-face interview. The risk of these biases is a reminder that cost-benefit analysis is a tool whose results are no better than the systematic way in which it is used and the quality of the data it elicits or estimates – its value lies principally in it being appropriately used to fairly assess the relevant costs and benefits of a project.

vary the appropriate discount rate. The use of expected values of costs and benefits is relevant to the NBN, as the uncertainties of the evolution of technologies and of consumer demand mean no single estimate for each of the future costs or benefits can be proposed with certainty.

The forthcoming Staff Working Paper also confirms the appropriateness in most circumstances of market-based discount rates and suggests an anchor rate of 8 per cent with testing over a range from 3 to 10 per cent. It finds that Governments should only discount with the risk-free rate when:

- the project is risk-free; or
- the market is able to spread all the risk associated with the project; or
- the government spreads all risk so that the project does not impose risk on beneficiaries and taxpayers; or
- the expected values of cost and benefit flows have been converted into 'certainty equivalents'.

These propositions about the appropriate discount rate are important for evaluating the NBN, as the project does carry undiversifiable risks. The expected value of its future benefits are positively correlated with the future state of the economy. No variation of public or private ownership can alter that, and the project's implementation options should be evaluated at a discount rate that incorporates an element to compensate for this risk, just as a private project would.

'Optimism bias'

When assessing the options, policy advisers and the implementation team should also be aware of the tendency for optimism bias. According to the UK Government's *Green Book*, this is the:

> demonstrated systematic tendency for appraisers to be over-optimistic about key project parameters. It must be accounted for explicitly in all appraisals, and can arise in relation to capital costs, works duration, operating costs and under delivery of benefits (UK Government 2003).

In a review commissioned by the UK Treasury, which examined 20 years of major public procurement projects in the United Kingdom, the average optimism bias was estimated as 17 per cent for work duration, 47 per cent for capital expenditure, 41 per cent for operating expenses and 2 per cent for benefits shortfall (Mott MacDonald 2002). The study also found that the level of bias in projects procured using public-private partnerships (PPPs) was lower, partly because of a more rigorous approach to risk analysis and more robust and realistic business cases.

Pilot projects

The discussion above highlights some complex questions for cost-benefit analysis, including forming appropriate estimates of the expected values of costs and benefits, and appropriately discounting for undiversifiable risk.

Pilot trials in projects that are large and complex can be useful to explore the practicality of implementation and to discover which delivery methods work best or are most cost-effective. Policy trials are useful insurance policies, protecting the government from expensive failures, and preventing good policies from being discarded because of implementation problems.

In addition, data needed for project evaluation might only be revealed through pilot studies. A systematic use of pilot phases could be designed to produce valuable evidence how consumers value the different approaches.

The Government has chosen Tasmania to begin the roll out of the FTTP. It has also designated Regional Backbone Blackspots for priority construction of backbone transmission links to Darwin, Geraldton, Broken Hill, South West Gippsland, Emerald, Longreach and Victor Harbor. These provide an opportunity for the Government to apply cost-benefit analysis on a pilot, gathering evidence to guide the implementation of the full project.

Financing of Infrastructure

A recent Staff Working Paper provides some guidance on the efficient financing of public infrastructure (Chan et al. 2009). Firstly, the paper makes the point that it is important to keep the investment and financing decisions separate. Secondly, because the financing costs of large and complex infrastructure projects are substantial, there can be material savings from the right choice of financing vehicle. By revealing detailed project information and by better aligning incentives, the right choice of financing vehicle can also impose useful disciplines on the efficiency of the project overall.

For projects which require a taxpayer-funded contribution to render them commercially viable, that contribution will often reflect multiple social or other broader objectives. In these circumstances, and consistent with the approach to funding community service obligations which has been agreed to by Australian governments, a public funding component for each of these constituent objectives should be separately and transparently identified.

While private financing of Government investment in infrastructure is still relatively small in Australia[3], it is more likely to improve the efficiency of the project and reduce life-time project costs if it results in better risk management, especially by transferring components of the risk profile to those best able to manage them. Two key forms of private financing are PPPs and specific-purpose bonds.

Public-private partnerships

PPPs are forms of private financing which, as noted above, have significant potential to reduce total project costs by aligning the incentives to manage project risks with those who have the capacity to accept the risks. Appropriately designed PPP contracts impose penalties for poor risk management, and provide payments to generate the right incentives for the contractors to build and operate the infrastructure. A key strength of a PPP contract is usually the bundling together of the design, construction, financing, operation and maintenance of the infrastructure. This can provide the appropriate incentives to minimise the whole-of-life costs of the project.

Crucially, however, the effectiveness of the incentives depends on the appropriate transfer of risk to the private sector. Where the Government carries a large contingent liability from a poorly managed project, it significantly reduces the benefits of a PPP contract.

PPP contracts are often complex, with time consuming and expensive requirements to negotiate, structure and document the project financing. Additionally, these contracts have traditionally been off balance sheet, which has been an attraction for governments seeking to reduce their direct call on the capital markets. Associated with this, however, is reduced public accountability to the Parliament and the public. 'Commercial-in-confidence' restrictions have also been invoked to reduce the scrutiny of PPP contracts.

A further issue that may be relevant to the NBN is the timing of the roll out of the network. If there is significant political and public pressure for a rapid implementation of the project, this may lead to a non-optimal sharing of risk as the private sector exploits the Government's timing constraints. It is also more likely that there will be a net benefit from a PPP where there is strong competition among potential private providers. Government officials also require a strong skill base to ensure the Government's interests are fully protected.

[3] In 2006-07, 63 per cent of government investment in infrastructure was funded through Budget appropriations, 6 per cent through public-private partnerships.

Effectively, Governments pay a premium to PPP partners compared with direct Government financing. If, and only if, the premium is more than offset by a reduction in risk to the taxpayer and through efficiency gains in the construction and operation of the infrastructure, then the PPP is worthwhile.

Specific-purpose bonds

Specific-purpose bonds can be issued to finance particular projects. However, their use in Australia was phased out during the economic reforms of the 1980s and 1990s and all borrowings by state and territory governments were brought under their central borrowing authorities.

The Government has announced that part of the NBN will be financed through 'Aussie Infrastructure Bonds'. To date no announcement has been made about the nature and structure of these bonds, although the title suggests a form of specific purpose bond.

Such bonds, if structured appropriately, can provide a level of market-based discipline to the project. To achieve this, the bonds need to be serviced from income generated by the infrastructure project rather than from general tax receipts. A close alignment between the returns of the specific-purpose bonds and the performance of the infrastructure project creates a form of quasi-equity instrument.

On the other hand, if the specific-purpose bonds are simply another line of government bond, the crucial issue is the cost of the borrowing via these bonds compared with the cost of standard government debt raisings. Such bonds may be less liquid and involve higher transactions costs. This would reduce their attractiveness to buyers and imply that the Government would need to sell the bonds at a higher yield than that of equivalent standard instruments. Should the Government provide tax concessions on the bonds to make them more attractive to purchasers, it should fully account for the cost of the concessions, noting that tax concessions might not appear on the Government's balance sheet. The key issue for Government is the cost of the borrowing, taking into account all concessions.

Pricing and access to infrastructure

The NBN company will operate the FTTP network, selling only to wholesalers. This averts the problems previously identified by the Commission, and noted in its report on National Competition Policy (Productivity Commission 2005), arising from the vertical integration of telecommunications companies. In principle the new

company would have no incentives to favour one wholesaler over another and this could encourage strong competition among wholesalers and retailers.

However, policy-makers should be cognisant of the potential for conflicts of interest should a significant proportion of the NBN's share capital be held by wholesale and retail competitors.

Principles for price regulation

Owners/operators of major infrastructure networks will typically need to upgrade and refurbish their networks to meet growing and changing market needs and to accommodate opportunities made possible by technological developments. It is therefore important that where private entities are responsible for such investments, they are not deterred or impeded from doing so by the regulatory environment. In the ICT area where rapid technological change is continually expanding the variety and sophistication of available services and greatly reducing their costs — often in ways that would not have been anticipated much before the event — 'investment friendly' regulation is paramount.

Some significant insights have emerged from Commission inquiries and research which have examined price regulation issues.

- Price regulation has some inevitable efficiency costs, including for investment, and should not be employed unless it is clearly necessary to avoid larger efficiency losses from the successful exercise of market power. The Commission has argued in various reports that the threshold or trigger for price regulation under access regimes should be set at a high level.
- Price regulation should not be employed to meet social objectives. As noted later, if subsidies for some consumers of particular infrastructure services are judged to be necessary, then consistent with the approach agreed to by Australian governments, these should be provided through separate budget-funded CSOs. In its report on the consumer policy framework (Productivity Commission 2008c), the Commission recommended that retail price regulation for telecommunications services and for contestable energy services be removed.
- Where price regulation is warranted, there should be sufficient pricing 'headroom' to encourage new investment. All of the methods available to regulators for setting an 'efficient' price have shortcomings — price setting is an imprecise exercise. Prejudicing future investment in important infrastructure services through setting prices too low is likely to be much more economically

damaging than allowing service providers some prospect of retaining a modicum of monopoly rent.

  - Excessively low access pricing produces its adverse effects gradually, but its long-run welfare implications can be significant. If access prices remain too low, no firm (including the incumbent) will make core network investments as it cannot expect a reasonable return on capital.
  - Excessively high access prices discourage service-based competition and lead to excessively high retail prices, less product variety and the potential for inefficient duplication of facilities.

- Further, as well as being at least sufficient to cover efficient long-run costs, including a return commensurate with the commercial and regulatory risks involved, regulated prices should:
  - allow service providers to employ multi-part pricing and price discrimination where this aids efficiency; and
  - embody incentives for providers to reduce costs and improve productivity (though achieving this can be far from easy in practice).

The ways in which the costs of unnecessary or poorly designed price regulation are manifest will depend in part on how infrastructure projects are delivered. For privately provided infrastructure, such inefficiencies may directly affect the longer term availability of services. Conversely, for major government-sponsored projects that are put out to tender, with service level and availability requirements specified in the tender, the costs may to a large extent be reflected in more expensive bids and/or greater required levels of public support to render the project viable for the successful tenderer.

Incentives for innovation

Given that the relative attractiveness of competing ICT technologies in the future is uncertain, there could be whole-of-economy costs in regulatory intervention which inappropriately limit the maintenance and growth of competing technologies. The potential opportunity costs of alternative technologies that may develop over the time frame of the project are such that they should be regularly assessed during the rollout of the FTTP.

In this respect, the Commission's Telecommunications Competition Regulation report found that open access networks, by encouraging downstream competition and innovation, have major advantages over those that restrict entry. The report also found that exclusive arrangements for providing content to particular network

technologies (satellite, cable, mobile or copper based) were unlikely to deliver the most efficient outcomes (Productivity Commission 2001).

In essence, the incentives for innovation and investment in broadband and telecommunications infrastructure are maintained by reducing barriers to entry by new operators while ensuring that regulation does not expropriate the returns that are needed for risky investment. Investors and entrants are likely to perceive that risks are lower where the regulatory environment is stable, transparent, independent, timely and administratively efficient.

Benefits in competitive neutrality

Compliance with competitive neutrality policy will also facilitate a competitive environment. Competitive neutrality policy seeks to ensure that significant government businesses do not enjoy any net competitive advantage over private sector competitors simply by virtue of their public ownership. In essence, this involves government businesses facing the same incentives (including earning a commercial rate of return), taxes and regulations that private operators face. Competitive neutrality policy not only allows the two sectors to compete for resources but also encourages the efficient operation of government businesses. As the Commonwealth Competitive Neutrality Policy Statement (1996) puts it:

> The implementation of competitive neutrality policy arrangements is intended to remove resource allocation distortions arising out of public ownership of significant business activities and to improve competitive processes. Where competitive neutrality arrangements are not in place, resource allocation distortions occur because prices charged by significant government businesses need not fully reflect resource costs. Consequently, this can distort decisions on production and consumption, for example where to purchase goods and services, and the mix of goods and services provided by the government sector. It can also distort investment and other decisions of private sector competitors.

While the details of the final structure of the NBN are currently uncertain, compliance with competitive neutrality policy would ensure that any company operating as a government business would not have a competitive advantage (or disadvantage) over its private sector competitors because of public ownership. In a practical sense this would mean, for instance, that the prices set by any government-owned business should fully reflect resource costs and, in doing so, achieve a commercial rate of return on the business' capital.

Community Service Obligations

While social and environmental considerations are important determinants in decisions about infrastructure, this is not a reason for moving away from the focus on promoting efficiency that has underpinned the infrastructure reforms of the past 25 years. Improvements in efficiency and better social and environmental outcomes will often go hand in hand. And where the various goals are potentially in conflict, it will often be possible to achieve social and environmental outcomes in ways that do not detract unduly from the efficient provision of infrastructure.

Governments in Australia have accepted the general proposition that support for low income, or otherwise disadvantaged, consumers of infrastructure services is better delivered either by addressing the disadvantaged directly or through transparent and directly funded Community Service Obligations (CSOs), rather than by requiring providers to cross-subsidise certain users through artificial pricing structures. The merits of each approach should be transparently assessed.

Commission research (Productivity Commission 2008a) demonstrates the importance of the appropriate funding of CSOs. The imposition of inadequately funded CSOs can lead to a deterioration in service quality, inadequate maintenance of assets used for CSO provision (insufficient investment) and higher prices for commercial services. Overfunding of the CSO can create an incentive for the organisation to increase the provision of the CSO beyond the Government's intention — this can cause an unintended and opaque reallocation of resources from the commercial activities to the CSO activities.

In terms of achieving environmental outcomes, they are generally better addressed through targeted measures that correctly price for spillover effects (such as pollution) rather than indirectly through subsidising particular forms of infrastructure.

Where governments seek to modify efficiency principles to achieve social or environmental goals, they should clearly and transparently signal why such a departure from the agreed practice is in the wider community interest.

Conclusion

In sum, while the Productivity Commission has not undertaken any recent work in this area, earlier related research suggests a number of approaches which could potentially reduce the risks and costs of the NBN. In particular, the application of a thorough cost-benefit analysis would aid the implementation study during its

detailed work, including its application to a pilot project in Tasmania. This submission also underlines the significance of issues to do with the structure of financing, appropriate pricing and access regulation and community service obligations, in determining overall outcomes from the NBN.

References

Australian Government 1996, *Commonwealth Competitive Neutrality Policy Statement*, June, Canberra.

Australian Government 2006, *Handbook of Cost-Benefit Analysis*, January, Canberra.

Australian Government 2007, *Best Practice Regulation Handbook*, August, Canberra, pp. 115 – 134.

Banks, G. 2001, *The Role of ICT in Australia's Economic Performance*, Address to the Communications Research Forum, September, Canberra.

Banks, G. 2008, *Letter to the Senate Select Committee on the National Broadband Network*, September, Canberra.

Banks, G. 2009, *Evidence-based policy making: What is it? How do we get it?*, ANU Public Lecture Series, presented by ANZSOG, 4 February, Productivity Commission, Canberra.

CEDA 2008, *Australia's Broadband Future: Four doors to greater competition*, December.

Chan, C., Forwood, D., Roper, H., and Sayers, C. 2009, *Public Infrastructure Financing: An International Perspective*, Staff Working Paper, March, Canberra.

Harrison, M., 2009, *Valuing the Future: the Social Discount Rate in Cost-benefit Analysis*, Staff Working Paper, Forthcoming.

Mott MacDonald 2002, *Review of Large Public Procurement in the UK*, July, London.

Parham, D., Roberts, P., and Sun, H. 2001, *Information Technology and Australia's Productivity Surge*, Staff Research Paper, October, Canberra.

Prime Minister 2009, *Media Release*, 7 April.

Productivity Commission 1998, *Rate of Return Issues*, CCNCO Research Paper, December, Canberra.

Productivity Commission 2000, *Broadcasting*, Report No. 11, March, Canberra.

Productivity Commission 2001, *Telecommunications Competition Regulation*, Report No. 16, September, Canberra.

Productivity Commission 2002, *Price Regulation of Airport Services*, Report No. 19, January, Canberra.

Productivity Commission 2004, *ICT Use and Productivity: A Synthesis from Studies of Australian Firms*, Commission Research Paper, July, Canberra.

Productivity Commission 2008a, *Financial Performance of Government Trading Enterprises 2004-05 to 2006-07*, Commission Research Paper, July, Canberra.

Productivity Commission 2008b, *Submission to Infrastructure Australia's National Infrastructure Audit*, September, Canberra.

Productivity Commission 2008c, *Review of Australia's Consumer Policy Framework, Inquiry Report*, April, Canberra.

UK Government 2003, *Green Book*, Annex 4, HM Treasury, p.85.

Verikios, G., and Zhang, X.G., 2008, *Distributional Effects of Changes in Australian Infrastructure Industries during the 1990s*, Staff Working Paper, January, Canberra.