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6 The European experience — regulating broadband services

6.1 Summary

This chapter examines imperatives driving the global initiatives by governments and operators to establish broadband infrastructure and deploy broadband services. It also considers their connection to universal concerns that the provision of broadband services, and access to broadband infrastructure, should be established on a basis that supports fair and sustainable competition. Various approaches are examined, including platform or infrastructure-based competition on the one hand, and a selection of mandated access regimes on the other. The chapter notes there are no cases where a comprehensive structural separation approach has been completely implemented, and that many programs for establishing functional separation arrangements are either in planning or in early implementation stage. This makes it difficult to assess such arrangements, since they are all works in progress. In terms of the European experience to date, the chapter discusses UK, Italy and Sweden as useful case studies on regulating access to infrastructure for the competitive deployment of broadband services. In addition, some countries, such as Hong Kong

and the Netherlands, have addressed the related regulatory issues of migrating from copper to fibre infrastructure for broadband service provision. These countries provide a useful context in which to consider the approach being planned by the Australian government.

6.2 Why broadband is important

Most Australians would recognise that information and communications technology (ICT) has the capacity to transform the way in which they live, relate socially and conduct business. They recognise this because of their own experience over the past decade or two. They know that access to the internet has changed their ability to access information in ways that were not possible before. They know that the messaging services to which they are connected give a new immediacy to social and business interaction and transactions. They know that response times and cycle times for many business processes have

reduced significantly. They know that they, and their acquaintances, are more connected and contactable than ever before, through mobile and other wireless forms of communication. And if they forget this, they are reminded as soon as there is a breakdown or non-availability in the systems on which they rely. A day without internet access might be regarded now as 'wasted', given the reliance on ICT systems.

The parameters of the information society are widely understood and the benefits widely accepted. The benefits of broad enabling technologies, such as those categorised as ICT, have been studied in terms of national productivity improvement and at the level of the individual firm. Not only does ICT improve efficiency at these levels, it will also transform both businesses and economies (Ovum 2003).

It is interesting to note that the benefits attributed to broadband are essentially those that relate to ICT generally, although perhaps writ large in recognition of the services and applications that will potentially be developed with greater data capacity and speed. The question remains how to assess the increment of social and economic benefit that will result from the additional, substantial cost of providing ubiquitous broadband access. This is very difficult, in part because broadband comprises a set of general and enabling technologies across the economy. It is a question that is similar to asking about the benefits of universal electricity services. A further question, seeking to clarify the differential in benefits between different broadband access systems (for example, fibre-to-the-node (FTTN) compared to fibre-to-the-premises (FTTP), simply adds another level of complexity.

Unfortunately, it does not help to look at the responses to these general questions overseas. The answers there are very similar to those in Australia. For example, Viviane Reding, the European Commission's Commissioner for Information Society and Media said:

Since the 1990s, the internet has changed our life and has transformed our economy. This process will accelerate as the mobile internet and ultra-fast broadband make it possible to deliver innovative services such as eHealth and eLearning everywhere, even in the poorest and most remote communities.

We all share the view that the internet is a key tool for free speech and contributes to a more people-centred and inclusive society. It is also a tremendous instrument for conducting business, for eCommerce. One of our favourite leisure activities, television, goes increasingly through the internet, as does our mail and our relations to public agencies. (Reding 2008b, p2)

The point of this statement is not how different it might be, but how very much the same it is to the approach in Australia. Although the reference is to

the internet, the context was broadband. The benefits are couched in the same terms of increased and innovative opportunities for social interaction, new services and new means of delivering both new and old services.

6.2.1 Broadband goals

Other goals are also being sought through broadband. A key goal is to ensure that national competitive advantage in trade and commerce is maintained. This leads to concerns about slipping behind our major trading partners and generally losing out in the global market place. The debate at this point has moved from specific benefits in terms of service development and delivery, convenience and social amenity, to fears about shifts in comparative national efficiency and productivity. The focus of this discussion is how well we are doing relative to other countries, rather than whether we are reaping the benefits that are inherent in the technology. In practical terms, globalisation means that businesses in Australia need to be connected with their partners and customers in other countries; and should have equivalent communications facilities.

6.2.2 A new focus

There are difficulties in developing a clear, quantified view of the social and economic benefits of broadband because:

- we recognise the dynamic nature of the technology and of the services that are involved, but the transformational and multiplier effects through many systems over time are not readily understood or amenable to reliable forecasting
 - we have no long-term time frame that would give us comfort in this area – we tend to consider that we are at the beginning of a major shift in platforms for transacting, innovating and communicating generally
 - the potential impacts will go so deep into the economic and social fabric that current analytical tools appear to be inadequate to fully assess them
- ACIL Tasman noted the difficulty in valuing broadband:

It is impossible to fully capture and model all of the impacts of broadband on the economy. This is partially due to the limitations of measures such as labour productivity, total factor productivity (TFP) and GDP in describing the 'value' of a technology. But, perhaps more significantly, broadband technology provides certain value that avoids quantitative detection and valuation by even the most complex economic models... A knowledgeable population tends to make more people more informed. More informed people make more rational decisions, and more rational decisions tend to be more efficient decisions. And, the argument

follows, that more efficient decisions by more people can make us all better off. Hence, it is important to recognise that while there are measurable gains from a technology such as broadband, its impacts on making the population more knowledgeable are not readily quantifiable. (ACIL Tasman 2004, pp3-4)

On the same point, the OECD has noted:

There is relatively little empirical evidence of the economic impact of broadband, although research is growing. In part this is because the impact on the economy occurs indirectly as it acts on variables that, in turn, are drivers of growth. Broadband is an enabler of changes – it allows an impact on the economy and restructuring when it is combined with other ICTs, such as computer hardware and software, and complementary factors such as skills and organisational change. The study of the economic impact of broadband is complicated by data availability and measurement problems, reminiscent of the early days of the study of the impact of ICTs more generally and Solow's Productivity Paradox (IT is everywhere except in the productivity statistics)... It is also difficult to establish any causality related to broadband as it is very hard to disentangle the effects between infrastructure availability and economic growth (and availability does not necessarily mean efficient use). (OECD 2007a, pp22-23)

Even at the level of the investing firm, the case for broadband access and the deployment of fibre in the access network is not clear, especially when the areas are currently being served by copper technologies. The upgrade in suburban and provincial town locations will typically be in the order of \$A1000–2000¹ per household passed, given typical Australian business and residential land use patterns, and depending on the pre-existing circumstances. The additional revenue needed to make the business case will be dependent on the take up rate that might be achieved. Uncertainties are manifest at this stage of broadband applications and service development. The level of uncertainty is compounded by policy uncertainty and by higher cost of deployment in markets with smaller demand and greater unit cost.

Under these circumstances it is not surprising that the policy debate has moved from quantifying the benefits to establishing arrangements for maximising the benefits that might exist and the incentives for innovation. Governments need broadband infrastructure so that the national and social goals already mentioned can be pursued. But it is to competition that they turn to provide the driver that will ensure that investment occurs in the right mix of technologies, at the right time, to address social and business demand in the right measure. And the framework for sustainable competition needs to be established.

6.3 The competitive framework

Generally, western economies are seeking sustainable competition at two levels in the provision of broadband:

- at the level of broadband access services, which is often packaged up with a set of services such as internet access and email, and sometimes also with associated telecommunications and/or entertainment services
- at the level of services or applications that are delivered and supported by the broadband platform.

At the first level, Australia has a history of permitting regulated access to those parts of an incumbent carrier's network that are considered to be natural monopolies – that is, those facilities or assets which it would not be economical for a competitor to duplicate. The critical assets that are relevant for the provision of broadband are those associated with the access network connecting subscribers to the operator's public exchanges (or switches). It is generally not economical to duplicate the access network both because of the substantial investment needed and because the existing network has substantial additional capacity. It is only used part of the time by each subscriber and, for residential subscribers, the provision of a single line is both necessary and sufficient.

Broadband is provided over copper lines using various digital subscriber line (DSL) technologies through the sharing of a common line between voice and data applications using splitter systems. However the maximum data capacity is limited to around 2Mbit/s using current technologies at a distance of up to 3 kilometres between the premises and the serving exchange.²

The capacity can be increased, and the applications capable of being delivered greatly enhanced, if the copper lengths are shortened to a few hundred metres, and the FTTN method of installing fibre into part of the access network (to a distribution node) is designed to do this. With such a configuration, speeds can be increased up to 12Mbit/s, and potentially much higher. Fibre connections running the whole distance from the exchange (or major network node) to the customer's premises (FTTP) will permit even greater speeds, currently in the order of 100Mbit/s and potentially much more.³

Fibre networks offer even more pronounced natural monopoly characteristics than copper networks. On current usage patterns households will only ever need one connection. By its nature broadband is a multi-media platform, so that different services will be delivered by the same access service, simultaneously if required. Separate service-specific networks will be superseded and displaced.

6.3.1 Inter-modal competition

There are two broad choices for regulatory frameworks to promote competition in this situation. Regulators can rely on inter-modal competition – that is, competition between different technologies, to generate appropriate incentives for cost and price reduction, innovation and quality. Or they can rely on intra-modal competition sustained by an access regulatory regime.

For inter-modal competition, the contest in the market place is between different infrastructures based on different technologies. In the broadband market, one dimension of this contest is between cable technologies (including fibre and copper) on the one hand, and cellular and other wireless technologies on the other. The characteristics of these competing technologies means that they are not complete substitutes, and each has advantages that might suit the requirements of different services, or the same customers in different circumstances. Radiofrequency spectrum and other constraints make bandwidth more expensive on cellular and other wireless systems, such as WiFi and WiMAX, compared to cable. Screening capabilities might also influence the sub-set of uses that each is best suited to. Mobility or nomadicity is an advantage for some applications.

Although most regulators profess to be striving for a technology-neutral approach to industry regulation, they cannot ignore the characteristics of the services that are typically supported by different technologies. Based on this, industry wisdom at this stage of development is to regard wireless and fixed cable technologies as complementary rather than as in full competition, overlapping service markets notwithstanding. So neither in Australia or elsewhere is the inter-modal competition at this level regarded as sufficient to deliver competitive outcomes for broadband service delivery.

Another inter-modal competitive opportunity exists between telecommunications operator broadband platforms and cable television operator platforms. This is an important source of meaningful competition in countries that are well served with independent cable systems either nationally or in some key regions. The United States is an example of the former, and the United Kingdom of the latter. The pattern of independent cable systems in Europe is quite varied.

In Australia the two cable television networks are in the hands of Telstra and Optus, and not controlled by parties independent of the major telecommunications carriers. The opportunity for inter-modal competition is further reduced by the largely aligned coverage areas of around 2.5 million households in aggregate and the decision by Optus to retire its network and to deliver broadband services using Telstra's mandated

unbundled local loop (ULL) service. Optus' investment remains under-utilised and undeveloped for broadband provision (ACCC 2008).

6.3.2 Intra-modal competition

For most countries, including effectively the whole of Europe and Australia, the choice of regulatory framework boils down to choices about the access afforded to a common broadband infrastructure.

Regulators have a number of options about how to proceed. The first choice is between *ex ante* and *ex post* remedies for potential anti-competitive behaviour by the sole broadband access network provider. National regulatory authorities worldwide have the task of balancing measures that are *ex ante* (that is, applied in advance as a framework in which competition should develop and operate), with those that are *ex post* (that is, applied in response to anti-competitive behaviour). The problem with telecommunications is that the structural impediments to unregulated competition may well be embedded and unlikely to dissipate rapidly, if at all. *Ex post* solutions, such as prosecuting once evidence of anti-competitive behaviour is found to have occurred, may be difficult to apply because of evidentiary burdens. In any case the victims may well have exited the market or collapsed in the meantime. *Ex ante* remedies, on the other hand, are always intrusive and may inadvertently distort or retard market growth and development. Broadband is considered to be too important to take a wait-and-see *ex post* approach.

So that leaves various forms of direct access control as part of a regulatory framework. The objective is to establish a control regime in advance to ensure that competitors in the provision of broadband services have access to the common infrastructure on a fair and reasonable basis. This includes being subject to terms and conditions that reflect the costs that would apply for access under competitive market conditions, and that are equivalent to the terms that would be applied to the infrastructure controller's own downstream retail operations.

Control is sought through various forms of separation. The three remedies that may be applied are:

(a) Accounting separation

This is a remedy that forces greater transparency in accounts to allow calculation of the real costs involved in the production of regulated services in order to avoid margin squeeze or cross-subsidisation. It is a tool that is already available to Australian and European regulators, and is in fact one of the remedies that they can use where they find significant market power (SMP) in specific markets.

(b) Functional separation

Functional separation requires the creation of separated divisions within the incumbent to comply with regulatory obligations, but does not imply a change of ownership. The separate division that is created is not the operator's total wholesale business – only that part which involves assets that cannot be duplicated economically and to which competitors therefore need access for their own businesses to be viable. It requires operational and management separation to be instituted and, potentially, decisions to be made by the separated division independently of the rest of the company. The most well-known example is that of BT's Openreach, the creation of which was requested by Ofcom as a result of the UK's Telecom Strategic Review (Ofcom 2003).

(c) Structural separation

Structural separation means that the incumbent is forced by the regulator to sell off a division or part of the company or to place those assets at arm's length – joint ownership to comply with regulatory obligations. It is a very strong measure as it implies a change of ownership, but could potentially simplify the regulator's job by removing any incentive for the incumbent to discriminate against alternative providers.

6.3.3 What's wrong with accounting separation?

Accounting separation has serious limitations as a tool for addressing the risks posed by SMP. It is labour intensive and addresses only the accounting aspects of internal transactions. There are many other ways in which infrastructure owners can discriminate in favour of their own downstream retail operations. For example, they can share planning and capacity information, thereby offering timing and rationing advantages plus the element of surprise in the market place to their own operations. Perhaps most importantly, accounting separation involves retrospective assessment of behaviour, and by the time the regulator examines the data and forms a view, irreparable damage to competition may have occurred. In the case of broadband regulation, most regulators have decided that accounting separation is inadequate.⁴

6.3.4 Functional v structural separation

It has come down to this – which of these remedies is likely to best deliver competitive outcomes in the provision of broadband services, keeping in place effective incentives to invest without distorting or delaying the development of a market that is generally considered to be in a formative stage?

6.3.5 Structural separation for Australia?

In its invitation for applications from organisations seeking to access up to \$4.7 billion available from the Commonwealth in equity funding, the government stated its clear preference for some form of structural separation, so that the ownership of the National Broadband Network (NBN) would be held by an entity that was not itself a broadband service provider to retail markets (Conroy 2008).

The general arguments for structural separation are that it involves:

- less intrusive, expensive or continuous regulation
- a clear separation of the interests of the infrastructure services entity (often called NetCo) and the remainder of the dominant carrier's operations (involving competitive infrastructure and service businesses)
- separation of personnel and brand, and no possibility of confusion
- removal of all incentives for the NetCo to discriminate between its customers (all of whom are at the wholesale level)
- a level playing field for all competitors in the market place.

The arguments against are:

- the wholesale NetCo would be less likely to respond appropriately and in a timely manner to the changing needs of dynamic retail markets for broadband
- planning would be less coordinated and effective than in a single organisation
- shareholder value would diminish (in the residual dominant carrier's business)
- NetCo would tend towards a bureaucratic approach to its services
- there would be additional costs and related inefficiencies associated with the separation of IT and other systems that had previously served the total organisation
- most importantly, the possibility of inter-modal facilities-based competition would be extinguished.

A preference for structural separation was understandable given the Australian government's interest in receiving a suitable commercial return on its investment, rather than having the funds treated as a social investment (that is, as a grant). However, the Australian government has left it open to bidders to suggest the organisational arrangements they consider should apply. Telstra has publicised that it is not interested in public-private partnerships for the NBN, or in an outcome that would involve structural separation of any kind. How these positions might be reconciled in an outcome that includes Telstra's bid being accepted remains to be seen.

If Australia is to have a structural separation solution, the details are yet to emerge.

There is no completed example of regulated structural separation, and therefore no established arrangement that can shed light on how the benefits and problems claimed might work out in practice. The nearest example is Singapore, where the government has determined that there will be two levels of structural separation. The Singaporean government is intent on separating the ownership and construction of the broadband network infrastructure from the operation and management organisation. The virtues of this level of separation are not apparent yet and may not be for some time, since the tendering processes are still ongoing.

6.4. The European experience

Notwithstanding the more recent efforts of the European Regulators Group and the EC to develop a common position and framework for determining appropriate regulatory measures to encourage broadband infrastructure investment and the development of a suitably competitive broadband market in each member state, the experience of European countries remains limited. The UK is somewhat in the vanguard, followed by a few other countries applying and adapting similar concepts. In all cases the experience is of functional (or operational) separation, as described below.

6.4.1 European Commission

In November 2007, the EC presented its proposals for the reform of the current telecommunications regulatory framework (EC 2007a). The outcome was influenced by a positive view of the results achieved in the functional separation of the Openreach Division from the remainder of British Telecom in the UK (more later). As a result the EU Commissioner, Viviane Reding, was enthusiastic to adopt functional separation as a common remedy to be applied by national regulatory authorities (NRAs) across Europe, in appropriate circumstances. This enthusiasm was matched by that of many NRAs.

Moves by the EC to include this remedy in its *Access Directive* have been relatively cautious, as is the case of all *ex ante* remedies. In this case the remedy is intended to be exceptional, and only applied after EC approval, and after persistent failure to achieve non-discriminatory access to non-replicable infrastructure resources, such as broadband (EC 2007b).

The legislation proposed in November 2007 is being considered by the European Council and the

European Parliament. The adoption of functional separation as a regulatory tool was agreed at committee level on 23 July, and has come before the plenary session in September 2008. Subject to this and to the finalisation of texts by the end of the year, the remedy of functional separation, and the whole reform package, will become law in the EU by 2010.

6.4.2 United Kingdom

Openreach was launched in January 2006 as an independent and separate organisational unit in BT (British Telecom) concerned with providing equal access (or equivalence of access) to BT's essential network infrastructure. Openreach is responsible for the whole access network and the large majority of BT's regulated wholesale services are under its management.

The initiative to create a functionally separated division along these lines was BT's. It was proposed as an alternative to the structural separation between the access network service division and the rest of BT. That suggestion arose out of Ofcom's Telecom Strategic Review in 2003 (Ofcom 2003).

BT considered that its proposal would deliver the same effective outcomes while preserving ownership by BT. The position of BT shareholders would presumably be maintained.

Openreach performance is reviewed by a specially created Equality of Access Board (EAB) which monitors the implementation of the undertakings given by BT to Ofcom in relation to the provision of wholesale infrastructure access services. The majority of the EAB are independent external members.

The key principle driving the operation of Openreach is the principle of equivalence of access and information to the services it offers, namely unbundled local loops (ULLs), wholesale line rental (WLR), number portability, wholesale extension services, backhaul extension services and wholesale Ethernet services. The manner in which Openreach staff and systems relate with the rest of BT is very important. Equivalence of information requires that the relationship is formal and arms length, and effectively on the same basis as with Openreach's other industry customers.

One measure of Openreach's performance is the improvement in the delivery of access to infrastructure to BT's competitors. In January 2006 there were only around 200,000 ULLs in service. This number had grown to 4.3 million by March 2008. Openreach is considered to be a success in terms of non-discriminatory access to existing network infrastructure.

The increased investment by the UK industry in ULL technology and the associated multiplexer technologies (DSLAMs) may also be considered to

be a potential barrier to the commercial adoption of and investment in fibre delivery systems of the kind required for higher speed broadband. The co-existence of copper and fibre systems represents a fragmentation of the demand for fibre connections and weakens the commercial case for investment in FTTN and FTTP.

The EAB and alternative service providers have expressed overall satisfaction that Openreach has complied with the undertakings relating to its operations and governance, and is delivering wholesale services more quickly and in greater numbers than before.⁵ This is a judgement based on equivalence of access and effective delivery principles.

6.4.3 Italy

In April 2007, the Italian Minister of Communications, Paolo Gentiloni, decided to put forward a draft modification of Article 45 of the Italian Code of Communication, which would give the telecommunications regulator, AGCOM, greater powers, particularly in carrying out functional separation of the incumbent provider, Telecom Italia (TI).

In mid 2007 AGCOM undertook a public consultation on issues associated with functional separation. The consultation also explored other issues associated with the direction and intensity of regulation and deregulation in various markets. It concluded in November 2007.

TI has been the subject of takeover speculation in recent years, as a result of one of its major shareholders, Pirelli, seeking to sell its stake in the company. After considerable turmoil and speculation, Telefonica purchased that shareholding via a new holding company. TI seemed to have no control of its destiny at the commercial level or the regulatory level.

In a bid to address both of these issues, TI completed its new investment plans which included an investment in next-generation network and broadband platforms of 6.5 billion in the next decade. This was less than had been previously touted. In order to ward off the prospect of imposed separation in a form devised by the regulator, TI announced a reorganisation in late 2007 of its technology division into four main units, one of which is called Open Access. Open Access is not a functionally separated division and represents a weaker form of separation than alternatives such as the approach in the UK.

AGCOM is reviewing whether the form of separation implemented by TI through Open Access is adequate as a competitive safeguard and for delivery of non-discriminatory outcomes.

6.4.4 Sweden

In April 2007 the Swedish regulator, National Post and Telecom Agency (PTS), was directed by the government to investigate remedies that might ensure non-discriminatory and transparent access by alternative providers to the ULLs of the fixed incumbent provider, TeliaSonera.

PTS concluded that access was impaired and that Sweden was falling behind other nations in broadband service development. PTS also concluded that functional separation would be the most appropriate remedy to rectify the competition problems identified in the market.

The PTS launched public consultation on its proposal and invited comments from the industry. TeliaSonera responded aggressively, announcing that it will establish a new infrastructure company that will cover copper and fibre networks and multiplexing, and will ensure that services are provided on equal terms to TeliaSonera wholesale customers, as well as to the company's retail arm. TeliaSonera rejected PTS's plans for functional separation as unnecessary in the broadband market. TeliaSonera also raised the issue of potential breach of its property rights guaranteed by the Swedish constitution. (This theme was echoed in Telstra's recent court case against the ACCC's decision on the pricing of ULLs in Australia; ARN 2008).

On 18 March 2008 the Swedish legislature passed the law for the 'Functional separation for better broadband competition', which came into effect from 1 July 2008. This approach is inspired by BT's Openreach, and will ensure TeliaSonera cannot discriminate in providing access to its copper wire network. It means that functional separation will become a new tool for PTS much earlier than the EU Framework proposal, which is due to come into force by 2010, and in which functional separation is listed as a last-resort remedy. However, practical outcomes are yet to be made manifest.

6.5 Fibre versus copper

An issue that is conceptually distinct from but which impacts on various approaches to separation is whether it is necessary to implement a fibre access network at all, or whether improvements in DSL technology, specifically in ADSL2+ technology, may be capable of providing all the bandwidth that we could possibly require.

ADSL2+⁶ extends the capability of ADSL by doubling the number of downstream bits. It is theoretically capable of a capacity of 24Mbit/s and 18Mbit/s at one kilometre and two kilometres respectively from the exchange, compared to 8Mbit/s for ADSL. In practice, speeds are lower than the theoretical upper bounds, typically between 10 and 20Mbit/s and, in 50 per cent of cases, over 15Mbit/s.⁷

The issue then is whether the quest for fibre is inappropriate and beyond the needs of most households and businesses. Clearly fibre, whether to the node or the premises, will deliver more, but why do we need more? Broadband is by definition a multimedia platform. For households, the likely major applications for the future will enable high-quality graphics and moving images for entertainment, interaction activation and for file transfer to facilitate remote and home-working. Fuel and transport challenges are likely to increase the number of full-time and part-time homeworkers in Australia. Fibre will support high-capacity applications to households and business premises simultaneously. In addition, as capacity becomes more generally available, applications developers will take that into account in producing services and applications that are bandwidth intensive and which rely on greater capacity for increased quality, speed or both.

If ADSL2+ and fibre are technologies that support greater capacity, why can't we have both? The copper is already in place, together with a regulatory access regime, to support ADSL2+, and many service providers including Telstra, Optus, Primus, Internode and others are offering the service in competition. Why is this not enough for now, with fibre access as an overlay? There are two strands to the answer – technical and commercial. If the fibre configuration is FTTN, then both the fibre-based services and the ADSL2+ services will share the copper from the node (pillar or other street distribution point) to the premises – that is, the copper distribution network. It severely limits the downstream speeds that can be delivered if there is a mixture of short and long copper lines all delivering DSL. Hence, much of the benefit of installing the fibre will be lost. In addition, if DSL options are to be retained, and if alternative providers are to remain co-located in legacy exchange premises, then the feeder network copper (from the exchange to the distribution point) needs to be maintained. The result will be a need to maintain multiple networks (fibre and copper) at additional expense. In fact, part of the cost rationalisation that is a benefit of a single broadband infrastructure would be foregone under these conditions.

The commercial issues follow on from the need to retain multiple access network infrastructures. Demand for services would be fragmented over two networks. The key economic point about access networks is that they are not traffic sensitive and, with broadband, only one is needed to support the delivery of all services to the premises. Both the copper and the fibre networks would pass all of the premises in any service area. In principle such an arrangement would be inefficient. If the business case for broadband is uncertain – and it is, otherwise public funds would not be needed – then it makes no sense to increase that fragility by allowing demand to be leached out via legacy systems.

It therefore makes business sense for an incumbent fixed network carrier to seek to move all of its traffic onto fibre at the earliest time. Unfortunately, what is sensible also looks very much like anti-competitive conduct. The incumbent's competitors will have established DSL services using the incumbent's ULL and will have invested in DSLAMs and other equipment to provide their own broadband services to customers. If copper is decommissioned the infrastructure on which the competitors operate will have been withdrawn, and the incumbent will have removed its competition.

6.5.1 The pros and cons

The separation debate – structural versus functional – has become intense in anticipation of the need for new fibre infrastructure, and in anticipation of the grant or investment of public money. However, the debate is generally not on the same terms when it concerns access only to legacy copper. Nobody is proposing structural separation for ULL management alone.

Public policy choices are becoming quite difficult and arriving at optimal solutions is not easy. On the one hand, public policy favours the implementation of fibre infrastructure since that is thought to guarantee the broadband capacity that may be required well into the future. But fibre is expensive, the demand is not yet clear, and public funds may be needed to fill the gap. On the other hand, copper is here and DSL technologies have been proven, including ADSL2+, which will certainly provide sufficient capacity for most people in the short to medium term. ADSL2+ does not need public funding. The niggling reservation is that ADSL2+ may turn out to be a dead end, and not a technology that will serve us well into the future. By relying on it for the medium term we might be risking competitive advantage in terms of overall productivity, leadership in the development and refinement of broadband applications and services, and overall transformation of the economy.

6.5.2 Overseas examples

Is the experience of any other country useful in giving us a steer in the right direction? The answer is probably not. Most developed economies have exactly the same dilemmas as we do, and none have implemented a system which is producing clear outcomes. There are some countries that have, at least, been through the issues associated with the withdrawal of copper access infrastructure, and these can offer us some guidance.⁸

In July 2004 notice was given of the withdrawal of the mandatory access to ULL provided by PCCW in Hong Kong (OFTA 2004). At that time the regulator, Office of the Telecommunications Authority (OFTA), determined that mandatory access would no longer be required, given the fibre capacity that was available in Hong Kong from a number of different carriers. OFTA set the effective date as 30 June 2008 for the change, after which access might be provided on a purely commercial basis. This case provides little guidance for the situation in Australia, because the network circumstances and subscriber densities are quite different. However, the willingness of the regulator to provide a four-year notice period is significant and relevant. Where carriers have been encouraged to invest because of the regulatory arrangements, regulators feel obliged to enable that investment to be written off over a reasonable period if the regulatory changes.

A more recent case is the Netherlands. The Netherlands has substantial cable television infrastructure that will support the provision of broadband services in competition with the incumbent carrier, KPN. In December 2007 the Netherlands had the second highest penetration of broadband services in Europe at 34 services per 100 population, and of these, nearly 40 per cent were provided by cable operators.

KPN planned to reduce its costs and establish a new competitive business model based on IP platforms. It announced its plan for an 'all IP' network at the end of 2005. The plan involved a combination of fibre to the curb (FTTC) and fibre to the home (FTTH), and would provide between 50 and 100 Mbit/s capacity to the whole country by 2010. This plan involved the provision of fibre in the access network and the removal of traditional exchanges and exchange equipment as the next-generation access network was implemented. Among the exchange equipment to be decommissioned was not only the circuit-switched central offices, but also the related main distribution frames (MDF) on which copper circuits were terminated. Providers of DSL-based broadband services also terminated their links on distribution frames that connected in turn to KPN's.

In effect KPN's plans involved the removal of copper and copper connectors and therefore the removal of the service that was critical to its DSL-based competitors continuing their operations.

The regulator, OPTA, responded to the concerns of the alternative DSL providers. OPTA was in a difficult position. It needed to support the rollout of the new 'all IP' network, but also to protect the position of the alternative DSL-based broadband providers. In the end, OPTA required KPN to arrive at a commercial agreement with the alternative DSL-based broadband providers, and, to avoid regulatory intervention, KPN submitted a migration plan to its competitors in July 2007. Since then it has signed memoranda of understandings (MoUs) with each of them.

The MoUs guarantee the continuation of MDFs in their current locations until 2010, after which there are a number of options. KPN may continue to provide services in some existing locations. If it does not, then alternative providers may migrate to alternative wholesale services, such as mini-MDF services in a number of locations around the country, wholesale broadband access services (unbundled fibre access where the service is FTTH), or access to street cabinets and sub-loop distribution from that point to customer premises (where the service is FTTC). The viability of the last alternative is yet to be tested in practice, and will not be tested under load conditions until closer to 2010.

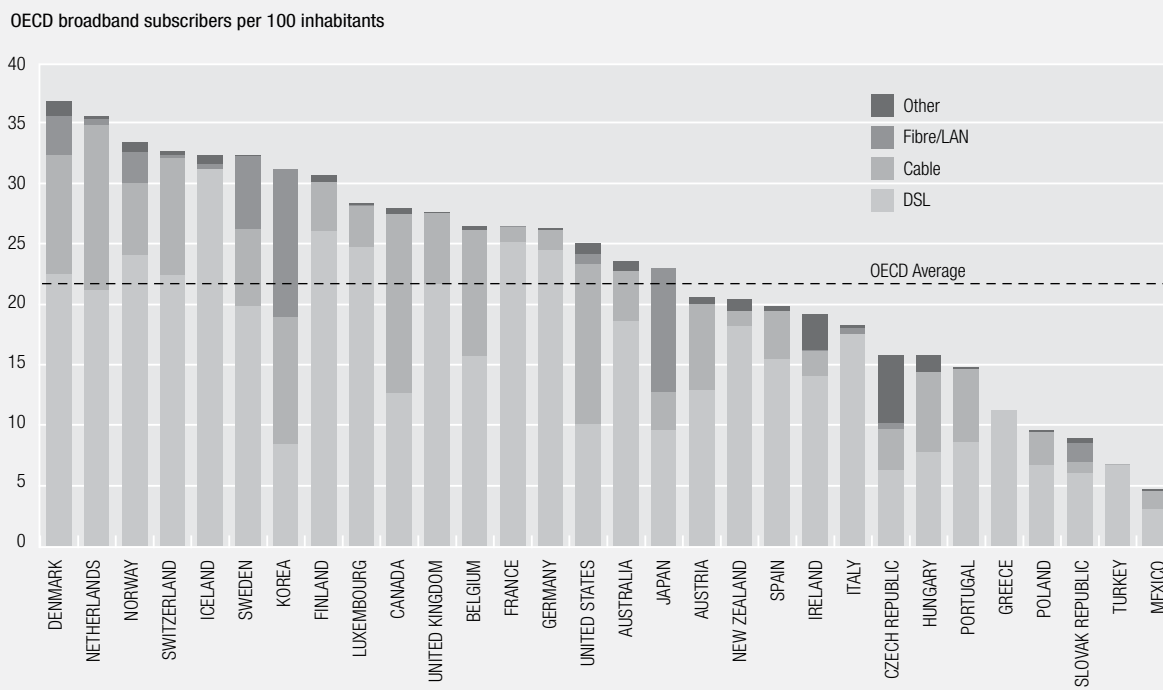
To date, the solution adopted in the Netherlands is not based on functional separation. In this regard OPTA noted that such a remedy would be disproportionate given its analysis of the market, and also one that would be additional and therefore require a ministerial decree.⁹ However, the application of a functional separation remedy in the future would be a matter dependent on developments at the European level.

6.6 Conclusion

It is difficult to judge the European initiatives because – with the exception of the UK – they are works in progress, with considerable potential but few practical results. With the exception of the UK, they might be better regarded as European dialogues rather than regulatory framework achievements at this stage.

The impact on investment and investment plans of these dialogues and the prospect of more rigorous remedies to address potential or actual discrimination and unequal access to essential broadband

FIGURE 1.
OECD BROADBAND SUBSCRIBERS, PER 100 INHABITANTS, BY TECHNOLOGY, JUNE 2008



Source: OECD

infrastructure is unclear. The deferral of previously announced plans by Telecom Italia could be argued to be more of a statement to the financial community about its fiscal conservatism under new ownership than a response to any regulatory uncertainty or anxiety.

On the matter of investment, Commissioner Reding has noted that the EU member states have, in aggregate, invested similar amounts to the North American and Asian zones in new telecommunications infrastructure, suggesting that the European approach which favours intra-modal competition based on regulated access and the prospect of functional separation is at least equal in sustaining new industry investment to the inter-modal competition favoured in the US and parts of Asia.¹⁰

In terms of the take-up of broadband services to date, the available OECD data is less clear than Commissioner Reding on whether intra-modal competition based on a mandated access regime produces better outcomes than infrastructure competition. The OECD per capita penetration figures for December 2007 show the make-up of broadband services (OECD 2007b). Where countries have a large proportion of services based on DSL, they reflect the mandated access approach of Europe (and Australia). Where services have a large proportion of cable they are more typical of the current arrangements in the

US. The results are far from clear and many other factors are at work in driving penetration than the choice of regulatory framework. However, these results do not especially support the European approach.

Overall, Openreach in the UK is considered to have achieved its pro-competitive aims in terms of safeguarding the competitive entitlement of alternative providers to the essential infrastructure needed for broadband (and for other services). To some extent the specific problem cases that have been highlighted and resolved show that the equivalence arrangements are working rather than that there are continuing problems. But larger questions remain unresolved. Equality of Access Board is not concerned with the broader question of whether encouragement by these means of investment in low capacity broadband that has a limited future may not defer investment in high capacity access technologies.

It is not clear how BT will be able to make hard decisions about turning off copper in favour of fibre. It has already deferred part of the 21CN programme for its IP-based next-generation network, and extended the deadline by over a year.¹¹ Regulatory entitlement of existing competitors and longer term national need may yet be on a collision course. However, there was encouragement in BT's recent announcement of £1.5 billion investment to bring fibre access technology to 10 million households by 2012 (BT 2008).

In most countries, functional separation seems to be preferred to structural separation because of its greater flexibility. Within the EU member states, structural separation has only been discussed seriously in Ireland, and that was essentially to enable the venture capitalist owner of Eircom to reduce the debt burden acquired through its acquisition process. Nowhere in Europe is structural separation still being seriously considered for regulatory purposes.

On the issue of whether fibre investment might be deferred pending greater capacity for copper networks to provide broadband services with enhanced DSL technologies, Europe has voted for fibre. Copper may well provide a continuing source of broadband service competition for the medium term, especially

with regulator-mediated commercial agreements as in the case of the Netherlands, but Europe, like Australia, Singapore, Japan, Korea, Malaysia and many other countries, has generally voted for a future without capacity constraints. The issue in that is to manage the migration and allow competitors time to write off current investments and to migrate to alternative arrangements in something that approaches an orderly manner. The lessons from both Hong Kong and the Netherlands are instructive.

Australia may take some cues from the experiences of other countries, but in the main it is as much at the forefront of these issues and developments and in unchartered industry and competition policy territory as they are.

Endnotes

- 1 Author's assessment based on commercial work.
- 2 With ADSL. Increased downstream capacity can be achieved with enhanced ADSL and other DSL services.
- 3 "Australia's Gigabit Future needs an end-to-end ecosystem that is scalable, integrated, flexible, device agnostic, secure, widely available and fast. When I say fast I don't mean one, three or even 12 megabits per second. Australia will need 30, 50 or 100 megabits per second in a relatively short period of time." Sol Trujillo, 2008
- 4 For example, ACCC Commissioner Ed Willett said that, "It is also noteworthy that the Commission has only relied on the existing accounting separation arrangements to a very limited extent in relation to its imputation testing analysis of specific cases" (ACCC 2004, p4).
- 5 "The EAB believes that BT is committed to the delivery of the Undertakings, although the company did not always achieve compliance with every aspect of each requirement" (EAB 2008, p1).
- 6 ITU Standard G.992.5.
- 7 http://www.internode.on.net/residential/internet/home_adsl/extreme
In Japan, for example, there has been a marked decline in the use of DSL by alternative broadband service providers in favour of direct fibre at 100Mbit/s. However, the regulatory arrangements behind the migration are not transparent in the author's view and therefore not useful in offering guidance in Australia.
- 9 <http://www.opta.nl/asp/en/publications/document.asp?id=2142>. '...in this respect the Commission has adopted the provisional position – based on the findings of the market analyses completed in 2005 – that an obligation which compels KPN to introduce a functional separation appears to be disproportionate for the time being, and it could produce undesirable effects with a view to the primacy of infrastructure competition', OPTA letter of 8 March 2007.
- 10 'The European model is empirically proven to promote not just choice, competition and innovation but also investment: in 2006, investment in the EU telecom sector reached another peak of over 47 billion, 5 per cent up on 2005. This was the fourth year on year increase since 2003. By the way, European investment is at least at the same level as other major regions (Asia Pacific: 44.3 billion and North America: 43.7 billion)' (Reding 2008a, p3).
- 11 "The upgrade, which BT calls its 21st Century Network (21CN) will replace 16 national networks with one single IP network. BT originally said the project would be carried out between 2004 and 2009, but the completion date has since slipped back to 2011. This is the first time the telco has admitted that the programme should have taken 10 years." (BT 2006)

References

- ACCC 2004, 'Gaining a Competitive Edge in the Telecom Sector', address by ACCC Commissioner Ed Willett, *2nd AFR Telecom Summit*, Sydney.
- ACCC 2008, *Telstra application for fixed line services exemption in Optus cable network areas*, December 2007, accessed at <http://www.accc.gov.au/content/index.phtml/itemId/806382>.
- ACIL Tasman 2004, 'Economic Impacts of Broadband Adoption in Victoria', prepared for Multimedia Victoria.
- ARN 2008, 'Telstra wholesale access appeal fails', accessed at <http://www.arnnet.com.au/index.php/id;1999536724>
- BT 2006, '21CN rollout timescale was squeezed', accessed at <http://news.zdnet.co.uk/communications/0,1000000085,39284808,00.htm>
- BT 2008, 'BT to pump £1.5bn into broadband', accessed at <http://news.bbc.co.uk/1/hi/business/7506742.stm>
- Conroy, Steven 2008, 'Government invites National Broadband Network proposals', media release, 1 April, accessed at http://www.minister.dbcde.gov.au/media/media_releases/2008/023.
- EAB 2008, *Equality of Access Board UK, Annual Report*.
- EC 2007a, *Proposals for reform*, accessed at http://ec.europa.eu/information_society/policy/ecommm/tomorrow/reform/index_en.htm
- EC 2007b, *Legislative proposals*, accessed at http://ec.europa.eu/information_society/policy/ecommm/library/proposals/index_en.htm
- Eircom 2007, 'Eircom in talks with ComReg on splitting company' accessed at <http://archives.tcm.ie/businesspost/2007/09/16/story26661.asp>
- OECD 2007a, *Broadband and the Economy*, ministerial background report, DST/ICCP/IE 20073/FINAL
- OECD 2007b, OECD Broadband Portal, accessed at http://www.oecd.org/document/54/0,3343,en_2649_34225_38690102_1_1_1_1,00.html
- Ofcom 2003, Ofcom's Strategic Review of Telecommunications, accessed at http://www.ofcom.org.uk/static/telecoms_review/index.htm
- OFTA 2004, 'Type II interconnection to be withdrawn', press release, 6 July, accessed at http://www.ofta.gov.hk/en/press_rel/2004/Jul_2004_r1.html
- Ovum 2003, *Productivity and Organisational Transformation: optimising investment in ICT: A report for the National Office of the Information Economy*, Canberra.
- Reding, Viviane 2008a, 'The Access Revolution: an evolution of regulation for competition', speech at *KPN Annual Event*, 14 January, European Commission, Brussels.
- Reding, Viviane 2008b, 'Seizing the Opportunities of the Global Internet Economy', speech at *Future of the Internet Economy OECD Ministerial Meeting*, Seoul, Korea, 17–18 June.
- Trujillo, Sol 2008, 'Get ready for the Gigabit Age', speech delivered to the *CommsDay Summit*, accessed at <http://www.nowwearetalking.com.au/news/get-ready-for-the-gigabit-age>