OVUM

Unfinished Business –

20 Years of competition in Australia's telecommunications sector

A report for Optus by Ovum

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The ancient Greeks knew that excellence was the product of competition. The ancient Olympic Games are well known, and were so important that warfare ceased for the duration of the Games. The Greeks saw competition as the crucible within which the best of human performance emerged. Such was their desire for the best that they ran competitions for everything from athletics to drama, rewarding the most accomplished practitioners in their fields.

In the past, Australia has been more ambivalent towards competition. Economic competition in Australia was highly regulated for much of the twentieth century. Trade, labour and market entry restrictions reduced both the level of competition and the capacity of firms to respond competitively. It is now recognised that these restrictions came at a high cost to productivity and economic growth, but this was not obvious at the time. The debate over market liberalisation was protracted, and the case of telecommunications was no exception.

The evolution of the industry from the staid monopoly of the 1980s to the competitive market we see today took place in several fairly well-defined stages. The initial moves were made by governments and regulators, but the importance of technological progress and competitor strategies has steadily grown as regulation has opened up space for competition in previously monopolised markets.

20 years of competition

As the twentieth anniversary of the launch of telecommunications competition approached, Optus asked Ovum to examine the effect of competition in the Australian telecommunications market over the last 20 years, on customers, the industry and the country. The result is this report, which provides a comprehensive narrative of the development of competition in the Australian market and an assessment of the benefits that have flowed from that competition.

In the absence of telecommunications competition, the Australian market would be very different. We know from our national experience that trends in price and functionality improve fastest in competitive markets. If it were not for competition, we would be paying much more, and have fewer choices. Prices would fall, but slowly and fitfully as monopolists squeezed out monopoly profits from their customers. Service levels would be low, since

customers would have no alternatives. Technologies would spread, but only slowly as investment flowed to competitive markets overseas. Industry revenue would be stalled as new products and services were not launched. And this would all have a cost in national productivity and our ability to compete globally.

A tale of two markets

Apart from the benefits, any assessment of telecommunications competition in Australia also entails a realistic assessment of the failures and unrealised promises of competition.

In many respects, the tale of telecommunications competition in Australia is a tale of two markets: a mobile market where lower barriers to entry led to a level playing field, and a fixed market where the legacy of a vertically-integrated incumbent slowed the growth of competition.

Starting in 1993, the mobile market was to set out a pathway towards competition which has proven remarkably successful. In contrast, the fixed market has been problematic. As recently remarked by the ACCC: “Telstra still controls the infrastructure by which the overwhelming majority of fixed voice and fixed broadband services are provided and because of its vertical integration Telstra enjoys a strong position in fixed voice and fixed broadband services… Accordingly, it is the ACCC’s view that both the wholesale and retail markets for the provision of fixed voice services, fixed broadband services and bundled fixed voice and fixed broadband services do not display the characteristics of effectively competitive markets”.

Any assessment of the effectiveness of telecommunications competition must acknowledge this unfinished business. Nevertheless, competition to date has delivered substantial benefits to customers in both the mobile and fixed industries. These benefits have accrued in areas such as price, value, innovation and service. Investment has been drawn into the industry in pursuit of revenue and profit.

Price and value

The immediate measures of competitive benefit are price declines and value for money. The telecommunications market has seen very significant price declines since the introduction of competition, and these declines have been most marked in the segments where competition is established both at the retail and wholesale level such as international and long-distance calling,

and mobile voice and data services. Fixed voice and broadband have also made progress, but only as access to Telstra's copper network has been opened up to competition.

Mobile pricing has been dramatically improved. On ACCC figures, average GSM voice prices fell 7.1% and 9.7% in 1994 and 1995 respectively, when mobile competition was launched. Prices fell another 9% in the following two years. This all happened as the monopoly analogue network's prices were stable. And since 1997, the ACCC records that average mobile voice prices have fallen another 49.9% - in other words, have halved since the introduction of full competition.

In the fixed market, progress has been less even. Where competitors were able to compete head to head with the incumbent, as in international and long distance, price declines were sustained and significant. STD and international calls have fallen 59% and 71% in real terms respectively since 1999. Even average local call prices have fallen 62%, as competitors have promoted discount local calls to defend STD and international customer bases. The exception to the rule was basic access, where prices rose 68% as prices were rebalanced. It is notable that this was where competitive pressure on Telstra was weakest.

The introduction of fixed and mobile data services provides another benchmark. While reliable data for price movements in DSL, cable and wireless broadband is recent, these show consistent and large price cuts. DSL prices fell 7.6% between 2007 and 2010, while cable broadband prices fell 6.5%. Wireless broadband fell over 33% just between 2008 and 2010.

These data price falls also have to be interpreted against the background of growing value for money. Data allowances have been increasing dramatically, with 50G, 100G and 500G and even unlimited plans now common for fixed broadband services. At the same time, we see growing data buckets in mobile. In many cases, advanced handsets are now bundled with mobile plans, making these devices much more accessible. Customers are getting much more for the money they spend.

Innovation and investment

The industry has produced sustained investment over the last twenty years. Between 1995 and 2001 alone, the ACCC records that the industry invested over $33 billion, putting paid to concerns that fragmentation of the market – otherwise known as competition – would discourage investment. Innovation

has not just been a matter of technology. New kinds of products and pricing, such as the capped plan revolution after 2004, have been instrumental in widening access to new services.

Competitive investment has democratised innovative new services that were only available to high-value customers in the past. The performance of mobile, again, has been particularly impressive. When Telstra launched its analogue mobile network, it took seven years to attract one million customers. GSM competition added one million customers in less than half the time, on the back of competitive investment in national GSM mobile networks. Similarly, the rollout of cable networks brought multi-channel pay TV to many markets, and the rollout of GPRS and later 3G technology has brought mobile data to the masses. And this investment has grown the overall market, as competitors have sought out new areas of demand to satisfy; between 1992 and 1998, the first few years of competition, industry revenues grew from $12 billion to $28 billion, with the fastest growth in new innovative services such as mobile and value-added services.

Where competitive investment was strongest, such as mobile, international and STD calling, and pay TV, competitive benefit was greatest. Where the legacy monopoly remained strongest, such as basic access and fixed broadband, competitive benefit was weaker or was dependent on regulator intervention, as was the case with DSL broadband. The long regulatory effort to open up the copper network was rewarded with a democratisation of broadband access that primed the market for the mobile data revolution. Collectively, fixed and wireless broadband are now the platform for a range of over-the-top content and services for consumers and business unimaginable only ten years ago. This industry has moved on from just providing innovations, and is now increasingly the platform for innovation across the economy.

Disclaimer

It is important to note that this report is not an econometric analysis, and it offers no new quantitative data. Rather, the intention of this report is to analyse and comment upon the development of competition in the Australian market, and the benefits that the competitive market has brought. To that end, we have relied upon previously published data and analysis to illustrate the benefits of competition.

THE PRELUDE TO COMPETITION: 1982 TO 1991

The monopoly under challenge

In 1982 the Government's Davidson Inquiry had recommended the end of Telecom's monopoly. The process of building up competitors in the industry had begun with the announcement of the AUSSAT satellite network in 1981, which began to offer domestic telecommunications and broadcasting services as early as 1985.

However, in 1988 telecommunications in Australia was still a series of monopolies. The Australian Telecommunications Commission, or 'Telecom', was only separated from the Post-Master General's Department in 1975. It held a statutory monopoly on the supply of terrestrial telecommunications within Australia, including analogue mobile telephony and the supply of standard telephone handsets. Attaching a line or any equipment to the network required Telecom's permission, and Telecom decided itself what could be attached and who could do so, without external oversight. The Overseas Telecommunications Corporation (OTC) held a similar monopoly on international communications. AUSSAT was forbidden to interconnect with Telecom's network.

Erosion of the monopoly was slow, and Australia was not atypical. As late as the 1980s, telecommunications was monopolised and integrated in most countries, both developed and undeveloped. The results were perverse: gold-plated networks provided reliable service, but limited and inflexible services might take weeks to connect; innovation and customer focus were rare.

However, informed observers saw that the traditional market arrangements were approaching a crisis. AUSSAT was rapidly accumulating debt, a problem greatly exacerbated by its lack of access to most of the telecommunications market. This starkly illustrated the folly of the monopoly arrangements. In the United States, New Zealand and the United Kingdom, the benefits of liberalisation were beginning to flow, challenging Australian policy-makers to change tack. The Government's microeconomic reform agenda, moreover, included Government Business Enterprises and telecommunications could not escape its purview. The telecommunications monopoly arrangements attracted scrutiny on a number of counts. In 1987, both the Trade Practices Commission and the Australian Telecommunications Users Group argued

that Telecom's monopoly was a breach of the trade practices legislation. And Telecom combined the roles of operator and regulator: was this not a conflict of interest?

Both criticisms were later justified. When the duopoly was introduced in 1991, the Trade Practices Act was amended to ensure that the duopoly structure could not be challenged, effectively conceding that Telecom's monopoly has indeed been inconsistent with the Act. And the conduct of the independent regulators that were established later, uncomfortable as it has been for Telstra, demonstrates clearly that an independent regulator executes its regulatory duties very differently to an incumbent.

The emergence of new kinds of services provided another challenge to the monopoly. By the late 1980s, Telecom was forced by criticism to allow some value-added services to be connected to its network, leading many to ask what other services might be competitively supplied. Telecom's own lack of responsiveness to such demand further eroded support for its monopoly.

In these circumstances, it should have been easy to make the case for greater competition, but this was not the case. It is not surprising that a monopolist should resist the end of its monopoly, but there was also wider support for Telecom, some of it generated by genuine though misplaced fear. One of the most potent reasons now seems trivial; apart from providing Australia's metropolitan telecommunications services, Telecom was responsible for providing rural services, cross-subsidising them from the city revenues. Telecom and its supporters argued that competition in the cities would undermine the revenues that subsidised the bush, subsidies estimated by Telecom to be in excess of $640 million in the late 1980s.

Today, the USO is costed independently at a considerably lower level, and funded through a levy across the industry. But in the 1980s, it was not clear this could be done. The threat to rural services was therefore seen as a potent argument against competition, all the more so because there was no independent estimate of the size of the cross-subsidy. Ignorance breeds fear.

The door opens for competition

In 1987, Australia took its first step towards a competitive telecommunications industry, when the Government announced a review of the telecommunications monopoly and the associated structural arrangements, including the possible role of the private sector in service provision.

The Government announced in 1988 that the standard telephone service and most carriage services would remain a monopoly. It was made explicit that this was to protect the cross-subsidies that funded rural services. However, the Bureau of Transport and Communications Economics (BTCE) was charged with investigating the true cost of the cross-subsidy. Telecom's conflict of interest was now widely recognised, and the need for independent evaluation and a fact-based policy had become clear.

While the network monopoly was retained, from July 1989 competition in the value-added services offered across these networks would be fully liberalised. The first handset in a premise would be reserved to Telecom, but second phones could be supplied by others. Telecom's technical regulation functions were to be transferred to a new independent regulator, the Australian Telecommunications Authority (AUSTEL), which was given responsibility for protection of carriers' reserved rights, protection of competitors from unfair practices, consumer protection, promotion of carrier efficiency and technical regulation. Meanwhile, Telecom was converted from a Government commission into a government-owned corporation.

In its announcement, the Government emphasised the importance of reform to Australia's international competitiveness: "Australia's success in both providing and using these wider services will be crucial to success in restructuring for growth in advanced economic activities".

But there was much more to do to achieve this outcome, and these reforms did not quell the pressure for change. The Government's 1988 announcement foreshadowed further liberalisation. The cost of the universal service obligation was to be quantified; AUSTEL was to report on the possibilities for mobile telephony competition; the Department of Transport and Communications was to conduct a Review of Structural Arrangements (ROSA). The latter was to have particularly long-lived consequences.

The competitive arrangements put into place in 1989 lasted less than two years, as momentum built towards opening the market. The dam burst towards the end of 1990. In response to the ROSA review, the Government announced:

- The privatisation of AUSSAT
- The merger of Telecom and OTC into a single government owned corporation
- The introduction of duopoly competition between AUSSAT and Telecom/OTC for basic carriage services

- Removal of all restrictions on the resale of basic carriage services, and the introduction of an access regime with resale prices based on incremental cost
- The introduction of full competition for the supply of telephone handsets
- The issue of three licenses for mobile telephony services
- New competition and consumer oversight powers for AUSTEL, and the establishment of a Telecommunications Industry Ombudsman
- Unlimited competition after July 1997.

At the same time, AUSTEL was ordered to investigate the future resale market, particularly whether resellers could establish switching facilities. By December 1990, AUSTEL had recommended that the switching facilities market should be fully opened, a recommendation that was carried forward into the new duopoly arrangements.

Finally, the BTCE reported back to the Government at the end of 1989 that the true value of the rural cross-subsidy was no more than $185 million, in contrast to Telecom's estimate of $640 million. (At least one subsequent independent assessment suggested that the obligation was a net positive for the incumbent). Telecom objected to both the methodology and the data the BTCE used, but the spell was broken. The then Minister for Communications ordered Telecom to adopt the BTCE methodology, and work began on how to divide the cost between the two new competitors.

These were the building blocks that today's industry is based on, and their legacy remains potent. Of all of these decisions, the decision to merge Telecom and OTC had the most lasting effects. At the time, the move was justified by some as creating a national champion that would move into international markets. The British Telecom experience suggested this was possible, but it came at the cost of creating a vertically integrated incumbent that commanded almost all of the industry's revenues and profit.

The alternative proposal, a merger between OTC and AUSSAT would have split the industry more evenly and provided a better platform for the new entrant, though even this would not have addressed the vertical integration issue which became the source of much trouble in later years. The problem was that this bound together the local access business, where Telstra was dominant, with the competitive retail business, where it was not. This left in place an incentive to resist competitor access to its copper network.

Duopoly, rather than open, competition was chosen on the grounds that a single operator with the advantage of focusing on Telecom-OTC would have a better chance of building a business than a group of competitors. This

was another controversial decision, but one that was probably inevitable given the incumbent's strength. Having created one vertically integrated incumbent, the Government sought to create a similar rival to provide the necessary competition.

In the event, the dreams of a global telecommunications company were not realised, but the legacy of a large vertically integrated incumbent has overshadowed the development of fixed line competition. This legacy is only today being addressed through the structural separation of the incumbent and the rollout of the NBN.

In contrast, mobile communications was set on a pathway towards competition which has proven remarkably successful. In many regards, the tale of telecommunications competition in Australia is a tale of two markets; one which escaped the legacy of the monopoly, and one that did not.

THE DUOPOLY ERA AND GSM COMPETITION: 1991 TO 1997

Enabling legislation for duopoly competition was passed in June 1991. The AUSSAT network was tendered for privatisation, along with a license to provide any and all fixed services in competition with Telecom and OTC, and GSM mobile services. Optus won the tender for this license against the competing Kalori bid in November 1991. The merged Telecom-OTC, which later adopted the name 'Telstra', was also awarded a GSM mobile license. The analogue mobile network was slated for mandatory phase-out between 1996 and 2000.

One of the key elements of the new arrangements was a new access regime which allowed Optus to interconnect with Telstra, and required the incumbent to sell capacity to other resellers. This was crucial to the growth of competition. To ensure that Telstra agreed acceptable access terms, the Telecom/OTC merger was suspended until AUSTEL found that acceptable access arrangements and pricing were in place. This provided a strong incentive for the incumbent to cooperate with the process.

Fixed competition: preselection and resale

In response to the powerful incumbent that the Government had created, and drawing on the international experience of other new entrants, Optus decided on a graduated competition strategy focused initially on international and long-distance services. Optus built a long distance network connecting Sydney, Melbourne, Canberra, Adelaide and Perth, and began offering services in November 1992. By June 1994, Optus long distance was available to 77% of customers around Australia.

Customers could select the Optus long distance network by dialing '1' before making their call, and Optus had some success advertising their services in the largest markets. However, much less progress was made in areas where Optus marketing did not reach. By June 1993, Optus was providing preselected services to 860,000 customers. But Telstra enjoyed a competitive advantage as the effective 'default' long distance and international carrier.

Had this default status remained unchallenged, the growth of competitive pressure on Telstra would have been significantly slower. In order to erode this status the Government launched ballots in all markets where Optus offered services. When the ballots were competed in 1994, Optus had captured 18% of the ballots in the key Sydney and Melbourne markets,

and lesser amounts ranging from 15% to 8% in other centres. Given Optus' entrant status, this result demonstrated a hunger for alternatives amongst Telstra customers.

Alongside direct competition from Optus' fibre infrastructure in long-distance markets, resellers contributed significantly to competitive pressure on the incumbent. AAPT, spun off from the old AAP media and information business, entered the market with its own switching infrastructure and built its long-distance business based on leased transmission capacity. Targeting the enterprise market initially, AAPT demonstrated the importance of resellers in the early days of competition by placing early competitive pressure on both Telstra and Optus. Others quickly joined it. By 1996 around 100 domestic and 21 international resellers were operating in the Australian market, turning over about $3.7 billion revenue (1995 dollars). Many of these took the opportunity to become full carriers after 1997.

The success of long-distance competition (and of resellers in particular) demonstrated the effectiveness of AUSTEL as a manager of the new competitive arrangements. The access regime and AUSTEL's implementation provided new entrants with the opportunity to build customer bases and achieve commercial scale that allowed them to expand after 1997. This in turn allowed service providers to expand their investment. Much the same issues are at stake today in the access undertaking for the NBN.

Fixed competition: cable networks and local access competition

In contrast, progress towards competition in local fixed services was slow. The merger of Telecom and OTC had left the incumbent's local call monopoly intact. The full significance of this fact was not immediately apparent, but this arrangement had left Telstra with both the incentive and the ability to strongly resist the emergence of local access competition. It left an incentive because the local call business was enormously valuable as a source of revenue and profit, justifying extreme measures to protect it. It left an ability because the cashflow generated by the local access network was a source of investment that could be used to fund these extreme measures.

The problematic nature of this arrangement only became apparent due to an oversight in the Government's pay TV policy. The Government had legislated in 1992 to establish a satellite-based monopoly pay TV provider in Australia. Alternative pay TV providers were allowed under the legislation, under the assumption that terrestrial technologies could never seriously challenge satellite technology. In particular, Telstra was not forbidden from

participation in the cable market, unlike, for example, incumbents in the United States. As it happened, the assumption that satellite would dominate pay TV was challenged by events.

In 1994, Optus announced that it would build a terrestrial cable system to deliver pay TV in a joint venture with Continental Cable Vision, to be called OptusVision. It was planned that the network later would also deliver telephony services. $1.5 billion was committed to the project, which immediately ran into problems from local resistance to overhead cabling. However, there was a much larger threat looming that Optus had not anticipated.

Telstra responded with a pay TV venture of its own with News Corporation. After a brief flirtation with Optus, Publishing and Broadcasting Limited also joined in. Meanwhile, Telstra launched its own cable rollout, replicating OptusVision's network coverage. Satellite pay TV was pushed aside as Telstra and OptusVision bid up the cost of content. But in the end, no-one was left with a compelling content lineup.

Optus ceased its rollout in 1996, having exhausted its funds. Investors had been delivered a sharp lesson in the risks of a competitive market, particularly in the difficulties of profitable investment in last mile infrastructure. However, customers benefited. Terrestrial pay TV became available for the first time as investors poured in funds, and the Optus and Telstra cable networks later became platforms for competitive telephony and broadband, starting in the late 1990s. But in 1996 investment in local access infrastructure had virtually come to a halt, and was not revived until the NBN was announced over a decade later. Telstra retained its lion's share of the PSTN market, and although Optus launched cable telephony in 1998 and had acquired 500,000 cable telephony customers by 2002, this corresponded to a market share of only 5%.

The experience had placed an enormous financial strain on the new competitor, but not enough to lead to its collapse. This was fortunate for Optus, but also for Telstra. Had Optus collapsed in 1995 or 1996, it is highly likely that the 1997 reforms would have imposed new and strong regulation on the incumbent. Because Optus survived, the appearance of burgeoning competition in local access networks was preserved, though this competition later proved to be both late and limited due to technical problems with cable telephony and to the limited Optus cable footprint.

In 2002, after a period of costly and unprofitable competition, the expected pay TV monopoly finally emerged as the competitors' content rights were consolidated into Foxtel as part of a wide-ranging deal. The Government

finally achieved its desired pay TV monopoly, but rarely has public policy delivered a result so different to the one intended. Competitive markets are effective, but they are also unpredictable.

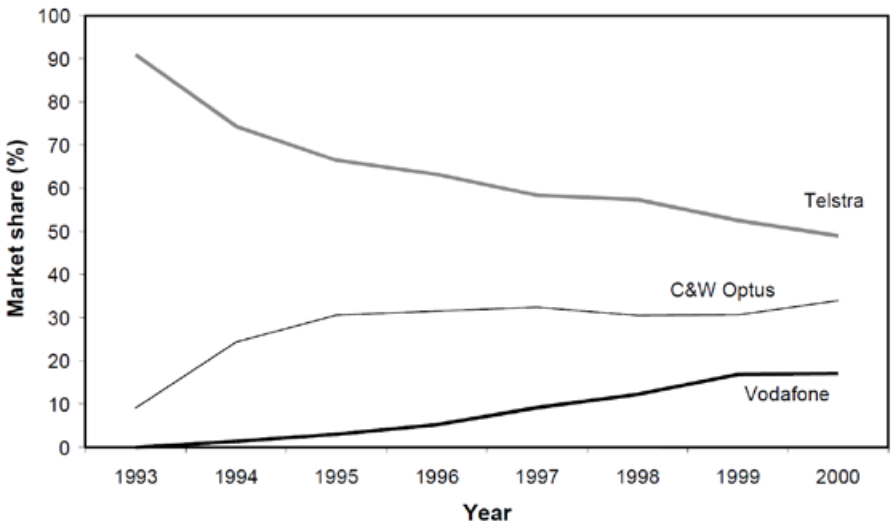
Mobile network competition takes off

The growth of competition in the mobile segment took a different and more productive path. The reason was simple. Mobile access networks are inherently less expensive than fixed access network, lowering barriers to entry. This meant that Optus and Vodafone could afford to roll out mobile networks with comparable performance to Telstra.

The Government had attached a GSM mobile license to Optus' operating license along with the AUSSAT satellite license, but Optus' first product was analogue mobile resale, launched in June 1992. However, Optus was determined to avoid dependence on resale; Optus GSM services were launched in May 1993. A third mobile license was allocated to Vodafone which commenced operation in September 1993. Vodafone was required to reach 80% of the population by June 1995, earlier than Optus' own 80% target. This placed additional competitive pressure on both Telstra and Optus to match or surpass this coverage.

Initially, much of the competition was driven by resale of analogue; in 1993, only 20% of Optus customers were connected to GSM, for example. By mid 1994, Optus had captured 32% analogue market share. The early GSM networks still suffered in comparison with the old analogue network, mainly because the technology was new. The networks were still being rolled out and lacked capacity in some locations. GSM handsets were expensive compared to analogue, and remained so until mid-1994, when manufacturers released a slew of new GSM handsets at increasingly attractive prices.

Figure 1: Mobile market share by operator, 1993-2000



Source: Productivity Commission, 2001 **OVUM**

Despite these limitations, competitive pressure on Telstra from analogue resale and GSM was intense, even in the early days of analogue resale. Although its absolute subscriber numbers grew, its competitors grew faster, rapidly eroding Telstra's mobile market share after 1993, primarily through price discounts. When competitors were not dependent on Telstra for basic infrastructure, competition blossomed.

Benefits begin to flow

Significant price discounting occurred in competitive markets. AUSTEL estimated that customer savings due to Telstra discounts alone amounted to around $300 million in the year 1992-93, out of a Telstra profit for the year of $997 million (1993 dollars). These savings grew to $500 million in 1995-96. Since these figures do not account for the savings offered by Optus and resellers, this is a significant understatement of the true customer benefits.

What is notable is that price declines in contested markets were significantly higher than the industry average, which was held back by slow competitive progress in areas such as local access. This is further evidence of the benefits competition offers, and of the costs of a failure of competition. Nor can these declines be attributed to the price cap rules imposed on Telstra, since Telstra always outstripped the price cuts required under those rules. There were subsequently some gains in the local call area after 1995, when average local call prices fell 8% between 1995 and 1999, mainly driven by discount plans.

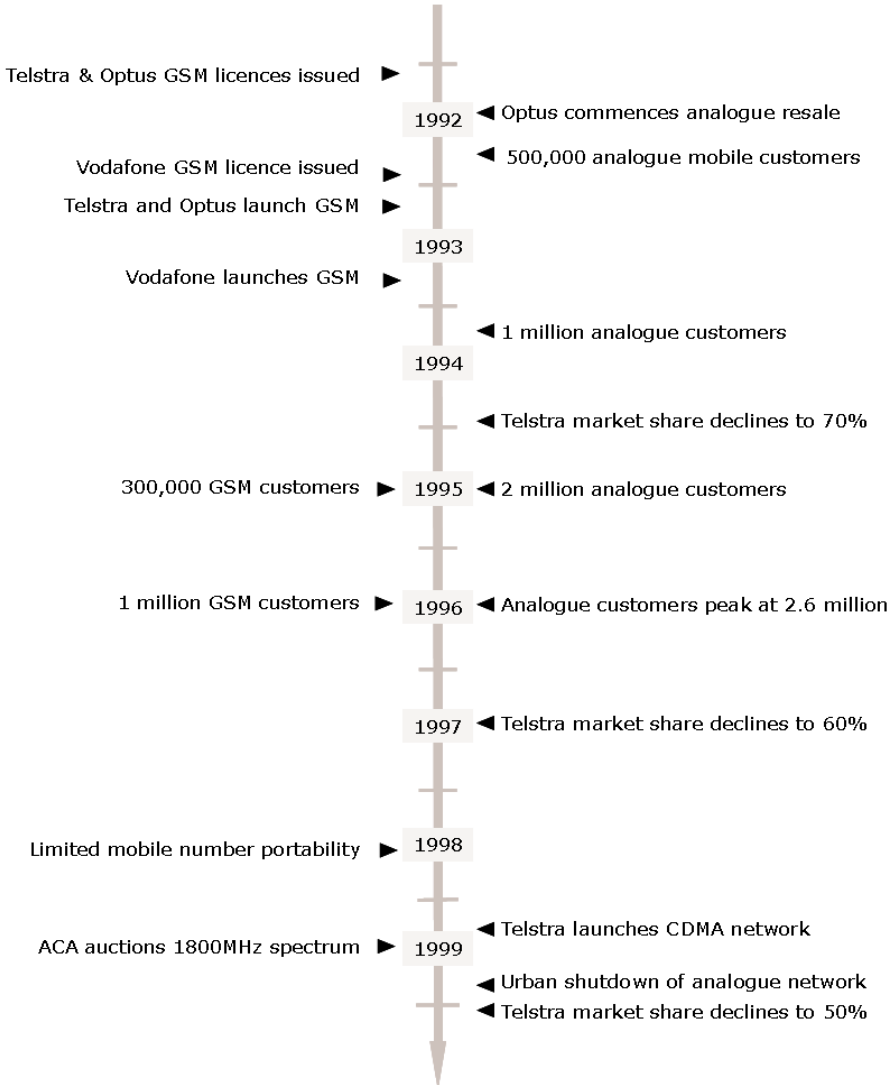
Table 1: Annual decline in average prices, 1994 and 1995

Service	1994	1995
Long distance	5.5%	8.9%
International	8.7%	7.6%
Mobile	7.1%	9.7%
Leased lines	-	7.2%
Average	**3.7%**	**5.6%**

Source: Department of Communications and the Arts, Annual Reports OVUM

The performance of international, long distance and mobile was impressive, both in terms of price and value, and these were the areas where network competition had taken hold.

Figure 2: Mobile timeline, 1992-1999



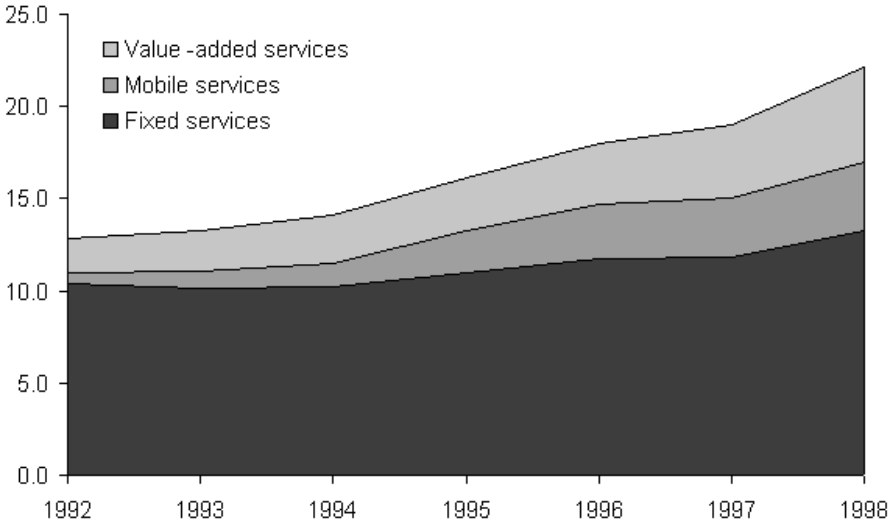
Source: Ovum **OVUM**

The monopoly analogue mobile network had taken seven years to add one million customers. In contrast, competition amongst GSM operators, despite the relative immaturity of the technology, had added a million customers in less than half of that time. As the GSM customer base grew, average prices per minute for GSM continued to fall. Average call prices fell 9% between 1997 and 1999. In contrast, analogue mobile prices remained stable, illustrating the benefits of head-to-head competition between networks.

The investment and price cuts driven by competition meant that new services were becoming more widely available. In particular, mobile telephony began the decade as a premium service but was rapidly democratised. In

June 1992, when resale competition was launched, there were a mere 425 thousand mobile customers in Australia. Two years later there were 3.7 million, 1.0 million of whom were GSM customers. By June 1995, Telstra analogue population coverage had reached 87%, while Telstra GSM had reached 82%. Optus and Vodafone GSM coverage had reached 75% and 80% respectively on that date, after starting from scratch in 1993. Later in the decade, average prices for GSM services fell 18.9% between 1996-97 and 1999-00.

Figure 3: Service revenues 1992-1998



Source: Productivity Commission, 1999 **OVUM**

Despite competition for customers, the industry grew impressively. Between 1992 and 1998, industry revenues grew from $12.8 billion to $22.4 billion, with mobile and value-added services leading the way. It was in the very segments most exposed to competition that the fastest growth occurred. This put paid to fears that competition would suppress revenues; new services driven into wider markets by competition were generating strong growth.

Meanwhile in the early 1990s, a new and odd service had emerged from the academic world. Dial-up internet services allowed customers to communicate by something called 'electronic mail', or e-mail. A new technology called the 'world wide web' made its appearance, allowing customers to browse text and pictures. It was a small cloud on the horizon, no bigger than a hand, as the saying goes. But in the next decade, it would change everything.

Benefits and challenges of the duopoly period

The duopoly period brought many benefits for customers, along with some harsh lessons for the industry and policy-makers.

There was real success in making some monopoly markets into genuinely competitive ones, especially long distance and international calling, where both new networks and reselling disrupted monopoly pricing. The success of analogue mobile resale is another case in point, with Optus using the access regime to force significant price cuts and efficiency gains in analogue mobile telephony. The GSM mobile market, which was born competitive, soon developed momentum and was the signal policy success in this period.

In contrast, the local access monopoly was eroded only slightly, and the incumbent retained this asset going into the 1997 reform period. This would have major implications for the growth of fixed broadband competition in subsequent years.

The price benefits were obvious, but they were unevenly distributed across different markets. Where comparable competitors existed, as in the mobile market, prices fell significantly. Where competition was limited, as in local access, the benefits were meagre.

Apart from GSM, the Internet also made its appearance, foreshadowing the new competitive landscape which began to emerge in the next decade. The seed was planted for new services and new kinds of competitors.

Finally, customers themselves experienced choice, many of them for the first time, and the rivalry between carriers and resellers began to form a new kind of customer. These customers were more savvy and discerning, less likely to settle for substandard service, and happier to complain. This was not always a happy experience for service providers, but it was a healthy one because it showed that telecommunications was becoming more like a normal market, a competitive one.

OPEN MARKET AND FIXED COMPETITION: 1997 – 2009

Stronger competition puts renewed pressure on the industry

The promise of an open competition came to Australia in 1997 with the passage of enabling legislation which:

- Opened up the process of issuing carrier licences, and reduced carriers' exclusive rights.
- Subjected the industry to the Trade Practices Act 1974, buttressed by an industry-specific telecommunications access regime and conduct regulation process.
- Tightened consumer protection rules, and placed Telstra's residual incumbency obligations on a more transparent footing.

AUSTEL's economic regulation powers were transferred to the ACCC, while its remaining technical regulation functions were consolidated with those of the Spectrum Management Agency into a new Australian Communications Authority (ACA). Nearly eight years later, the ACA was to merge with the Australian Broadcasting Authority to form the Australian Communications and Media Authority (ACMA).

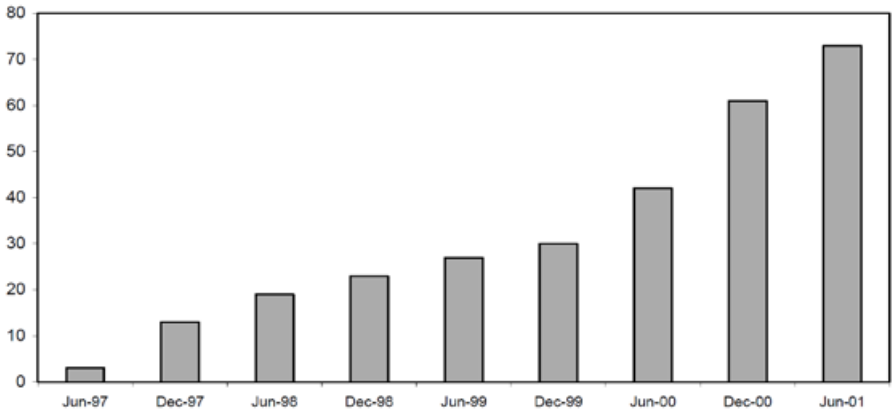
The most obvious impact of the changes was the growth in the number of carrier licensees after liberalisation. The three original carriers were quadrupled within months, and over 70 carrier licensees were in the market by 2001. Many small carriers with specialised markets began to emerge.

In particular, levels of competition in the mobile industry rose as two new operators took advantage of the 1998 3G spectrum auctions to enter the market. One.Tel, established as a reseller back in 1995, quickly became the number four carrier in the Australian market. In 1999 One.Tel launched a GSM network, while Hutchison launched its CDMA network in 2000.

The collapse of One.Tel in 2001 was a sharp reminder to the industry that the competitive market guarantees no-one's future. Although One.Tel was the fourth largest carrier by revenue, growth alone was not enough to save it. The lesson was that strong management and financial control were essential for survival in a more crowded market. Even Telstra's largest competitor,

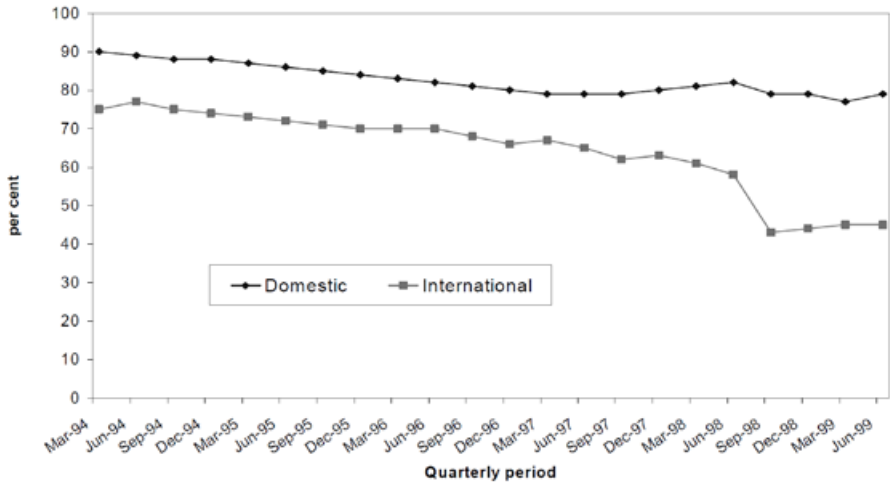
Optus, benefitted greatly from the stability and financial discipline imposed by SingTel when it bought out Cable & Wireless' interest in the company in 2001.

Figure 4: Carrier licensees, 1997-2001



Source: Productivity Commission, 2001 OVUM

Figure 5: Telstra long-distance market share, 1994-1999



Source: Productivity Commission, 2001 OVUM

This growth in competitors led to a sharp increase in the level of competition in many fixed markets. A surge of attractive long-distance offers from new entrants caused a spike in preselection churn and slashed Telstra's international market share. Competitive pressure was exacerbated by the introduction of local number portability in 1998, making it possible for customers to change service providers without changing their fixed line number.

The democratisation of mobile

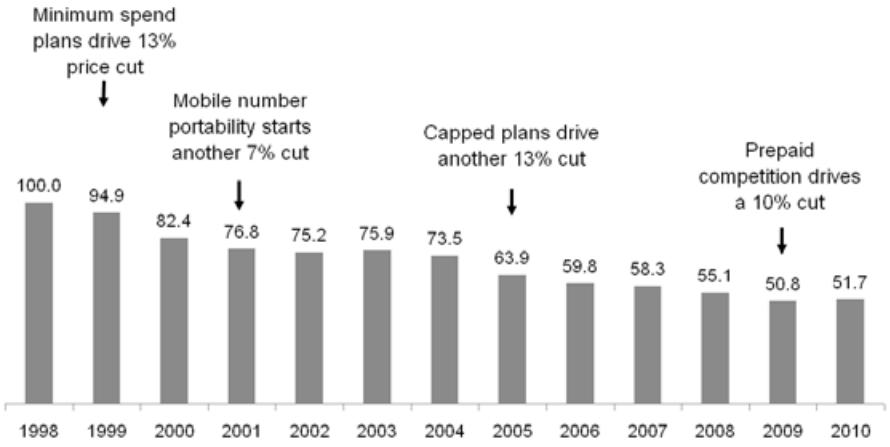
In contrast to the local call market, the mobile market was heavily contested, pushing Telstra below the 50% market share threshold in mobile by 2000. This pressure was exacerbated when full mobile number portability was introduced in September 2001. This cut one of the major customer barriers to changing providers. Port rates increased by roughly eight times compared to the previous year, and within five years over 5 million successful ports had been accomplished. The introduction of mobile portability was a major cooperative success for the regulator and the industry, and one that attracted global attention. However, it took the capped plan revolution triggered by Hutchison 3 to translate this new freedom into price cuts.

Until 1999 mobile access charges were similar to fixed access: an up-front fee was payable for access to a network, and the higher the access charge, the lower the cost per minute of each call. But from about 1999 the carriers, beginning with Hutchison, the market disrupter, gradually introduced a basket of free calls bundled with the access charge. By 2003 these "minimum spend plans" were very common, and the best plans had effectively dropped 3G voice prices to the level of GSM prices. They were increasingly popular with customers who liked the added value they brought.

At the time the growth rate of mobile phone users was slowing as the market became more saturated. In response, carriers began to offer better value plans that encouraged existing customers to increase their usage of other services such as SMS and later mobile data. Handsets were increasingly bundled with such plans.

The ACCC reported that the average price of mobile services fell by 6.5 per cent in 2005–06, driven by this price innovation and competition. Price reductions were most evident in post-paid services, particularly post-paid GSM services, for which average prices fell by 10.2 per cent. The price benefits of these plans drove customers off traditional pricing plans in large volumes. For example, Optus' share of post-paid customers on capped plans increased from 7% in June 2005 to 21% in June 2006.

Figure 6: Mobile price index and major competitive events



Source: ACCC, 2010 **OVUM**

Capped plans were extended to 3G services, and continued to offer improving value after 2006. The capped amount included in most post-paid and prepaid capped plans increased significantly, with more services (e.g. international voice calls) offered on certain plans by some carriers. Data usage allowances for both post-paid and prepaid capped plans for 3G services increased. The data usage allowances and handset subsidies embedded in these plans were later instrumental in the spread of smartphones, which would otherwise have been out of the reach of many customers.

The benefits of the capped plan revolution have been immense, placing affordable smartphones and data services in the hands of millions. About 71% of Optus' postpaid mobile base was on capped plans in June 2011, up from 65% a year ago.

The challenge today facing carriers is that data usage is growing so fast that excess data charges, previously a rarity, are now generating "bill shock" amongst a significant number of customers.

In contrast to the success of mobile competition, competition in the broadband market was heavily constrained by the incumbent's dominance of the basic access network until the mid-2000s. To overcome this dominance, Telstra's challengers required increasing levels of intervention by the regulator.

The battle for broadband

Unknown to its authors in the early days of full competition, the reform had opened the way to the development of an entirely new market: broadband access. Prior to 1999, almost all Internet access was via expensive and slow dial-up connections. The emergence of DSL technology towards the end of the 1990s was a god-send to the telecommunications industry. The copper infrastructure had been designed for voice, but DSL provided a relatively low-cost way to adapt copper to deliver broadband services.

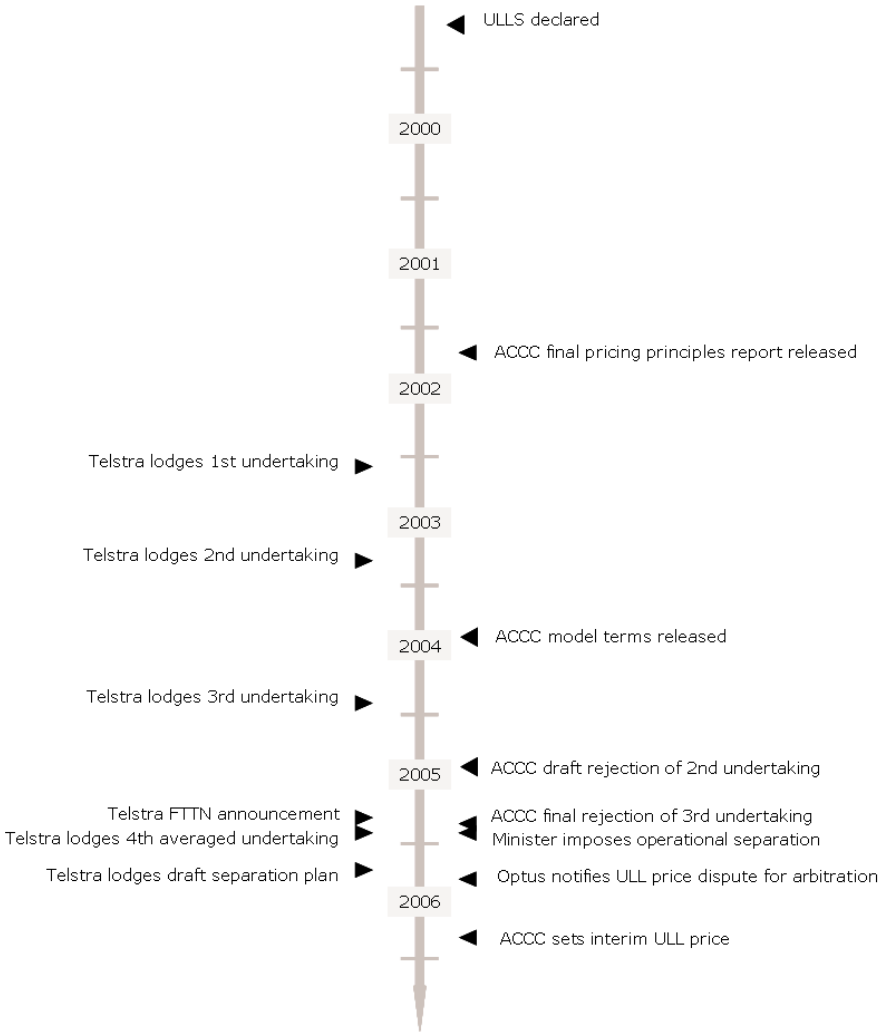
At the same time, a problem loomed: just one competitor, namely Telstra, wholly owned the copper infrastructure. Under pressure from the regulator, Telstra allowed its competitors to re-sell its DSL service, but the resale margins left to the incumbent's competitors in this case were small, limiting the commercial appeal of resale. If DSL was to be delivered both competitively and profitably, then Telstra's competitors would need access to Telstra's copper network and to the exchanges where competitors could deploy their own DSL infrastructure.

The Australian Competition and Consumer Commission (ACCC) declared ULLS (Unconditioned Local Loop Service) in 1999, imposing a legal requirement on Telstra to provide this access to competitors, but leaving the crucial question of price unresolved. The incumbent remained vertically integrated, with little incentive to expedite the availability of ULLS. After a period when Telstra put the required technical and business procedures in place, ULL became widely available in Australia in 2002. However, the question of the copper access price became one of the primary concerns of the regulator, the incumbent and its competitors for several years afterwards, and remains controversial today.

Several years of negotiations, interim price offers, draft undertakings and regulatory guidance followed, generating industry uncertainty. The tortuous progress of ULLS price setting was a consequence of the complex negotiate-arbitrate model established in 1997. Unsurprisingly, the ACCC was ultimately forced to intervene by agreeing to arbitrate the process.

In August 2006, seven years after the declaration of ULLS, the ACCC finally set a ULLS price of $17.70 in the crucial suburban market. By this time, Telstra had announced its intention to build a FTTN network that would have made ULLS obsolete, but the investment was never undertaken. The ULLS price continued to be contested in the following years, but the benchmark had been set.

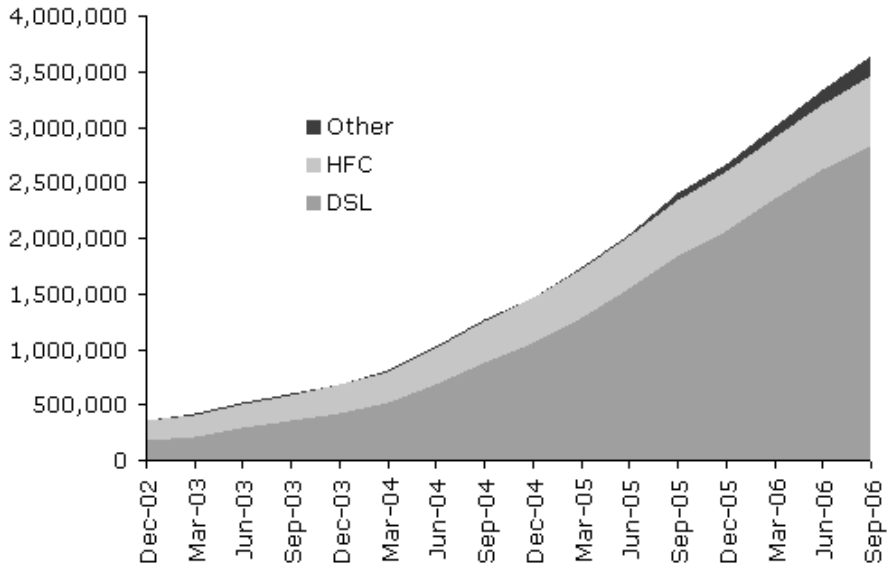
Figure 7: ULLS regulatory process, 1999-2006



Source: Ovum analysis **OVUM**

While the combination of vertical integration and a complex price setting mechanisms had delayed broadband growth, the regulator's efforts on ULLS, coupled with the pressure from resale and increasingly from ULLS-based competitors, gradually increased the penetration of broadband, particularly DSL. The combination of technology progress, falling costs, regulatory intervention and price competition saw broadband penetration soar between 2002 and 2006, and DSL contributed most of this growth.

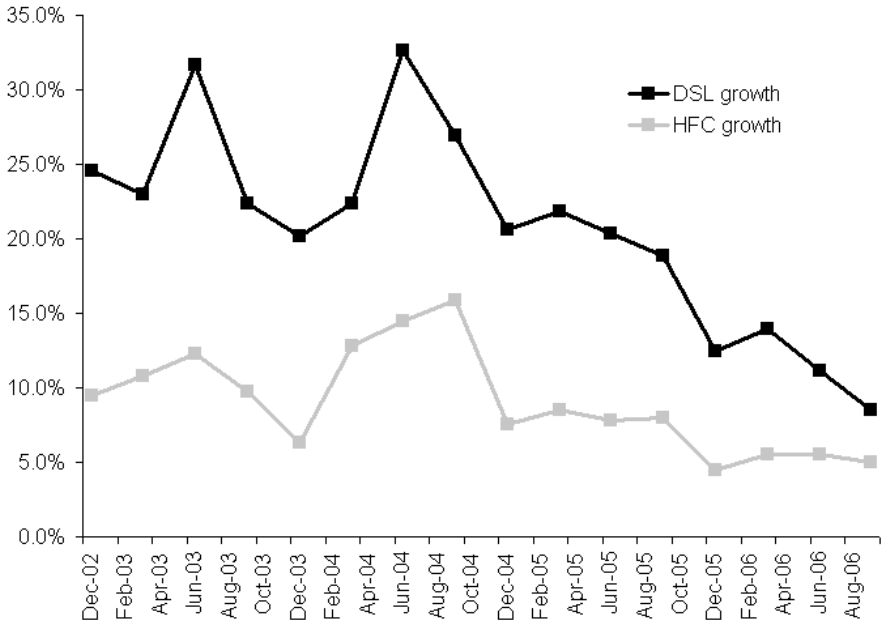
Figure 8: Australian fixed broadband connections, 2002-2006



Source: ACCC **OVUM**

In particular, DSL connections consistently grew much faster in percentage terms than cable connections, a measure of the pent-up demand for broadband services and a testament to the effectiveness of ULL regulation as a promoter of customer benefit.

Figure 9: DSL and HFC connection growth rates, 2003 to 2006

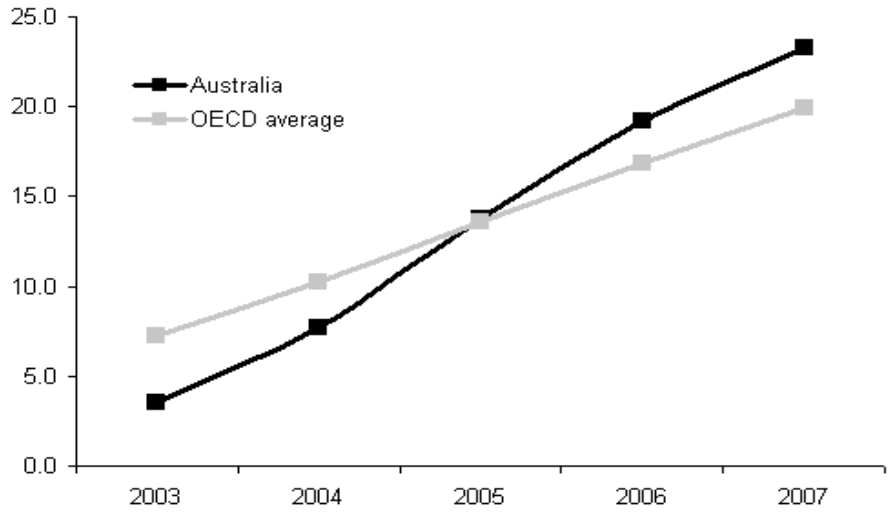


Source: ACCC, Ovum analysis **OVUM**

The success of this competition policy is evident when we compare growth in broadband penetration in Australia against the OECD average. Prior to 2004, Australian penetration rates lagged the OECD average by a wide margin. Subsequently, Australia overtook the OECD average by a significant margin. In more recent years Australia has converged with the average as Australian penetration rates have stabilised.

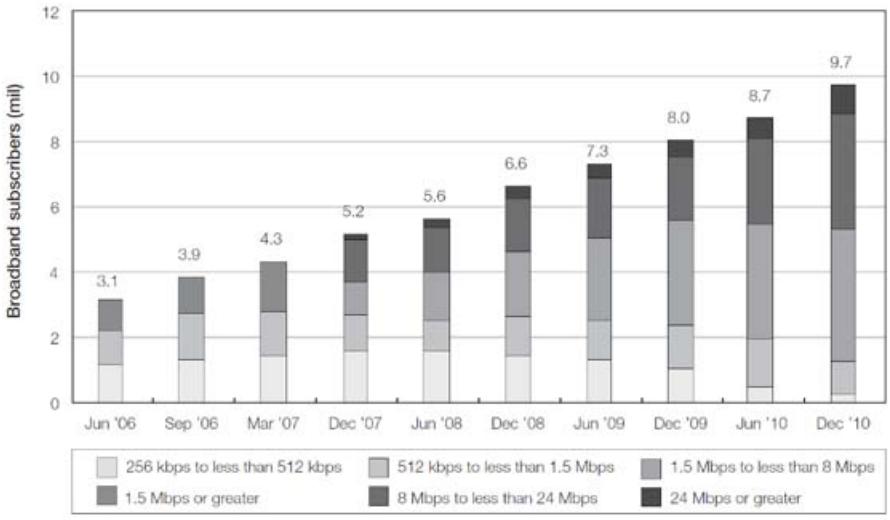
It was in the middle of the decade that DSL finally overtook dial-up as the main fixed Internet access technology. Optus' launch of the first mass market ADSL2+ services in 2006 was a step change in broadband functionality, and was quickly followed by the launch of the first capped plan for the 'Fusion' voice/broadband bundle, bringing new value to the market. The number of connections, the average speeds of those connections, and the associated data allowances have grown steadily since then. Both Telstra and Optus have launched 100Mbps cable broadband services, and the rollout of the NBN, once accomplished, will open up new opportunities to improve broadband functionality and speed.

Figure 10: Australia and OECD broadband penetration by population



Source: OECD, Ovum analysis **OVUM**

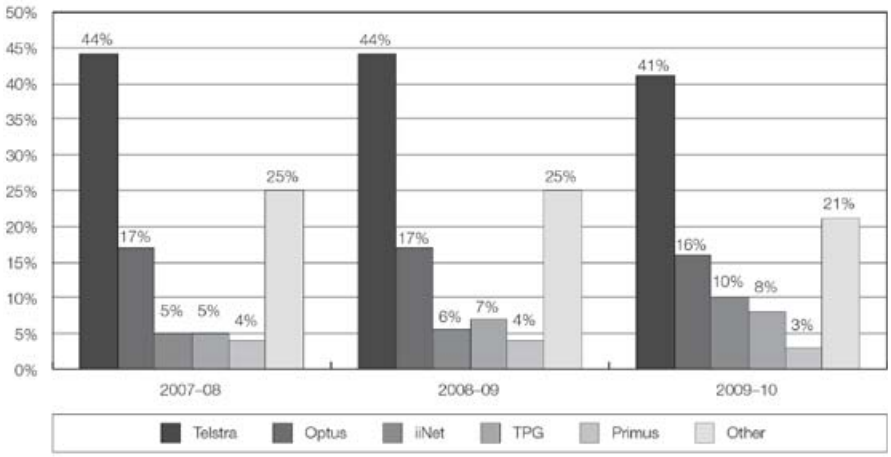
Figure 11: Australian fixed broadband connections by speed, 2006-2010



Source: ABS, quoted by ACCC, 2010 **OVUM**

The growing competitiveness of retail broadband provision was particularly evident, and this has extended to the present day. By 2009-10, Telstra's competitors had briefly pushed its fixed retail broadband market share down to 41%.

Figure 12: Fixed retail broadband connection shares 2007-08 to 2009-10



Source: ACCC, 2010 **OVUM**

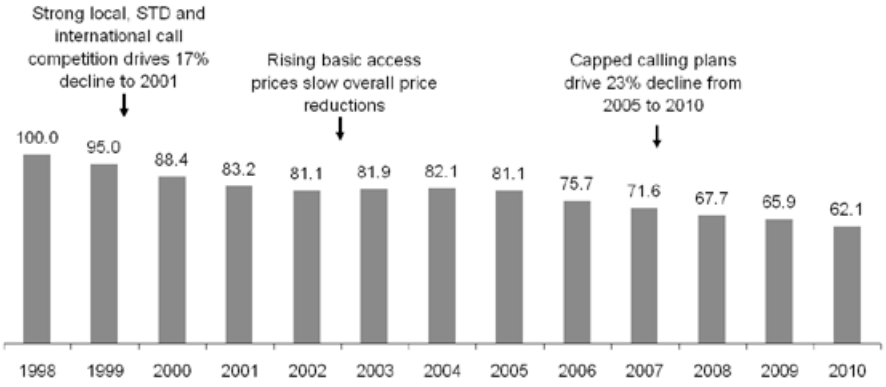
However, this picture must be qualified because the incumbent remains dominant in the fixed access market. If we add Telstra's fixed wholesale and retail broadband connections, then we find that Telstra still controlled 90% of fixed broadband connections as recently as June 2011. These wholesale connections are unbundled local loops, spectrum sharing lines, or wholesale DSL services where Telstra captures a large share of revenue and profit. It is the strength of this position that the Government's 2010 reforms are designed to address.

Stronger competition drives customer benefit and investment

As the market opened, Telstra mounted a competitive reaction, and prices fell across the industry. Optus delivered a 20% decline in real prices for long distance and a 29% decline in international prices, compared to Telstra's 14% and 61% respectively, between 1995 and 1999.

In the long term, both fixed and mobile prices have continued their decline. Capped plans for fixed services made their appearance in 1995. The ACCC price index for consumer PSTN communications declined 38% between 1998 and 2010, driven by large price cuts in all categories, apart from basic access which rose significantly in the early part of the last decade. The consumer mobile index declined by 48% over the same period.

Figure 13: PSTN price index, 1997–98 to 2009–10



Source: ACCC OVUM

And while established services continued to offer better value for money, new services began to emerge as service providers sought out new sources of revenue. SMS service became available in the late 1990s, and an agreement amongst carriers to interconnect SMS in 2000 led to a boom in SMS usage. In 1998 data revenue accounted for only one per cent of total carrier revenue. In 2002-03, SMS services generated an estimated 3.95 billion messages (or an average of 294 messages per mobile phone subscriber) and accounted for an average of 9 per cent of revenue received by mobile service providers.

As a consequence of competition and growing demand, investment in the industry was sustained, although Telstra accounted for around three-quarters of the industry total.

Table 2: Investment by Telstra, Optus, AAPT

	1996	1997	1998	1999	2000	2001
Telstra	3,904	4,248	3,741	4,274	4,705	4,368
Optus	1,436	1,627	786	898	1,471	1,604
AAPT	na	na	111	204	215	na
Total	**5,340**	**5,875**	**4,638**	**5,376**	**6,391**	**5,972**

Source: ACCC OVUM

While the 1990s had been dominated by the growth of mobile and dial-up Internet, the following decade proved to be the "decade of data". SMS, immensely popular with customers, was just the beginning of Australians' use of data services, which was to balloon in the next decade into a major new service category.

Benefits and challenges of the 1997 reforms

The opening of the market to other carriers in 1997 was a welcome boost to competition. However, the presumption that wholesale access was to be negotiated commercially, with arbitration as a fall-back, was to prove unrealistic in wholesale markets dominated by the incumbent. Arbitration was required time and time again.

The underlying issue remained the presence of a vertically integrated incumbent with an incentive to favour itself in the wholesale market. It is impossible to retrospectively quantify any actual disadvantage to Telstra's competitors, but it is indisputable that this incentive was real and was left in place. Suspicion and accusations were the natural result, and this destabilised negotiation for wholesale access.

It is fair to note that opinions vary on whether access arbitration has favoured the incumbent, the access seekers, or neither. What is certain is that structural reforms of the industry's retail, wholesale and access operations, now in process, will render these arguments moot. With the monopoly elements of the network treating all access seekers transparently and equivalently, no accusation of undue favour can arise.

The contrast with the mobile market was stark. With the shutdown of the analogue mobile network in 1999, Telstra's legacy advantage was largely eliminated. A signal example of genuine mobile competition was the agreement between the three mobile operators to interconnect SMS traffic. This was a commercial agreement that led to a boom in customer usage (and industry revenues), all achieved without regulatory imposition because there was a level-playing field in the market.

CONVERGENCE AND THE DATA REVOLUTION: 2000 TO PRESENT

While competition has continued to drive price cuts and improved capabilities for fixed and mobile telephony, the provision of fixed and mobile broadband services in the last decade has followed similar trajectory. The penetration of the household market by fixed broadband providers in the first half of the decade exposed household customers to text and graphical communications for the first time. Demand for data has grown dramatically since.

Mobile data takes off

Both mobile and fixed data have grown dramatically during the last decade, as data services once available only to an elite group of customers have rapidly been democratised. This has already been shown for fixed broadband, but mobile broadband too has been placed in the hands of average customers. In contrast to the fixed broadband market, this has been almost entirely a consequence of strategies of the mobile operators in an already competitive market, rather than a tandem action of regulation and competition.

The decade had begun inauspiciously for mobile data. WAP, the carriers' first attempt to deliver mobile data to consumers, was a text-book demonstration of the adage that the success of innovation is not guaranteed. High prices, a lack of applications and a walled-garden approach to content by the carriers prevented WAP from gaining any traction amongst customers. It was any early indication of what customers, primed by the growth of the Internet, were looking for. They wanted cheap access to content of their choice.

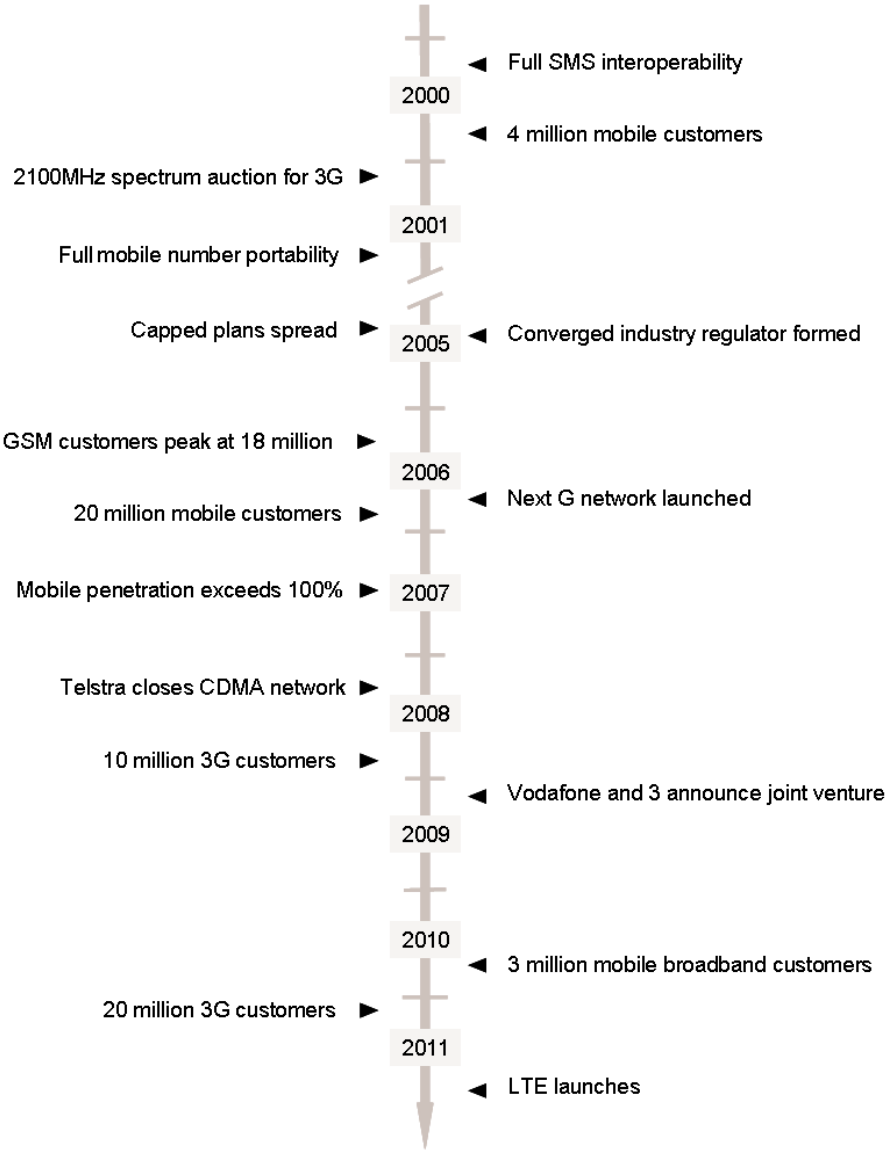
Competitive pressure was also increased by two new players in the mobile network business after the 1800MHz spectrum auction in 1999. While One.Tel fell by the wayside, Hutchison launched a CDMA network in Sydney and Melbourne, and were the first to launch the next generation of mobile technology in 2003.

So-called 3G technology was better designed to deliver mobile data services, though this had little impact in the early years. 2100MHz spectrum for 3G services was allocated in 2001. Handsets and mobile applications were still too primitive or expensive to attract customer interest. Nor was GSM exhausted. In 2000, Optus was the first operator to incorporate GPRS data services into GSM.

The pressure of falling prices for fixed and mobile telephony was forcing competitors to seek new revenue streams. Hutchison, the disruptor in the mobile market, was the first to launch its '3' network 2100MHz. The other operators followed soon after. Despite the abortive career of WAP technology, the functionality of handsets and networks was improving, and customers began to see value in the new 3G networks that the operators were building. The growth of fixed Internet services had opened the eyes of customer to the benefits of a mobile Internet. By the beginning of 2006, GSM and CDMA connections had peaked, while the number of 3G customers was growing rapidly. Many of these were exploiting mobile broadband to obtain services such as email and web browsing on the move. The launch of the Apple iPhone 3G in 2008 generated a new surge of demand and the Optus launch of the first Android device in 2009 continued the trend.

Telstra had dramatically stepped up the level of mobile competition by announcing in 2005 that it would shut down its 850MHz CDMA network in favour of a HSPA 3G network, dubbed "NextG". This placed significant new competitive pressure on Telstra's competitors, who stepped up their own investment plans, investing in 900MHz 3G and improving their offer to customers. Optus also introduced unlimited post-paid voice plans, and unlimited mobile access to social networking, which were quickly taken up by other operators.

Figure 14: Mobile timeline, 2000-2011



Source: Ovum OVUM

Faced with rising demands for investment capital, the two smallest operators Vodafone and Hutchison concluded a merger in 2009. After going from three to five mobile operators in 2000, Australia was back to a more realistic three again.

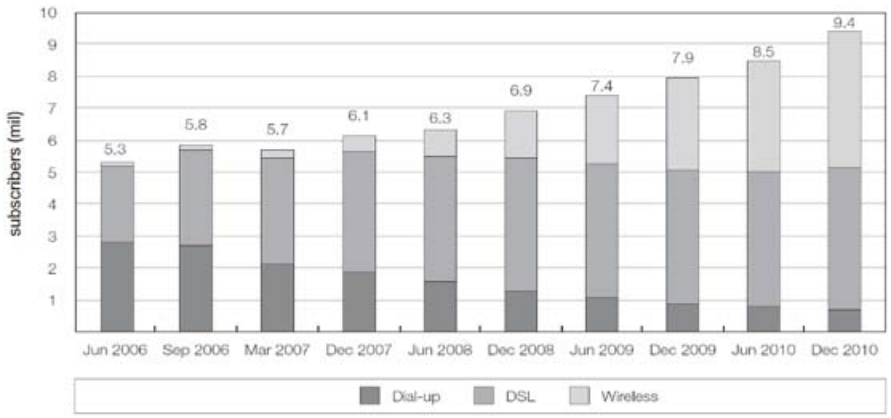
2011 saw announcements of new fourth-generation mobile networks. Highly optimised for data, these LTE networks will significantly speed up the transport of data and squeeze more performance out of limited spectrum. We expect that the end of the decade may see the end of the GSM workhorse,

with LTE increasingly deployed in the telecommunications players' spectrum holdings. This will give a large boost to the capacity of the networks to support data-intensive services and to transfer data speedily and reliably. LTE will be the platform for the next generation of data-intensive and latency-sensitive mobile services.

Customers get more for less

The total number of fixed broadband subscribers has begun to stabilise, with growth rates slowing to the single digits in 2009. In contrast, wireless broadband connections, mainly driven by handsets, have grown at double digit rates since the middle of the decade. At the end of 2011, there will be more wireless broadband connections than fixed broadband connections.

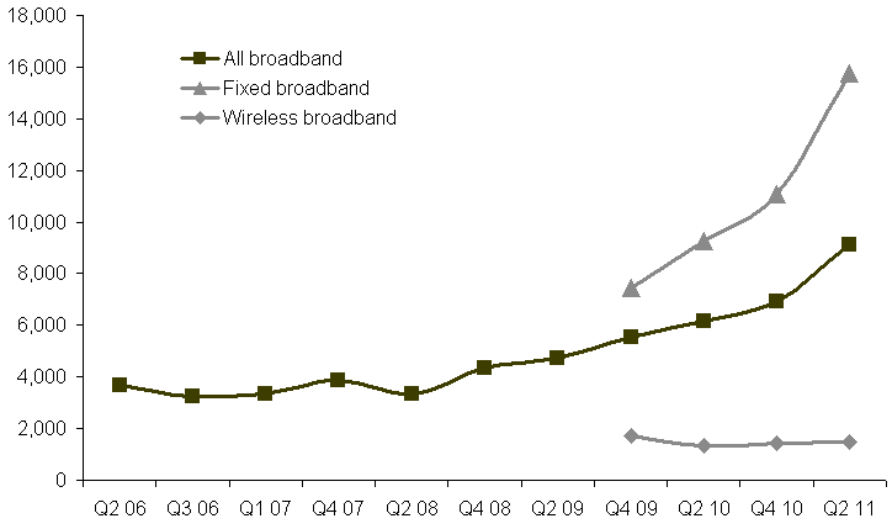
Figure 15: Internet connections by technology, 2006 to 2010



Source: ACCC, 2010 **OVUM**

While fixed broadband connections are now growing relatively slowly, usage of data is increasing steeply. In contrast, wireless broadband data usage is relatively stable, with data volumes being driven by growth in wireless connections.

Figure 16: Total monthly data downloaded (MB) per connection, 2006-2011



Source: ABS, Ovum analysis. Wireless broadband excludes mobile handset connections **O V U M**

Despite growing data volumes, broadband value for money has improved dramatically. Broadband prices continue their long-term decline across all technologies, at the same time that higher speeds and bigger (even unlimited) data allowances have been delivered.

Table 3: Changes in ACCC broadband price indexes, 2007-08 to 2009-10

	2007-08	2008-09	2009-10
Dial-up	-11.0	-13.8	13.0
DSL	-5.2	-0.4	-2.0
Cable	-5.9	0.5	-1.1
Wireless	na	-18.5	-14.7
Overall	**-6.2**	**-4.6**	**-4.9**

Source: ACCC, "Changes in the prices paid for telecommunications services 2009-10" **O V U M**

Assessment: a new kind of competition

Apart from providing access to new forms of media, the spread of both fixed and mobile broadband has brought new players into growing competition with telecommunications service providers. The telecommunications industry is now part of a larger ecosystem, comprising telecommunications service providers, content and applications providers, traditional broadcasters, smartphone manufacturers and IT providers.

Disruptive players such as Google, Yahoo, Amazon, Skype, EBay, Facebook, and Apple have introduced new kinds of services and are changing the way we communicate and do business. The new business models they have developed have challenged many other segments of the economy, and increasingly they have challenged the telecommunications industry for the loyalty of their customers. The telecommunications operators remain the primary providers of connectivity, but the broadband services they provide are the very platform that applications Skype and Viber, for example, use to undermine telecommunications voice revenues. The decade finished with increasing demand for data and data-intensive applications, such as video, file-sharing and online gaming.

This is a new kind of competition, and one that has been very beneficial for customers. The irruption of these new competitors into the widening industry has increased the capabilities of communications and the rate of innovation. Services unimagined only ten years ago are rapidly placed in customers' hands. This foreshadows more disruptive changes to come.

In this market, it is becoming impossible for telecommunications companies to differentiate themselves on their communications services alone. The correct competitive response for the telecommunications carriers and resellers is not a race to the bottom through commoditisation and price competition, but a race to the top through innovation and customer service.

Customer dissatisfaction remains a problem for the industry, and customer complaint numbers in Australia have risen in recent years, according to the Telecommunications Industry Ombudsman. But this trend needs interpretation. This problem has been driven by massive growth in the number and complexity of new communications services, along with steeply rising customer expectations as these services become more embedded in their work and lives.

As a result, the industry has increasingly placed the quality of the customer experience at the centre of strategy. The pace here is now being set by smaller operators who do customer service very well. This is the consequence of their nimbleness and lack of legacy systems. The challenge for the larger, more established service providers is to match this nimbleness in the context of a legacy business.

THE NBN AND THE NEW INDUSTRY FUTURE

A new reform agenda

In 2009, the Government announced new competitive safeguards for the industry that were carried into legislation in November 2010. The competitive regime has been strengthened in several respects:

- The ACCC will have the power to set prices, terms and conditions for declared services three to five years in advance. This signals the end of the complex negotiate–arbitrate process that has been in place since 1997
- The ACCC will have the power to make binding rules of conduct for the supply of declared services with immediate effect and up to 12 months in duration
- The ACCC will no longer be required to follow complex procedural rules in issuing competition notices to offenders
- The option to apply for exemptions from access obligations or undertakings will be removed, and merit reviews of regulatory decisions will no longer be available. Judicial appeals will still be available on points of law.

The end of the negotiate-arbitrate model, unlamented by almost everyone, will undoubtedly streamline regulatory decision-making, increasing industry certainty. Along with these changes, proposals for a separation of Telstra's network, wholesale and retail operations were also passed. These proposals should address the industry bugbear of vertical integration that has plagued fixed competition and regulation since 1991. By separating those parts of Telstra's business where it is dominant from those where it is not, much greater transparency and equivalence of wholesale access will be possible. If successful, this will undo the mistakes and omissions of earlier rounds of reform.

But these re-arrangements of Telstra's operations, though important, are themselves only transitional. The rollout of a wholesale-only fibre network should entrench separation, and open up new opportunities for competition in the fixed market.

A structurally separated industry

The rollout of the National Broadband Network (NBN) will usher in a new phase of competition that will deliver new benefits to customers. The NBN will result in a structural separation of the industry, with a single, shared

fixed access network and a competitive market for everything else. For the first time, the basic access network will be open to all service providers on the same terms, dramatically leveling the competitive playing field for basic services. But this new industry structure will have other, far-reaching effects.

The focus of competition will shift to the new value-added services that exploit the NBN, such as high-definition content and so-called cloud services. Competitors will differentiate themselves by investing in infrastructure to support these value-added services. While the industry has been focused on Telstra's copper access network until now, no single competitor should be able to dominate these new services, guaranteeing productive competition.

Obtaining this happy outcome will demand perpetual vigilance: vigilance that the transitional separation arrangements for copper promote genuine transparency and equivalence of access, rather than leaving it to be achieved in the long-term by fibre; vigilance that new sources of market power do not arise in areas like content; and vigilance that the NBN is also bound to transparency and equivalence, and is subject to continued regulatory oversight. The ACCC confirmed as recently as October 2011 that it will pursue these outcomes.

A converged industry structure

The NBN will accelerate the developments that are already driving the telecommunications industry into a new future for the next decade. The most powerful engine of change is, and will remain, the Internet protocol (IP). IP increasingly underpins the transport and delivery of anything digital. The variety of disparate networks dedicated to particular services is being replaced by an interconnected and converged IP network carrying all services.

This consolidated platform will enable major industry changes over the coming decade:

A new industry structure

As the IP platform becomes ubiquitous, IP transport will gradually be commoditised. Bit carriage will become a scale-based utility business, increasingly focused on cost control and operational efficiency. And scale will be needed; IP video will drive a massive increase in overall broadband traffic, which will need to be supported by new access and backbone networks. Consolidation through merger and acquisition will increase. In

contrast, platform and applications providers will generate value by innovating and deploying new services over these IP networks. Increasingly, a two-track industry will emerge.

The new customer

First and foremost, customer requirements will become more demanding. Customers will require services that are easy to find, easy to set up, and easy to use; are relevant and convenient according to the context at the time of use; are personalised to the user, their devices and their connections; and provide an appropriate quality and security of service. This will require the industry to provide services that are portable and transferable across devices and domains; are interactive and immersive; and are information and graphic-rich. Customers will expect these services to be available everywhere, thanks to the availability of ubiquitous, higher bandwidth mobile networks and more capable mobile devices

Explosion of connected devices

Many of the new 'customers' won't be humans. By 2020, most electronic devices will have direct access to web-based cloud content and applications through wireless connectivity in the home and wide area networks. This will allow for sophisticated, productivity-enhancing control of devices and processes within value chains and logistics systems, minimising energy consumption and maximising economic efficiency.

The rise of the cloud

The next decade will see the emergence of networked resources to support these new services, resources that will respond in real time to the needs of customers and devices supported by the network. This will place greater demands on the public Internet, which will lead to the spread of features and capabilities only seen on private IP networks today.

These changes will undoubtedly pose major challenges to the industry. The cut and thrust of competition will undoubtedly claim some players, while new ones will rise out of their ashes. But it is competition, and not competitors, that guarantee customer benefit. The opportunities for excellence that the converged industry offers are enormous, but it is up to competitors to seize them.