

OPENING UP ACCESS TO BROADBAND MEDIA SERVICES

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INTRODUCTION

This paper briefly examines the legislative, technical and competition issues affecting conditional access for both subscribers of and service providers to broadband media services, with pay television as a prime example. Relevant parallels with overseas developments are noted in considering the competitive and service issues raised by different options for shared or separate access in the Australian context, including opportunities for new service and information providers. The paper identifies key issues that should impact upon access arrangements under the new post-1997 telecommunications regulatory regime.

APPRECIATING CONDITIONAL ACCESS

Both pay television and on-line information services are arranged to be provided to customers so that only legitimate subscribers may view the required programmes or participate in the information sessions. For this to happen, a system must be in place that identifies each and every subscriber with a unique address and then provides or denies access by subscribers to the service on an as-required basis, ie. conditionally.

To effect such a 'conditional access' regime which underpins the economic and service quality relationship between the service provider and customer, a rigidly controlled system is required that prevents illegal access by 'pirate' customers. A typical pay television enterprise, whether broadcast or narrowcast, involves a complex arrangement or procedures to effect conditional access, viz

- first, the form of the picture signal must be continually changed (ie. scrambled) so that it is unintelligible without a suitable de-scrambler and electronic key at the customer's Set Top Unit (STU);
- secondly, the electronic key needed to de-scramble the signal must be continually changed (via data encryption under control of the operator) so that the keys are secure from piracy;
- thirdly, a process of subscription management is required in order to receive and process requests for new or discontinued services, and to pass on relevant data to the systems that authorize access as well as initiate billing;
- fourthly, the above arrangements need to be economically and securely implemented on a mass market basis in STUs. The world-wide trend is towards the use of a programmable 'smart card' inserted into each STU.

Figure 1 depicts the typical system arrangement for conditional access. Neither the traditional free-to-air broadcaster nor newspaper proprietor possesses knowledge of who is viewing or reading their material provided. In contrast, the primary functions of subscription (pay television) management are quite detailed and immediate, eg

- unique customer information is stored and updated on a database, including subscriber details, method of payment and services purchased;

- fully automated billing and payment collection facilities are provided;
- a credit control system may provide customised automatic debt collection;
- various management reports detailing subscriber and subscription summaries, marketing and financial analyses;
- support of prepaid and impulse pay-per-view programme authorisation; and
- network management reports detailing the current status of the network, together with works orders for allocation to service and installation teams.

From the above brief description, it is evident how critical the overall conditional access system is to conventional pay television or future digital terrestrial television. In fact, it has often been said that whoever controls such conditional access systems are tomorrow's information and entertainment 'gatekeepers'.

PROVISION OF PAY TV CARRIER ASSOCIATE SERVICES IN AUSTRALIA

Background

On 20 September 1994, Optus Communications announced that it planned to install a broadband network for the delivery of pay television, interactive multimedia services, as well as telephony, and that control of such a network would be exclusive to Optus. It would not succumb to industry pressure to provide open access to its proposed pay TV network because, according to their Director of Corporate and Regulatory Affairs, Mr Andrew Bailey: "We are going to invest \$3 billion and we have got to make the pay TV venture work and if you let go of the decision making on content, you let go of a part of your capacity to raise revenue". (Joshua Frith, 1994) Optus Vision was also reported as 'likening the demands for network access to David Jones demanding access to space in a Grace Brothers department store'. (Deborah Brewster, 1994)

Telstra had previously filed a tariff with AUSTEL (on 15 July 1994) providing for open access to its 'Videostream' pay TV Services. However, in light of the anticipated AUSTEL assessment of the Optus proposal, Telstra withdrew its tariff on 14 November 1994 and restructured its broadband proposal akin to that of Optus.

Report of the AUSTEL Investigation

Optus's organisational arrangement and claimed scarcity of cable capacity were the cornerstones to their eventual success in being free to extend a novel regime of 'closed access' to their proposed cable investment. Optus Vision was established as a joint venture specifically to own and operate the broadband cable system for installation and maintenance by Optus Networks utilizing its rights and immunities as a licensed general carrier. Telephony access would be provided by the non-carrier Optus Vision back to the carrier Optus Networks, in addition to carriage services for pay television being provided to another entity Multicom which held the necessary licences under the Broadcasting Services Act 1992.

AUSTEL observed that, whilst Optus Vision could operate as a Service Provider under the Telecommunications Act 1991 to effect 'closed access' to parties other than those in the joint venture, such an arrangement may not have been contemplated

under the Act and the impact upon competition should be considered. Nevertheless, other important considerations were that the Optus Vision network would result in a competitive local telephone service for the first time to a broad base of residential customers, and that the pay television carriage services provided for Multicom would further extend competition and consumer choice.

In addition to any special status derived from their proposed organisational arrangement, Optus claimed that the analogue technology to be deployed produced only a relatively small number of television channels (64 in fact) which, according to the joint venture's business plan, were a scarce resource that was necessary to fully allocate to Multicom. AUSTEL concluded that with the advent of digitalisation, channel capacity relief would ultimately arise that should then remove any justification for discriminatory provision of service. On the other hand, Optus Vision could nevertheless be arguably free to continue in the same vein since it was a Service Provider and not a carrier, and hence not subject to the usual requirements of access.

AUSTEL likewise concluded that Telstra's broadband joint venture proposal with News Ltd was similar to that of Optus in that the cable network was to be installed by a licensed carrier but owned and operated by a Service Provider who in turn was to provide pay television carriage on to a licensed broadcaster and telephony carriage back to the licensed carrier. The evidence submitted by Telstra led AUSTEL to believe that the initial (pre-digital) phase of pay television services could be at least three years away. With the AUSTEL report to the Minister being dated 23 November 1994, limited capacity may then be said to be a constraint to open access at least until end 1997. In other words, limited channel capacity was seen to be an artefact only of the initial phase of pay television services. AUSTEL considered that where the Service Provider network is characterised by strictly limited capacity, it is unlikely for the then Trade Practices Act to require either Optus Vision or Telstra to provide pay television carriage to third parties.

The Optus and Telstra organisational arrangements are depicted in Figure 2. Despite the differences in detail, in both cases the Service Provider (later to be known as a 'carrier associate') was to own and operate new broadband cable infrastructure which would then be installed and maintained by the relevant carrier.

AUSTEL concluded that Government policy objectives would be met most appropriately by a combination of a direction from the Minister and an amendment to the Service Providers Class Licence. (AUSTEL, 1994)

The Carrier Associates Direction

Federal communications Minister Lee, announcing acceptance of the AUSTEL report, cited the two critical issues as being duplication of cable infrastructure and access to the broadband cable network. (Michael Lee, 1994)

He justified the former on the grounds of encouraging greater competition in telecommunications without the need to resort to splitting up Australia into regional monopolies. Regarding the desire of Optus Vision and Telstra Multimedia for closed access to their broadband cabling, the Minister supported the argument that greater benefit would accrue from the rollout of cable not being delayed if the builders of the cable could share revenue from both content provision as well as carriage. In addition, closed access should be tolerated during the period when the service

provider has limited network capacity. Recognising that closed access could be seen as discriminatory and hence inconsistent with both the Telecommunications Act and the Government's general competition policy, Minister Lee agreed to closed access operating at least until 1 July 1997.

The resultant Direction to AUSTEL from the Minister took the form of the Telecommunications (Service Providers Class Licence) Direction No. 1 of 1995, hereafter called 'the Carrier Associates Direction'. It created the new entity of a 'carrier associate', which has a direct or indirect interest in a carrier and a significant influence on the carrier's business activities. The Direction required AUSTEL to issue a class licence governing the conditions under which a carrier associate is permitted to supply certain services.

In brief, where carrier associates such as Optus Vision and Telstra Multimedia are already providing a pay television service they are exempted from being required to provide access for another person's (the 'recipient') pay television service up until 1 July 1997, but in any case not if one of the following applies:

- AUSTEL deems connection of the requested service to be not technically feasible;
- the carrier associate deems the recipient to be not creditworthy, et al;
- the carrier associate deems there to be inadequate capacity to meet its own reasonably anticipated network requirements, or the needs of the recipient;
- the requested service has not been previously separately supplied to another person.

In like manner to the above, the grounds on which a carrier associate may discriminate against another person include the supply of a pay television service prior to 1 July 1997. However, applicable at all times are a wide range of additional grounds such as:

- in relation to the supply of telecommunications services for community, charitable or educational purposes, or for the promotion of health,¹
- the recipient is a person who is disadvantaged on financial or health grounds;
- the difference in costs that would be borne by the carrier associate;
- the different characteristics involved with the intended service;
- the commercial value of the service to the recipient;
- the desirability of trial programs and demonstrations being conducted (by the carrier associate) that promote the objects of the Act.

Such discrimination, which may relate to the charges for or the performance characteristics of the service concerned, may in particular be justified in terms of costs borne by the carrier associate in respect of service quantities, transmission or

¹ Whilst the genesis of this allowance to discriminate is unclear, perhaps it is explained by a statement attributed to Mr Bill Spain, a partner in law firm Gilbert & Tobin and then acting for Optus, made during the period of the AUSTEL inquiry, viz. The alternative is an open-access system which would enable education and other community services to make a claim for scarce space that would probably deliver less substantial revenues than, for example, movies and sport. (Mark Furness, 1994).

bandwidth capacity, the places from or to which the service is supplied and the relevant periods of supply, the required performance characteristics, (unspecified) network matters and costs of an administrative or operational nature. Where the discrimination is argued on grounds of insufficient capacity, the carrier associate may take into account its reasonably anticipated requirements which may extend to the introduction of new kinds of eligible services not currently provided.

REVIEW OF RELEVANT POLICIES AND PROPOSALS IN OTHER DOMAINS

Planning for Digital Terrestrial Television Broadcasting (DTTB) in Australia

Although the rollout of cable television networks and their large programme channel capabilities have gained significant public attention of late, if US experience is to be a guide, terrestrial broadcast television is expected to remain the prime means of delivering video entertainment to the mass consumer market for at least the next one to two decades. Conventional (free-to-air) terrestrial television in Australia uses analogue transmission and enables only one broadcast television service to be carried via each licensed channel bandwidth. However, with digital television transmission it is possible that on one such bandwidth the following services could be carried:

- a single high definition television channel, or
- four or five lower definition ('standard') television channels, or
- up to ten news or movie channels of VHS quality, and/or
- various data services (but at the expense of some of the above).

Digital television transmission also permits an improved quality of picture and may complement other digital signal delivery options such as cable and satellite.

Commencing in 1993, the Australian Broadcasting Authority established a Specialist Group of interested parties that sought comment, investigated various DTTB options and submitted its preliminary views in 1995. (DTTB, 1995) In part, the Group concluded that:

- each existing (free-to-air) broadcaster should be allocated an appropriate DTTB bandwidth for operation in parallel with their existing (analogue) channel;
- given that Australia's channel spacing differs from existing US and European standards, adoption of either overseas digital standard² is currently premature but it may be preferable to wait rather than develop a unique standard;
- there could be longer term advantages for the consumer if the transmission standards for DTTB, satellite and cable pay television services converged.

The report noted that the chosen DTTB arrangement should be flexible enough to provide either a single high definition service or multiple standard quality services but

² The European standard is part of the DVB family of standards; in the US, standards are being formulated by the HDTV System Grande Alliance of broadcasters and equipment manufacturers.

that if the existing free-to-air broadcasters gained sole access, they could then "explore potential new business opportunities". Although greater programming choice was possible with DTTB, "additional free-to-air programs do not come free" and broadcasters needed to assess "to what extent they (the public) are prepared to pay for any new services which might become available".³

Developing Australian Digital Video Standards for Pay TV & Other Services

Almost in parallel with investigations into the introduction of DTTB, various industry, manufacturer and consumer organisations expressed concern towards end 1994 over the need for coordinated development of digital television delivery in Australia, primarily regarding pay television services. This led to the digital Video services Task Group (DVSTG) being established by Standards Australia and Standards New Zealand. Its mission was to put forward recommendations relating to standards for digital video and broadband network services, especially to best meet the needs of consumers, provide opportunities for software and program producers, manufacturing and trade, and identify the areas where standards are required and who could produce them. (DVSTG, 1996)

Any assessment of the output from DVSTG should appreciate the commercial environment confronting pay television during that period as the main players either had already committed or were about to commit themselves to technological decisions from which they could or would not change. The Australis Galaxy microwave-delivered (MMDS) service commenced in January 1995 and satellite-delivery by August 1995. Optus Vision commenced cable-delivery in September 1995 and Telstra/Foxtel similarly in October 1995. It would be safe to assume that in the above four instances, key technological decisions were made at least some 4-6 months before the respective service launch dates. Whilst the above MMDS and cable services commenced with analogue transmission and STUs, together with associated conditional access systems, it is noteworthy that in March 1995 at the announcement of the creation of Foxtel, digital transmission and STUs were originally to be deployed as a key means of gaining a marketing edge over their rivals. (Telstra, 1995) The satellite service was digital from the outset and followed a proprietary standard gazetted by the Federal Government in August 1995.

The Group was realistic in recognising that the current pay television systems were inherently proprietary and that this could lead to an operator monopolising its service for a particular area, rather than enabling a choice of service or content provider using a single receiving device. However, it was contended that future digital networks and systems could be readily configured to enable direct and open connection between any such provider and any consumer, under an open access regime as depicted in Figure 3. (DVSTG, 1996, p.15).

With digital services, once the appropriate digital signal interfaces are built into new generation digital television receivers (or on-line personal computers), there would no longer be a need for STUs interposed between the various providing systems and networks, and the customer premises. However, an interim period may exist when

³ DTTB, 1995. p.37

separate (digital) STUs could still be necessary whilst the new generation receivers gain consumer acceptance.

The DVSTG reached a number of conclusions regarding the need for a coordinated approach to the development of digital delivery systems for satellite, cable, MMDS and general broadcasting transport technologies. DVSTG also adopted a process of receiving submissions from which a number of principles were distilled. In summary, the principles noted that future standards for digital video and associated services should:

- ensure affordable service delivery, and provide certainty and confidence;
- achieve open interconnectivity and interoperability based upon recognised international standards and be transport independent;
- be harmonised with the developing Australian regulatory regime;
- recognise separate standards developing for building cabling to deliver digital video services, with any new standards not adversely affecting existing services;
- provide for consumer equipment to have a common interface supporting proprietary manufacturers' conditional access systems (in similar manner to that determined by DVB).

This last principle is most significant, in that it asserts that no transport service provider or operator (eg. Using proprietary signal scrambling and conditional access systems, and either cable, satellite or MMDS delivery) should be allowed to present a barrier to the customer, or interpose a relationship between a customer and a service or content provider.

Development of European Standards and Regulations Affecting Access

Founded in September 1993, the European Digital Video Broadcasting (DVB) Project Group now brings together almost 200 organisations representing broadcasters, manufacturers, network operators and regulatory bodies. Supported by the European Broadcasting Union, the DVB Project was established to promote common standards across Europe that support digital television for both broadcasting and interactive services. These standards are now recognised as having a major influence on the development of digital television throughout the world and, in particular, could be recommended for adoption by Australia. By combining the MPEG-2 standards with other technologies, the aim of the DVB system has been to enable digital television to be broadcast via a mix of satellite, cable and radiated (terrestrial) means requiring a common type of decoder or STU.

Over the subsequent eighteen months, the Project Group further agreed upon a Conditional Access Package that comprised "Recommendations on Antipiracy Legislation" and a "Common Interface for Conditional Access and Other Applications in Digital Video Broadcasting Decoders" (DVB, 1995) (ETSI, 1994-1995). The latter was to address the following requirements:

- Two routes to develop the market for digital television reception should be encouraged, viz. receivers incorporating a single conditional access system

(the 'Simulcrypt' route), and receivers with a common interface, allowing for the use of multiple conditional access systems (the 'Multicrypt' route);

- The definition of a Common Scrambling Algorithm and its inclusion, in Europe, in all receivers able to descramble digital signals. This enables the concept of the single receiver for the consumer.
- The drafting of a Code of Conduct for Access to Digital Decoders, applying to all conditional access providers.
- The development of a Common Interface Specification.
- The licensing of conditional access systems to manufacturers should be on fair and reasonable terms, and should not prevent the inclusion of the Common Interface.
- The conditional access systems used in Europe should allow for simple 'Transcontrol', for example, at cable headends, where cable operators should have the possibility to replace the conditional access data with that of their own.

An understanding of the above concepts is instructive for appreciating how important it is to standardise technological solutions in order to reach certain regulatory goals for orderly access to broadband media. The core of the problem was how to address the competing requirements of both existing and aspirant equipment and service providers, some of whom already possessed valuable patents and/or captive consumer markets. The DVB solution was a compromise between those who already had a system for conditional access on the market⁴ and intended to make agreements with programme service providers to use their system (eg. the Simulcrypt system) and the proponents of a more open approach⁵ where there is no single conditional access arrangement interposed between each programme service provider and the viewer as consumer (eg. The Multicrypt system). The difference is portrayed by Figure 4.

Since an open system requires the consumer to have a separate service contract with each programme service provider, each STU must adhere to a standard embodying a universal slot into which is plugged some sort of access control device (such as a smart card or PCMCIA card) provided by the relevant service provider.

The common scrambling algorithm in conjunction with the standard MPEG data transport protocol enables messages to be included within the delivery of a programme that permit different conditional access systems to separately control the same scrambled broadcast signal where necessary. This flexibility of different conditional access systems being able to variously address the one population or different populations of STUs, and therefore consumers, also provides for added protection against signal piracy.

DVB tolerates proprietary conditional access systems by means of specifying an optional common interface that embodies a common signal descrambler in a detachable module able to be inserted in an interface socket in the STU. Manufacturers of separate STUs or television receivers with integrated functions are

⁴ Mainly being BSkyB and Canal+ who had heavily invested in building subscription-based markets driven mainly by their exclusive rights to sports and movies within their Europe. (Analysis, 1994)

⁵ Said to comprise the BBC, ITV, Channel 4, TF1 and Swedish Television, none of whom had existing vertically-integrated subscription-based businesses.

provided with a licensing regime under which they can include in their product either a common interface or different conditional access systems under terms that are fair, reasonable and non-discriminatory. Finally, the DVB standard is only practicable if aided by a Code of Conduct governing key relationships between those who provide or own the conditional access systems and the programme service providers or broadcasters. Under this Code, conditional access systems must be provided on fair and reasonable terms and on a non-discriminatory basis.

Regulating Access in the United Kingdom

During 1995/96, in concert with EU Developments but particularly spurred on by the burgeoning markets for broadband media services, there have been three areas in which the UK government has focussed upon regulating access.

Pay Television Supply Agreements

In response to continued complaints directed to the UK Department of trade & Industry about anti-competitive behaviour, the Director General of Fair Trading (OFT) commenced a review of BSkyB's position in the pay television market concerning the supply of programming and related services at the wholesale level in the UK. (OFT Press Release No. 50/95) Specifically, the review was to examine aspects such as access to encryption, subscriber management and transponders as impacting upon supply agreements between BSkyB's satellite-delivered pay television operation and UK cable television operators. The Agreements were pivotal to the cable television operators since they granted the right to receive certain television channels from the BSkyB satellite and re-transmit them to cable-connected viewers. In many cases, this was the only avenue for gaining cable transmission rights to premium channels (eg. Movies, sports) in the UK as all rights were held by BSkyB.

Notably, the OFT review attracted the attention of the UK Office of Telecommunications (OFTEL) who envisaged adverse implications for the prospects of network competition in the telecommunications access market unless certain shortcomings in the supply agreements were remedied. OFTEL submitted that the key issues concerned BSkyB's ability to use dominance in one part of the pay television market to leverage its position in another and raised questions relating to net work access (as well as price levels and discounts, tenure of supply and channel packaging).

Since BSkyB was seen to dominate the distribution of most pay television programming for cable distribution as well as being the sole provider of satellite-delivered pay television in the UK, OFTEL drew attention to what safeguards might be necessary to prevent an adverse impact upon competition elsewhere in the market.⁶ Alluding to parallel developments with regulating conditional access and subscription management for digital television, OFTEL noted that the provision of subscriber management services had the potential to form significant 'bottleneck' barriers to market entry. A dominant operator should not be able to require the purchase of its

⁶ OFTEL argued that dominance in analogue pay television distribution could readily strengthen BSkyB's position in future new markets such as online gambling, near video-on-demand and services using digital terrestrial television.

subscription management services as a condition of use of its encryption system. (OFTEL 1996, s.55)

OFTEL concluded by observing that without regulatory intervention, BSkyB would retain its substantial market power. Resultant aspects were seen to be:

- although the advent of digital television services was uncertain, as was the migration from analogue (satellite and cable) services to digital, greater opportunities would be created for new entrants; nevertheless, the regulatory framework was needed to translate such opportunities into effective competition;
- continued discriminatory supply agreements would restrain the ability of cable companies to grow their pay television market share; even if their bargaining power increased over time, it was no guarantee of greater competition as the market could take the form of a very few large customers (ie. pay television companies) with a single dominant supplier. (OFTEL 1996, s.135)

OFTEL was concerned that should cable television penetration rates fail to achieve a critical mass, the companies would experience greater difficulty in competing against British Telecommunications plc (BT) with telephony services and hence in funding the development of new digital services.

In commenting on other issues raised by the OFT review, OFTEL said that "digitalisation will not, in itself, remove the potential for organisations to acquire market power through the acquisition of gatekeeper roles – these include control over access to transmission networks, conditional access and subscriber management". (OFTEL 1996, Annex)

In finalising its review, the OFT secured new undertakings from BSkyB ensuring that the UK's wholesale pay television market would be as open and competitive as possible and the public interest protected. Importantly, the Director General of Fair Trading made the following statement:

I have regard also to the large and high risk investment BSkyB has made in establishing itself and creating a market which has greatly enhanced consumer choice. I believe it is important that companies which show enterprise and flair are not sent the wrong signals by regulators as soon as they move into profit (OFT Press Release No. 32/96)

Broadband Switched Mass-market Services

During the latter half of 1995, OFTEL released for public comment a Consultative Document intended to stimulate discussion as to certain regulatory regimes proposed therein. It focussed upon broadband switched services yet to be marketed but likely to gain mass appeal and delivered by telecommunication systems. Of necessity, it also considered broadband non-switched services not delivered via telecommunication systems (eg. Satellite pay television), as well as variants that could exhibit changing service characteristics on a continuum between being non-switched and switched.

Switched services enable customer control and necessarily imply some sort of return path communication, with those of a broadband nature typically delivering video images to consumers. There is also no channel scarcity with a fully broadband

switched mass-market (BSM) network and hence less opportunity for market domination. Availability of a broadband 'dial tone' would enable customers to connect to any content server on that or an interconnected network. However, for many years variants of broadband networks with little or no interactivity yet scarce channel capacity would be delivering mass-market services (via broadcasting) and exploiting opportunities for market dominance. The transitional implications of migrating towards switched services would complicate the task of regulators.

Recognising that investment calls for a certain and stable regulatory environment, the Consultative document proposed a minimal regulatory regime deemed to encourage investment but at the same time discourage anti-competitive behaviour. The firm conclusion was reached that specific licence obligations should be imposed in relation to a BSM service of a dominant operator or similar provisions triggered once an operator becomes dominant. Putting aside pricing-related issues, it was proposed that a dominant operator should comply with the following:

- to be unable to refuse other service providers (including network owners) access to its broadband conveyance business on transparent and non-discriminatory terms;
- to specify the use technical standards and interfaces at either end of its broadband network in support of the open access principle;
- to allow service providers to directly relate to individual customers;
- to allow service providers to set their own retail price levels;
- to grant competing service providers equal prominence in its own navigation system (unless it runs competing navigation systems); and
- to take steps to ensure that any information on service use is not used to distort the market in service provision. (OFTEL, 1995, s.6.2.4)

A dominant operator would also be prohibited from excluding the supply of items such as STUs by third parties. Without declared and publicly available equipment interfaces for digital services, customers may become 'locked-in' to a single network operator. However, where STUs are only analogue and have no return path (eg. via a telecommunications network), OFTEL considered that approvals were unnecessary. Navigation systems were also highlighted due to their scope for distorting the market content. In contrast, a non-dominant distribution network was seen to have very limited opportunities to act anti-competitively and should therefore not be prevented from excluding service or content suppliers from access to the network (ie. such a network operator could elect to provide 'closed access').

Digital Terrestrial Broadcasting

Contrary to the usual trend of governments being too late in regulating technology-based activities due to the remorseless developments in technology and the keenness of entrepreneurs to exploit any new technological advantage, the UK Government acted with exemplary speed to outline its competitive and regulatory principles for digital terrestrial broadcasting. Its interests were two-fold: terrestrial broadcasting was recognised as an immensely powerful medium in that almost all households can receive the signals, and the amount of spectrum available for terrestrial broadcasting was limited and valuable.

The Government's initial proposals, presented in August 1995, may be summarised as follows (regarding television services, but in like manner also for radio):

- six 'conventional' frequency channels could each carry at least three digital television services of excellent picture quality, resulting in at least 18 services with substantial national coverage;
- to receive the signals, each consumer would initially require a STU inserted between the television antenna and conventional receiver. Thereafter, receiver manufacturers would produce new television sets that combine the common elements of digital satellite, cable and terrestrial television technology and so dispense with the STUs;
- while some digital terrestrial services would be 'free-to-air', others would be expected to require subscription (as for pay television) and therefore necessitate conditional access;
- to encourage competition from new broadcasters and a greater variety of programs, each new digital television service would be separately licensed;
- most importantly, recognising that several digital services would then be broadcasted on the one frequency channel and thereby require combining or 'multiplexing', this latter function would also be licensed as an intermediary between the viewers and program broadcasters;
- commercially, the multiplex provider would play a crucial role in developing acceptance of the new services since it could organise subscription management services, manage the allocation of digital signal capacity as well as any supplemental data services;
- multiplex providers would be required to treat their broadcasters fairly, reasonably and in a non-discriminatory way;
- the Independent Television Commission (ITC) would license each multiplex provider, broadcaster and provider of data services, with OFTEL licensing any conditional access system;
- no one company should control more than two multiplexes;
- existing analogue free-to-air television broadcast services are guaranteed a digital place so that public broadcasting continues after analogue signals are discontinued;
- given that a single subscription management centre may be more practical and efficient, any such provider for digital terrestrial broadcasting should not discriminate or refuse to offer service (Cm 2946, 1995)

A chart of relationships under the proposed framework is depicted as Figure 5.

Backed by the Broadcasting Bill introduced into Parliament on 14 December 1995, the UK Government implemented a recent EC Directive on the matter (Directive 95/47/EC) with a more detailed statement of the licence conditions that would apply to implement its previously announced framework. (DTI, January 1996) However, since the original policy document of August 1995, DTI had come to realise that it was too simplistic merely to talk of regulating conditional access, but instead announced that it would treat the act of encryption/authorisation separately from the subscriber management part of the service and hence require separate class licences for each activity. (DTI, January 1996) In a further refinement which now revealed

draft regulations and licence conditions in a detailed consultation paper, conditional access services were ultimately separated in regulatory terms as follows:

- Non-Technical Services
 - Customer Management Services (CMS)
- Technical Services
 - Subscriber Management Services (SMS)
 - Subscriber Authorisation Services (SAS)
 - Encryption Services (ES)

The CMS activity does not involve the conditional access technology per se but concerns itself with processing customer orders, billing and payments for television services. Within the UK, the provision of CMS services appeared to be a strongly competitive market without any threat of bottleneck control. However, the 'technical services' were seen to involve potential for gatekeeping as they are considered to be inseparable from the conditional access technology in the television gateway to the viewer, ie. the STU. Based upon the above distinctions, the various 'technical services' were proposed to be subject to the full force of prescribed regulatory provisions, whereas the CMS activity would only be exposed to the keeping of separate accounts. (DTI, June 1996) Furthermore, the principal issues were identified as:

- the need to have multiple CMS with a guarantee of interconnection to an SMS provider;
- securing supply of smart cards to subscribers; and
- confidentiality of the subscriber information managed by any SMS provider.

These would be addressed through codes of conduct backed by licence conditions. To encourage investment, licensees would not have to pay fees to government until after 12 years. Most importantly, the Broadcasting Bill, since enacted, included provisions for the ITC to set compatible standards for STUs across the different digital delivery systems.

US Video Dialtone & Open Video System Policies

It is important to appreciate the legislative, regulatory and commercial backdrop against which Video Dialtone and Open Video System policies evolved in the USA. Whilst cable television companies delivered video programming to consumers in defined geographic franchise areas under industry-specific regulatory controls, telecommunication carriers were forbidden to deliver video programming for decades. Carriers were widely feared by cable television operators for their anti-competitive behaviour. Furthermore, the technology for delivering video signals over telephony infrastructure was until recently not commercially viable.

In 1992, the US Federal Communications Commission (FCC) issued new regulations that permitted telephone companies to elect to provide common carrier video services to consumers. (Video Dialtone Order, 1992) These carrier services would be regulated completely differently from those of cable companies and were not considered to entail broadcasting. They therefore did not require franchises as did cable services.

In essence, Video Dialtone was defined by the FCC as follows:⁷

- provision of a basic or 'Level One' platform that enables delivery of video programming and basic adjunct services⁸ from independent programmers to consumers;
- the basic platform service must be offered to these programmers on a non-discriminatory basis, ie. under a common carrier tariff;
- provision of sufficient capacity to service multiple video programmers, as well as satisfying their increased programme demand over time, ie. not to become a bottleneck to thwart competition;
- a VDT provider may also offer some additional enhanced and non-common carrier services of its own (a 'Level Two' platform) to end-consumers of the basic platform. Such Level Two services would not be price-regulated as for Level One services.

A Level One operation necessarily meant that the VDT provider could not determine how programming is packaged for presentation to consumers. To reinforce this restriction, carrier providers were limited to 5% financial interest in or control over any video programming provided over their platform.

Whilst the FCC made no mention of the technology or technical standards applicable, it was assumed that optical fibre to the home or ADSL transport would most likely be used. Inherent in these means of transport would be the lack of channel scarcity, either through the broadband nature of fibre or the switchable nature of ADSL, or whatever else is deployed, such that consumers who subscribe to the Level One platform viewed some sort of a menu with a navigation tool enabling them to switch from one program or information service to another. In effect, VDT services would embody some degree of interactivity effected by a return communications path from the consumer back to the Level One platform.

Despite the stringent FCC restrictions, critics of the VDT policy nevertheless raised concerns. They cited the possibility of a carrier in control of a Level One platform arranging for the VDT 'menu' to give preferential placement to its own services to the detriment of competitors and consumers. A solution could be to construct the menu in two tiers, with the first listing only the broad categories of services (eg. 'television/video programming', 'computer/library services', 'business services', 'shopping', etc) and the second tier listing all the service providers in each selected category. Furthermore, the services provided by the VDT carrier should even be listed last among all service providers within each category. (Yankeevision, 1992, p.12)

With an ever increasing amount of technological solutions being controlled by software, particularly when the video transmission is digital, implementation of the Level One gateway concept should not pose difficulty. However it necessarily implies a common STU, a common smart card (although perhaps separately programmable according to the service provider) and common encryption.

⁷ Thorne, 1995: ss.2.7.4,5.3.1,6.4.4,8.4.6 & 12.5.4.

⁸ Basic adjunct services include video gateway services (directory, routing, navigational aids), video processing services (encryption, scrambling), billing, order processing, customer premises equipment and inside wiring

Employing the recently established terminology of the UK's attempts to regulate digital terrestrial television (DTT, June 1996), a Level One gateway could be envisaged as shown in Figure 6, whether applicable to VDT or even cable television services. In addition, other service delivery and non-discrimination requirements would need to be expressed in contractual terms between the Level One operator and the accessing programmers or service providers.

Within the US, only a few trial operations of Video Dialtone have eventuated and only one seems to have been commercialised. In February 1996, with the enactment of the US Telecommunications Act 1996, the concept of VDT was replaced by that of the Open Video System (OVS). Under this new regime, telephone companies are now allowed to provide video programming within their service areas operating as a common carrier, a cable television system, an MMDS operator or as an Open Video System. Whilst the OVS option avoids having to seek an additional franchise from the local municipality, it is otherwise very similar in operation to VDT except that the electing carrier can now provide its own video programming but is obliged to occupy no more than one-third of the channel capacity in the event of there being greater demand from other programmers⁹. (Telecommunications Act, 1996) Such a restriction poses no dilemma for a (digital) switched delivery system since its channel capacity would be virtually infinite.

DISCUSSION OF ISSUES

The previous review of policies and proposals around the world relating to access to broadband media services has identified similarities in broad approach and understanding of the main principles involved, viz

- Conditional access embodies a form of gateway control for the purpose of extracting an economic rent; other things being equal, there can be no objection over the exercise of such control, but certain gateway developments may be exploited to place obstacles in the way of others wishing to gain access for whatever purpose and this may even be deemed as anti-competitive conduct;
- Each gateway, however, has two sides – one seen at the input from providers desiring to provide services to consumers via the gateway operator, and the other at the consumption end interfacing with the STU; furthermore, consumers may wish to subscribe to competing gateways and effortlessly switch between them;
- From time to time, governments may see fit to implement policy objectives that increase the opportunity for access, however defined, so as to maximise choice, control over those choices and/or diversity within the services; they must balance such objectives against the need to encourage industry investment in the provision of future delivery infrastructure, services and/or content.

Undertaking such a balance calls for a good appreciation of the legislative, technical and competition aspects of the following key issues.

⁹ A good discussion of the pros and cons of the new Open Video System regime may be found in Noam, 1996.

The Role of Interfaces and Set Top Units in Conditional Access

Within Australia, the two largest cable television service providers, Optus Vision and Telstra Multimedia/Foxtel, are deploying quite different types of conditional access systems and STUs that are both proprietary and incompatible. As result, consumers subscribing to the competing networks are required to utilize different STUs and smart cards in order to decode the respective signals. The same outcome also arises with cable modems for high speed Internet access. No interchange of the necessary consumer equipment is possible, even if the consumer merely wishes to view the re-transmitted free-to-air broadcast channels. Because the high cost of each STU or cable modem would be a disincentive to potential subscribers, each service provider bundles the equipment into a total service package which it markets. Subscribers therefore indirectly pay for the STU or cable modem over time through higher usage charges. It should be reasonable to conclude that, due to greater economies of scale, charges would be lower if the equipment items were compatible from the outset. Perhaps they could be lower still if made available through competitive supply at retail outlets.

Even if Optus Vision and Telstra Multimedia/Foxtel were to permit direct access to their broadband cable networks (eg. at the program playout level) by other service providers aspiring to distribute separate programmes to viewers, completely parallel conditional access and subscriber management systems would then be necessary that in turn may call for even more different STUs, smart cards and cable modems. Of course, the latter problem could be solved if the resultant 'open access' environment permitted joint use of the respective conditional access systems.

In the United Kingdom, the Department of Trade & Industry (DTI) has justified that it is important in the national interest for the government to specifically regulate conditional access for new services that employ digital transmission. The elements comprising conditional access are complex and quite detailed arrangements are required for the outcome to be fair and equitable to all parties.

On the other hand, the 'first mover' advantages of Optus Vision and Telstra Multimedia/Foxtel in their creation of new mass markets with analogue-delivered services are likely to make it quite difficult for adequate open access regimes to be established in either the analogue or digital domains.

The Role of Standards

Neither of the kinds of analogue STU currently in use adheres to any Australian standard. Whilst continuance of such non-standard interfaces may have competitive advantages for the major subscription television providers, it disadvantages consumers who would otherwise be able to access all systems via a single STU – not to mention the inability of new competitive service providers to enter the same growing markets for pay television and future on-line services.

The development of standards is a time-consuming and elaborate process, in which it may be difficult for bodies other than the major players to make a significant contribution. The technical terminology employed can also make it difficult for outside interests to follow.

Almost twelve months after completion of the DVSTG report, with Optus Vision and Telstra/Foxtel well into their cable rollouts but with international digital standards (eg. DVB) having substantially progressed, Standards Australia and Standards New Zealand have reconvened the studies of DVSTG under the new banner of Committee IT/25 commencing October/November 1996. Although a new digital standard has been foreshadowed, it is likely to entail options sufficiently broad in scope and/or be sufficiently late in issuance as to raise doubts about whether it can be effectively applied to new digital consumer equipment. If this were the case, even digital STUs would then remain incompatible.

It is too early to see if the European Digital Video Broadcasting option of allowing an open access regime so programmers can sell their services competitively to a common population of consumer digital STUs will be commercially successful in the European market. The continuing difficulty with the DVB standards is that there is nothing to prevent dominant players, such as BSkyB and Canal+, from building and marketing proprietary STUs which restrict entry by competitors.¹⁰ (Analysis, 1994)

The broad issue for Australia is whether, and how, to provide a national standard which will encourage uniformity for the benefit of consumers, but will not unduly impede future infrastructure investments and service developments. Can interoperability be achieved through industry agreement on common standards? Should mandatory standards be made by the new Australian Communications Authority, or some other body? Would a mandatory standard involve 'picking winners' among competing systems?¹¹

The Government Policies Affecting Competition and Access

This paper addresses the technical and practical issues about the arrangements under which competition and access can operate, rather than the 'macro' issues about the direction of communications policy. However, the broad policies must be taken into account.

Around the world, there is almost universal agreement that the ideal communications environment would be one in which there was abundant available capacity for all services, large and small, new and old. This spirit was captured by the Chairman of the FCC who said in a recent address that his mission was: "to give customers and businesses more services, more choices, and more control over those choices – in other words, more bandwidth. If the bandwidth and access are there, the services will be invented". (Hundt, 1996)

The current Australian policy on competition, duplication and access was set by the previous government in November 1994, when the then Minister for Communications and the Arts announced, in summary, that whilst there would be no monopoly rights

¹⁰ Digital transmission leads to greater channel capacity which logically calls for extra program content, however these two players already dominate the supply of premium program content in Europe. Excess channel capacity can be readily depleted simply by employing 'near video-on-demand' which replays the same movie at staggered start times.

¹¹ Governments nowadays express a fear of doing just this. However, recent examples of success stories from mandating standards are those of analogue and digital cellular mobile telephony, which have produced Australia-wide compatibility between the handsets of competing service providers in addition to national interconnectability.

over cable infrastructure for delivery of subscription and on-line services, for an interim period until 1st July 1997 "the general access and interconnection principles of the Telecommunications Act will not be applied". The Minister further explained of the Carrier Associates Direction:

At first glance, it may be appealing to simply require totally open access ... This however would deny the builders of the cable a share of the revenue from content provision, as well as carriage, and the end result could be to delay the rollout of cable in Australia. (Michael Lee, 1994)

However, the current Minister has made it clear that the exemption will not extend beyond the original 1997 date, when a new Telecommunications Act 1997 is expected to commence.

The Proposed Telecommunications Access Regime

The regime proposed to govern access to telecommunications systems after 1st July 1997 is to be found in Part XIC ('Telecommunications access regime') of the exposure draft *Trade Practices Amendment (Telecommunications) Act 1996*. The access regime in that Part is intended to supersede the current arrangements, including the Carrier Associates Direction, described earlier. The objects of Part XIC include: the long-term interests of end-users; promotion of competition; and "the objective of achieving any-to-any connectivity in relation to carriage services that involve communication between end-users". The provisions of Part XIC clearly relate to subscription television, but there must be doubt about whether the connectivity object relates directly to services such as pay TV, given that it fundamentally involves only communication from a program playout source to end users, rather than between end users themselves.

Part XIC embodies a complex scheme for setting conditions of access, including: a Telecommunications Access Forum; requirements for services to comply with standard access obligations; access undertakings; arbitration where necessary by the Australian Competition and Consumer Commission (ACCC); and Ministerial pricing determinations. Whilst this paper is not focused on the workings of the proposed access regime, its affect on the conditional access, standards and capacity issues mentioned earlier will clearly be significant.

In practice, realistic decisions about access will also need to take account of factors such as smart card programmable parameters, marketing, co-marketing, billing, channel number allocation, programme guides, and viewer statistics. Without focussing down to this level of detail, it is quite possible for 'open access' regimes to be developed that are open in name only.

Capacity Limitations: Bandwidth versus Technology

In arguing for deployment of separate broadband cable networks, Optus and Telstra informed AUSTEL that the analogue technology to be used produced only a relatively small number of television channels (64 in fact) which, under their business plans, was considered to be a scarce resource that had necessarily to be fully allocated only to their own pay television service providers – Optus Vision and Telstra Multimedia. AUSTEL concluded that with the advent of digitalisation, channel capacity relief should arise that would then remove any justification for discriminatory provision of

service. In the meantime, limited channel capacity was clearly seen to be a feature of the initial phase of analogue pay television services which was then regarded as spanning the period from late 1994 to end 1997.

Under the Carrier Associates Direction mentioned earlier, Optus Vision and Telstra Multimedia are exempted from being required to provide access for another person's service until 1 July 1997. Even thereafter, they are not required to provide access to others if they deem there to be inadequate capacity to meet their own 'reasonably anticipated' network requirements. Such requirements could also encompass new kinds of services not currently provided. The judgements involved in these determinations are far from objective.

The broad issue concerns the future availability of channels, beyond the reasonable requirements of the major pay TV providers, so as to mark the end of the start-up period of channel scarcity¹². Although 'scarcity' may only truly end when the current systems are fully digitised, it is proposed that a realistic settlement of the matter should call for assessment of each type of service deployed or to be deployed across both carrier associate networks as serving the same consumer market.

CONCLUSION

This paper has identified the main legislative, technical and competition issues affecting ongoing conditional access for both subscribers of and service providers to broadband media services, with pay television as a prime example. Useful parallels have been drawn with overseas developments in policies and standards. A more sophisticated understanding of conditional access systems is now had that should make it easier to establish arrangements in the Australian context opening up access to not just new programmers but also independent service providers. There is no practical reason why future digital services, delivered via cable, satellite or terrestrial, can not be mandated to employ standardised consumer equipment.

The new telecommunications access regime has yet to be tested. Services have to be 'declared' by the Australian Competition and Consumer Commission before access obligations on carrier service providers can be prescribed. The key question remaining is this: with the existing pay television players having effectively monopolised all of the mainstream program content, will there be an entrepreneur remaining who is bold enough to seek such a declaration and then exploit an open access regime?

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¹² Even as at end 1996, Optus Vision for example are occupying only 27 of their 64 channel capacity yet 12 of these are also carried by Telstra Multimedia's Foxtel. In other words, less than one-quarter of the available channel capacity is currently occupied by channels with non-repeated programme content.

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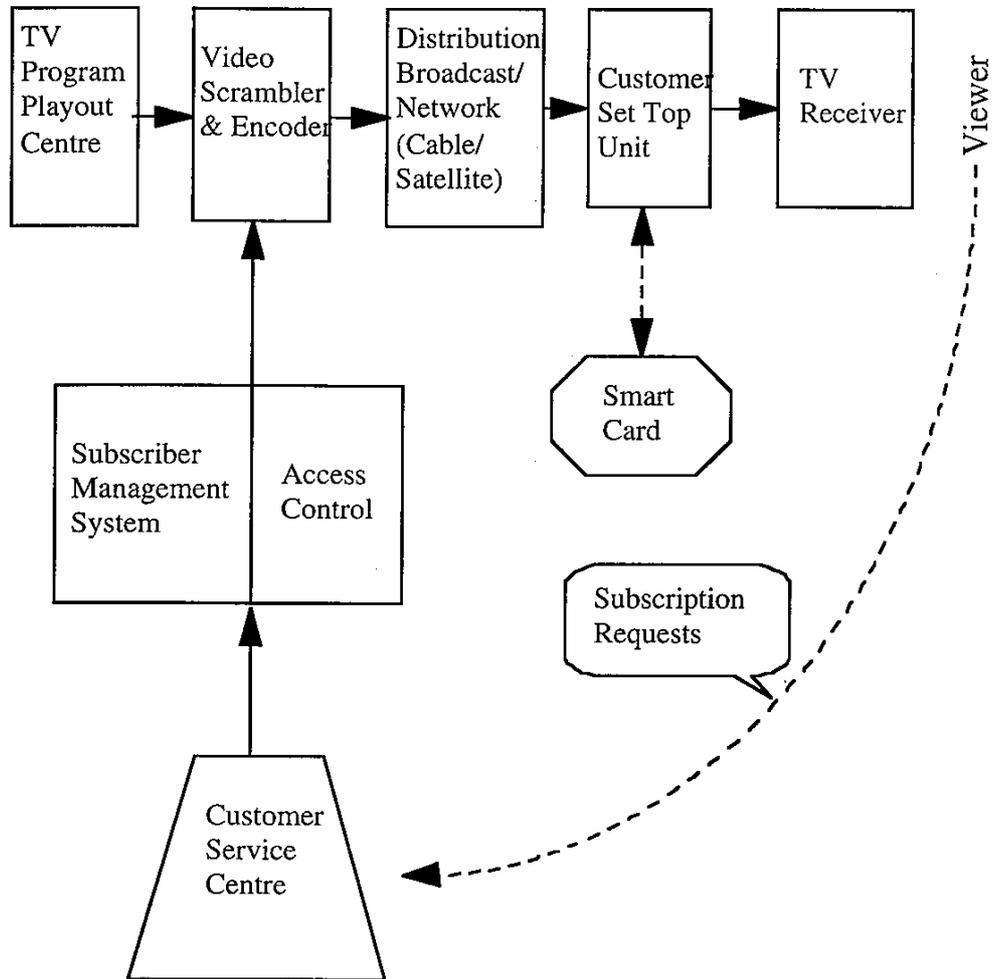


FIGURE 1 – TYPICAL ARRANGEMENT FOR CONDITIONAL ACCESS

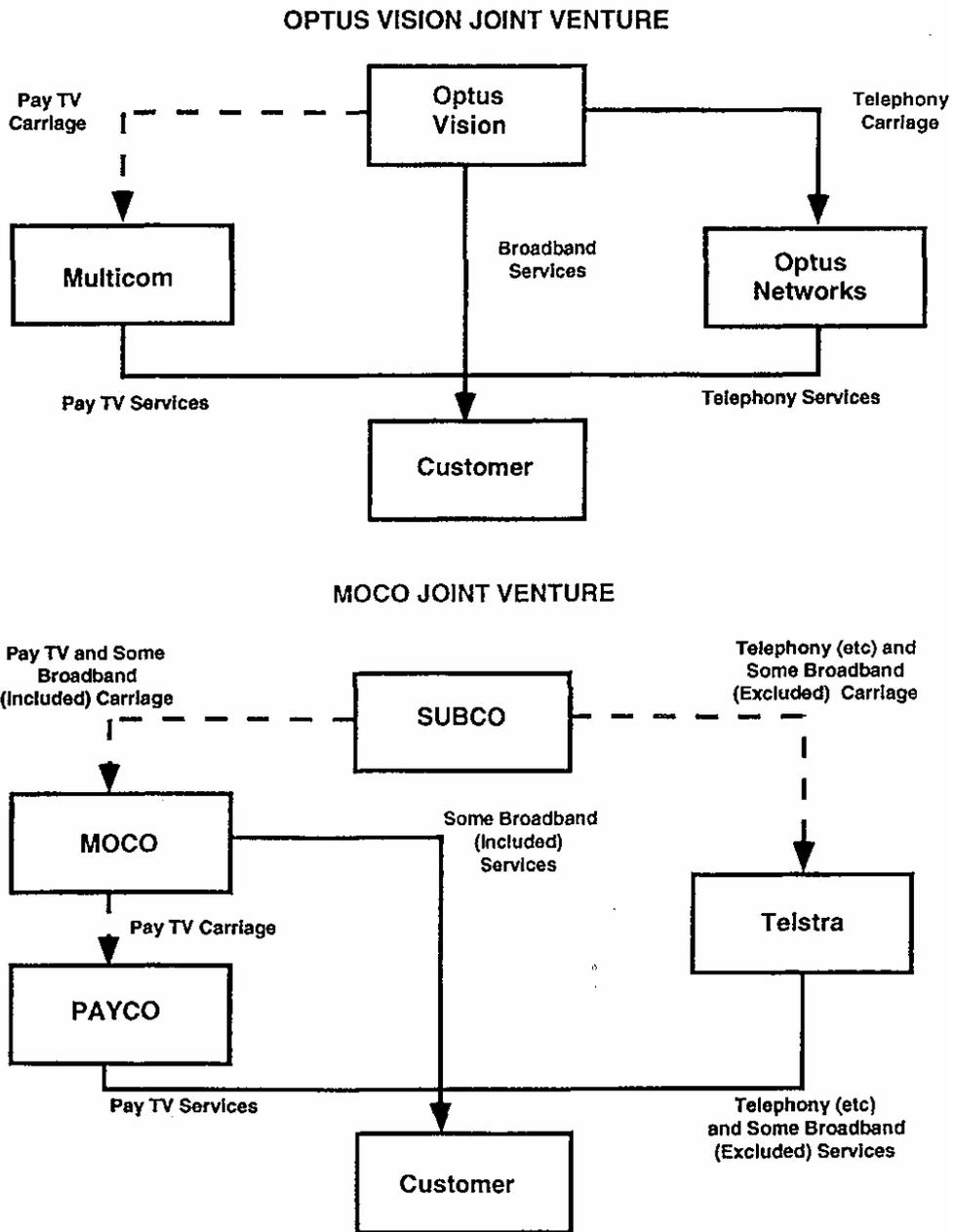


FIGURE 2 – COMPARISON OF OPTUS VISION AND MOCO (TELSTRA MULTIMEDIA/FOXTEL) PROPOSALS (extracted from Austel, 1994)

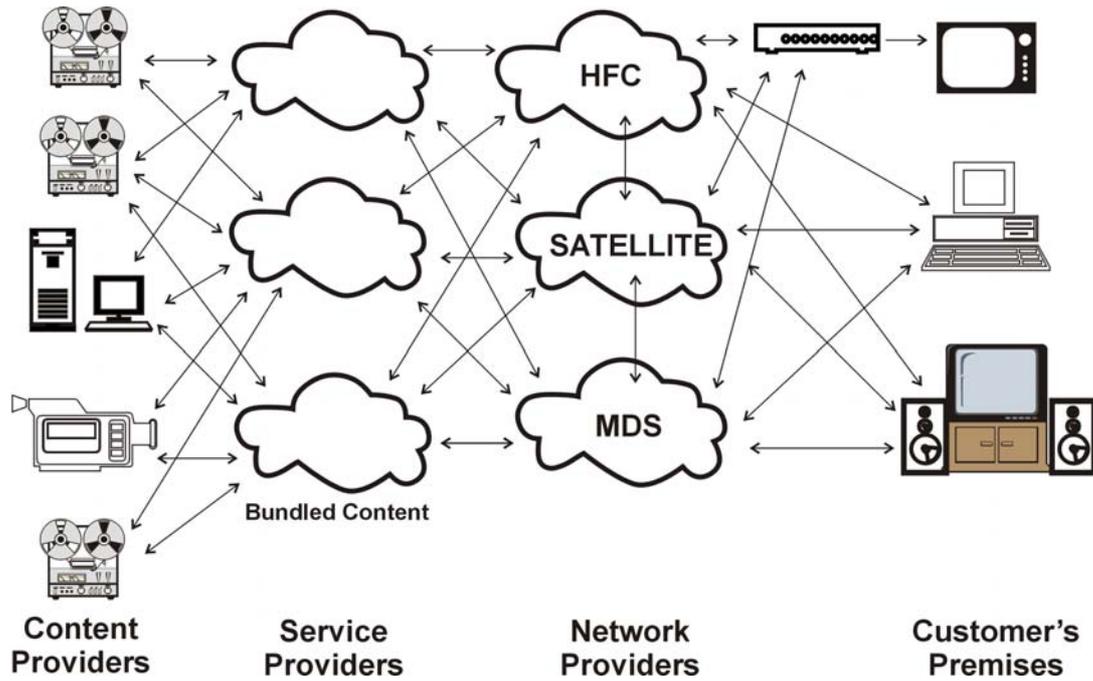


FIGURE 3 – DESIRABLE OPEN ACCESS REGIME FOR DIGITAL TERRESTRIAL TELEVISION BROADCASTING

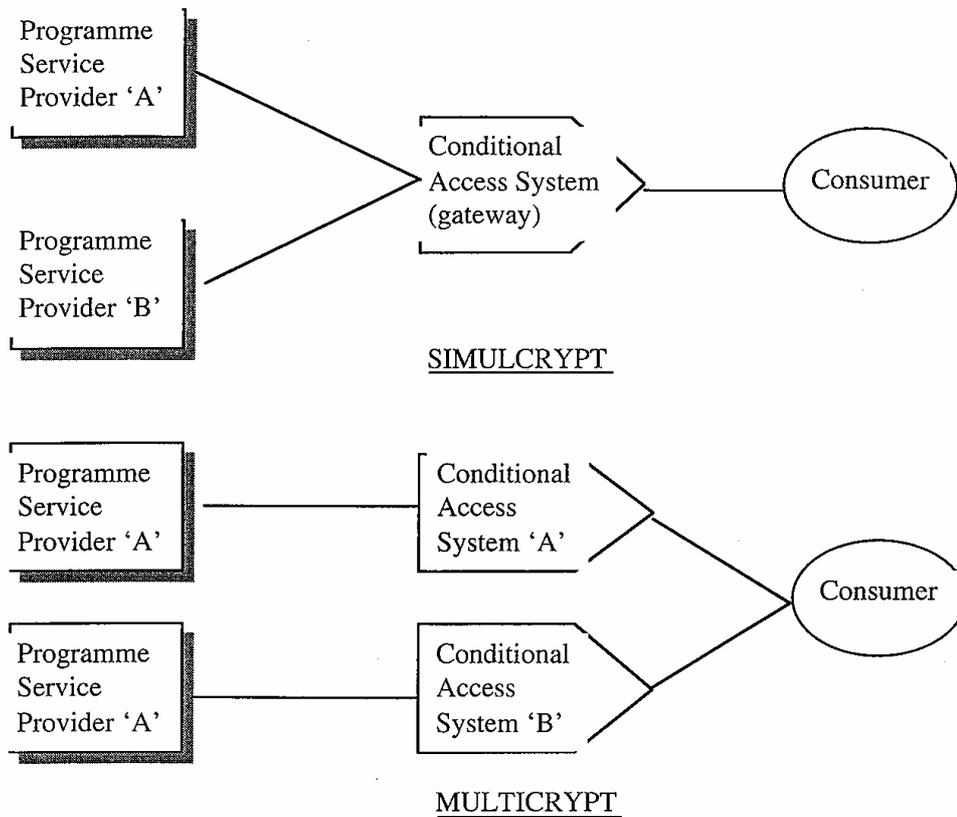


FIGURE 4 – ILLUSTRATIVE COMPROMISE UNDERPINNING THE EUROPEAN DIGITAL VIDEO BROADCASTING STANDARDS

Chart of relationships under the proposed framework

Notes:

1. Frequencies for the BBC and S4C are allocated direct.
2. Independent Television Commission and Radio Authority.
3. BBC operates services under the terms of its Charter and Agreement.
4. Additional service providers may contract with multiplex providers, broadcasters, or both.
5. Conditional access providers may contract with broadcasters, multiplex providers, or both.

Key: > = Licensing. - - - - = Contractual arrangements

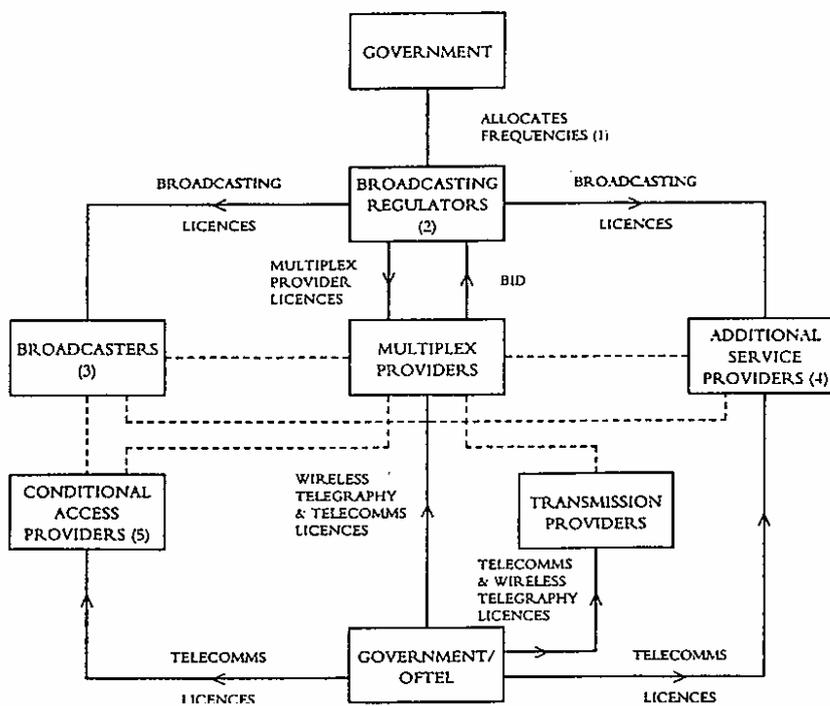
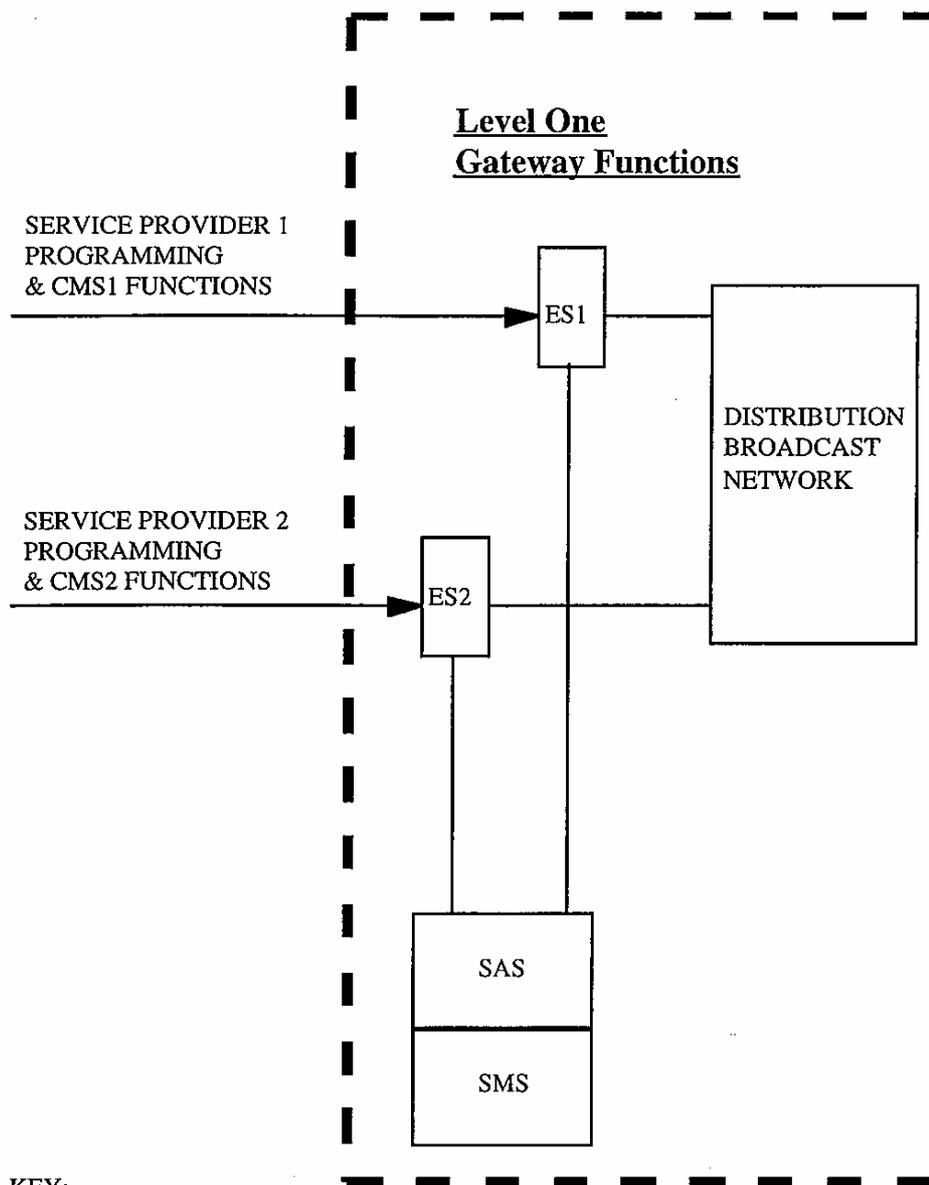


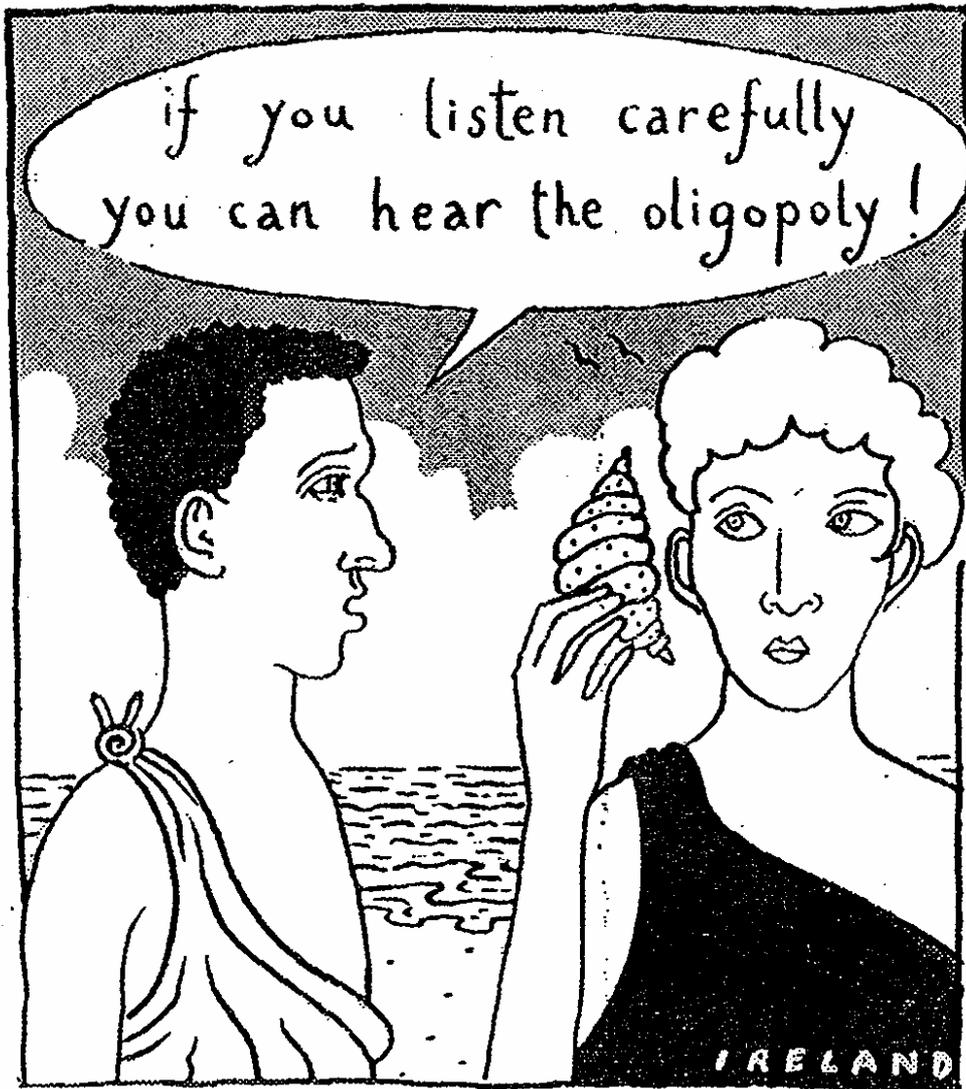
FIGURE 5 – CHART OF RELATIONSHIPS UNDER THE PROPOSED FRAMEWORK FOR DIGITAL TERRESTRIAL BROADCASTING IN THE u.k. (extracted from Annexe B, Cm2946, 1995)



KEY:

- CMS - Customer Management Services
- ES - Encryption Services
- SAS - Subscriber Authorisation Services
- SMS -Subscriber Management Services

FIGURE 6 – POSSIBLE ‘LEVEL ONE’ GATEWAY CONFIGURATION



With acknowledgements to: "Keating revisits 1990 Telecom defeat",
Australian Financial Review, 10/2/95, p.29