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The Management of Digital Rights in Pay TV

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ABSTRACT

Successful roll-out of Digital Rights Management (DRM) solutions has the potential to transform the economics of pay television. This paper explains how a technology that is being developed as a potential solution to the challenge posed by the widespread theft of intellectual property (piracy) may ultimately support the development of new business models. These new business models could trigger a radical change in the sources of market power in the supply chain, increasing the bargaining power of content companies relative to vertically integrated platform operators. The paper examines some of the regulatory challenges that the new business models and the new technology raise.

JEL Classification: L1, L5, L82

Keywords: Digital rights management, pay television, competition.

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1. Introduction

Anyone who legitimately consumes an information good³ or a digital media product, say, by viewing a DVD, by watching a sporting event on a pay per view basis or by downloading a music track to their i-Pod device, also consumes in parallel some form of content protection. The form of content protection chosen by the content creator or distributor will typically depend on the nature and value of the underlying content. Content suppliers with low value content and few piracy concerns may rely on legal protection under copyright laws. Suppliers with more valuable content may supplement legal protection with technological solutions. Consider, for instance the standard model of conditional access in pay TV which uses the encryption of television signals to restrict access of programming to paying customers. In general there is heterogeneity of demand for content protection which results in the use of a wide range of non-mutually exclusive legal and technical solutions.

As the growth of broadband Internet increases the potential for illegal access to, and exploitation of, content, and as the commercial value of that content increases, we expect a change in the balance of legal and technological solutions to protect intellectual property. Even as a case is made for adapting copyright laws to the new technological landscape,⁴ more sophisticated technological means of content protection are being developed. We believe that one such technological solution, Digital Rights Management (DRM), will become increasingly important for protecting digital content in the pay TV supply chain and in time is likely to supersede conditional access. DRM describes a suite of software and hardware technologies that can be deployed to provide persistent end-to-end content protection.

Our paper aims to contribute to the understanding of the potential impact of DRM on market power in digital pay TV. As we aim to identify long term trends in a technologically dynamic area, our analysis can only be speculative. Following this introduction we provide some non-technical background on what DRM means and, using analogies from related markets, suggest new business models that may be feasible in the pay TV environment. In Section 3, we explain the roots of DRM development, which can be traced to measures taken to counter the illegal theft of intellectual property and many of the concerns about the potential that DRM has to strip consumers of their usage rights arise. Following this, in Section 4, we offer suggestions as to how we believe DRM may impact on the markets for intermediary services in the supply chain and in Section 5 we explore the potential impact of DRM on

³ Shapiro and Varian (1998) describe information goods as “anything that can be digitised”.

⁴ See Congressional Budget Office (2004).

selected competition policy issues common to pay TV markets. Section 6 concludes.

2. Background to Digital Rights Management

Digital goods are protected through a variety of methods. Copyright laws provide legal protection, but these require that the rights owner is alert to any breaches of those legal protections and is in a position to enforce those rights. Legal protection may be supplemented with simple technical barriers to easy duplication of content. For example, the deliberate use of faint type in printed documents makes it harder to produce perfect photocopies. As the commercial value of the digital content increases, and as the growth of the Internet increases the ease of illegal access, storage and distribution, we should expect that more sophisticated forms of protection will arise. Even as there is talk of the potential of quantum encryption (which involves utilising the principles of quantum mechanics to generate random light-based keys, rather than large numbers, to secure content),⁵ the content creation and delivery industries are concentrating on the shorter term development of an efficient system of DRM to provide end-to-end persistent technical protection for their content.

DRM has been described as *“a systematic approach to copyright protection for digital media”*⁶, though this does not quite explain what DRM is, or how it might evolve in the future. From a technical perspective DRM encompasses *“the description, identification, trading, protecting, monitoring and tracking of all forms of usages over both tangible and intangible assets.”*⁷ More simply, DRM is a suite of solutions that allow for the technical identification and protection of intellectual property. The technical protection allows the owner to monitor and control access to the protected content from the point of its creation to the end of its life. Usage rules embedded in the content ‘metadata’ can control how and by whom a particular piece of content can be exploited. This control can include the designation of devices upon which the content can be consumed and, whether or not it can be transferred from one platform to another. It can, in theory, allow for differential charging for access based on the identity of the user, time of use or the device on which it is used. This empowerment of content owners gives rise to a broader understanding of

⁵ See for example

http://www.commsdesign.com/news/tech_beat/showArticle.jhtml?articleID=23901208.

⁶ See the IT encyclopaedia web site, www.whatis.com.

⁷ See Iannella, cited in Rump (2003).

DRM, which encompasses how intellectual property rights are managed and exploited in a digital environment.

DRM technologies employ a number of discrete tools, which are combined in order to provide the kinds of functionality described above. The primary tools are briefly described in Table 1.

Table1. Some Common DRM Tools⁸

Tool	Purpose
Secure containers	Restricts access to those with authorisation
Rights expression languages	Establishes which users have access
Content description	Unique description of content for search purposes
User ID	Allows for the tracking of usage
Authentication	Determines an individual's usage rights
Fingerprinting/Watermarking	Complementary tools allowing the originator to identify unauthorised use
Payment	Billing and payment mechanism

The precise choice of tools in any DRM solution will depend on the purpose of the DRM and the nature of the content that is to be protected. Tools used to protect documents differ from those used to protect a Hollywood movie. For instance, Adobe Acrobat is software that utilises secure containers to set permissions on how protected documents can be used and distributed. Copy Generation Management System (CGMS) comprises rights expression languages that control the ability to duplicate DVDs, as do copy management rules for DAT and minidisk players which are managed by a Serial Copy Management System (SCMS). Similar tools underpin the Content Scramble System (CSS) in DVDs, which allows content owners to segregate markets geographically, by restricting usage of regionally-encoded DVDs to hardware specific to the regions.

In addition to the threat posed by physical piracy, the growth of broadband has led to a growing online market for content, which requires appropriate DRM technologies to provide rights protection. For example, Apple's successful online music retail service, i-Tunes, and AOL's Musicstore service have extensive DRM, exploiting user ID, authentication and billing tools. It is a form of DRM that prevents users of games consoles from also using them as conventional PCs. Tools such as watermarking and fingerprints are

⁸ For more detail, see Becker et al (2003) et al.

increasingly used by rights holders to trace illegal copies of content or to degrade the quality of the copied material.⁹

The ability of the content owner to attach usage instructions to the metadata sent with the content enables greater control over the exploitation of the content. The implications are obvious. For example, while it may be technically feasible in the future for video content to be transferred from a Digital Video Recorder to a portable device, such duplication would deprive content owners from appropriating the value of the transfer to the user and possibly the potential value from the onward distribution of its content. This lack of appropriability is an obstacle to the development of business models based on transferable content and creates a clamour for legal impediments on technologies that enable transfers. DRM technologies can enable appropriability and provide the content owner with greater incentives to support new technological platforms.

DRM also offers to reduce the transactions costs associated with the transfer of digital media. These typically include the costs of search, the costs of reaching a contractual agreement, monitoring exploitation of the acquired good and enforcing contractual terms, and together may be prohibitively large in some transactions. As transactions costs fall new business models become viable.

The welfare benefits arising from the introduction of new products and the viability of new forms of exchange may be substantial. For instance, in the case of the US telecommunications market, Hausman (1997) estimates that the welfare costs of Federal Communication Commission's failure to introduce two new telecom products was approximately \$2 billion.¹⁰ Amazon.com provides an example of the welfare impact of the emergence of a transformative entrant rather than a new product. Brynjolfsson, Hu and Smith (2003) estimate that the increase in consumer welfare resulting from the introduction of online sales of books was between \$731m and \$1.03bn for the year 2000 alone. More than the effect of competition on retail prices, the gains in welfare came from the reduced cost to the consumer of searching and locating previously hard to find titles, and access to recommendations based on their identified preferences.

In much the same way as Amazon.com, the transformative power of DRM, and its ability to support new pay TV business models for the exploitation of

⁹ See http://www.commsdesign.com/news/tech_beat/showArticle.jhtml?articleID=23901208 for a recent discussion of watermarking technologies.

¹⁰ Other works on the theme include Nevo (2003) and Petrin (2002)

existing content may lead to substantial welfare gains. For example, a Video-on-Demand service with time-restricted usage could be a substitute for video rental, while a download service with unrestricted time usage could be an alternative to DVD sales. The ability of a service provider to collate information on consumer preferences by monitoring usage could enable the retail service to make valuable recommendations about alternative content that the consumer may be interested in – potentially generating welfare gains in much in the same way as is done by Amazon.com.

3. Piracy

The early development of many DRM technologies has been driven by growing concerns about piracy. The ease of illegal access to intellectual property via the Internet has become a major issue for both policy makers and content creators. The inability of existing copyright legislation to prevent the mass downloading, distribution and physical copying of content has created the need for improved technological solutions. However, there is a growing fear that increased reliance on DRM technology to combat piracy compromises the principle of fair use under conventional copyright law and may ultimately act to the detriment of society in general (see Lessig (2004) and Samuelson (2003) for good illustrations of the arguments).

Many characteristics of digital media products make them particularly susceptible to illegal piracy.

- Digital content goods are non-rival in consumption.
- Without recourse to technological solutions, digital content is non-excludable.
- The incremental cost of making a copy is insignificant relative to the fixed costs of making the original.
- The cost of transporting and storing digital media products is negligible and declining with falling PC prices and Internet charges.
- The cost of detecting piracy and tracing illegal use over the Internet is often high relative to the commercial value of the content.

The cost structure, specifically the near-zero marginal cost of making copies, means that cost-based pricing is unlikely to recover the fixed costs of producing the first copy. In such environments, it may be rational to charge customers according to their individual willingness to pay. Prices would then differ across consumers. Not only is this discriminatory pricing commercially rational, in many cases it is also Pareto efficient. The sequential release of

content through time-specific windows – say, the cinematic release of a new movie, followed by its release on pay TV, followed by release on DVD, and so on, is a common form of inter-temporal price discrimination. This sequential release strategy, when supported by copyright law, grants the content creator monopoly rights over the exploitation of the content within each release window.

While this enables the content owner to set prices above marginal cost within each period, such pricing generates opportunities for profitable piracy. Illegal copying is hardly a new phenomenon, but digitalisation has made it possible to making near perfect quality copies at low cost. The Internet has enabled the low cost distribution of pirated content. The decentralised structure of the Internet makes it difficult to track usage of that pirated content, and since piracy often straddles many jurisdictions, it is costly to enforce legal action. The content creating industries face the risk that if pirated copies become a reasonable substitute for the legitimate version, many consumers will be reluctant to pay prices significantly above marginal cost. Rob and Waldfogel (2004) conducted a small-scale experiment to illustrate this: a sample of students reduced their expenditure on legitimate CDs from \$126 per capita to \$100 when offered the possibility of free downloads. If the results of this small scale experiment can be legitimately extrapolated, the production system underpinned by exclusion and price discrimination will no longer be sustainable. In the context of music file sharing this fear has been expressed by the Committee on Intellectual Property Rights and the Emerging Information Infrastructure (2000): *“For publishers and authors, the question is, how many copies of the work will be sold (or licensed) if networks make possible planet-wide access? Their nightmare is that the number is one.”*

Identifying the cost to the content industries of illegal piracy of its intellectual property is not a simple task. At one level the download of an illegal film is a lost legitimate sale, so that the cost of the estimated 600,000 movies illegally downloaded each day in the US could be valued in terms of lost revenue at the box office or in terms of lost DVD sales (Deloitte (2004)). However the analysis is not so simple. Not everyone who purchases or downloads an illegal copy would have bought a full-priced legitimate copy, so that valuing every lost sale at full price overstates the loss. Additionally, not all sales might have been lost. Sometimes consumers sample music by downloading a track illegally, and subsequently purchase a legitimate copy of the album. Hence it is not easy to quantify the cost of piracy to content owners.¹¹

¹¹ Deloitte (2004) estimate that the lost profits are in the range of \$6bn to \$7.5bn per year. Henning (2004) develops an econometric model to identify the variables that determine the

While piracy erodes the revenue of content owners, measurement of the impact of piracy on overall economic welfare is not easy. Against the loss of producer welfare, there is the possibility of an offsetting increase in consumer welfare. Piracy lowers average prices, by enabling consumers the option to switch to a cheaper (although possibly inferior) version of the product. Piracy also extends the market: some consumers who were unable or unwilling to buy products at the full retail price can buy the cheaper (albeit illegal) pirated version

And while piracy usually hurts producers, sometimes the loss may be partially or substantially mitigated through indirect appropriation of the value of pirated content. Besen (1987) provides an interesting example. A television channel may be able to charge higher fees for advertising if it can show that its content is being pirated: the additional viewer base may increase the attractiveness of the channel to advertisers. It may even be that the piracy-driven increases in advertising revenue can more than compensate for the loss in carriage or subscription fees from piracy. Liebowitz (1985, 2002) argues that publishers of periodicals realise that library copies of their content may be vulnerable to piracy through photocopying, but may be able to extract some surplus through higher charges for institutional subscriptions than for individual subscriptions. The libraries themselves may recover some of this through profitable pricing of photocopying. Similarly, the application of a levy on blank recordable media like tapes, CDs and DVDs may be viewed as a means of indirect appropriation. In these scenarios the content creator can extract some of the surplus from the act of piracy, provided that the pirate can be identified and a mechanism for transfer can be imposed. If so, piracy underpins a form of price discrimination, and producer surplus may be higher than what is achievable in the absence of piracy. Although nice in theory, the inability to identify the pirate, establish the value of the copies that the pirate will produce and enforce the higher price makes indirect appropriation impractical in most cases (Liebowitz (2000)).

The introduction of dynamic considerations provides for additional complications. Even when piracy of software results in lost revenue to producers, there may be offsetting benefits. This may happen if, for instance, there is an element of lock-in to a particular piece of software or a network effect surrounding the adoption of a particular standard. Students who use

likelihood of piracy for a given movie. The model estimates the cost of piracy to the German film industry at \$153m in 2003. With extrapolation, this would suggest a cost of \$3.6bn for the film industry worldwide. The gap between the two above estimates illustrates the difficulty in accurately estimating the cost of piracy to the film industry.

pirated copies of software are more likely to pay for newer versions of that software (as well as complementary products) later in life, if only because they are more familiar with its routines. Moreover, as future generations of the software are developed and marketed, the illegal copies of the earlier generation may serve to lock consumers into legitimate purchases of later generations. Similarly, pirated copies of an earlier (later) instalment of a part-work, for example *Star Wars* or *Lord of the Rings* could serve to increase sales of legitimate copies of later (earlier) episodes. Ultimately, the net effects of piracy are context specific.

Traditionally, content owners have relied on a mix of technical and non-technical means to minimise the adverse effects of piracy, including:

- use of copyright law to deter piracy;
- raising the costs of piracy, by making it expensive to replicate quality (Novos and Waldman (1987));
- bundling the IP asset with a complementary product that cannot easily be copied (Novos and Waldman (1987) and Besen (1987));
- lowering the potential return to piracy by offering discounted versions to compete with pirates on price and manipulation of the release window strategy.

Going forward, technical solutions to piracy are likely to come to the fore. DRM is considered a key technical component for anti-piracy efforts, but as with any software it is susceptible to hacking. This is recognised in the drafting of the EC Copyright Directive (2001), which prohibits measures designed to circumvent technical protections measures such as DRM.¹² This is crucial for rights owners. Not only is the intellectual property protected through the power of the courts, but the technical measures deployed by rights owners to protect the intellectual property are also protected.

The scope of protection provided to content owners through DRM differs from that provided by copyright law. While copyright laws accord a degree of monopoly control over content, exceptions to the law are normally incorporated to remedy the potential for abuse of this monopoly award and to protect social interests. The doctrine of first sale (also known as the principle of exhaustion) serves to limit the exclusive right to distribution of the content. A consumer who purchases a legitimate item is entitled to sell, rent (in certain circumstances only), donate or share that item with others. In so doing, the market power of the copyright owner is constrained by what amounts to a

¹² Article 6 of the Directive provides the framework for the protection of such measures against acts of circumvention.

second hand market. Secondly, what is generally known as the fair use doctrine enables certain classes of users to exploit the copyright protected content without the owner's consent, where the specified usage is deemed to be in the public interest. Although the doctrine is peculiar to US copyright law, it is mirrored in the laws of other territories.

In contrast, DRM is a technical means of exclusion and requires explicit action from copyright owners before consumers can take advantage of the traditional exceptions provided for in law. DRM allows the owner to specify usage rules for each piece of protected content, restricting exploitation to a specified set of uses, whether it be read only, store for a certain time, edit, distribute a specified number of times or view only on specific devices.

Indeed there are some who believe that the roll-out of DRM technologies grants copyright owners too much control over how their content is exploited and consumed (Samuleson (2003)). These concerns are not new.¹³ However, as discussed above it is not clear that complete exclusion is always in the interests of copyright owners: limited piracy may be consistent with commercial advantage. As Varian (1998) notes, the objective of content owners is to maximise the value of their content, not to maximise the protection. It is not therefore certain that the fears of many consumer lobbyists are justified.¹⁴

While the European Commission has aimed to providing a comprehensive framework of protection for technical measures such as DRM, consumer interest groups have continued to challenge the scope and nature of the protection. As Table 2 shows, the legal situation remains uncertain.

Looking ahead, content creators are increasingly likely to support the use of DRM technologies as a means of content protection. The greater technical ability to protect content through DRM technologies may also enable content creators to manage more sophisticated windowing strategies, to introduce pricing structures that are more flexible and tailored to individual consumer's demand. Flexible pricing and price discrimination will allow content owners

¹³ The most significant decision in this regard is perhaps that which provided legal support for Sony's introduction of the Video Cassette Recorder, which opined that the time-shifting enabled by the VCR amounted to fair use and therefore was not in breach of copyright law. (*Sony Corp. v. Universal City Studios* 464 U.S. 417 (1984)).

¹⁴ Additionally, the EU Copyright Directive reflects the view that parallel legislation on fair use and other exceptions will protect consumers. However, where voluntary measures by rights holders are deemed to be insufficient then the Directive empowers Member States to take remedial action, subject to the requirements of national legislation on fair use.

to offer prices that more closely reflect individual consumers' demand than is feasible today. This may support pricing to certain consumers that reduces the margin between the legitimate and the pirated product. The increase in output that may also be facilitated may go some way to addressing concerns of consumer groups about access rights.

Table 2. DRM and the Law: Some recent ambiguities

Country	Issue Summary
UK	The High Court held that modification chips allowing users to defeat DRM protections on Sony video game cartridges (which specify regional coding) were in violation of the Copyright Directive. ¹⁵
Spain	A court upheld the consumers' right to hack the same regional coding protections. ¹⁶
France	The courts have forced EMI to withdraw copy-protected CDs from shops in response to complaints that the copy protection DRM prevented consumers from exercising the right to make private copies (Tribunal de Grande Instance de Nanterre (2003)). However, in another case the court refused to uphold a challenge to the right of a film studio to incorporate DRM protections on the DVD of <i>Mulholland Drive</i> (France Tribunal Paris (2004))
Norway	In perhaps the most famous case, courts upheld the right of consumers to hack CSS, the DRM protection of DVDs, using DeCSS ¹⁷
Belgium	A court ruled in May 2004 that consumers had no right to make personal copies of copyright protected material so had no right to hack DRM protections (Tribunal Bruxelles (2004))

¹⁵ See <http://news.zdnet.co.uk/hardware/emergingtech/0,39020357,39161307,00.htm>.

¹⁶ See <http://www.geek.com/news/geeknews/2004Jul/bga20040723026148.htm>.

¹⁷ See <http://www.linux-magazine.com/issue/28/WorldNews.pdf>

4. Intermediaries: Management of Digital Rights

The promise of security and control over how content is exploited across the supply chain is likely to have a significant impact on how content owners engage with consumers. While the public policy debate has focused on the issues of intellectual property and piracy in the recent past, the emergence of new business models for delivery of content will shift the policy debate towards regulatory and competition policy challenges arising from the new technologies. In particular the consequences of the new developments for the intermediaries in the supply chain will come under considerable focus.

Content creators are heterogeneous in their approach to the distribution and retailing of their content. While some control the process end-to-end (these may be viewed as conventional business-to-consumer operations), others merely license their content to others for distribution and retail (and thus are business-to-business operations). Traditional, free-to-air producers/broadcasters, such as the UK's BBC and ITV, are representative of the former model, while independent producers and film studios sit within the latter group. The different market models may reflect differences in the value of the content being distributed relative to the benefits in each case of using intermediaries to distribute the content.¹⁸ Where the transactions costs involved in using intermediaries are high relative to the value of the content then the end-to-end model will typically be favoured.

Amazon and iTunes provide helpful illustrations of the role to be played by intermediaries in digital markets. They exist as a result of imperfections in the market for the delivery of digital products and services, but have been able to establish a presence in the value chain as a result of entry barriers falling due to technology and DRM. Although they operate in the Internet space, they may provide a useful precursor of the role of intermediaries in the broader digital chain and for pay TV in particular.

Bailey and Bakos (1997) identify the four major functions of an intermediary as (1) the aggregation of supply and demand; (2) providing trust to transacting parties; (3) market making; and (4) matching buyers and sellers. In the context of pay TV, the typical vertically integrated platform operator can be seen to be offering bundles of those functions. Their intermediation services include the retailing of channel bundles (aggregation of supply and demand), the supply of conditional access and subscriber management

¹⁸ The determining variables in deciding whether to rely on intermediaries or to internalise the supply chain include transactions costs, scale and scope efficiencies, as well as asset-specific efficiencies.

(provision of trust) and the provision of electronic programme guides (aggregation and matching).

With the increasing penetration of both digital TV and broadband Internet, the recent interest in the economics of the digital supply chain is not surprising. In many of the supply chains studied in the recent literature the intermediary provides a matching role, putting consumers in touch with suppliers. Bhargava and Choudhary (2004) explain the network effects at work in the supply of aggregation services by “infomediaries”.¹⁹ They use the example of Expedia.com, which allows consumers to browse and book holidays from a selection of suppliers, to explain how the number of buyers using a service will increase as the number of suppliers increases. As they note, the “intensity of the aggregation benefit provided by an intermediary to buyers (sellers) is determined by market characteristics and the mix of information processing features made available to buyers (sellers).” A similar network effect exists in the provision of electronic programme guides in pay TV and in the bundling of pay TV channels into retail packages. In pay TV the platform operators will typically not provide a matching role, but will act as a wholesaler, in effect managing the transaction with the consumer on behalf of the content owner.

The role played by platform operators in providing intermediate services will come under pressure as a result of the roll-out of DRM solutions in the pay TV supply chain. This pressure may be increased as the ability to deliver Internet- protocol based TV services over broadband lowers entry barriers at the intermediate levels. In such an environment, the aggregation benefits could conceivably be supplied by the technology as well as by new entrants such as search engines, rather than by the existing players. However, for the purposes of this paper we concentrate on the impact on the intermediate markets of a successful roll-out of DRM solutions. Table 3 summarises how DRM solutions can substitute for functions that are currently provided by the platform operators.

¹⁹ See also Kaplan and Sawhney (2000), who explore the role of electronic intermediaries in the aggregation of demand and supply.

Table 3. DRM substitution for intermediary functions

Role played by intermediary	In what way is DRM a substitute?
Provide transactional trust for consumer and producer	DRM may be used to unlock content only after payment and to extract payment only when the content has been supplied
Record transactional data	DRM can allow the content owner to monitor content exploitation
Protection against IP theft	Access can be restricted only to those who pay
Setting boundaries on fair use	DRM provides a technical replacement for legal boundaries on fair use exploitation

In effect, DRM may enable content creators to do without some of functions currently supplied by intermediaries. However, this potential disintermediation does not necessarily mean the content creators can do without intermediaries altogether. In the pay TV chain, the intermediaries shoulder the risks involved in dealing with end customers. Even in the pay-per-view window, perhaps the TV window where the consumers is “closest” to the content creator, the platform operators manage the risks involved in both retailing the product to consumers (subscription management, bill processing and marketing) and in licensing the content (estimating effective demand). For this, intermediaries such as BSkyB are well rewarded.²⁰ Where DRM can fulfill some functions of intermediaries – in particular the authentication of users/subscribers and the management of transactions across platforms – there is the potential for content owners to integrate down the supply chain to the relevant stages. However, the scope for the complete displacement of intermediaries is limited:

- **Brand awareness.** With the exception perhaps of Disney, perhaps there are few content companies with an established brand that consumers can identify with a particular genre of content. Content creators would have to invest heavily in brand awareness.
- **Business model.** As most content creators operate as business-to-business entities, downstream integration would require radical restructuring of their operations, including investment in consumer management at the retail level.

²⁰ BSkyB reported profits of £154 million for the six months to December 2004.

- **Aggregation.** Although advanced search techniques may reduce the value-added to consumers of aggregation undertaken by platform operators, the platform operator does provide scale and scope economies in the supply of content.

In short, digitalisation, underpinned by DRM, will not automatically lead to the elimination of intermediaries in the pay TV supply chain. We are more likely to see a change in the economics of the supply chain at the intermediate levels. Some functions currently provided by the traditional intermediaries may no longer be necessary in the delivery of many of the new services. In areas such as video on demand (and its variants) there may be less need to package content into channels as consumers will be able to search for content on a title by title basis or by genre. The lowering of entry barriers in the intermediate markets, as a result of the potential for unbundling of services, means that there is scope for independent niche intermediaries, to compete with established players who will continue to provide bundled service. For an illustration of what the future market structure could look like, consider Movielink, a joint venture between some leading Hollywood film studios.²¹ Movielink offers broadband consumers the opportunity to download movies to their home PC or TV, either for immediate view or for storage. Search costs are low as consumers can select directly from a wide range offered by the studios involved in the joint venture. In effect, Movielink has enabled the studios to bypass the established intermediaries in a particular segment of the home movie viewing market. As the new intermediaries at the aggregation stage can expect to get regulatory support for gaining access to electronic programme guides, consumer search costs need not increase much as new players arrive in this market. Similarly, where content can be grouped by genre, new players can easily package their content in a well-defined offering.

Where the genre is hard to define, leading to higher search costs, or where the transactions costs involved in managing multiple intermediaries are large relative to the value of the content, the traditional intermediaries are likely to retain some advantage in packaging content into discrete channels. Here content owners would continue to benefit from the bundled service provided by intermediaries. Even here, the potential competition from the new entrants is likely to provide content companies with greater leverage with intermediaries.

Where content is valued across multiple platforms, there may be greater scope for content creators to assume some intermediation functions using DRM. For example, consumers may wish to download a movie onto a DVR

²¹ www.movielink.com

and then transfer that to other devices. In such contexts it may be simpler to use multi-platform DRM enabling a single user authentication and billing system than transacting with multiple, platform-specific intermediaries.

5. Implications for regulatory and competition policy

Successful roll-out of DRM solutions in the pay TV supply chain is likely to transform the economics of pay TV. If so, it would require a change to the traditional case for regulatory intervention to constrain the potential for the abuse of market power in this market. We focus on two underlying features of DRM in this context.²² Firstly, DRM provides a channel for secure, delivery of content through open distribution networks, and may allow content owners to bypass the existing pay TV channels built around proprietary platforms. More generally, the creation of an alternative delivery channel will alter the distribution of market power in the supply chain. Of course, the outcome will also depend on the market structure that emerges in the DRM technologies sector. Secondly, the increasing use of DRM in the delivery of content will have significant implications for the nature of pricing in these markets by altering the scope for price discrimination. We look at each of these issues in turn.

a. DRM and Market Power in Pay TV

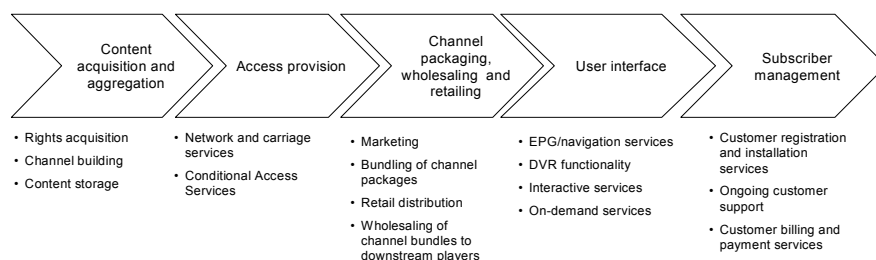


Diagram 1. Illustration of a Hypothetical Digital Pay TV Supply Chain

²² Issues such as standardization, leverage of market power from related markets and patent pooling are beyond the scope of this paper, but are nonetheless important areas for research.

Diagram 1 provides a simple illustration of a digital pay TV supply chain. The key regulatory bottlenecks in the current supply chain are well known and have been subject to regulatory investigation (Competition Commission (1999) and OFT (2002)) and to academic scrutiny (Cowie and Williams (1997)). The market power of the platform operators is allegedly built around their exclusive access to valuable content through long-term contracts for premium sport and blockbuster movies. Vertical integration across proprietary conditional access services has also generated regulatory concern. Despite several attempts to moderate the market power of the platform operators, using both *ex ante* regulation (of conditional access) and *ex post* competition law (in cases relating to access to and the licensing of sports and movie rights), the market power of large platform operators remains virtually intact, with little sign of effective potential entry.

What are the sources of market power of the current pay TV platform operators? Pay TV operation requires considerable fixed investment to set up the technical infrastructure for programme delivery. Further, investment in editorial infrastructure is necessary to aggregate licensed content into channels and to develop own content. The first category of expenditure involves economies of scale while the latter involves economies of scope. Such a cost structure – and the fact that many of the costs are in the nature of sunk costs – creates a tendency towards concentration. Consider the relatively concentrated nature of most pay TV markets in Europe. Not surprising, even in countries with some competition between platform operators, there is considerable commercial pressure for consolidation.²³ The scope for competitive entry in this sector is limited: entry usually requires an operator-specific decoding device (the set-top box), which results in significant consumer switching costs and some element of lock-in.

The diffusion of DRM solutions may challenge the market power of pay TV operators, and even ease some of the regulatory and competition policy concerns. DRM can enable the secure and exclusive delivery of content through open networks, and thereby obviate the need for proprietary networks built around encryption-based hardware. If DRM allows content owners to bypass conditional access, it is likely to weaken the market power of the current vertically integrated platform operators and strengthen the bargaining position of the upstream content owners/creators in the wholesale market for their content and channels.

²³ As in Italy, Spain and France.

To understand this, consider the market for the licensing of content rights for pay TV. Due to the relatively small number of buyers and sellers in this market, it is not a competitive market in the textbook sense.²⁴ If there are multiple pay TV operators vying for a license, the content owner may choose to auction the rights. If there is only one pay TV operator that can credibly acquire the rights from a content owner – that is, if there is a bilateral monopoly – the terms of the license will be determined through negotiation between the licensor and licensee. While each party may prefer an outcome that maximises its share of the profit from the commercial exploitation of content, the outcome of the bargaining process would depend naturally on their relative bargaining strengths. For instance, if their bargaining strengths are equivalent, the agreed upon price will be mid-way between their individual positions in the event of disagreement. Of course, the outcome may be sensitive to the availability of outside options. For each player, the outside option refers to what player expects to get if they fall back on alternative opportunities in the event of disagreement in the bargaining process. In general, the availability of more valuable outside options is likely to improve a player's payoff (and certainly cannot lower it) within the bargaining process.²⁵

A content owner is naturally attracted to the dominant pay TV platform/channel. The dominant channel may have considerable advantage over its rivals due to its larger subscriber base, its superior knowledge of downstream demand or its ability to package and promote the content better than other channels. The dominant operator can exploit these advantages and the related advertising potential to maximise the surplus to be shared between the licensor and licensee. A content owner's outside options may be quite limited if rival pay TV operators have a small subscriber base and if there are no other channels for distribution of content. In contrast, from the dominant channel/platform operator's perspective there are few forms of content for which there are no credible substitutes. Typically they have stronger outside options. This asymmetry of outside options implies that the bargaining outcome is likely to be favourable to the pay TV operator. It is in

²⁴ Indeed, in extreme cases, the standard model of monopsony (monopoly) may be more appropriate. If there is only one credible content licensee (licensor), the single pay TV channel (content supplier) would set the price for the content in way that maximises its surplus.

²⁵ The 'split-the-difference' solution of Nash Bargaining assigns to each player a payoff equal to his disagreement point plus a share of the surplus that remains after disagreement payoffs have been made. If outside options are viewed as disagreement points, they affect the Nash bargaining outcome directly. In contrast, the outside option principle of strategic bargaining argues that outside options merely constrain the set of possible solutions. If so, an outside option affects the outcome only if it enables a player to improve on the outcome in the absence of that option. For a discussion see Binmore et al (1989), Muthoo (1999) and Osborne and Rubinstein (1990).

these circumstances that competition authorities, content owners and independent channels have raised concerns about the behaviour of the vertically integrated platform operators, alleging abuse of market power.

The roll out of DRM can potentially alter the bargaining outcome. Content owners can threaten to use DRM technologies to distribute the content directly to their consumers and, in the process, bypass the primary bottlenecks and intermediary services of the pay TV platforms. Of course new distribution channels will need to reach agreements with the vertically integrated platform operator to secure access to the programme guide and to other technical access services for effective delivery of content. Over time, there is scope for unbundling of such intermediary services, so that DRM-enabled delivery will become a credible alternative. In terms of bargaining theory, DRM increases the outside option for the content owners. Where the outside option is credibly more profitable than the existing outcome for content owners, the emergence of this better outside option should enable content owners to improve on their bargain relative to pay TV platform operators. This is not to say that content owners will necessarily exploit the new outside options. Rather the increased leverage that the new options provide can allow them to secure a greater share of the rent derived from the marketing their content via existing platforms.

The recent history of auctions of television rights for Football Association Premier League (FAPL) matches suggests how the balance of bargaining power might shift. The FAPL has tried to suggest that it may launch its own channel if it cannot secure favourable terms from BSkyB²⁶, but the threat has never been credible. It is undermined by the fact that a channel owned by the FAPL would have to negotiate carriage with BSkyB, as well as access to the intermediary services provided by BSkyB and its related companies, and BSkyB would be in a strong position to appropriate the rents at that stage. If so, FAPL may be in no better position than if they had agreed to license the rights to BSkyB in the first place. However if FAPL is able to license DRM solutions from a party other than BSkyB, the expected returns to FAPL from launching their own channel would be higher, and this enhanced outside option makes FAPL's threat to launch their own channel more credible. Similarly, film producers, particularly the major Hollywood studios, would benefit from having the outside option of retaining their own rights and developing their own distribution services as an alternative to licensing to a

²⁶ See for example, http://www.advanced-television.com/2002/June10_17.html. Peter Scudamore, CEO of the FAPL in 2002, said "Next time round, rather than sell our rights to a broadcaster for them to sell on to households, the Premier League may do a deal direct with consumers, so that you can ring up [the] PL and say "I'd like to buy your Premier League channel with all the games on it for X pounds a month."

downstream channel operators. Indeed, Movielink is an early example of how this might pan out.

What are the implications of this for regulatory and competition policy? If the threat of DRM-enabled distribution channels is able to curtail the market power of the dominant pay TV platform operators, it would ease some of the current regulatory concerns. However, there are some caveats. The dominant position of pay TV operators may only partly be based on conditional access. It could also derive from their production and editorial functions, say those associated with the packaging of content into attractive channels that match subscriber preferences, or their reputation for innovative content production. While DRM can level the playing field in secure delivery of content, superiority in the editorial or production infrastructure will preserve some advantage for the current pay TV operators. In such circumstances, DRM will enable only limited displacement of the pay TV operators, more so for some categories of content than others. Regulatory policy may then focus on whether retention of these advantages requires regulatory oversight.

It is possible that the greater deployment of DRM will only shift market power from pay TV operators to the upstream content owners/creators, without affecting the overall degree of monopoly power. In many markets the current regulatory concern has been with the arrangements / market forms by which rights to content are transferred from content creators to pay TV broadcasters. If monopoly power migrates upstream, regulatory oversight will need to make an appropriate transition itself, to see if the growing dominance upstream is against the public interest.

Further, it is possible that some market power might shift to the technology vendors that came to control the dominant DRM standard(s). It is conceivable that slight market advantages – real or perceived – could cause the market for DRM applications to tip in favour of one or two proprietary standards. If so, one bottleneck technology (proprietary DRM technology) would end up replacing another (proprietary platforms of pay TV channels), with no overall improvement from the consumers' point of view.

This scenario cannot be ruled out but is not a foregone conclusion. The outcome may well depend on many technological and strategic considerations. Entry in the DRM applications market might be easier than launching a pay TV platform, so that multiple DRM standards could potentially coexist in a competitive environment. Heterogeneity in patterns of demand for DRM may create scope for distinct categories of DRM applications. As different types of content are susceptible to differing degrees of piracy, content owners will seek different levels of protection. For some,

current encryption technologies provide sufficient protection, while others, like blockbuster movies, might prefer persistent end-to-end protection. For enterprise DRM (DRM designed to protect documents when there is shared access within the enterprise), methods akin to using faint type to make photocopying difficult might suffice. It is plausible that the heterogeneity in demand will sustain a variety of DRM standards in the long run. If so, any sub-market within a spectrum of protection technologies might be contestable.

The degree of interoperability between rival DRM applications will also affect the effective competition in this market. There will be pressure from the content industry for many of the different DRM solutions to be interoperable. Re-versioning content for different distribution platforms increases the costs of distribution, so that greater interoperability in DRM systems will allow them to reach more consumers at any given cost. The incentives for DRM operators to build in interoperability are more complicated. For one, interoperability increases the intensity of price competition between rival standards, so that restricting the degree of interoperability might be attractive.

Overall while it is conceivable that the market for DRM standards may be concentrated, the heterogeneity of demand and the desire for interoperability of reception devices from the perspective of content suppliers is likely to restrain this tendency. Competition policy may need to maximise the possibility of a competitive outcome, at least in terms of pricing of DRM technologies. Regulatory policy may also need to guard against the possibility that existing pay TV operators may themselves acquire interests in DRM /DRM vendors in order to prevent the dilution of their market power.

b. DRM, Pricing of Content and Consumer Welfare

Pricing structures for premium content, particularly movies, display considerable price discrimination. This is hardly surprising. Given the technology of generating content – high fixed costs of producing the first copy, and near zero cost of subsequent copies – there is little reason for prices to be related to the marginal cost of production. Once that anchor is lost, pricing of content is likely to be related to consumers' willingness to pay and thus may well involve different prices for different consumers.

For price discrimination to work, a seller must be able to sort customers (that is, distinguish those who are willing to pay a high price from others who are not) and to segregate the market (so that those who are offered low prices cannot transfer the good or service to others facing higher prices). We argue

that DRM technologies potentially could enhance content owners' ability to sort customers and to segregate markets, thereby increasing the scope and extent of price discrimination. DRM is likely to improve the precision of conventional price-discrimination strategies but also enable newer forms of price discrimination. Indeed it could be argued that the real impetus for DRM roll out comes not from concern about piracy, but from its potential for enhancing the value of intellectual property rights through more aggressive price discrimination.

A common strategy in the market for cultural content involves inter-temporal price discrimination (Caves (2001)). This relies on a simple attribute, impatience, to sort customers. Under the plausible assumption that those who are eager to watch a movie sooner are willing to pay more than those who are prepared to wait,²⁷ the revenue-maximising price structure displays a trajectory with prices falling over time. For instance, a movie is first released in theatres; with some lag it become available on a Pay-Per-View basis and/or DVDs. Next it may be released on a pay TV channel and ultimately shown on free TV. The staggered release of the movie through a sequence of windows achieves a price trajectory that has prices falling as waiting time to access the content increases. Consumer expectations matter in this context. If consumers thought that the content owners could not commit credibly to waiting six months after the theatrical release to releasing the DVD version, they might be less willing to pay the high price of the cinema version. The durability of content matters too. Blockbuster movies are generally regarded as more durable than sporting events, where the value to the consumer drops dramatically once the outcome is known (Cowie and Williams (1997)). Further, the segregation of the market into different windows is feasible only to the extent that leakage or piracy from one window does not undermine the revenue stream from subsequent windows. For instance, pirated copies created during the theatrical release would erode the revenue potential of the DVD and pay-per-view releases. Thus the optimal windowing strategy – for instance, the geographic extent and duration of release in each window and the price charged for that release – depends naturally on a variety of practical commercial considerations.

How does DRM improve the ability to charge discriminatory prices? Current windowing strategies allow only a handful of discrete windows, based on the delivery platforms (theatres, DVD, pay-per-view, etc).²⁸ DRM

²⁷ The assumption that those who are most impatient are also those who place the highest value on the content is not always valid.

²⁸ The gap that must be left between the windows to support the sequencing model has a cost in that the momentum of the movie's marketing is stalled at each stage. This may reduce the degree of self-generating publicity and require increased marketing spend.

can enable a finer partition of the access intervals – for instance, prices could be a continuous function of time elapsed since first release. By reducing the risk of leakage across windows, DRM can better segregate the different markets and can support higher prices in some windows.²⁹ Both of these are likely to enhance revenue.

Furthermore, DRM may allow the seller to discriminate access in dimensions other than just waiting time. In particular, where it is difficult to segment consumers according to exogenous characteristics, endogenous characteristics, such as the quality of the product being sold may be used to discriminate between consumers (Varian (1997)). By pricing the different quality of products appropriately consumers can be incentivised to self-select the price- quality bundle that reflects their willingness to pay. In this way, quality discrimination can be used to supplement price discrimination. A seller could discriminate between consumers who would like to watch a movie just once and those who are willing to pay for repeated viewings. A seller could restrict access by time of day or day of the week to distinguish between low-income students and busy executives. Similarly, a movie could be priced to discriminate between viewing technologies, with viewing in an HDTV format used as a proxy for a higher willingness to pay than viewing in standard definition. In terms of the conventional typology of price discrimination, a significant proportion of the current approach can be viewed as analogous to third-degree price discrimination or group pricing: observably different groups of people are charged prices based on group characteristics like demand elasticity. DRM may replace this with a richer menu of carefully constructed consumption bundles, forcing individuals to select a bundle most suited to their privately known preferences.

At the same time, the ability of DRM technologies to monitor use may allow sellers to build better profiles of their consumers by tracking their past consumption patterns. While this may well conflict with privacy rules, it allows sellers to gain a better understanding of an individual's willingness to pay, and thus sort its customer more profitably for future transactions. Amazon.com bases its approach to making recommendations to users on its ability to track past consumption choices. It is not inconceivable that a similar approach could be taken to tracking consumption of audiovisual content within a pay TV environment. To the extent that prices can be conditioned on

²⁹ To some extent the possibility of piracy is undermining windowing, as content released in one window is illegally transferred to consumers in ways that compromise the profitability of other windows. A rational reaction to this would be to increase prices in the early windows to compensate for compromised revenue in later windows, and possibly to compress the windows to reduce leakage of revenue streams (which we are seeing in regions where piracy is a major concern, such as Russia).

the history of consumption pattern, DRM may entail a step closer to the theoretical ideal for price discrimination, where every unit that a customer buys is charged at a price close to his willingness to pay.

What are the welfare implications of these changes? First-degree price discrimination generally enhances efficiency. Even though some consumers end up paying higher prices than they would under non-discriminatory pricing, the expansion of the market by enabling sales to previously excluded consumers is likely to be welfare-improving.

To understand this, imagine that consumers differ in more than one characteristic: their willingness to pay (one consumer is willing to pay more to see a James Bond movie than another) and their impatience (both would like to see the movie earlier rather than later, but one consumer is more impatient than the other). Windowing strategies exploit the typical correlation between these attributes, by selling at high prices to impatient consumers and low prices to patient ones. DRM could enable finer sorting of consumers even when these characteristics are not correlated. It could make the movie available to all consumers at an early stage, matching individual prices to their individual willing to pay, thereby increasing welfare. DRM succeeds here because supplying the movie cheaply to this person does not necessarily interfere with charging a higher price to other consumers. From the perspective of competition authorities concerned about the effects on the potential for competition of the exclusive contracts necessitated by inter-temporal price discrimination the alternative forms of price discrimination enabled by DRM may offer a more attractive market-driven outcome.

Even though there are strong theoretical arguments that suggest that better forms of price discrimination can *potentially* be welfare improving, it must be recognised that it generates considerable antipathy from consumers. In some case, this even translates into calls for regulatory intervention. Groups such as the Electronic Frontier Foundation³⁰ have been particularly active in this regard, raising concerns about the potential for the breach of privacy rules, infringement of the consumers' alleged right of fair use and the potential for content companies to constrain consumers use of content unfairly (Electronic Frontier Foundation (2004)). What this activity illustrates is that not all parties in the supply chain agree that DRM provides the potential for an improved consumer experience. The challenge faced by the content industry is more complicated than competing with freely available pirate copies.

³⁰ www.eff.org

6. Conclusions and Implications

Digital Rights Management may not be an entirely new concept, but the threat posed by piracy to the content industries, underpinned by the dramatic growth in broadband penetration, has brought debate on the technology and its implications to the fore. We have sought to look beyond the current debate on piracy to briefly predict how DRM may impact on business models in the content supply chain, in particular how DRM may potentially lead to a refinement of the traditional, rather clunky, windows-based content release model. What is clear is that DRM can cause an upheaval in the economics of the supply chain and a change in the way in which consumers access content, which may affect the way in which it is regulated. It remains to be seen how the incumbent platform operators will respond, but DRM does have the potential to achieve what competition authorities and regulators have thus far been unable to do, namely to reduce the market power of the vertically integrated pay TV platform operators and reduce the barriers to entry at key stages in the supply chain. The extent to which the pay TV bottleneck will simply be replaced by a DRM bottleneck remains to be seen, but the regulatory community will need to retain a close eye on this aspect of development.

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