

Chapter 21

Copy Protection Management

21.1 Development of Copyright for Information Goods

Information goods satisfy information needs. Whoever wants to make money by selling information goods has a great interest in the consumer acquiring his desired information in the designated fashion, and not just taking it without supervision: music providers want to sell their CDs or downloads, publishers their books and magazines and the film industry their films, on DVD or in the cinema. Unpaid copying is the *bête noire* of all these kinds of providers. The most common term is piracy, which is incorrect from a legal point of view as no violence is used by the copier's appropriation of an information good. It seems more appropriate to speak of bootlegging.

If we look back in history, we can see that from the ancient world up until the middle ages, it was common practice to take information that one had acquired and alter or develop it further at one's guise. A document or book wasn't allowed to be stolen in those days, but its content was not subject to protection. The invention of the printing press in the mid-15th century then made it relatively easy to create larger numbers of copies. This facilitated the distribution of information goods, but created financial problems for the printers, who were the providers. They had to invest in their machinery, and in their authors' work, but could not be sure that their product would not be copied by others once it became available. In consequence, printers demanded protective rights, which they were also increasingly granted (Neubert, 2005, 9). Later, the authors were also granted ever-increasing rights to their intellectual work, which they could cede to a publisher for money (Gehring, 2008). At the beginning of the 18th century, the first modern copyright law was passed in England in the form of the Statute of Anne (Tallmo, 2003).

The development of copyright was and is a permanent balancing act between private and public interests. The creator of a work has an interest in its valorization on the market, as he wants to be (financially) compensated for its usage. The possible danger of a continued, gratuitous usage lies in the creator of a work losing interest in further production, which can lead to a shortage of information

goods. The public, on the other hand, has an interest in the most comprehensive and cheap—ideally free—distribution of a poem, painting or piece of music etc.

The legal protection of intellectual property was introduced for the benefit of the creator. It was adjusted and readjusted over time, with the tendency toward more strictness. A fundamental reason for this is due to the increasingly easier possibilities for reproducing information goods. Where it used to be a long and arduous process, for example, to copy books, the invention of the photocopier has made it extremely easy to reproduce documents. The copy problem has been exacerbated by the unending march of digitalization; copies of digital information goods can be made with no loss in quality, which leads to no differences between original and copy being distinguishable.

21.2 Digital Rights Management Systems (DRMS)

The providers of information goods are meeting the simplified means of reproduction in two ways. On the one hand, they have an interest in strengthening legal protection. This can be clearly recognized in the changes to German copyright and the industry associations' commentaries. The 1965 version still allowed the fashioning of a copy for private consumption. In the current version, however, a private copy is only allowed if no copy protection measures must be circumvented to create it. Nevertheless, industry lobbyists still regard copyright as not restrictive enough. Another approach to safeguarding one's rights is through patents. They play an important role as software patents, or patents of computer-implemented inventions, for example, in order to secure a product—or at least the parts of it that represent a technological innovation.

Apart from legal protection, information providers also have means of protecting their products technologically. These aim at preventing the unlawful use of information goods, making copying impossible or at least being able to track which original spawned which copies. The copy protection system Lenslok was used for game software as early as the 1980s, for example. Here the user had to enter a code, displayed on the screen in encrypted form, which could only be read through a special pair of glasses—which were part of the software package—before he could start playing. Another example is the analog copy protection method for VHS video systems developed by Macrovision in 1983. Here an interfering signal is added during recording, making further copies of the same tape impossible with devices that used the method.

If technological and legal components are used together in order to allow the copyright holder to manage the rights to his information goods, we speak of Digital Rights Management (DRM) (Picot, 2005, 3). This refers to

procedures that help protect rights to digital products in the same way that we are accustomed to from intellectual property tied to physical media. Copy and circulation must be tied to the copyright holder's, i.e. the content provider's, rules (Grimm, 2003, 97).

If we look back on the public-good problem of information goods, we can see quite clearly what the use of digital rights management is meant to achieve: it is supposed to make it possible to exclude unlawful usage and thus prevent the mutation of originally private goods to public goods. Information goods to be distributed commercially do not suffer from the problem of usage rivalry—in fact, they show positive network effects in most cases—but from the lack of excludability, which makes it very hard, or impossible even, for the copyright holder to make usage of his information good contingent upon the payment of a fee.

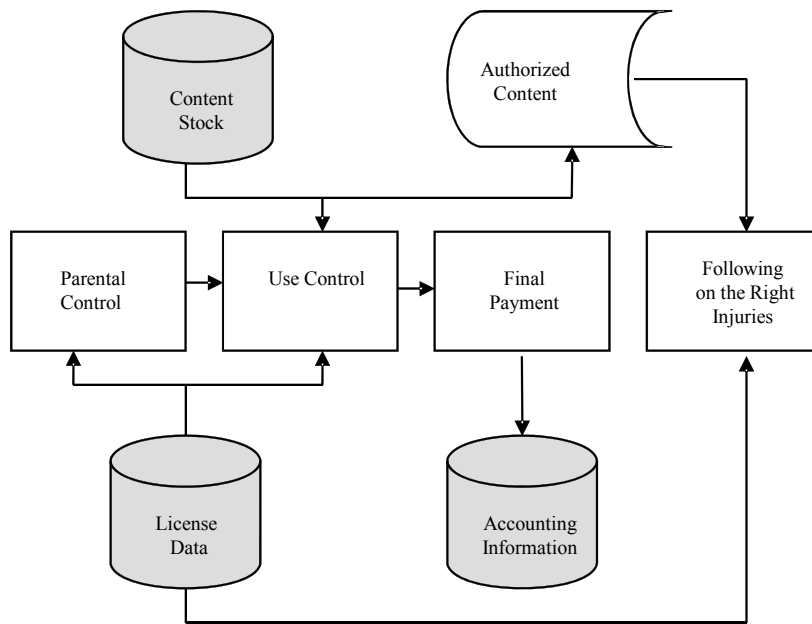


Figure 21.1: Architecture of DRM Systems. Source: Hess, 2005, 19.

In order to secure these rights, digital information goods require the simultaneous management of several functions (Hess et al., 2004a, 55). Information providers must pre-emptively control access (who is using?) and usage kind (how is it being used?), while at the same time—downstream of usage—being able to trace copyright infractions.

Complementary billing functions pave the way toward generating usage-dependent revenue (Hess, 2005, 19). If all these functions are technologically integrated in a system, we speak of Digital Rights Management Systems (DRMS).

Function	Short Description	Protection Technology	Application Examples
Access and usage control	Controls who has access to the content and how the content is being used.	<ul style="list-style-type: none"> • Encryption • Passwords • Product activation 	<ul style="list-style-type: none"> • Video DVDs (Content Scrambling System–CSS) • Online games • Software
Protecting authenticity and integrity	Securing the content via security tags that are inseparably connected to the information good.	Digital watermarks, digital fingerprints, digital signature	Photos, audio/video files Audio/video/text files
Identification via metadata	Allows the exact identification of an object such as digital content, copyright holder and user.	--	--
Rights Expression Language	Describes the kind and extent of access and usage rights as well as the necessary billing information in a machine-readable fashion.	Xtensible Rights Markup Language (XrML), Open Digital Rights Language (ODRL)	--
Copy recognition systems	Search engines that scour the networks for illegal copies.	Search engines, watermarks	Audio, video
Payment systems	Legitimization procedure for payment settlement.	User registration, credit card authentication	Online shops
Special hardware and software	Hardware and software in terminal devices used to protect digital information goods from unlawful usage.	Set-top boxes/ Smart cards Dongles Music management software	Pay-TV Software iTunes

Table 21.1: Functions and Protection Technologies of DRMS.

In order to be able to really control access and usage, the provider must consult the corresponding licensing data that define usage rights. To recognize copyright

infractions, it is necessary for information goods to contain identifications that should be unremovable, if possible, and for the billing procedure, the required user data must be available for identification and completing the payment process. There are different protection technologies available for each of these functions in a DRMS (Fetscherin & Schmid, 2003, 317; Fränkl & Karpf, 2004, 29 et seq.), an overview of which is provided in Table 21.1.

How a DRM system is built up in specific detail is shown in Figure 21.2 on the example of the Windows Media Player. This application is available for free, and is preinstalled on many Windows PCs. It serves to play video and audio files on one's computer. The Media Player's DRMS functionalities are contained within the Microsoft Media Rights Manager.

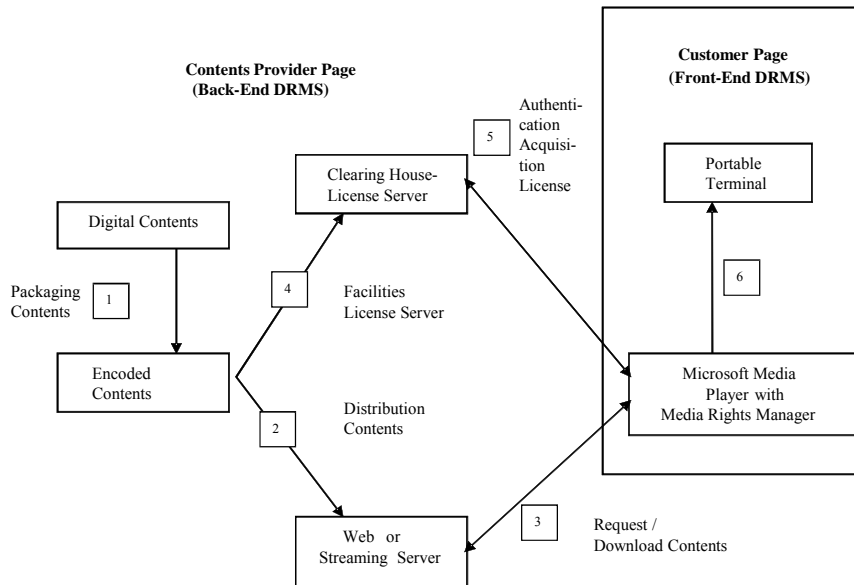


Figure 21.2: Architecture of Microsoft's Windows Media Player. Source: Schumann & Hess, 2006, 104, following Pruneda, 2003.

The functionality is as follows (Pruneda, 2003): In Step 1, the digital content is encrypted by the provider as a Windows Media File. Next (Step 2), the content is offered, securely, via web or streaming servers. In Step 3, the users can download the content. The user's software recognizes that the content is protected and establishes a connection with the licensing server (Step 4), through which the user (Step 5) can acquire a license for a fee. After the payment is received, the license is released and the user can play the content (Step 6). If the user sends the Media File

to another user via e-mail, the latter must buy his own license before being able to access the file.

21.3 Advantages and Disadvantages of DRMS

Now what advantages and disadvantages can be observed in the use of DRM systems? Generally, there is a fundamental difference between the interests of customers and those of the providers. Let us first consider the **customers**:

Consumers generally reject any control over their media consumption and request interoperable and user-friendly solutions, if anything (Hess et al., 2004a, 55).

It can be shown empirically that customers highly value the up-to-dateness and exclusivity of content. Willingness to pay is reduced strongly, though, if the transmission or usage entails technological difficulties (Fetscherin, 2003, 309). Such difficulties might be that the acquired information good is not playable on all devices. If the music CD can be played on a CD player, but will not run on a PC or in the car, consumers will regard this as a major nuisance. Additionally, the installation of DRM clients, which may even have to be separately acquired in the first place, whose functionality must be learned and for which licensing conditions may have to be checked, all significantly curtail the product’s usefulness in the consumer’s mind (Hess et al., 2004a, 56). Figure 21.3 clearly shows that the rejection rates for different kinds of usage constraint are very high.

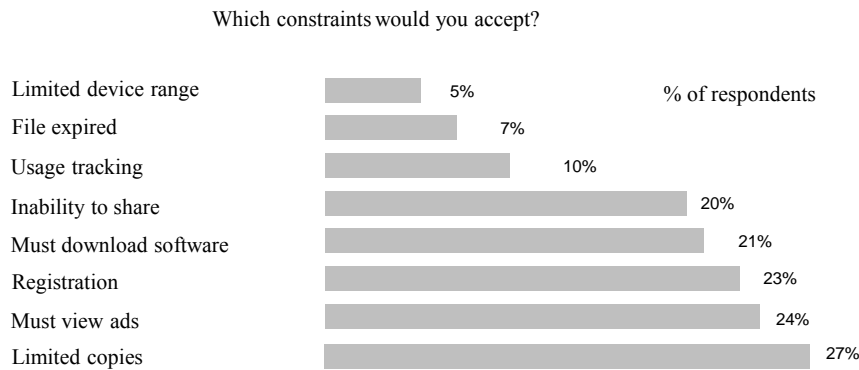


Figure 21.3: Acceptance of Usage Constraints. Source: Fetscherin, 2003, 316.

The DRMS currently in use are generally to be considered as user-unfriendly (Bizer et al., 2005, 196 et seq.). They are mutually incompatible and generate severe data protection problems. An extreme example of the implementation of providers' interest in protection is the Super Audio CD:

Heard of DVD-Audio or Super Audio CD? Probably not, yet both formats were touted earlier this decade as successors to the Compact Disc, each offering superbly detailed audio and music in surround sound. There are many factors to blame for the general lack of interest in the DVD-A and SACD, but it was probably the need to connect six(!) individual analog cables between the player and the rest of the system that convinced most everyday consumers to stick it out with their old-fashioned CDs. The record companies were so paranoid that a digital connection would make it too easy to clone a disc that they insisted on a hookup that required a spaghetti bowl of wires and a degree in electrical engineering to configure properly. Most people couldn't be bothered, so they stayed away (Pachal, 2006).

The use of protection mechanisms is accepted by the consumer if it serves to increase usefulness. This is the case, for instance, if protected songs or films that cannot be copied are pre-released. In June of 2002, the music industry, using DRM, tried out such a form of Follow-the-free with the band Oasis:

On June 23, nearly two million Britons opened their Sunday edition of the London Times and found a free CD containing three not-yet-released song clips from the band's new album. But this was no ordinary promotional CD: Using new digital content controls, Sony had encoded it with instructions that, in effect, banned people from playing the three clips for more than just a few times on their home PCs. Fans also were unable to copy the music file and post it to file-sharing networks—thereby making it harder to steal. Oasis fans who wanted to hear more had to link to the band's Web site and preorder the new album from U.K.-based retailer HMV—or wait until it was released. The idea: Use software code not to ban, but to create buzz for new products without getting burned in the process. Did it work for Oasis? Preorders of the album exceeded company expectations by 30,000 during the week following the Sunday Times' promotion, and Oasis' record company gained data from 50,000 fans who registered online—new information that could be used to sell more CDs in the future. HMV was able to raise the number of visitors to its retail Web site, and even the Sunday Times was able to score a win in the deal: Circulation that day was 300,000—its second-highest Sunday circulation ever (Marks, 2002).

This free audio sample generated network effects that benefited not only the band, but also the participating complementors. As this example does not represent a usage constraint on a bought good but on a free offer, i.e. a sort of gift, the use of DRM did not meet the kind of rejection mentioned above in this case.

As opposed to the customers, **information providers** have a vested interest in preventing the usage of their goods counter to specifications. DRMS can help, as—depending on how restrictively the system is designed—only legitimized users have access. In such a case, bootleg copies can only be created with great effort, contingent upon the circumvention of the protection mechanisms at work.

Information providers face a certain dilemma in using DRM, as DRM aims for the bootlegger but always hits—as collateral damage—the paying customers via the control and usage constraints that ensue. In the most favorable case—assuming a perfectly functioning DRMS—the customers could merely say that they are not worse off with DRM than without it. To use DRMS is also only worth the effort if the excluded bootleggers actually have a willingness to pay of greater than zero, thus representing a potential source of revenue. Should this not be the case, the resulting effects will be negative on balance: the company downgrades the offer to interested customers while failing to compensate for the loss of profit by excluding bootleggers.

Information providers must thus consider carefully which access and usage conditions they want their products to enter the market with. Let us consider, following Shapiro and Varian (1999, 98 et seq.), the initial case of a provider who offers his information goods with DRM and makes a certain profit (A: initial case).

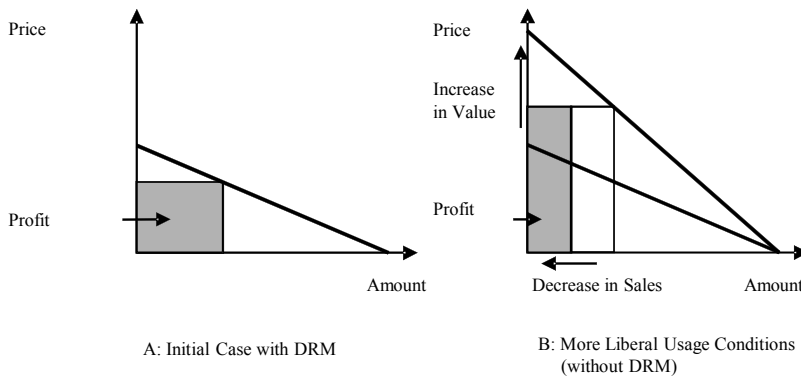


Figure 21.4: Trade-Off Between the Increase of the Use Value and the Sales Figures. Source: Following Shapiro & Varian, 1999, 99.

If this provider were now to go without DRM, this would increase the use value for the customers. As we have already seen above, this is a very realistic perspective, as the demanders can then use the information good (film, music title etc.) on any device, without any technological restrictions, and even copy (on a small

scale), lend or resell it, all within the framework of the applicable copyright, of course. The higher use value thus leads to a greater willingness to pay, and the demand curve goes up (Case B). If sales stay the same, the profits will increase. In the displayed model, the demand rises twofold, i.e. profits would double.

Strube et al. (2008) show, via an empirical analysis of online music, that these model statements are correct. Foregoing DRM raises the use value for the customer, as would sound quality or lower prices—further, less important parameters. An unchanged price of 99 cents per song will, without DRM, more than quintuple profits. Thus without DRM, there are possibilities for raising prices, which favors further increases in profit.

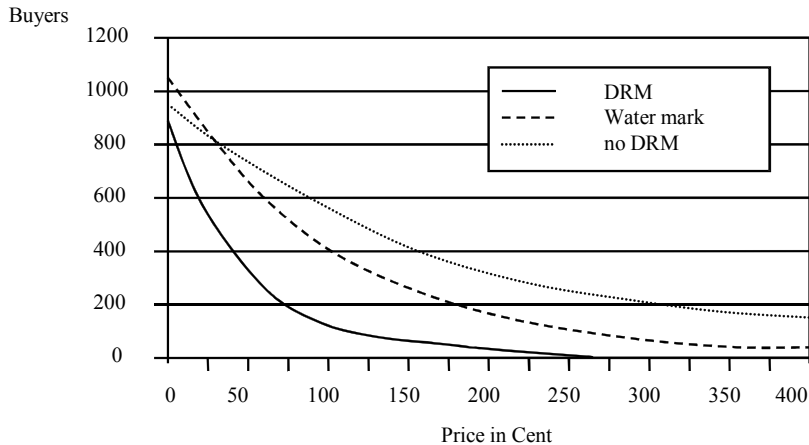


Figure 21.5: Price-Sales Function for Different Degrees of DRM Protection without Bootleg Copies. Source: Strube et al., 2008, 1053.

However, foregoing DRM also has other effects on sales figures. If we assume that the absence of DRM will lead to more (legal and bootleg) copies and fewer sales, turnover will decrease. The above model estimates that sales will be halved. How this affects profits depends on the relation between the decrease in sales and the price increase. In our example, profits stay the same. Without DRM, half the amount is sold at twice the price. This, according to Shapiro and Varian, represents a trade-off: more liberal offer conditions facilitate a higher-priced offer while leading to fewer sales. However, Shapiro and Varian assume, in their model, that the overall demand will remain unchanged, i.e. that the saturation quantity stays the same. Against this, we can say that the absence of DRM will not only increase the use value for the existing interested potential buyers, but that there is al-

so as a yet unused market potential. We are talking about people who—even at a price of zero—had shown no previous interest in a DRM-protected product, e.g. because the terminal device compatibility was unsatisfactory, or because the creation of copies is prohibited. If this customer circle then unveils further demand, the saturation quantity will shift to the right and the market will even grow. If we look once more at the results of Stube et al. (2008, 1053-1054)'s analysis, we can say that the higher profits resulting from the absence of DRM more than makes up for the losses incurred by illegal copies. On the one hand, customers' willingness to pay is much higher; on the other hand, the saturation quantity is increased significantly, i.e. there are more buyers.

However, there is yet another approach to increasing the use value and thus the market volume: easing the rights. So far, we have concentrated on the renunciation of technological copy protection methods, which will then no longer have to be circumvented. Yet as information provider, one also has the option of easing the existing legal regulations oneself, by defining oneself the degree of (legal) protection regarding content. In addition to the known legal regulations, Creative Commons, already mentioned in Chapter 5, here provide an alternative framework for the release and distribution of digital media content in the form of tiered licensing agreements.

21.4 Copy Protection and Network Effects

Now there are some interesting cases in which a provider may even draw a profit from a free distribution of his product via either legal or illegal copies by the end consumers. To wit, it is always of great advantage for the provider to have a large installed base when selling goods that demonstrate pronounced network effects.

Conner and Rumelt (1991) show, on the example of **software**, that piracy can make a positive contribution, particularly for programs that are complex and difficult to operate, which require a customizer, or which lend themselves to simultaneous use by many users (Conner & Rumelt, 1991, 137). This includes spreadsheet applications, more complex text processors, as well as database or desktop publishing programs. In these cases, the product's protection leads to a diminished installed base that is of disadvantage for both customer and provider, when customers either abstain from buying or (bootleg) copying. It can thus be of advantage for the provider to accept piracy as an additional cheap distribution path next to traditional sales. Distribution via copies even gives the provider a cost advantage, as he can save marketing expenses (Peitz & Waelbroeck, 2004), and it is not him but the user who invests time and money in the creation and distribution of the copies (Conner & Rumelt, 1991, 137). If we then assume that these are mainly people with no, or a very small, willingness to pay, who could not have been enticed to buy in any case, this is a viable alternative for quickly building up a large installed base. Model-supported analyses for software by Shy (2000), Blackburn (2002), as well as Gayer and Shy (2003), confirm this assumption. It can be shown that goods displaying strong direct or indirect network effects can

profit from bootlegging, as the installed base will grow faster with than without illegal copies. This increases consumers' willingness to pay and thus enables the provider to compensate for lost profits. Tolerating bootlegging thus facilitates a kind of price differentiation in which the provider gives customers with a low willingness to pay the (tolerated) option of acquiring the desired product via copying. In this way, the provider can profit from a growing network without having to offer a uniformly low price to all customers. As the network increases in size, he can then enforce measures of product protection and perhaps even increase prices (Sundararajan, 2004, 302 et seq.).

For providers who carry both the basic good and its necessary complements, it may be advisable to turn a blind eye to bootlegging. Gürtler (2005) analyzes this via a model of the video game market. Here it transpires that the

...enabling of product piracy is a device to shift reservation prices from the software market to the more important market for video games hardware (Gürtler, 2005, 22).

Caution should be exercised when using this strategy, however, if the overall offer of games suffers from piracy, i.e. if other software companies are less inclined to produce games for hardware providers that tolerate bootlegging.

If the provider holds a strong position on the complementary market, wholesale copying may even represent an alternative to sales (Blackburn, 2002, 86). This approach, which is tantamount to giving the product away (Follow-the-free), is profitable if it leads to increased demand on the complementary market, which overcompensates for lost profits from the basic good. Here we can link to our remarks on versioning in Chapter 18, where the basic good (e.g. Acrobat Reader) is given away and the higher-end product version (Acrobat Writer) is sold.

There are also some interesting examples for **content**, where the free distribution—via legal copies in this case—has led to a market success that would likely not have been achieved otherwise.

The label Reprise—a subsidiary of Warner—offered a few songs from the second album of their band My Chemical Romance (Anderson, 2007, 123-124) for free on websites such as AbsolutePunk.net or MySpace five months before the release date. The persons in charge were able to observe how the band's fans began downloading and sharing the songs. This information served as a pointer to which single should be released next. That song was soon played on the radio due to further fan support and later became the hit of that summer. The following tour was complemented by further audio and video material, which led to the album becoming one of the year's biggest sellers.

A similar case is Radiohead, who, after their contractual obligations to EMI ceased, put their seventh album on the market by themselves. It could be downloaded for free on a special website (www.inrainbows.com); an innovative feature was that the users could set their own price. Information provided by the online service Comscore (Gavin, 2007) revealed that around 40% of users worldwide

were willing to pay for the download. The average price was £2.93. For the band, this amounted to an average profit well above the usual \$1 that is earned via record-label distribution of an album (Schmalz, 2009, 72).

In both of these cases, the bands commanded a fan base they were able to activate via the free offers and which then helped them succeed in the long run.

The British band Arctic Monkeys even managed to succeed without this basis (Heilmann, 2006). Their debut album immediately soared to the top of the English charts, buoyed by extensive concert tours and free downloads via MySpace.

The band Nine Inch Nails recorded a similar success with their album *Ghosts I-IV*, which is offered under a Creative Commons license. Despite free online access, the album led the list of bestselling CDs on Amazon in 2008 (Gehlen, 2009). Currently, all songs from *Ghosts* are streamed on the band's homepage, the first nine titles can be downloaded for free and the different album versions bought for between \$5 and \$300 (Nine Inch Nails, 2011). The limited ultra-deluxe version alone netted the band around \$750,000.

Common to all the above examples is that they went without product protection. Instead, their motto is "please copy". This form of offer generates reach, an installed base, and thence positive network effects that lead to a quickened proliferation of the songs. Once the threshold to the mass media radio and TV has been crossed, further success is very probable.

As an information provider, one now has the heavy task of estimating what concrete effect a loosening of copyright will have on one's sales figures. Should one go without DRM and rely on pure legal protection ("all rights reserved"), but energetically enforce it? Or should one officially invoke one's rights yet be secretly grateful for the bootleggers' support? Or does one aggressively build an installed base, exploit one's product for free—wholly or in part—and perhaps even waives a part of one's protective rights by using Creative Commons licenses ("some rights reserved")?

Let us again draw upon Shapiro's and Varian's thoughts on trading-off: if willingness to pay and sales change proportionally, profits will stay the same. In that case, the provider could happily save the costs of DRM and thus increase his overall profit. If, on the other hand, only (bootleg) copies increase, there will be no profits in sales and the use of DRM would be advisable for the provider. Yet if sales without DRM, or using Creative Commons licenses, only decrease less than proportionately, or market volume actually increases and network effects are created, it will be extremely recommendable to offer information goods without any particular protection.

Conversely, the introduction of DRM to a previously unprotected product does not merely represent the opposite case. On the one hand, the use value is decreased by the technological and legal restrictions, which in turn decreases willingness to pay. The provider should thus always take care to design DRM systems in such a way that they do not encroach on the product's use value for legal users (Sundararajan, 2004, 303). On the other hand, it cannot be simply assumed that sales of legal copies will just increase as intended. This is only the case if there is

a corresponding number of bootleggers who have a positive willingness to pay for the information good and are prepared to turn to legal consumption.

So far, though, there are no concrete recommendations that could give an information provider specific advice. More generally, King and Lampe (2002) observe, on the subject of profitable piracy in the face of network effects, that it is always better to actively practice price differentiation than to tolerate bootlegging. They regard the danger of customers with a high willingness to pay resorting to illegal copies as too high. If a company has the option of differentiating between potential bootleggers and potential customers, it should, according to them, also protect the product and make an attractive offer of payment to the former as well, even on a low level. If the contingent of bootleggers is not too large and their willingness to pay for the product is low, it is even advisable to give the product away for free (King & Lampe, 2002, 16 et seq.).

Price discrimination allows the firm to exploit any network benefits from spreading use of their product while also raising revenue (King & Lampe, 2002, 24).

It is highly recommended to combine price differentiation with versioning, which is very easy to implement for information goods. For instance, if customers value complementary services to a product, they will only be able to buy the desired product, as these services are not available for an illegal copy. Gayer and Shy (2003, 200 et seq.) demonstrate on a simple model that the free distribution of lower-quality versions of information goods has a positive effect on sales and profits of the priced version.

If customer group differentiation, and hence price differentiation, is not an option, tolerating piracy can represent a profit-increasing alternative, but only if the ability to bootleg is in inverse proportion to willingness to pay; i.e., if it is to be assumed that those who are able to create illegal copies with ease are the ones who would not be willing to pay for the product anyway. Castro et al. (2008, 80) here speak of an “overlap” between the legal and illegal markets, which must not become too large if profitability is to be protected.

The greater the overlap between the markets of customers for legal versions of the product and customers for pirated versions, the more piracy reduces sales of legal versions.

On the other hand, potential bootleggers must not gain too large a share of the overall market (King & Lampe, 2002, 5). It can be added here that the price level has an influence on the readiness to not buy information goods but to copy them (illegally), which increases in proportion to the product prices (Gehrke et al., 2002).

It must also be noted that the usual, usage-restricting use of DRMS leads not only to rising transaction costs, but also increases manufacturing costs. If these are

passed down to the customers in the form of higher prices, the effect will be reduced sales. In the extreme case, the use of DRMS may even render the exchange of certain information goods no longer economically viable (Gehrke et al., 2002).

In summary, we can say so far that looser product protection increases the use value for and thus the willingness to pay of the customers. Furthermore, it is to be assumed that market volume will increase correspondingly. Increased sales volumes (including (bootleg) copies) will then also lead to increased network effects. This means that the average consumer's valuation of the information good will increase due to its increasing prevalence. Blackburn speaks, on the example of music, of an awareness effect:

This awareness effect is essentially a network effect—however, rather than increasing the valuation of individual customers, the increased number of listeners increases the share of the consumers who are aware of the artist, thus raising the valuation of the average customer (Blackburn, 2004, 10).

This, in turn, contributes to further (legal and/or illegal) distribution. How pronounced this distribution caused by network effects will be should, among other factors, depend on their strength. Apart from this, the sampling effect surely plays a role, as once an information good (song, film, game etc.) has been tried out and experienced with no strings attached, any positive valuation of it will only make a purchase more probable (Blackburn, 2004, 9; Strube et al., 2008, 1045).

Wu and Chen (2008, 170) explicitly recommend using versioning in combination with legal and technological measures of protection to defend against bootlegging. On the one hand, this will allow companies, via market expansion, to gain customers who would not have committed to buying the product without versioning, and on the other hand bootleggers will be at least partially scared off as the costs of producing illegal copies rise.

The benefits of versioning ... can come from two sources: from accommodating more customers to the market and from converting pirates into buyers (or discouraging piracy) (Wu & Chen, 2008, 170).

The more noticeable the costs of bootlegging, the better versioning will work. In this respect, the introduction or tightening of legal and/or technological protection methods play into the hands of the versioning provider. Network effects, initially blanked out by Wu and Chen, benefit the profitability of versioning even further.

Thus the circle to the pricing instruments, including versioning, that were already discussed in Chapter 18, and with the help of which customers can be made a very cheap or even free offer in order to build a large installed base, is complete. The higher-grade and more expensive versions that profit from this are then only available for a price. Here again it is shown that the old marketing adage, that the customer is never influenced purely by price or service but by their relation to

each other, still holds. Hence this is a broad field for information providers to experiment in.

Common to all the examples of the effects of copying on the provider's profits mentioned above is that they refer to the end consumer who engages in (bootleg) copying. The recommendations concerning the use of copy protection are different if **commercial providers** are active on the market. Poddar (2006) demonstrates on a simple model that it is always advisable for software providers to protect their products as comprehensively as possible, even independently of the quality and reliability of the (commercial) bootlegs. If commercial bootlegs appear alongside the original offer, the result will still be network effects and increased demand for the original product, but the difference to bootlegging by end consumers is that this scenario results in a real competitive situation (Poddar, 2006, 3 et seq.). The consumer can now decide between different, very similar or even identical offers at different prices. The original provider will experience price abatement, meaning that sales will rise but profits drop. According to Poddar (2006, 9), this effect even arises independently of the strength of the network effects. An information provider must then incorporate the additional determinant of whether commercial bootleggers are active on the market in question. This is a regular occurrence, particularly in countries with less-developed economies (Poddar, 2006, 2).

21.5 Media Asset Value Maps

A pragmatic approach to determining the degree of technological protection via DRM is represented by Hess et al. (2004b, 56 et seq.)'s "Media Asset Value Maps". They suggest determining an information good's economic worthiness of protection from both the customer's and the company's perspective. From the **customer's perspective**, it is necessary to weigh the potential for illegal copying, which is influenced by the general interest in the product and the options for technological access. The **interest** represents the desire for, and the **access** the capability of producing copies. Some factors contributing to the desire are the consumers' willingness to pay, the illegal copy's potential loss of added value due to the lack of complements (e.g. booklets or call-centre support), transaction costs (search, download, danger of being detected) as well as the presence of substitute goods. The capability, on the other hand, is influenced by the potential copier's technological know-how and specs (dialine bandwidth, hardware equipment). For music, this might mean that it appears more sensible to provide better protection for music aimed at a young, tech-savvy audience than for older listeners with little technological affinity. Thus it can be observed of the—mostly older—fans of German schlager music:

As opposed to young listeners of pop music, they almost never illegally download songs online or copy CDs (Rüdel, 2007).

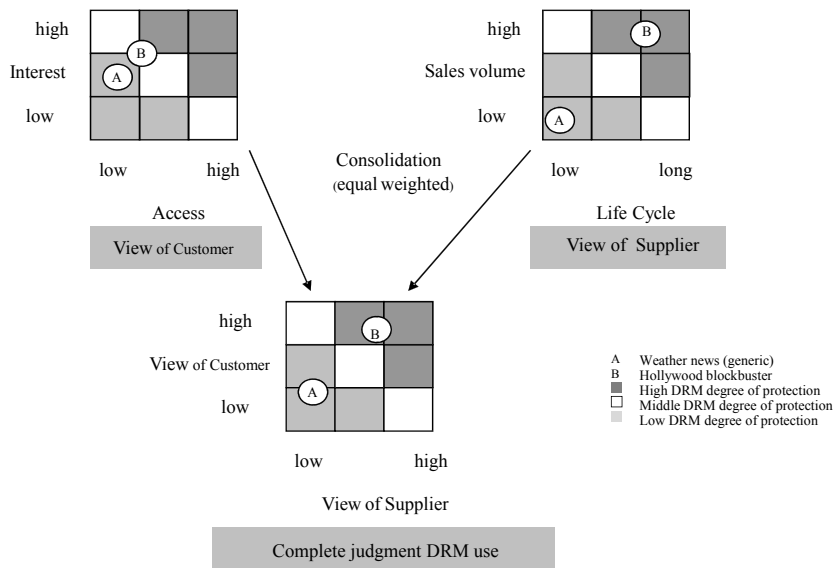


Figure 21.6: “Media Asset Value Maps” from the Customer’s and the Company’s Perspective. Source: Hess et al., 2004b, 57.

From the **company’s perspective**, it is advisable on the one hand to assess **sales potentials** and the **duration of the product life cycle**, up to the end of which profits may be generated, on the other. In terms of profit, one should—departing from Hess et al. (2004b)—not only prognosticate expected sales without bootlegs but also the difference to sales including bootlegs. To determine this difference, the considerations on the effects of bootlegging with regard to network effects mentioned above may be drawn upon. This is to say that only when potential sales including bootlegging are significantly lower should the next step be taken and both perspectives be consolidated in order to arrive at a recommendation for the use of DRM for the information good in question.

For weather reports, which command mid-sized customer interest, have minimal technological access options, small sales potentials and a short life cycle, it is thus not recommended to implement protection methods. For large Hollywood movies, on the other hand, which from a similar customer perspective have high sales potentials as well as a long life cycle, and for which a provider assumes that increased revenue via network effects will not outweigh lost revenue due to piracy, a high degree of DRM protection should be aimed for. Another verdict would apply to music by unknown artists, for which uncontrolled distribution creates network effects, which then lead to profits, in the first place. Here the estimated

profits with copy protection should, from the company's perspective, lie below those in which no protection mechanism is used.

The questions of copy protection, so prevalent at the time, might lose weight in the future. On the software market, for instance, there is a trend toward Software on Demand, where the customer no longer has to buy and install the applications; instead, they run on the provider's servers and access is gained online. In such a constellation, bootlegging is no longer possible, and what's more, the provider can even see in detail, via tracking programs, who is using his services to what extent and base his pricing models and bills on the insights thus gleaned. The case is similar for streaming media offers, where the audio or video files are accessed via on-demand or live streams and can be saved on one's PC only with great technological effort.

21.6 Conclusion

Only available in the printed version.
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21.7 Bibliography

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