

Chapter 17: Managing Intellectual Property Rights

17.1 Introduction

Intellectual property rights take several forms, of which patents and copyrights are the most important. Patents protect product and process innovations, while copyrights protect specific content. The forces driving e-commerce include two major challenges for managing intellectual property rights. One is the increased speed, variety and complexity of innovation, which is making patenting more valuable, more complicated, and in danger of becoming a legal battlefield. The other is the low cost reproduction and distribution of digital products, which poses new challenges for copyright holders.

The proper goal in managing intellectual property rights is not to enforce them as strictly as possible (though having that option is certainly valuable), but to maximize their value to the rights holder. Sometimes these goals are coincident. For example, maximizing the value of a patent will typically require making it as comprehensive as possible, and having the ability to enforce it. However, maximizing value may not mean restricting the use of the innovation that is patented. The value of the patent may be enhanced by letting others use the innovation, provided they pay enough for the privilege. Licensing may be a profitable third way between restricted use and imitation. Managing patents will also involve strategic decisions beyond short-run revenue maximization. Licensing may achieve short-run goals, but allow competitors to emerge, if they can combine licensed technology with other strengths. Content, distribution capacity and brand name are all assets that may complement technology for an online business. On the other hand, licensing may help establish a patented technology as a standard, and lead to a stronger and larger customer base for complementary products and services. Patent strategy therefore has to be developed in the context of the overall business strategy.

Thinking of content as another business asset protected by an IPR, in this case copyright law, emphasizes the similar concerns that arise for this different class of intellectual property. Again, maximizing value may or may not coincide with maximizing protection of the rights. The difference here is that the property right pertains directly to an output (the information product) rather than an input (the technology protected by patenting). The value-protection trade-off is therefore different for copyright than in the case of patenting. The basic trade-off here is that more liberal terms and conditions for use of copyrighted material can raise the value of your product to consumers (and hence its price) but reduce the number of copies sold.

In this chapter, therefore, we explore these issues in some depth, in the context of e-commerce. We begin with the role of patents in e-commerce, expanding on some of the points made in Chapter 3. We then consider patent strategy in more detail. Next, we discuss the implications of digital products for copyright protection. Finally, we consider the consequences of easy reproduction and distribution for copyright management, again returning to some issues introduced in Chapter 3. In this chapter, we do not return to trademarks and trade secrets. The reason is that there is less to say on strategy for these

two classes of IPRs. Trade secrets, in particular, simply need to be kept secret. Legal protection and licensing are moot for trade secrets. Trademarks are carriers of image and reputation, and simply must be protected as much as possible. There are circumstances where trademarks can be licensed, and in that case some parallels with the analysis for patents may be useful.

17.2 Patents in E-commerce

In Chapter 3, we outlined the emergence of the possibility of patenting software. It is a measure of how much information technology has changed business that no one had an inkling, even by the early 1990s, when the courts and United States PTO fleshed out the legal guidelines for software patents, that this would open the floodgates. Essentially, since the courts ruled that software associated with physical processes was patentable, and all online commerce involves many different types of software, patents must take center stage in e-commerce.

E-commerce patents become even more salient to the extent that other sources of competitive advantage, or of potential barriers to entry, become eroded in the online marketplace. If customer search costs are low, if competitors are a click away, and if they can set up a web storefront that achieves the same effect as a vast investment in bricks and mortar stores, then protecting business methods, and the software that governs them, may be one of the few remaining avenues of economic profit. There are also demonstration and competitive effects at work, since aggressive and lucrative patenting by one firm encourages others to follow suit.

Another, more subtle force has been at work to make patents more important in the online world. As we have seen in earlier chapters, the increasing ability to store, process and transmit information has changed and expanded the ways in which buyers and sellers interact. Therefore methods of search, the ways in which product and price information are compiled, lists of information on previous buyers' satisfaction, and methods of posting and adjusting prices to clear markets, have all multiplied. For example, reverse auctions of the kind used by Priceline.com are not feasible at any kind of efficient scale without the technologies of the Internet and Web. Thus, these technologies have become the basis of the new patents. Reverse auctions are not a new idea. From a conceptual viewpoint, they have been studied and understood by economists, and the idea of a reverse auction is presumably not patentable (though Jay Walker, founder of Priceline and actual holder of the reverse auction patent is suing Microsoft's Expedia travel site for patent infringement), but the implementation of the idea through software on the Internet and Web can be, and has been patented.

The economically sensible approach in such cases seems to be to restrict the breadth or scope of the patents that are awarded. For example, a patent can prevent others from utilizing a particular kind of image compression algorithm (such as the GIF algorithm) without permission, but not stop someone from "inventing around" the patent with a different compression algorithm (e.g., JPEG). On the other hand, if a patent prevents others from creating software programs that perform a function in a certain way, it may be too broad. For example, a company named Compton's New Media was

awarded a patent (since withdrawn) that appeared to prevent anyone else from performing certain types of multimedia database queries. Some of the same problems of scope and breadth arise in all patenting (there have been disputes over microprocessor patents, for example), not just software or e-commerce technology. The main point to remember is that there is no socially ideal solution. Broad and strict patents reward innovators and encourage innovation, but they also may create market distortions and discourage other types of innovation. Patent law and policy have to achieve a balance that seems to be appropriate on average. In the next section, we consider what businesses can do with patenting as an aspect of business strategy, whatever the particular scope and interpretation of patent law happens to be.

17.3 The Economics of Patent Strategy

The most obvious component of patenting strategy is the aggressive filing of patents to protect intellectual property pertaining to useful product and process inventions. We saw in Chapter 3 that firms are now rushing to patent software-related e-commerce business methods. The importance of patents probably started to increase earlier, in the 1980s, not only as a result of the Supreme Court's decision on software patenting, but because East Asian firms started catching up technologically. Patent enforcement became a way of countering this technological competition. This is true in general: if your rivals are technologically far behind you, then they are unlikely to imitate, patent or no patent. If they are close behind, as is now invariably the case, then patents become one of the first lines of defense in a competitive struggle.

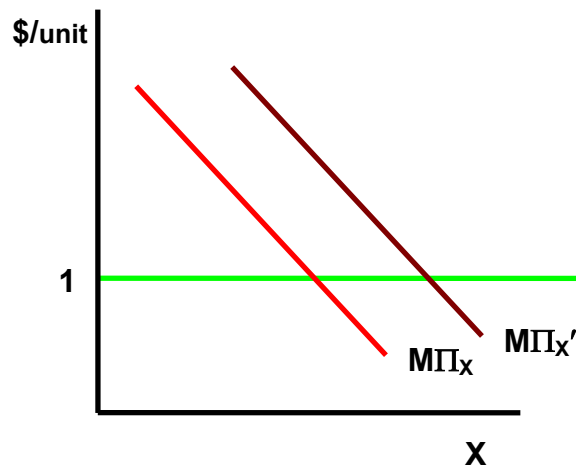
Patenting and competition We can illustrate the change in incentives for patenting very simply, in terms of marginal benefits and costs. Consider a firm called Millisoft. If the resources spent by Millisoft on patenting are denoted by X , and the marginal profit at the level of patent protection achieved is denoted by $M\Pi_X$, it is plausible to hypothesize that the $M\Pi_X$ curve is downward sloping, at least after a point, since the returns to more and more stringent patent protection (say via numerous niche patents beyond the core patents protecting the main innovation) are likely to diminish. Note that the marginal profit curve here is net of R&D, production and selling costs, but not of the costs of obtaining a particular level of patent protection. Also, the curve is derived assuming that the firm chooses outputs and prices to maximize its profits given the patenting decision. The marginal cost of that, since we are directly considering expenditures on patenting, is just 1. Hence, we have the optimal level of resources devoted to patenting by Millisoft where $M\Pi_X = 1$, as shown in Figure 17.1.

Now, if competitors are technologically closer to Millisoft, then at any given level of patenting, the marginal profit of patenting for Millisoft will likely be higher, because it defends against a greater potential competitive incursion. The new marginal profit curve is denoted $M\Pi_X'$. Note that Millisoft's total profits may be lower against more technologically advanced rivals, even as its marginal profit from patenting is higher¹.

¹ Formally, if X is resources spent on patenting, T is the rival technology level, and $\Pi(X,T)$ is the profit before patenting costs, it is possible that $d\Pi/dT$ is negative but $dM\Pi_X/dT$ is positive.

The result of the higher marginal benefit from patenting is that the optimal level of patenting goes up.

Figure 17.1: Optimal Patenting and Competition



We need to add two qualifications to the simple analysis. First, we have assumed very simplistically that the innovations to be patented already exist, and are fixed. It is easy to see that we could push the discussion back one step, to the choice of investment in innovation, through research and development (R&D) expenditures. Increased competition is likely to result in increased R&D and innovation, and this will itself increase patenting, as the activity that allows the firm to capture the benefits of innovation. Second, the analysis has been from the perspective of the single firm, and ‘optimal’ has been used in the sense of what is best for that firm. This may not coincide at all with what is best for consumers, or for society overall (based on some agreed-on way of aggregating everyone’s welfare).

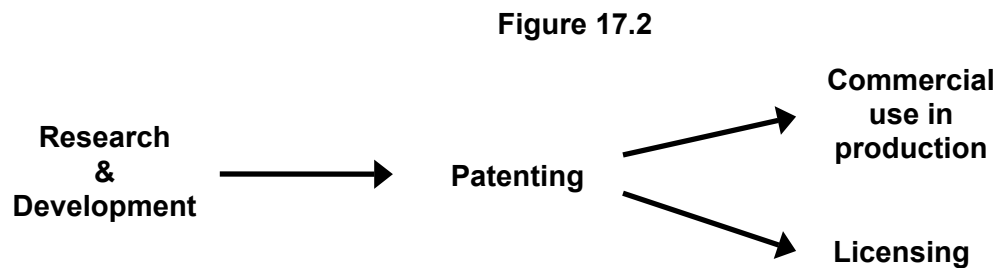
Preemptive patenting The focus on patenting rather than on innovation in the above discussion illustrates another aspect of patent strategy that is gaining in popularity with the rise of e-commerce, and of the knowledge economy in general. This is sometimes called ‘strategic patenting’, but since all patenting is strategic in some way, a better term is ‘preemptive patenting’. In the analysis above, we implicitly assumed that the patent was for a new product that would be made and sold by the patent holder, or for a new process that would allow an existing product to be made more efficiently. In such cases the firm starts with the goal of product or process innovation, and the patent simply defends this innovation against imitators.

Preemptive patenting changes the goal of the firm to staking out a particular technological territory, and in the process it partially reverses the order of innovation and patenting. The end goal is no longer a viable product or process innovation, but simply the patent that that will control the right to undertake certain classes of such innovations. The possibility of preemptive patenting has always existed, and there is a strong case for allowing a great deal of flexibility in this aspect of patenting, since it protects small,

individual inventors, who lack the resources to develop prototypes or working models. Without the patent in hand, such inventors would have no protection during the process of raising capital, or otherwise trying to commercialize their innovations. Nevertheless, the mushrooming of preemptive patenting attempts in online commerce applications is outstripping the PTO's ability to judge them effectively, and raising concerns about the stifling of true innovation. For example, it is reported that Walker Digital, essentially a 'patent factory' started by Jay Walker, has over a dozen patents (including Priceline.com's famous reverse auction), with 200 more in the pipeline.² The proliferation of patents also results in overlapping of patents, partial infringement, and numerous resultant legal tangles.

Preemptive patenting can be used by firms that actually sell products and services, but in its purest form, in patent factories, it illustrates the general potential for the organizational separation of the production and the commercial application of innovations. Even firms that commercially implement their own innovations may avail of this possibility by licensing their patented technology. We therefore next discuss patent licensing and its use in e-commerce.

Patent licensing Licensing is the last step in a chain of possible decisions, as shown in Figure 17.2. A firm first innovates, then it patents to protect the innovation, and finally it employs the innovation to produce itself, and/or licenses it for use by other firms. In making its decisions on patenting, the firm has to know what to expect in terms of the profits from the patented innovation: that was the assumption implicit in the analysis illustrated in Figure 17.1. Similarly, in deciding on how much to invest in innovation, the firm has to be forward looking, and estimate the returns from patenting and commercialization of the innovation, including the possibility of licensing. Note that patenting is a precondition for licensing an innovation, but not for commercial use of the innovation in-house, since the latter may be protected by keeping it as a trade secret. Hence consideration of future licensing possibilities is particularly important for the patenting decision.



We may consider the licensing decision in a very simple way, by treating it as the choice of a one-dimensional variable, the level, L , of licensing. This is a simplification because who to license to, what exactly to license, and the terms of the license contract

² "The Knowledge Monopolies", *The Economist*, April 8, 2000, p. 78.

all matter in practice. We can think of the level of licensing reflecting all these factors: more liberal licensing of the technology means a higher level of L . Also, there may be a minimum level of licensing required for there to be any takers. Staying with the simple case, suppose $R(L)$ is the revenue obtained from a level of licensing L . This can capture the requirement of a minimum level of technology licensing, since we can require $R(L) = 0$ up to $L = L_0$, for example. However, the firm's licensing also affects its profits indirectly, besides the direct contribution of licensing revenue.

Most obviously, licensing innovations strengthens the licensee firm, which may therefore become a stronger competitor. For example, Intel licensed some of its microprocessor technology to AMD in the 1980s, and AMD was a direct competitor that gained as a result. This negative effect might be mitigated if the licensed technology is required by the contract to be used only in a different geographic market, but such a restriction may be hard to enforce in online commerce. Similarly, technology may be licensed only for use in products that are not direct substitutes, but further product innovation may make this obsolete. For example, wireless phones are a different product from laptop computers, but both are now competitors in providing Internet access.

It is also possible that licensing may have positive effects on profits. Licensing an innovation may help establish the licensor's technological leadership and to set the technology standard for the industry. This may mean higher profits overall, through other products or through future innovations, even though profits are initially impacted negatively. In the extreme case, a licensing firm may not even charge for licensing the technology (see Application Box below).

In general, therefore, if we think of $\Pi^*(L)$ as the licensor's maximum profit given licensing level L , but not including licensing revenue, and using $M\Pi_L^*$ and MR_L to denote the marginal effects of the licensing level on maximum profits and on licensing revenue respectively, the optimal level of licensing must satisfy the equation:

$$M\Pi_L^* + MR_L = 0$$

Hence one of these marginal effects must be negative at the licensor's optimum, unless both are zero. For a pure patent factory, the first term is always zero, and it will license up to the point where the marginal licensing revenue is zero (again, recall that this is given the level of innovation and patent protection).

Concept Check:

Would it ever make sense for a firm to choose not to charge for licensing technology? What could be the possible benefits? Is a free license for patented technology any better than not patenting the technology at all?

How would the analysis above change if the firm has more than one technology that it can commercialize itself or license?

This simple analysis is easily generalized to take into account different contract terms, choices of who to license to, and so on. But the basic tradeoff between licensing revenue and the impact of licensing on the licensor's other profit sources remains valid. Note that, in the AMD-Intel case, Intel chose to extricate itself (which it did after some

litigation by AMD) from the licensing agreement with AMD, which it had entered into because of its lack of sufficient manufacturing capacity. Instead, Intel established technological and market leadership by investing heavily in innovation and manufacturing. However, this strategic approach is probably harder to implement now, since the interdependence of different technologies on the Internet is much more pronounced, and licensing based on patented technology may often be an attractive option in e-commerce situations. Often, mutual dependence on the other's patented technology leads to cross-licensing arrangements, with or without additional cash payments.

Application Box **Licensing Strategy Lessons**

Lesson One: Licensing to set a standard

Sun Microsystems has provided one of the strongest examples of technology licensing to set a standard. It developed the Java programming language to meet the goal of "write once, run anywhere". The advantage of such a language in the heterogeneous computing environment that makes up the Internet (including all the configurations of millions of desktop computers) is obvious. To gain acceptance, and realize these advantages, Sun allowed free licensing of Java, requiring only that users not alter its basic character. Java has succeeded enormously, becoming an essential ingredient of e-commerce applications, from advertising to ordering. Sun has benefited by selling Web servers and Internet-related services, and by enhancing its reputation enormously. A footnote to this story is the attempt by Microsoft to protect the market position of Windows by trying to alter Java to work well only with Windows. Sun had to go to court to stop this attempt, on the basis that Microsoft was violating its licensing agreement.

Lesson Two: Licensing to manage a technology portfolio

IBM has research labs that are among the world's best. A steady stream of innovations pours out of these labs. Some innovations are central to the firm's business strategy; others are not. The nature of research is that there will be such fortuitous discoveries. IBM therefore has a portfolio of technologies, which it can decide to develop commercially in-house, or to license. In the 1990s, the firm shifted from just protecting its own products to a broader approach: revenue from licensing patents increased from \$500 million in 1994 to \$1.5 billion in 1999, the latter figure being one fifth of the company's profits. At the same time, there have been positive spillovers for the market for other IBM products using complementary technologies (similar to Sun's case). The importance of controlling core technologies should be kept in mind, however. IBM's experience illustrates this also. In the early 1980s, it did well by licensing its PC technologies freely, making 'IBM compatible' PCs the standard, at the expense of Apple Computer. But it licensed the key operating system (DOS) from Microsoft (which itself had simply purchased the technology from another small firm). Controlling the operating system, Microsoft did much better out of the PC revolution than IBM.

Sources: Java and DOS: various news accounts; IBM licensing : "The Knowledge Monopolies", *The Economist*, April 8, 2000, p. 76

Complementary assets As we have mentioned briefly, the Internet requires a vast array of complex technologies that must work together. No single firm can expect to control all the technologies that matter. Licensing agreements, including cross-licensing, may

give a firm access to the technology portfolio it needs for commercial success. However, even this may not be enough, because licensing already may weaken the firm's competitive advantage. Furthermore, control of technology may be viewed as necessary but not sufficient for commercial success. Without other defenses that maintain competitive advantage, a technology lead may be quickly eroded. Even more importantly, successful commercialization may require strong capabilities in areas such as manufacturing, marketing, and customer support. These capabilities are called complementary assets.

A basic economic insight helps predict the importance of complementary assets. Even if the holder of patents with potential commercial value does not directly own the requisite complementary assets, if markets work well, these assets can be bought or even rented. At the same time, the market for intellectual property has to work well enough (including the legal regime to protect IPRs) so that imitation is not easy. However, if the IPR regime is too weak, and markets for complementary assets do not work well, then the profits from innovation may accrue to the owners of key complementary assets, rather than to the developers of the intellectual property. To defend against this, therefore, the innovating firm must establish a prior position in these complementary assets. Otherwise imitators who build this position instead may be the ones to profit from the innovation. Table 17.1 illustrates a wide range of successful and unsuccessful innovators and imitators.

Table 17.1: Success and failure in innovation

	INNOVATOR	FOLLOWER-IMITATOR
WIN	Pilkington (Float Glass) G.D. Searle (NutraSweet) DuPont (Teflon)	IBM (personal computer) Matsushita (VHS video recorders) Seiko (quartz watch)
LOSE	RC Cola (diet cola) EMI (CT scanner) Bowmar (pocket calculator) Xerox (office computer) DeHaviland (Comet)	Kodak (instant photography) Northrop (F20) DEC (personal computer)

Source: "Profiting from Innovation," David Teece, , (1986)

In e-commerce, the ability to execute and the reputation that is established, is perhaps the key complementary asset. Innovative technology is essential in giving online customers options, devising pricing and transaction mechanisms, and managing their orders. However, underlying assets such as servers for hosting Web sites, and warehouses and trucks for speedy fulfillment of orders (for physical goods), are also critical for success. Whether the owners of these assets (e.g., Exodus Communications, with its server farms, or UPS with its enormous distribution network) are able to appropriate the lion's share of the gains from innovation depends in turn on how

specialized those assets are, or what the entry barriers are for competitors in those industries. Matching UPS's distribution network for household delivery may be impossible, or at least too costly, even for large e-commerce firms such as Amazon.com. In this case, the existence of large competitors, FedEx and the US Postal Service, give the innovator some leverage. Note that Amazon.com went from relying on a specialized book distributor, Ingrams, to building its own facilities, precisely so that it could control a key complementary asset that is essential for it to profit from its online innovations.

While UPS and its current competitors are probably immune to new entry, Exodus, the pioneer in specialized Web hosting, has itself had to face entry. In its case, its innovation did not involve any patented intellectual property, and it has no legal defense along that avenue. Instead, it must rely on three things: superior execution to build reputation, growth to achieve economies of scale ahead of competitors, and creating its own combination of complementary assets to protect its innovation. It is trying to do the last of these by acquiring other technologies and service companies, permitting it to offer a more valuable array of e-commerce-related services (see Illustration Box). Its strategy in this case can be viewed as one of relying on customer switching costs to protect against competition.

Application Box
Exodus: Storage and Speed

Web hosting firm Exodus Communications recently invested \$637.5 million in Mirror Image Internet, an online content distribution company. Exodus, which maintains and monitors computer equipment necessary for many major e-commerce companies (including Yahoo, eBay, Quote.com, Lycos and Pets.com), will use Mirror Image's technology in its data centers to speed the distribution of Internet content. This investment serves as the latest move in the growing market for Internet content caching and distribution.

A handful of start-ups offer technology intended to make the Internet faster by storing Web pages in locations physically closer to Net users. Others, particularly satellite-based companies, also offer systems designed to quickly distribute streaming audio and video clips. Companies such as Mirror Image, Akamai Technologies, Digital Island and Adero aim to reduce online congestion by caching copies of frequently requested Web content within service provider networks. Akamai went public last November, shortly after Digital Island bought content distributor Sandpiper Networks.

Source: Exodus sinks \$637.5 million into distribution firm, Corey Grice, Staff Writer, CNET News.com, March 22, 2000, <http://news.cnet.com/news/0-1004-200-1581726.html>

The essential point, to summarize, is that patenting is only one component of a business strategy for successful innovation. Having complementary assets such as capabilities for manufacturing, marketing, distribution, and customer support will almost always be critical for commercial success. This is as true in e-commerce as in traditional business approaches. Whether these complementary assets should be purchased, or

whether they should be contracted for, depends on the particular situation: the strength of the IPR regime, economies of scale and scope, capital availability and requirements, and the asset suppliers' bargaining power. The last of these in turn depends on whether the assets are generic or specific, and the nature of scale economies and entry barriers in the industry that supplies those assets.

17.4 Copyright and Digital Products

Practically everything that is protected by copyright law, from words to music to images, can be converted to digital form. Digital products have low costs of reproduction, distribution and adaptation. Furthermore, access to these low-cost technologies is widespread. Since the three primary rights of authors granted under copyright law are those of reproduction, distribution, and adaptation, it is not surprising that copyrights are a central issue in the Internet economy.

Reproduction Copyright protection requires fixation of the protected work. Technological change, in particular the ability to store large quantities of information in digital form, has made this requirement harder to interpret. For example, the courts have sometimes put forward a broad interpretation of fixation, which would include RAM copies of digital files, deleted but not-erased copies, copies in transit, and web cache copies. According to this interpretation, reproduction is pervasive. The questions that must be faced are then: Does it violate fair use? And should rights holders care? Perhaps the intent to distribute is the key in judging the economic effects of reproduction, and in answering these questions.

Distribution Copyright law makes it clear that the copyright owner has the right to distribute copies "to the public by sale or other transfer of ownership". What exactly constitutes distribution on the Internet is the domain of lawyers and judges, because again, technology has changed our common sense interpretations. Delivering newspapers or broadcasting radio or TV shows certainly constituted distribution. But what about posting information on a Web site? Only if someone visits that site is the material distributed in the traditional sense. In practice, such concerns are handled by weighing economic costs and benefits, rather than legal hairsplitting. Furthermore, recent legislation has provided protection to 'conduits' such as ISPs. The major issue is therefore the erosion of the copyright owner's market due to unauthorized distribution. This is the basis of the music industry's case against programs such as Napster (see Illustration Box).

Resale Resale with unauthorized duplication clearly violates copyright. What about resale without reproduction? The first sale doctrine allows a buyer who has purchased a copy of a copyrighted work to sell, give away, or lend it to others. A single use product (e.g. a forecast, or a computer program that produces a forecast) can be used and resold numerous times, without copying, very quickly over the Internet. So quick, low-cost distribution alone can create problems of market erosion.

One remedy for this problem is the use of a specific prohibition of resale in the copyright notice. However, this contravenes the first sale doctrine and may or may not stand up to legal challenges. It may also not be socially efficient, when products are experience goods, and the consumer did not get what they expected or hoped for. Prohibiting resale reduces their incentive to try the good, though warranties may correct for that where they can be offered without severe moral hazard.

Application Box Napster in the dock

In May, 2000, a federal judge ordered the Napster music-swapping company to stand trial for copyright infringement. The U.S. District Judge found that Napster is not a "mere conduit" for information, rejecting arguments that the case should be thrown out because the company is not directly responsible for copyright infringement on its network. Napster had argued to the court that it is entitled to some of the same protections from copyright liability as Internet service providers are afforded under recently enacted digital copyright laws. ISPs that respond appropriately to complaints of infringement on their systems cannot be ordered to pay damages under the Digital Millennium Copyright Act.

The Napster software, created in 1999 by 19-year-old Shawn Fanning, allows thousands of computer users to open their hard drives to one another over the Internet, giving people near-instant access to hundreds of thousands of songs, many of them copyrighted. Music piracy has been a long-standing concern on the Internet, but Napster raised the stakes for the music industry. Previously, would-be music pirates were forced to comb hundreds of often short-lived music Web sites for copies of a favorite song. Now that song may be available with a quick search and point-and-click download through Napster's service. The Recording Industry Association of America (RIAA) sued Napster late in 1999, contending that the software itself contributed to massive copyright infringement. This month, hard rock band Metallica and rapper Dr. Dre also sued, alleging their own work had been pirated by Napster users.

There is still room for legal maneuvering, and the Napster cases are likely to be critical in determining how much power traditional copyright law retains in the digital age. At issue is whether the Napster software, which provides a directory to the songs on its members' hard drives and helps establish a connection between two computers, can be held legally responsible for files that never flow through its own systems. Napster noted that the court's preliminary decision allows it to seek several different kinds of protections under federal copyright law, however. Other defenses include some that shield ISPs from liability, as well as those that originally kept VCRs from being ruled illegal despite their ability to make copies of protected movies.

Source: Napster to face trial on music piracy claims, John Borland, Staff Writer, CNET News.com, May 8, 2000, <http://news.cnet.com/news/0-1005-200-1839039.html>

Alternatively, copyright holders can use licensing contracts, rather than selling. The terms and conditions are then governed by contract laws, which are different from copyright laws. Licensing agreements are therefore very popular for digital products such as software (including site licenses for organizations). Licensing agreements may also allow the licensor to spell out restrictions on the use of the licensed product, e.g., outputs from computer programs. Even with licensing, however, monitoring and enforcement is

still an issue, especially with individual consumers, who may still make unauthorized copies. The nature of the product also matters: time-independent, single use products will be particularly susceptible to resale and market erosion.

Adaptation Electronic files are supremely easy to change, allowing the altering of content without easy detection. This makes preserving the integrity of a digital product harder. Partial copying and the creation of derivative works therefore become much bigger problems in the digital domain. Cryptographic and authentication technologies (encryption, hashing, digital time-stamping), which we discussed in Chapters 2 and 3, are one technological response to these potential problems. However, they only identify if any change was made at all. They do not evaluate the level and nature of an adaptation. In general, the right to content control is closely related to the rights over reproduction and distribution.

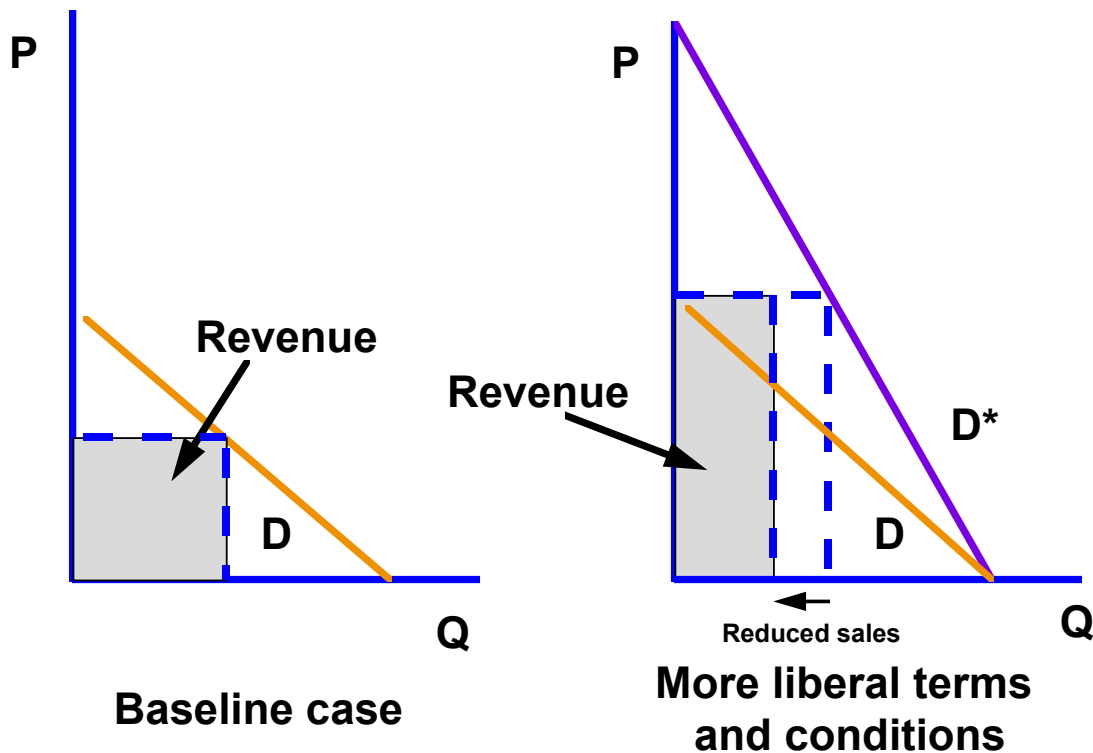
17.5 The Economics of Copyright Strategy

Copyrights play two distinct roles in an e-commerce IPR management strategy. First, they provide additional protection for software. As we have discussed, patent protection for software is being used more and more, both because of a favorable legal climate, and because of the increased importance of online commerce, which relies critically on software. Copyright law protects only the particular expression of an idea, and therefore does not prevent inventing around an innovation, something that even patenting may not rule out. However, copyright protection is much longer-lived than patent protection, and for that reason alone, it is a vital complement to patenting. We may think of the IPR protection here being sought for inputs into the production process. In general, a firm has an incentive to patent and copyright as broadly and aggressively as possible. Subsequently, it may wish to license its patented technology, and it may even do so for free, but having patents allows it to retain ultimate control over features of the technology that may be crucial (as in Sun's protection of the 'write once, run anywhere' feature of Java).

The other role of copyrights is in protecting a firm's output: all kinds of information and entertainment, that we can describe by the category 'content'. Managing IPRs for content shares some similarities with patent strategy, but there are also some differences. Business firms in either case want to maximize profits, not control. For content, maximizing copyright control can raise the volume of sales, but not necessarily profits. This is because the terms of use themselves may affect the value to consumers. This direct impact on customers is because here copyright control is exercised over the product or service provided to customers, not over an input in the production process (as is the case with patent protection or copyrights for business process-related software). This aspect of IPR management thus becomes one aspect of product differentiation ("versioning") as part of an overall business strategy. Of course strictly enforced patent protection indirectly protects sales against competitors who would otherwise be imitators -- the point is that relaxing the enforcement provides no direct benefit to customers.

Figure 17.3, taken from Shapiro and Varian's analysis of copyright management in *Information Rules*, illustrates the 'value-volume trade-off' that they identify. The baseline case on the left hand side is where copyright protection is strictly enforced, while the right hand side figure illustrates the case where more liberal terms and conditions for use (e.g., the ability to download information from a Web site and store it on one's desktop computer) raise the value of the information to the customer. In the right hand side figure, while the willingness to pay for the content therefore goes up, there is some loss of paying customers, so that revenue is only the shaded rectangle. The new revenue rectangle may still, however, have a larger area than the one on the left hand side. Of course, if the volume shrinks too much (as music companies and musicians fear is happening with Napster), the more liberal use will reduce revenue. Note that in this example, we are assuming that marginal costs of production and distribution are zero, or at least negligible, so that they do not enter into the firm's profit calculation. On the other hand, if there are substantial enforcement costs in the situation depicted on the left, then more liberal usage terms may be relatively even more attractive.

Figure 17.3: Value v. Volume: Illustration



One problem that firms may face is that in a competitive market, they may be have incentives to be over liberal in their copyright enforcement. The problem is of the familiar 'prisoner's dilemma' type. Liberal copyright enforcement, by raising value to customers, may take away customers from a competitor, even though it also loses some sales. But if each firm does this, they may both be worse off than if they jointly decided to be strict in their enforcement. Table 17.2 illustrates this possibility.

Table 17.2: Copyright Enforcement and Competition

Sony	Liberal	Strict
Atlantic		
Liberal	(90, 90)	(110, 80)
Strict	(80, 110)	(100, 100)

In the example, Atlantic and Sony are two music companies, each with its own set of contracted artists. Thus their products are not perfect substitutes, but they are close enough so that greater ease of access to the music may cause customers to switch. If one company offers more liberal use, it gains \$10 million in revenue, which may be thought of as \$20 million gained from its competitor's former customers, minus a net loss of \$10 million from its current customers. Thus, in the absence of the 'business capture' effects, the firm would not be liberal in its terms for use. Whatever the competitor does, both firms provide liberal terms, and both are worse off. This phenomenon is not unusual, of course, since it occurs in other dimensions of competition as well, to the benefit of customers. In this case, however, the firms are entitled to cooperate, and agree to enforce the copyright laws strictly. If an outsider such as Napster upsets that cooperative arrangement, then the firms, through their industry association, can use the courts to protect their profits.

The point in the above numerical example is true more generally. Offering liberal terms for use to customers may not be something that you would do as a monopolist. But if not doing so leaves you open to competitive attack, then you may need to be liberal. So copyright rights management is a competitive weapon (capture rivals' customers) as well as a market-power-driven tool (capture greatest surplus from a given customer base).

In the example illustrated in Figure 17.3, a firm lost some paying customers as a result of its more liberal policy (they were able to copy, or share friends' downloaded files, for example). This was made up by charging more to the remaining paying customers, whose willingness to pay went up. In other cases, this extreme divergence may not occur. In dealing with business customers, the contract may recognize the possibility of sharing, and explicitly undercut it through site licenses. Site licenses for software are often priced at a low multiple of the software's unit price, so that the incentives for illegal copying are reduced. At the same time, site licenses reduce transaction costs for both buyers and sellers. Clearly, they also work for information content, e.g., online news or research, and are standard in providing business customers access to such services. As we noted in Chapters 13 and 14, site licenses can also be motivated by considerations of bundling and price discrimination.

Lower distribution costs for digital products online can be used to strategic advantage in ways that do not necessarily involve the strictest enforcement of copyright.

They can help promote digital products by permitting low-cost free samples for experience goods, giving some content away and tracking its use to get customer information for marketing, trading content for customer information, or giving away one part of a complementary pair (e.g., search service and content). These cases, however, do not involve copyright infringement, since the copyright holder chooses to give away the content.

Lower adaptation costs for digital products also provide options that can counter the copyright problems that they might create. For example, the copyright holder can easily customize digital products for different markets. In addition, personalization may help reduce the incentive for unauthorized distribution. This strategy provides a two-fold advantage: it creates greater value for each customer, and it lowers the substitutability of products between customers.

In their book, Shapiro and Varian emphasize that content businesses have been able to survive previous technological challenges to copyright protection. The evolution of the markets for books and for videos illustrates how new and profitable mass-markets were created -- business models changed, but industries survived. For example, the low cost of home video recorders did not lead to a destruction of the video rental market. Even if an individual can copy any broadcast material for only the minimal cost of a blank videotape, the time and storage costs of maintaining a library of movies on video are just too high. Similarly, few people would want to build a library of books by buying a photocopying machine and making copies of every book they want to own.

One difference in the digital age, as compared to these examples from recent history, is the decline in the cost of copying, and of storage, and the concurrent rise in the quality of copies, so that they are indistinguishable from the original. These factors combined certainly greatly increase the possibilities and incentives for copyright infringement. Legal and technological responses by copyright holders are natural in such circumstances. Copyright infringement suits by the music industry against MP3.com and Napster illustrate legal strategies. The development of a rival, proprietary digital music format by Sony as a response to MP3 is an example of a technological strategy.

While the music industry's challenges to MP3.com and Napster are cooperative responses, the type of approach taken by Sony runs the risk of foundering because of competition. If consumers of content care enough about liberal terms and conditions with respect to copyright enforcement, then Sony may have a hard time succeeding. Again, the success of its IPR strategy will depend on the complementary assets it controls and deploys, including its reputation, its marketing muscle, and its stable of recording artists.

17.6 Conclusion

We may summarize the lessons of this chapter quite briefly. Clearly, in the information economy, no firm can afford to neglect IPR protection. However, it must be used judiciously as part of an overall business strategy. The ultimate goals of a business are profit maximization and building a sustainable competitive advantage that enables

profit maximization for the long run. Both patenting and copyrighting are important, complementary aspects of IPR strategy. They must be viewed not purely in legal terms, however, but from the perspective of maximizing economic value. Licensing of intellectual property may be an important aspect of implementing this perspective. One can also think of IPR management in terms of how it fits into more general strategic approaches. For example, varying terms and conditions for use of copyrighted content can be an example of product differentiation or “versioning”, which may also support price discrimination and increase consumer switching costs. A final economic perspective on IPR management is in terms of balancing what may be competing objectives: growing the market and getting the most out of the given market.

Summary

- Managing IPRs, and patent and copyright protection in particular, is an increasingly important activity for businesses, and should be integrated carefully into overall business strategy.
- Software and business method patents are a vital component of many successful e-businesses, and may even become the centerpiece of business strategy in ‘patent factories’.
- Businesses should maximize legal patent protection, taking account of any costs of obtaining patents, but they may choose licensing as a way of maximizing the value of patents.
- Licensing may be used for revenue generation, but it may also be used for meeting strategic goals of technology leadership, and market growth.
- A successful patent strategy will also require creating the right portfolio of complementary assets, including possibly manufacturing, marketing, distribution and customer support capabilities, either through acquisition or through alliances and partnerships.
- The possibilities for flawless reproduction of digital products, and for their low cost distribution and adaptation, pose substantial challenges for copyrighted content providers.
- Firms may use legal and technological responses to discourage copyright infringement. The former, particularly, may work best in a concerted response, since individual firm incentives to enforce copyright may be weakened by business capture motives.
- Liberal copyright use terms may increase value for customers, and increased revenue from those who pay may more than make up for those who pay nothing as a result of the relaxation.
- Copyright rights management for content providers fits in well with general overall business strategies of customization, bundling and price discrimination.

Questions

1. Jeff Bezos, CEO of Amazon.com, after winning a legal challenge to his company's 'one-click shopping' patent, has come out in favor of three-to-five year terms for software and business model patents. What reasons might he have for proposing this, from the perspective of Amazon's business strategy? Does it make sense from the perspective of consumers? At the same time, Bezos made it clear that Amazon will not stop seeking new patents or enforcing its existing ones when it sees it in its interest to do so. Is this consistent with his other position?
2. In addition to legal assaults on copyright infringement, and technologies to make copying of digital products more difficult, what can content providers do to protect profits in a world where large-scale reproduction and distribution are practically costless and instantaneous? How are matters different for music sellers versus news providers, in terms of the products, customers, and industry structures, and so on?
3. If patent protection for software is reduced, will copyright still provide a useful avenue for protecting software? Think of your answer partly in terms of languages and algorithms versus particular programs.