

## Chapter 3: Law Overview

**"Congress should declare a moratorium on software and business-method patents."**

Lawrence Lessig, Professor, Harvard Law School, in *The Wall Street Journal*, March 23, 2000.

### Prologue

In April, 2000, *The Economist* magazine asked on its cover, "Who owns the knowledge economy?" Newspapers and magazines were full of this topic, because Jeff Bezos, founder of online retailer Amazon.com, had recently won a court battle over the patent rights for Amazon's 'one-click' online shopping technology. Bezos then made public a letter expressing concerns with the current patent system, in which software and business-method patents, mainly related to e-commerce, are exploding in number. What precisely are these patents, and what kind of ownership of the knowledge economy do they provide? Assessing the debate among practitioners like Bezos and academics like Lessig and Joseph Farrell, an economics professor at the University of California, Berkeley, who has also floated the idea of a moratorium, requires understanding at least the basics of patent law.

Soon after the 'one-click' controversy and the debate it sparked on online patents, another brewing dispute bubbled over. MP3.com, and Napster, two companies that, in different ways, make digital music easily available over the Internet, separately ran into legal trouble for possible violations of copyright laws. One set of technologies made music digital and therefore easy to copy. Another set of technologies compressed digital music into small files and made it easy to find it and share it around the world. How companies like MP3.com and Napster used these technological advances collided with the interests of the producers and sellers of recorded music. MP3.com appears to have made its peace with the corporate distributors of recorded music, but Napster fights on. Part of its defence rests on 'fair use' provisions in copyright law that, in a 1980s court ruling, effectively saved the VCR. What do the copyright laws say? What kind of ownership of the knowledge economy do they provide, and how does it differ from what patents do? Read on!

### 3.1 Introduction

In the information economy, information is certainly one of the most ubiquitous commodities. The proliferation of information -- the ease with which it can be stored, processed and communicated -- makes it more freely available than ever before in human history. Yet knowledge is still valuable, and producing knowledge or information is still not costless. If the incentive to produce useful knowledge or information is to be maintained, there must be a legal concept of ownership of such an intangible product.

In this chapter, we focus primarily on describing what is termed intellectual property law, the set of legal conditions that define ownership of different kinds of information and knowledge. The ultimate end of intellectual property laws is to promote creation of knowledge and useful arts. Achieving this goal requires proper economic incentives, which come with property rights. At the same time, creating the incentive may also create distortions by enhancing market power of owners of intellectual property. A further complication is that knowledge can be a non-rival (shareable) good, so even competitive markets may not work in the standard efficient way. We will treat these economic considerations in later chapters.

Here we consider four areas of intellectual property (IP) law: (1) trade secret law, which protects valuable information not generally known that has been kept secret by its owner; (2) trademark law, which protects words, names, and symbols used by manufacturers and businesses to identify their goods and services; (3) patent law, which protects new, useful, and “nonobvious” inventions and processes; and (4) copyright law, which protects original “works of authorship.” All these concepts of intellectual property predate e-commerce by centuries, of course, being spawn of capitalism and the technological change associated with the industrial revolution. The information revolution merely provides some new challenges in this arena. Some of the greatest challenges are in the area of copyright law, which will receive a section to itself, after we treat the other three classes of IP law.

While IP issues are among the thorniest legal challenges in a world of bits and bytes, the legal status of electronic communications is also of interest. For many types of communications, particularly those associated with contracting over economic transactions, the main legal distinction has been between oral and written (paper based) communications and agreements. The ‘written’ contract as a legal document has, for millennia, meant a paper document. The restricted nature of electronic communications, their vulnerability to mangling in transmission and to tampering, and difficulties of authentication, have kept paper consumption increasing. In this chapter, we also outline the general legal issues that arise with the use of electronic communications and electronic documents for economic transactions. We will explore specific implications in future chapters, particularly in the context of financial services.

A final aspect of the law as it pertains to e-commerce is the role of the government in regulating the market. This includes antitrust law, which is designed to prevent or control the exercise of monopoly power, and to promote competition, as well as specific regulation of various industries and laws to protect consumers. A general

theme that we wish to emphasize is that the legal principles in these areas are quite durable. Extensive rewriting of laws is not often necessary to deal with the information economy and the conduct of e-commerce. Adaptable implementation of existing laws will be the typical solution.

### **3.2 Intellectual Property: Trade Secrets, Trademarks and Patents**

Trade secrets, trademarks and patents all represent very different aspects of intellectual property. Of these, patents are the most complex, and the fairly recent allowance of software patenting has raised contentious issues in e-commerce. Trade secrets and trademarks are more straightforward, and existing law has carried over quite easily to e-commerce.

**Trade Secret Law** Trade secrets are protected under state laws. According to the Uniform Trade Secrets Acts in force in most states, they are “information, including a formula, pattern, compilation, program, device, method, technique, or process that derives independent economic value from not being generally known and not being readily ascertainable and is subject to reasonable efforts to maintain secrecy”.<sup>1</sup>

#### **Application Box**

##### **Trade Secret Theft in Silicon Valley?**

In 1997, Silicon Valley maker of chip-design software Avant! and seven of its employees were charged with stealing software source code from rival Cadence Design Systems, where the defendants previously worked. According to observers, this case is considered “a critical legal test of trade secrets theft in the valley”, but has gotten nowhere. Meanwhile, the 1994 technology that is the subject of the dispute is probably fast becoming obsolete.

Source: “Avant! case dismissed: Prosecutors must go back to drawing board in trade-secrets case,” *San Jose Mercury News*, April 29, p. 1C.

Examples of trade secrets include customer lists, instructional methods, manufacturing processes, and methods of developing software. The last category is useful in e-commerce, since software can be protected under trade secret law while it is in the process of being patented. Since a trade secret does not have to be unique in the stringent sense used in patent law, trade secret law is the only recourse for inventions that are not patentable. However, generally known information does not qualify as a trade secret. While trade secret protection is automatic if an effort is made to keep the secret, there is no protection against independent discovery or reverse engineering, the latter

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<sup>1</sup> Quoted in “Intellectual Property Law Primer for Multimedia Developers”, J. Dianne Brinson and Mark F. Radcliffe (1994), [www.timestream.com/stuff/neatstuff/mmlaw.html](http://www.timestream.com/stuff/neatstuff/mmlaw.html).

being very much possible with software. This lack of protection contrasts with patent law, as we shall see below.

**Trademark Law** Trademarks and service marks are used by businesses to identify and distinguish their products and services. They can be words, names, symbols or graphics. Thus not only is “Coca Cola” a trademark, but so is the distinctive script or logo of the product. Generic terms, such as “cola”, however, can not be trademarks. Thus, in addition to protecting trademarks from rivals, businesses also have to make sure that their trademarks do not become generic terms.

The federal trademark statute, the Lanham Act, and similar state laws afford legal trademark protection. Registration of a trademark with the federal Patent and Trademark Office is the most effective protection, but there is also geographically limited federal protection for unregistered trademarks. State statutory protection is also geographically limited. The obvious implication for e-commerce, which transcends geography, is the importance of obtaining as wide protection for trademarks as possible.

In general, since trademarks protect the owner’s commercial identity (including goodwill, reputation, and investment in advertising). To the extent that trademarks carry reputation in the absence of personal knowledge and personal contact, their commercial importance has been increasing, and e-commerce only enhances this trend. It should be noted that trademark protection can also be used for short phrases, such as tag lines, which are outside the scope of copyright protection. A final point is that descriptions of functions or quality of products have to be distinctive or special in some way to be protected as trademarks.

**Patent Law** There are two main kinds of patents: “utility” patents protect inventions and processes, while “design” patents protect ornamental designs for manufactured articles. Traditional utility patents were for machines or mechanical devices, such as the 19th century cotton gin, and chemical processes such as making synthetic materials. The concept easily extended to electrical devices, so the transistor and microprocessor were patented straightforwardly. Genetic engineering and software have raised greater problems for the patent system, and we will focus on software patents below. Design patents can cover a variety of product designs, including shoes, computers, and even buildings. Design patents last for 14 years while utility patents are granted for 20 years from the date of filing.

United States patent law originates in the Article I, section 8 of the Constitution, which states:

Congress shall have power ... To promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.<sup>2</sup>

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<sup>2</sup> Quoted by Daniel A. Tysver, of Beck & Tysver (1996-98), at [www.bitlaw.com](http://www.bitlaw.com).

Congress followed through on this provision by creating the U.S. Patent and Trademark Office (PTO), which reviews patent applications and grants patents. There are four requirements for utility patents. They must be new, useful, “nonobvious”, and statutory.

The usefulness requirement is very easily met in practice, and there are numerous examples of patents that have met this criterion, but never led to any commercial product. The novelty requirement is also quite straightforward, with the main consideration being that there are legal restrictions on the amount of delay in filing after any public disclosure of the invention. However, novelty is not sufficient for a patent to be granted, since it must be a nonobvious improvement over “prior art”. This determination requires considerable judgment in practice, and the patent examiner has to decide whether the invention would have been obvious “to one of ordinary skill in the art.” This criterion has become a focus of attention with software patents associated with business methods, as we discuss below.

The fourth requirement for utility patents is that they must be statutory, i.e., covered by the U.S. Patent Statute, which states that processes, machines, articles of manufacture, and compositions of matter are patentable. However, the PTO also stated in a written ruling that certain items were “clearly non-statutory”, including<sup>3</sup>:

- data structures or programs per se (which are mere information rather than a computer implemented process or specific machine or computer readable memory as an article of manufacture);
- compilations or arrangements of non-functional information or a known machine-readable storage medium encoded with such information;
- natural phenomena such as electricity and magnetism.

The first two items seem to rule out software patents. We next discuss how it turns out that software may be patented, despite these restrictions.

Until a 1981 Supreme Court case, the United States PTO was reluctant to grant patents on inventions relating to computer software. They reasoned that patents could not be granted for scientific truths or mathematical expressions of it, and viewed computer programs as mathematical algorithms and not processes or machines. The case of *Diamond v. Diehr* related to a method for determining how rubber should be heated in order to be “cured”, using a computer program to calculate and control heating times. Even though the only novelty was in the computer control of the process, the court ruled that since a physical process was involved, the invention was patentable.

The Supreme Court’s ruling opened the door for software patents, but it was not until the early 1990s that the Federal Circuit court clarified the general implications of the ruling. It reaffirmed that pure mathematical algorithms were not patentable, but that an invention including software was patentable if the software controlled real-world

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<sup>3</sup> *ibid*

processes, or numbers that represented real-world concepts. This really throws open the floodgates for software patenting.

The most obvious example of patentable software is that which directly runs hardware -- the invention is clearly a patentable machine. But any kind of application software now is generally “statutory”, i.e., covered under patent law. Hence graphics programs, spreadsheets, word processing programs, computerized methods of accounting, and a host of other applications are all statutory when properly claimed in the patent filing. In 1996, the PTO adopted its latest computer-related examination guidelines, basically following the circuit court’s ruling: “software” as a class is still not patentable, but processes and machines are. Hence, software connected with a specific machine or product, software controlling external activity, and software manipulating numbers representing real world values are all patentable.

**Illustration Box**  
**Software and E-Commerce Patents**

<b>Patent Number</b>	<b>Date Issued</b>	<b>Invention</b>	<b>Inventors</b>	<b>Group</b>
4,648,047	Mar. 3 1987	Generating footnotes on the computer	James Repass et al	IBM
4,687,353	Aug. 18 1987	Generating paragraphs on the computer	Peter DeGeorge et al	IBM
5,797,127	Aug. 18 1998	Reverse auctions, where the buyer sets the price	Jay Walker et al	Walker Asset Management
5,862,223	Jan. 19 1999	Selling professional advice over the Internet	Jay Walker et al	Walker Asset Management
5,960,411	Sep. 28 1999	One-click buying	Jeff Bezos et al	Amazon.com
6,029,141	Feb. 22 2000	Click-through affiliate relationships on the Internet	Jeff Bezos et al	Amazon.com
Not yet issued	-	Group buying on the Internet	Not public	Accompany.com

Source: “The Knowledge Monopolies”, *The Economist*, April 8, 2000, p. 76

While the importance of the intellectual property embodied in software makes software patenting desirable to protect incentives for innovation, the explosion of e-commerce and the general evolution of the information economy have raised several important issues. These issues actually transcend just software patenting. For example, in the 1990s, Dell obtained over 70 patents on various aspects of its complex build-to-order system (which presumably also relies on particular software). The big accounting and financial services firms are similarly working on patenting their products and services. One of the most well known e-commerce patents was awarded to the founder of

Priceline.com, for electronic reverse auctions. Another was awarded to Jeff Bezos and Amazon.com for “one-click buying” (see Illustration Box). Lawrence Lessig, the foremost expert on cyberlaw, estimates that there are over 40,000 e-commerce-related patents.

The issues that have been raised with respect to the explosion of e-commerce patents include the degree of nonobviousness, the breadth of patents, and the scope of business-method-related patents. Nonobviousness remains an important criterion for patenting, but the complexity of software (and the increasing complexity of technology in general) means that patent examiners may have a more and more difficult time judging whether an invention is obvious “to one of ordinary skill” in the art of computer programming. Also, using previous patents to judge prior art in software may be misleading, since much software was not patented in the past. This can lead to “bad” patents, representing mistakes in the PTO. This problem will be mitigated as the database of software patents expands. However, the difficulty of judging patent applications is increased by the existence of increased specialization. For example, reverse auctions are an obvious idea for economists, but their implementation through a particular software has been patented.

Breadth is another way of viewing the controversy. The “one-click buying” patent withstood a court challenge in March 2000. Perhaps the idea is nonobvious. Yet the concept is so broad that it seems strange to allow it to be patented. Similar concerns apply to concepts such as group buying and selling professional advice on the Internet. Many of these broad patents are in the category of business methods, which traditionally were not patentable, but are increasingly being patented in the information economy. On the other hand, narrowing the scope of patents, either in general or by restricting categories, may not work if patents can be broken up into smaller components, as Dell has done. As in many situations in law, there is no perfect solution, and patent law and its interpretation and implementation will no doubt evolve substantially over the next decade or two. In Chapter 17, we will consider the e-commerce business strategy implications of the current state of patenting, and in Chapter 22, we review the public policy issues that have come to the forefront of discussions on patent law in the U.S.

Patents are valuable for the scope of protection they provide. A patent owner has exclusive rights to the use of the patented idea, unless these are assigned or licensed to others. In other words, patent law gives the patent holder the right to exclude all others from making, using, or selling the invention. Unintentional infringement of a patent is no defense, so independent discovery has no value if the patent already belongs to someone else – this contrasts with the case of trade secrets. Furthermore, since patents, in contrast to copyrights, protect the ideas (subject to the restrictions in the statutes), rather than just particular expressions of ideas, they provide much broader protection. However, copyright can be a significant complementary protection for software, as we discuss in the next section. Patenting can cost \$10,000 or more, but the rewards for a commercially successful invention can be in the hundreds of millions of dollars. E-commerce creates enormous possibilities for innovation. Hence the economic importance of patents is increasing.

### 3.3 Intellectual Property: Copyrights

Copyright law is different from patent law. It prevents the copying of the expression of ideas, but does not protect ideas themselves. Copyright law therefore does not protect against someone stealing an invention or someone else independently creating a similar expression. However, copyright does provide some protection against “non-literal infringement”, such as the near duplication of screen displays. The primacy of information products, or “content”, in e-commerce and the indestructibility, transmutability and reproducibility of digital information, have made copyright law for the Internet a major area of discussion.

#### Illustration Box Copyright Law: History and Key Developments

15th century	Introduction of printing press
1557	Royal Charter in England gave monopoly right to a publisher
1710	Statute of Anne in England laid down first terms of copyright, for 14 years, and set out penalties for infringement
18th-19th century	Series of laws subsequently strengthened protection
1886	Berne Convention for the Protection of Literary and Artistic Works
20th century	Revisions of Berne Convention, creation of World Intellectual Property Organization (WIPO)
1996	WIPO Conference on digital copyrights

#### Key Developments since 1710

- Intrinsic rights of authors increasingly recognized
- International copyright agreements to combat foreign market piracy
- Laws extended to all types of intellectual properties, including paintings, musical scores, photographs, recordings, and performing arts

Source: *The Economics of Electronic Commerce*, Choi, Stahl and Whinston (1997)

In fact, copyright laws originally came about as a response to a previous revolutionary innovation in the mass production of information, the printing press. This supply side revolution was followed by a significant shift on the demand side, namely improved literacy. Together, these created a mass market for printed content. The origins of copyright law therefore lay in the economic motive of protecting the profits of book publishers and sellers. Over time, this has changed to an emphasis on protecting the rights of authors, and to providing them with proper incentives (see Illustration Box).



All intellectual property is intangible, and has to be made tangible in some way for enforcing property rights, either by being attached to a process or machine (patent law), or to a physical expression of the idea, such as a book (copyright law). Even then, intellectual properties are different from tangible properties. In particular, copying is different from theft in the usual legal sense. Hence, violation of copyright is termed “infringement”, and pirated copies are destroyed, not returned to the owner of the copyright.

Under the current U.S. Copyright Act, copyright protection exists in “original works of authorship fixed in a tangible medium of expression.” The ease with which copyright rights are secured under this definition has led to copyrights becoming the most widely available form of intellectual property protection. We discuss several aspects of the legalities of copyright protection.

First, for a work to be protected by copyright law, it must be “original.” Actually, the amount of originality required is extremely small. A few restrictions are that the work cannot be a mere mechanical reproduction of a previous work, nor can it consist of only a few words or a short phrase. If the work is a compilation, the compilation must involve some originality beyond mere alphabetic sorting of all available works.

The Copyright Act uses the phrase “works of authorship” to describe the types of works protected by copyright law. This purposefully broad phrase was chosen by Congress to avoid the need to rewrite the Act every time a new “medium” was discovered. This allows the Act to protect World Wide Web pages and multimedia CD ROMs, even though these items did not exist at the time the Act was written. To clarify what was considered a work of authorship, Congress included a rather long list in the Act:

- literary works
- musical works, including any accompanying words
- dramatic works, including any accompanying music
- pantomimes and choreographic works
- pictorial, graphic, and sculptural works
- motion pictures and other audiovisual works
- sound recordings
- architectural works

Although this list is not meant to be all-inclusive, most protected works fall into one of the specified categories. These categories are broader than they initially appear to be. For example, computer programs and most databases and directories are registered as “literary works,” while maps and architectural plans are registered as “pictorial, graphic, and sculptural works.”

In order for a work to be protectable, it must be fixed in a tangible medium of expression. A work is considered fixed when it is stored on some medium in which it can be perceived, reproduced, or otherwise communicated. For example, a song is considered fixed when it is written down on paper. The paper is the medium on which the song can be perceived, reproduced and communicated. It is not necessary that the medium of

fixation be such that a human can perceive the work, as long as the work can be perceived by a machine. Thus, the song is also fixed the moment the author records it onto a cassette tape. Similarly, a computer program is fixed when stored on a computer hard drive. In fact, courts have even held that a computer program is fixed when it exists in the RAM of a computer.

Fixation itself implies copyright protection: no other actions are required. There is no need to file an application for copyright protection, or to even place a copyright notice on a work. These additional steps were previously required to secure copyright protection. Under the current law (since 1989), the formalities of registration and notice now merely serve as recommended steps to expand the legal protection provided by copyright. However, registration makes subsequent legal remedies for possible infringement easier to seek. Registration of copyright is maintained by the Library of Congress.

The treatment of compilations in copyright law is of particular relevance on the Internet, because compiling information available online is a major activity. Compilations, according to the Copyright Act, are works formed by the “collection and assembling of preexisting materials or of data that are selected in such a way that the resulting work as a whole constitutes an original work of authorship.” Hence, a grouping of facts is protected as a compilation, if it contains enough original expression. For example, a list of links to other web sites is a protectable grouping of facts. The creative, original expression protected in this case is the sorting, selecting, and grouping of all the web sites into an ordered list. In general, databases are also protected as compilations.

Unfixed, unoriginal works, and titles and short phrases are unprotected by copyright law. In addition, ideas, facts (considered equivalent to ideas for this purpose) and useful articles are protected by patent law or not at all. However, while the design of a dress may be patentable, the print on the cloth is protectable by copyright. Also, copyright protects a particular expression of an idea, if not the idea itself, while original compilations of facts are protected. Finally, works in public domain (e.g., Shakespeare’s plays) are not protected by copyright.

Copyright protection is much longer lasting than patent protection. According to the law in effect since 1978, works published on or after January 1, 1978 are protected for the author’s life plus 50 years after author’s death. Corporate-authored works, where individual authors do not have authorship, are covered for 75 years after publication or 100 years after creation. Works created and first published before January 1, 1978 have a total protection, in general, of 75 years from creation

Owning the copyright in a work gives exclusive rights which are very different from the rights given to a person who merely owns a copy of the work. According to US law, the copyright owner has the right to:

- reproduce the copyrighted work
- prepare derivative works based upon the work
- distribute copies of the work to the public

- perform the copyrighted work publicly
- display the copyrighted work publicly

These exclusive rights serve the function of protecting the economic interests of the copyright holder. The copyright owner can assign these rights (like selling tangible property), or license them in various ways (like renting out property). Clearly, as “content” on the World Wide Web proliferates, the importance of managing copyright rights in the face of cheap and easy reproduction will grow. Copyright laws cover not just what we see on the screen, or hear as Internet users, but also the particular software code that underlies our experiences and makes them possible.

In 1988, the U.S. joined the Berne Convention, which recognizes two additional rights:

- paternity right to claim or disclaim authorship
- integrity right to prevent or destroying one’s work

U.S. copyright law has since been extended to include these rights for the visual arts. The basis for these additional rights is in the moral rights of authors, rather than economic considerations.

Despite the broad rights listed above, not all copying is banned: what is called “fair use” is permitted. Under the U.S. Copyright Act, four factors determine whether something is “fair use”:

- The purpose and character of the use, including whether such use is for commercial or nonprofit educational purposes (though quotations for reviews in for-profit media would generally pass the test).
- The nature of the copyrighted work (e.g., is it factual or creative, has it been published or not).
- The amount and substantiality of the portion used in relation to the copyrighted work as a whole (the less, the more likely it is to pass the test, with a quantitative boundary beyond which it is clearly violated, though even small portions may be considered substantive).
- The effect of the use upon the potential market for, or value of the copyrighted work (how closely does the borrowing work substitute for the original).

One area where the fair use doctrine has been invoked is the reverse engineering of hardware or software. Under trade secret law, it is generally accepted to reverse engineer a product by analyzing circuit board layouts or decompiling computer software, to determine how it works. If software cannot be decompiled and analyzed without making a copy of the software, this would seem to infringe copyright rights. However, judicial decisions have sometimes treated the making of these copies in the context of reverse engineering as a fair use and not as copyright infringement. This would still not permit general copying of the software, but in this case only sufficient patent protection can prevent reverse engineering.

**Illustration Box**  
**MP3: Here Comes the Judge**

In a milestone case, a federal judge recently ruled that MP3.com was guilty of copyright infringement when it gave consumers access to songs stored on the company’s Web site. MP3 is a digital compression format that makes music files compact enough to be easily portable, without detectable sound-

There are quite a few more wrinkles to copyright law, and we refer the reader to the references cited at the end of the chapter. Phenomena such as the widespread copying of digital music through software such as MP3 and Napster have heightened concerns about enforcement of copyrights on the Internet. Some have called for more stringent copyright laws. However, it may be that existing laws are quite sufficient, as a recent court ruling suggests (see Illustration Box above) -- the interpretation has to be strong enough. Often concerns are over the moral rights of authors, rather than just the economic interests of the copyright holders. The economic perspective, briefly, is that there is no ideal solution to the issue of the degree of copyright protection: as usual, there are tradeoffs among choices that can be made. In subsequent chapters, we will not debate the issue of copyright reform, but instead analyze how individual or business holders of copyright may best manage this particular kind of intellectual property right. The legal and economic issues surrounding intellectual property in general have made it a specialization of rapidly growing popularity for lawyers (see Illustration Box below).

#### **Illustration Box**

##### **Where the Money Is: Intellectual Property Law Becomes a Hot Field**

Lawyers have not been left behind by the e-commerce boom, thanks to the importance of intellectual property (IP) law. The IP Law section of the State Bar of California is the fourth largest of 17 specialized membership sections, and is growing. The attractions of IP law are leading students to choose law schools

### **3.4 Electronic Contracts and Communications**

Traditional commercial transactions are governed by well-defined laws and legal precedents. In particular, there is a clear concept of what constitutes a legally-binding contract. Paper documents with signatures are the norm for contracts. Sometimes, notarization to authenticate the signatures is required. There are also disclosure requirements and escape clauses, particularly for consumers transacting with business. The legal issues in e-commerce contracting revolve around how identities can be verified, signatures can be authenticated, and content can be protected, when information is stored, processed and transmitted electronically.

The problems arise partly because of the nature of the technology: dealing with electronic signatures is not a direct sensory experience, unlike checking a handwritten “John Hancock”. Furthermore, detecting tampering may be harder in the case of electronic documents than for physical documents (though computer technology has made tampering with physical documents and photographs easier as well). In these cases, there are technological fixes as well, some of which we have outlined in Chapter 2.

Another category of problems arises in communications, and this involves a mix of technology and institutions. We accept the U.S. Mail and private courier services as reliable, secure methods of delivering physical documents. Tampering in such cases is difficult and costly to accomplish on a large scale, possible to detect, and subject to severe penalties. On the other hand, large-scale electronic eavesdropping or tampering with communications is not difficult or costly. Scanning large volumes of electronic communications is quite different from opening hundreds or thousands of envelopes to check what is inside. As a result, ordinary e-mail over the Internet is much less secure than First-Class Mail via the U.S. Postal Service. Furthermore, tampering with the U.S.

Mail is a well-defined and serious legal offense. The same kind of legal protections and standards are still evolving for Internet communications. Part of the solution will not be formal changes in law, but reputation-building: FedEx and UPS do not have the same legal status as the U.S. Postal Service, but they do have strong reputations for delivering physical documents reliably and securely.

**Certification and Assurance** Here we will focus on the problems of verification of identity and authentication of information, not on more general quality or reliability problems related to content. For example, we are concerned with how the recipient of an e-mailed stock alert can be sure that the alert came from her online broker, rather than an impostor, and that the content of what she received is exactly what the broker sent. Whether her broker's information is useful, or even accurate, is a separate issue. While deliberate misrepresentation would be unlawful, whatever the medium of delivery, the legal status of bad advice is less clear, and in any case, the issues there are not specific to electronic communications. Similar concerns about identity and the integrity of content would apply to an electronically transmitted contract.

Security of content is provided by encrypting (encoding or scrambling) that content. Encryption is an old idea, but information technology permits the use of more powerful mathematical algorithms, and therefore more secure encryption. The technology of encryption was outlined in Chapter 2. Security is different from integrity of content. Authentication of content integrity and of the sender's identity use mathematical ideas and technology similar to that for encryption. In physical markets, checking IDs or signatures is a well-established procedure. Even over the telephone, ID can be checked by providing certain information that authenticates identity (the last four digits of your social security number, for example). Digital signatures achieve similar goals for electronic communications: they can identify the sender, and also authenticate content.

In traditional transactions, where assuring identity is extremely important (large financial transactions in particular), signatures are often required to be authenticated by being done in the presence of a notary public, who acts as a trusted third party. Certification authorities in e-commerce are intermediaries that address verification problems relating to identity, but without the physical proximity that traditional methods require (you have to be physically present to sign in front of the notary. A certification authority (CA), therefore, is a public or private entity that issues digital certificates to authenticate identities and messages, or to attest that an action has occurred. CAs can provide verification or assurance of identity, verification of message content, and verification of events or actions (see Illustration Box).

Private CAs in e-commerce have stepped in to fulfill roles traditionally played by trusted government agencies such as the U.S. Postal Service. How do private CAs themselves establish trust? They may need to be certified themselves, or they can build reputation in the marketplace. In the long run, as e-commerce grows in scope and complexity, transactional certificates and time-stamping may be more significant functions of CAs than simple identification, which will become more standardized over the Internet.

### Illustration Box Types of Digital Certificates

**Identifying Certificates** attest to the identity of a person. Different levels of verification can be provided, up to detailed background checks.

**Authorizing Certificates** verify attributes of a person other than identity, e.g., citizenship or adulthood. They can preserve anonymity.

**Transactional Certificates** attest that a certain fact or incident has occurred, and been witnessed by the attester. This is often a role performed by public notary services. Digital receipts are an example, providing details of a financial transaction.

**Time-Stamping Certificates** provide assurance on when something occurred. For example, they can establish when a document was sent, or when it was modified.

Source: *The Economics of Electronic Commerce*, Choi, Stahl and Whinston (1997).

The growth of e-commerce itself will depend on the ability of two parties to complete a contract, sign it in a legally binding manner, and transmit it, all purely electronically. The technology is not the stumbling block to this goal. The issue is one of clear, generally agreed on legal standards. In June 2000, the President signed (electronically as well as with the traditional pen) a bill that sets these standards, and will make it possible for businesses to close deals with electronic contracts and digital signatures.

Electronic contracts are especially attractive for B2B transactions. However, the possibility of electronic contracting will probably require some updating of rules that protect consumers. Since a large percentage of households is still not online, presumably consumers should still have the right to have all contract details and subsequent pertinent notices on paper, without financial penalty. This makes the cost-saving that electronic dealings offer to businesses harder to achieve, but presumably these will come with time, as electronic communications become cheaper and more ubiquitous. The technology of digital certification will also have to become more widespread and widely understood for it to serve the everyday needs of B2C transactions. Firms such as Verisign and Entrust (see Application Box) are well known in technology circles and the Fortune 500, but they are far from being household names.

### Application Box Certification Authorities

**VeriSign, Inc.** ([www.verisign.com](http://www.verisign.com)), is the leading provider of Internet trust services - including authentication, validation and payment - needed by Web sites, enterprises, and e-commerce service providers to conduct trusted and secure electronic commerce and communications over IP networks. The company has established strategic relationships with industry leaders, such as AT&T, British Telecommunications, Checkpoint Technologies, Cisco, Microsoft, Netscape, Network Associates, Network Solutions, RSA Security, and VISA to enable

**Communications** The problem of electronic communications is more widespread and basic than that of electronic contracts, since many communications are not directly transaction-relevant. One area where electronic distribution of information is very attractive, because of its speed, flexibility and capacity, is in financial services. The Securities and Exchange Commission, which regulates financial services related to securities markets and transactions, noted in 1995 the “promise of electronic distribution of information in enhancing investors' ability to access, research, and analyze information, and in facilitating the provision of information by issuers and others.”<sup>4</sup> The SEC went on to state that “given the numerous benefits of electronic distribution of information and the fact that in many respects it may be more useful to investors than paper, its use should not be disfavored.”

The SEC's approach used the analogy of traditional paper-based communications to define the parameters of what would be acceptable for electronic communications from financial services firms to investors. In doing so, the SEC was not rewriting any laws, but using its broad regulatory powers to state its views with respect to using electronic media as a means of delivering the information required under the Securities

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<sup>4</sup> Securities and Exchange Commission, “Interpretive Release on Use of Electronic Media for Delivery Purposes,” 13 October 1995



Act of 1933, the Securities Exchange Act of 1934, and the Investment Company Act of 1940. The SEC has the authority to make sure that those laws are followed. The SEC guidelines are summarized in Table 3.1. The SEC stated that it would “view information distributed through electronic means as satisfying the delivery or transmission requirements of the federal securities laws” if it followed these guidelines. In 1997, the New York Stock Exchange handed down guidelines to its member firms, essentially following the SEC’s lead.

**Table 3.1**

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**SEC/NYSE Guidelines for Electronic Message Transmission**

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Customers must receive information substantially equivalent to the paper form, i.e., all required information, and in substantially the same order.

Information in paper form must be provided upon request to those who choose electronic delivery.

Customers must be able to effectively access and retain (or have ongoing access equivalent to personal retention) information provided electronically.

The intended recipient's informed consent to delivery through a specified electronic medium must be obtained, and the recipient must have appropriate notice and access.

Evidence that the intended recipient actually received the information, such as by an electronic mail return-receipt, must be obtained.

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Not that these guidelines focus on ensuring that information is available to investors, whether through paper or electronically, in a manner in which it can be understood, stored and retrieved. Investors are entitled to choose the means of delivery. Prospectuses, stock trade confirmations and statements are examples of documents that are required to be sent to investors, and which may be delivered electronically once there is a sufficient level of trust and acceptance of the technology and the providers of the service. Content integrity, authentication, time stamping, and so on may all matter for such financial communications. Private startups, as well as the U.S. Postal Service, are dipping their toes in this opportunity for providing a level of electronic communications that meets regulatory requirements for financial information in ways that ordinary email does not.

**Application Box**

**Electronic Communications and Regulatory Compliance**

Tumbleweed IME [Integrated Messaging Exchange] for Financial Services meets SEC guidelines for the delivery of compliance documents such as trade confirmations, prospectuses, and annual reports. This new level of online security allows brokers to cut costs and raise the bar on service, without sacrificing the security and reliability investors expect.

### **3.5 Government Regulation**

Governments in all industrialized countries are still struggling with the implications of the explosion of e-commerce. IPRs and regulation of electronic contracts and financial communications are just two important areas where legal concerns have arisen. We will return to government e-commerce policy issues, including taxation and monetary policy, in Chapter 24. Here we mention some of the other areas of law that are being debated.

Privacy issues in e-commerce are of great concern. As we shall discuss in detail in Chapter 15, online browsing and shopping allow businesses to capture large amounts of consumer information, often without the consumer being aware of it. Tracking information can be deposited on the user's desktop machine, allowing clicking and buying patterns to be closely monitored. The kinds of legal protection proposed here involve requiring disclosure that information is being collected, and typically also consent for collecting the information. The difference from traditional shopping is perhaps sharpest in the case of actions that do not result in a purchase. The buying habits of a shopper with a credit card or grocery "club" card can be tracked, but not browsing habits. The latter can be precisely measured in the case of online browsing, without the customer being aware of it at all. This heightens the importance of disclosure and consent.

Aside from requiring firms to disclose what information they are collecting, a separate set of laws protect consumers by requiring disclosure of product and warranty information. These laws translate quite straightforwardly to the Internet. A different class of consumer protection laws, those on antitrust, are perhaps the most debated of all. It is sometimes argued (see Chapter 16) that the economics of information is fundamentally different from the economics of physical goods. On the supply side, the information economy involves high fixed costs but low marginal costs, supporting a tendency toward large, dominant firms. On the demand side, the benefits of large networks (including virtual networks of users of particular software as well as explicit communications networks) reinforce this dominance effect.

Does this mean that antitrust law, designed to maintain competition in markets, is irrelevant in the age of e-commerce? It is not at all clear that antitrust law needs to be rewritten. The same economic principles apply as did 100 years ago. Even if efficiency favors monopoly, certain actions are clearly anticompetitive and illegal (for example, certain kinds of exclusion, tying, and predation), and the standards of behavior for monopolies can be different. Antitrust law has an important continuing role to play. Potential competition and future competition (through innovation) may limit monopoly power but they do not eliminate it. In this context, economists would agree that any disagreements in the profession in the Microsoft antitrust case are about the applicability of the law and the particular facts of the case, not about the relevance of antitrust law to the information economy (see Application Box).

#### **Application Box** **Innovation and Antitrust**

The Justice Department's antitrust case against Microsoft has been based on showing that the firm exercises monopoly power. Microsoft's defense has been that action against it would stifle innovation. Not surprisingly, the government has sought to counter this argument. When it submitted its request for breaking up Microsoft, a supporting brief was written by economist Paul Romer, who has done some of the most significant work on innovation and economic growth. Romer argues that competition is more favorable for innovation than monopoly, and that breaking up Microsoft will provide incentives for more innovation. While economic analysis on innovation has progressed rapidly in the last decade, University of California, Berkeley law professor and economist Daniel Rubinfeld notes that "The case law in innovation is not very well developed." Nevertheless, it is likely that concerns about innovation will be more and more central in the government's enforcement of antitrust law and competition policy.

Source: "Antitrust for the Digital Age", *Business Week*, May 15, 2000, p. 46.

### **3.6 Conclusion**

Many of the legal questions that arise in the new economy have to do with the complexity of technology, the pace of innovation, and the simple fact of innovation. New ways of conducting business and communicating in general require new legal

standards. Much of how our laws work in practice is based on the interpretation of what is in the statute books. Judicial rulings create precedents of interpretation, which guide future rulings. Substantial technological discontinuities create problems such as the ones now facing the U.S. PTO, trying to deal with the flood of software-related patents unleashed by a cautious judicial admission, some 20 years ago, of the significance of computer-controlled production processes. When the prevailing interpretation of a law becomes palpably inefficient or unfair, then there may be the need for legal change. Both patent law and copyright law are under some strain from the demands of the new economy, where information rules. Whether they will adjust or need to be altered remains to be seen. Existing antitrust law, on the other hand, seems capable of doing the job, provided that its enforcers are well-equipped with technical expertise and implicit political backing.

### **Summary**

- Trademarks, trade secrets, patents and copyrights are the four kinds of intellectual property rights as defined and protected by different laws.
- Patents are a significant way of making sure an inventor reaps the gains of innovation. They can provide broad protection of ideas and processes, though for a relatively short period of time.
- The growth in online commerce has meant a proliferation of software-related patents on various business processes. There is some concern that these patents are being awarded too easily, and too broadly.
- Copyright only protects particular expressions of ideas, not the ideas themselves. Software, music and any substantial writing can be protected by copyright.
- As the amount of content available online has exploded, the problems of copyright enforcement have multiplied. New technologies for copying and sharing content, especially music, have made the problems worse, and legal battles to define standards of copyright for the Internet are still being fought.
- In the case of electronic contracts and business communications, technology has provided appropriate reliability and security. Regulatory and legislative moves by the government are ratifying the use of electronic methods of business transactions.
- Antitrust law is an area where government has recently maintained a high profile in examining the conduct of firms that make up the new economy. Even though the applicable laws are many decades old, the economic principles they embody still provide the framework for the control of monopoly and anticompetitive practices.

### **Questions**

1. How does patent protection for software compare with copyright protection for software? When do you think a company would use either or both?

2. What are the benefits of copyright protection? Are there disadvantages? Why do you think copyright protection is much longer than patent protection?
3. Among the arguments that Microsoft has made in defending itself against the government's antitrust suit is the assertion that regulating Microsoft's activities (as tried by the government in an earlier case against the company) or altering its structure (as in the breakup proposed by the government) will stifle innovation. Why do you think this might be true? Even if it is true, why might the government still have a case for applying the antitrust laws?