Project Looking Forward

Sketching the Future of Copyright in a Networked World

Final Report

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Executive Summary

Executive summaries are usually one or two pages. This one is longer—about sixteen pages—but it includes the major points of this Report. A much shorter summary appears in section *7. Conclusion*, at page 283.

What is the Internet?

The Internet is not a "thing" so much as a word that describes both a loosely connected set of computers and the technology that allows them to communicate. It provides a means of transmitting anything that can be represented in "digital" form—text, images, music, videos, cartoons, animations, voice, diagrams, photographs, etc. Millions of computers and tens of millions of people are connected with this technology. The amount of information residing on all the computers connected in this way around the world is quite large, though often overestimated: all the computers connected to the Internet as of mid-winter, 1996, contained less than the amount of information residing on a single large information service like Lexis.

Circuit and packet switching. Networks before the Internet, such as the telephone network, were usually "circuit switched." That is, when a call was placed, telephone company equipment would set up an electrical path from calling party to called party. The entire conversation would flow over that same path; the path would be reserved for the use of the caller for the duration of the call.

Internet and other computer networks work differently; they are based not on "circuit switching" but "packet switching." Transmission is effected by breaking up whatever information is

to be sent into small "packets" that are individually routed. Routing is done by computers that are connected to the Internet. A single transmission of, e.g., a twenty-page document, might be accomplished with several dozen packets, each of which might travel a different path through the network. Computers at the sending end are responsible for creating the packets; at the receiving end, computers re-assemble the packets back into a single document.

Network technology is a subject of constant research, but the basic idea of packets that are individually routed or "switched" among computers is likely to remain for years to come—if for no other reason than the inertia of current huge investments and reliance on this particular technology. These networks will, however, continue to operate at faster and faster speeds.

Flat-rate pricing to disappear. Most users today pay a single flat rate for basic access to the Internet. This will almost certainly change. In time, users will not buy generic "Internet access"; they will either buy a type of access, such as "e-mail access" or "telephony access" or "video access," or they will buy different amounts of transmission capacity called "bandwidth," or a combination of these two. Prices for the lower-end services will likely be very low—within the reach of nearly anyone.

Intranets. New uses of the Internet and digital technology generally are being developed and refined rapidly. The same technology that allows messages to be sent around the world can also be used to send messages down the hall. Many organizations today are using this technology to support "in-house" e-mail, document transfer, and so on. These in-house Internets are often called "intra-nets."

Technologies relevant to copyright

A lot of new technologies have copyright significance. Some important ones are described here.

Encryption. Packet switching technology means that messages travel through many different computers, each of which can be owned and controlled by almost anyone located almost anywhere. Consequently, security of Internet communications, including some assurance of privacy, is an altogether different matter than it has been for telephone or paper mail communication. Encryption is therefore an essential element of the Internet of tomorrow.

Electronic Copyright Management Systems. Some of today's technology research is directed toward making digital works harder to copy or easier to license. These schemes are often lumped under the single heading "Electronic Copyright Management Systems" or "ECMS." The most basic systems rely on "secure transmission" of digital materials between sender and recipient. A stronger degree of protection can be created with a centralized source of access to copyrighted material. For example, a user might gain access to an entire lengthy work like a novel or movie, but with access only for purposes of making use of the work while "connected" to the source site.

Digital objects. A "digital object" is a unit of information such as a story, a movie, an image, a game, a computer program, or any other informational work, that is encrypted and then "wrapped" inside a software "envelope." Anyone receiving a copy of a digital object would be able to read the "wrapper." Access to the encrypted contents would, however, be conditioned on acceptance of terms specified in the wrapper, such as payment of a royalty fee.

Proprietary viewers. With some technologies, a digital object that is unencrypted (after, say, payment of the appropriate fee)

becomes a digital work that is "in the clear": no longer encrypted. The work can be further copied or distributed without authorization. Another technology, called "proprietary viewer" technology, changes that outcome. A proprietary viewer is a computer program that keeps a digital object always under its control. For example, if a buyer of an encrypted novel satisfied the conditions for decrypting the novel, the decryption would remain under the control of the proprietary viewer program. The proprietary viewer program would not allow the user to make unauthorized uses of the work. For instance, if the user had paid for reading only, the proprietary viewer would prevent the user from printing out the work, or from making additional copies, and so on.

Watermarks. A digital watermark is a small, almost unnoticeable alteration to a digital work like an image, a photograph, or a sequence of sounds.[1] The watermark cannot be perceived with the human eye, but can be detected with a computer program designed for the purpose. Watermarks can be used to embed identifying information into the digital work. Moreover, software for working with images can automatically detect the hidden markings and act accordingly: not permit copying, for example. If the watermark contains a serial number, any given copy of a watermarked work can be logged and recorded somewhere, allowing the author to track down the source of unauthorized copies.

Dispersed works. Web pages are often more than a static repository of text and graphics. A given "page" may consist of some material in a single computer file along with links to information stored in many other files. These other files may reside on the same computer as the primary "page" or they may

[1] A work of text cannot as readily be watermarked because any alteration of the bits would alter the letters or punctuation and show up as an error. A slight alteration to an image is far less noticeable.

reside anywhere on the Internet. In addition, much of the page may not "reside" anywhere, but be generated "on the fly" under the control of computer programs (often written in the programming language called "Java"). These well-known facts have a less well-known consequence: much of the material on the Internet *cannot* be copied by a "single button press." There is not a single "thing" to be copied.

Real time audio and video. A variety of technologies exists to provide audio in digital format. Many radio stations are now broadcasting over the Internet simultaneously with the over-the-air broadcasts. Other Internet sites have arisen that offer to play CD's of the user's choice, on demand. Similarly, video signals are also being transmitted over the Internet on a regular basis.

Today's legal issues

The rate of change in Internet and digital technology is too rapid for any easy classification of issues as "today's" or "tomorrow's." The use of these terms in this Report is as a short-hand for issues that are either widely recognized ("today's"), or less well known ("tomorrow's").

Web posting as "publication." Putting material on a Web site and thereby making it available to a wide audience is not the same thing as distributing thousands of books or magazines to retail stores or consumers. At one time, these differences might have caused some to think that unauthorized Web posting of copyrighted material was consequently not an infringement. However, today it seems clear that such a posting violates the copyright owner's rights. Less clear is the question whether such a posting should be considered a public "distribution," or "performance," or a "reproduction." Less clear as well is the issue whether such a posting constitutes "publication" for copyright purposes.

Caching. Nearly everyone wishes the Internet were faster. Technologies to speed things up are therefore popular. If a message (or text file, or image, etc.) can originate at a point closer to the ultimate consumer rather than farther, or from a computer that is faster or less congested than another, the consumer will be able to obtain it more quickly. Mechanisms to do that—to store information temporarily "closer" to the consumer or on a more powerful or less congested computer, in order to speed up access—are referred to as "caching." When information is temporarily stored midway between sender and recipient, it is also copied. Copying invokes copyright, and the issue of whether temporary storage is a fair use, or impliedly licensed.

RAM copies. "RAM" stands for "random access memory." It refers to a type of computer memory, the solid state or "internal" memory of computers. With present technology, a digital computer cannot run any of its programs without effecting some sort of copying of information and data into the computer's internal RAM memory. A number of cases have held that loading instructions from a disk into RAM memory constitutes the making of a "copy" of the program for copyright purposes. That is, the process results in the creation of a copy that if not expressly or impliedly authorized or within some exception such as fair use, is a potentially infringing violation of the copyright owner's rights.

Any access to or use of digital information means access to or use of information that is under the control of a computer. Access to digital information therefore entails the running of one or more computer programs. If a computer program is run, a copy is created in the computer's internal memory. There is a link, in short, between access to digital information and copyright law: the former implicates the latter. Absent statutory amendments to the contrary, judicial decisions will likely result in copyright law's becoming the means for governing that access and use.

Intermediaries' Liability. The Internet has given rise to many organizations whose purpose is to provide individuals with online information services and access to the Internet. These "Online Service Providers" or "OSPs"—or for that matter, any computer on the Internet that forwards information from one point to another—are thus situated between their user-subscribers, and the Web sites to which these subscribers connect and browse. Copyright law has a tradition of liability for innocent infringers. No case so far has held that such an intermediary is liable in circumstances where the intermediary's actions were wholly innocent. Nevertheless, a current issue is whether and to what extent OSPs as intermediaries ought to be liable for copyright infringement when their users engage in copyright infringing activities.

Wide-spread copying. The most obvious concern about copyright and the Internet today is that a lot of copying takes place over the Internet. Web pages, graphics, news articles, e-mail messages, and other digital works are frequently taken from one source and used in another or circulated to large numbers of people. The phenomenon of falling reproduction costs resulting in widening dispersal of reproduction activities is labeled "decentralized infringement" in this Report. Decentralized infringement has a long history: photography, photocopying, analog audio tapes, digital audio tapes, video tapes, computer software, and so on. Responses to the phenomenon have included the application of fair use principles; the development of fair use guidelines; statutory compulsory licenses; application of the doctrine of contributory infringement; and new technological developments to raise the cost of unauthorized copying.

Digital registration. Project *Looking Forward* did not address the technical issues of digital deposit or registration because the Copyright Office is actively pursuing those concerns through other more focused projects like CORDS. But interviews conducted as part of the project did reveal some misconceptions in the technical community about the nature and function of the

Copyright Office as a central repository. In particular, some think that the Copyright Office's function is to authenticate authors: to verify that anyone claiming to have authored a work is in fact the author. This view can lead to the conclusion that if digital techniques allow a work to be "self-authenticating," a central registry is no longer needed. Much less understood or appreciated is the fact that the Office's files provide a means for the public to track changes of ownership *after* initial authorship. Digital self-authentication alone cannot accomplish this type of tracking.

Tomorrow's issues

Non-public posting. It is generally conceded that the unauthorized posting of information on a world-wide-accessible web site constitutes infringement. Whether denominated "distribution" or "display" or "performance," the act of such posting violates the copyright owner's rights. Crucial to this conclusion, though, is a finding that something "public" has happened: either a public distribution, a public display, or a public performance. Any of those things done privately would not constitute infringement. Increasingly, Web technology is being used for less than world-wide access. Corporate "intranets" exemplify this trend. The narrowing range of accessibility raises the "slippery slope" issue of when a posting is "public" and when private. The slippery slope problem is common to all law, and certainly to copyright law, but the matter is made more difficult here because the copyright definition of "public" is tied in part to physical places.

"Live" information and display forms. The Internet will commonly feature links to changing databases of information. Users accessing this information through a World Wide Web "browser" will be able to pull up constantly updated information that is reformatted on the fly for Web display. The techniques for doing this live, constant updating of Web page information are fairly straightforward today, and will only get easier tomorrow.

Copyright law, and particularly the Copyright Office registration process, will be faced with an enormous amount of frequently changing information displays, raising the issues of both copyright registration of rapidly-changing works, and the copyright of derivative works.

Factual information. Facts are not copyrightable. Much of what makes the Internet useful is the ability to pull down timely information on a moment's notice. Much timely information is factual: weather, sports scores, locations, directions, forecasts, departure times, maps, etc. The general prohibition against copyrighting facts, and the *Feist* case's prohibition against "sweat" copyrights, will prevent copyright protection for these works. In the absence of other forms of protection, such as for factual databases, Web site owners who would like to charge for essentially factual material will find it difficult to do so.

Avatars. Computers can create three-dimensional figures and animate them. Experiments are already underway on the Internet in allowing users to create animated figures to represent themselves for purposes of on-line interactive discussions. Some obvious questions will arise from this technology: Can one copyright one's avatar as a fictional creation? Does this bring into play other legal issues like trademark and right of publicity?

Internet broadcasting. Today, a number of radio stations are broadcasting their performances directly over the Internet, simultaneously with their over-the-air broadcasts. Some video broadcasting is also being undertaken. The quality of both is rapidly improving. Because the cost of becoming an Internet radio or television station is substantially less than becoming a broadcast station, we will see a large increase in the number of such stations. For those that are already broadcast entities, and have been paying ASCAP and BMI royalties, an issue may arise as to whether that existing royalty payment means that royalties have "already been paid" and further royalties are not owed. For new Internet stations, the issue will be whether such stations

should be treated just like broadcasters for copyright purposes, or in some other way.

In-line linking and framing. "Framing" is a technique whereby one Web site's pages are made to appear in a smaller window inside another Web site's page. The copyright issues in framing have already arisen in litigation, though have not been resolved: does the provision of such links involve the creation of a "copy?" A "public display?" A "derivative work?"

Authorization and extra-territoriality. Copyright's traditional commitment to "territoriality"—that United States copyright law does not apply outside the territory of the United States—has led to judicial decisions holding that an authorization made within the United States of the use of copyrighted works outside the United States does not violate an owner's right to "authorize" uses of a work under section 106. With the sharp rise in easy transmission of information around the globe, we will likely see a sharp increase in the number and variety of such circumstances. The increase will accordingly put new stress on the interpretation of the "**authorization" right** in section 106.

Works of visual art. Parts of the current Copyright Act continue to be tied to the notion that works of authorship exist in printed or paper form. The moral rights that inhere in "works of visual art," for example, depend on definitions of "works of visual art" that are directed to traditional media like paper and canvass, rather than to digital works fixed in electronic form. The application of these rights to the electronic medium will therefore raise new issues of interpretation tomorrow.

RAM copies and other issues. When a user browses the WWW with browser software, the various sites browsed may be able to gather personal information about that user from the user's computer. Copyright does not apply to most personal information because such information is factual and cannot be considered an original work of authorship. Yet, information extracted

automatically from a user's own computer will typically cause some form of computer processing on *that user's* computer. That computer processing may entail the creation of copies of the programs in the RAM memory of the user's computer. Can the user argue that the copying of programs in that way is a copyright violation? Similar arguments can be made about the receipt of unwanted e-mail—receipt takes place under the control of computer programs on the user's own computer and hence may cause some form of copying into the user's RAM memory. Can the user argue that the receipt of unwanted e-mail therefore causes an unauthorized copy to be made of computer programs? Similar arguments can also be made about unwanted hypertext links to one's own computer. When those links are followed by others, they cause the running of certain computer programs, and perhaps the copying of those programs. If unauthorized, is that a copyright infringement?

Changes in pricing structure. The Internet seems to represent a "convergence" of different media into one digital transmission stream. Oddly, the Internet will likely also begin to exhibit "divergence," with different service quality levels becoming available at different prices. This shift may be perceived in some quarters as reducing access to high quality information by poorer schools, individuals, and other organizations. Quite possibly what is perceived as a reduction in access will encourage some to press for changes in copyright law. The pressure will take the form of urging alterations in copyright's protection to ensure greater access to information, as by expanding the exceptions to copyright's subject matter.

Computer-generated works. Humans can program computers to create, and the resulting computer programs can clearly be original and copyrightable; but what about the output of the computer program? The traditional answer has been that a computer cannot be a copyright "author" because computers are not human. Yet, computers are getting better all the time. If computer poetry today is not very good, then it will be better

tomorrow. Computers can draw maps, for example. Maps can be copyrighted. Though not conceptually a problem, the copyrightability of computer-created works is nonetheless likely to cause factual disputes over which portions of such works are of human origin and hence copyrightable.

Multiple authorship. Collaboration among multiple authors is a phenomenon of long standing. In this sense, multiple authors of digital works raise no new issues. But lower communications costs may expand the opportunities for multiple authorship well beyond what we have seen in the past. How should works by many authors, perhaps *very* many authors, be treated for copyrighted purposes?

Libraries, archives, search sites. Huge amounts of information are circulated daily on the Internet. Organizations have begun keeping archives of much of this material. These archives exist and function by making "copies" of the materials they store and serve, invoking copyright issues. Provisions of the current Act deal specifically with "Libraries and Archives," but these provisions are directed to reproduction of works that were originally fixed on paper and are of uncertain application to works originally created in electronic format.

Metered use. The use of digital information can be monitored by a computer. That is, given that the information is "computerized" in the first place, it requires a computer to display or perform or copy or otherwise make use of it. This allows a very fine level of metering and billing for information access. In the past, we have been used to being charged for larger units of information: hundred-page books, two-hour movies, fifteen-song CD's, etc. Arguments can be made that current copyright provisions like fair use were created in a world of that sort of "coarse-grained" metering, and that those provisions should be changed to recognize a different world if policies underlying the provisions are to be preserved.

Filtering. Filtering technologies, or "filters," consist of computer software that screens all material received over computer communications lines. Filters, designed originally to screen out pornography, can also be used to provide automatic inclusion or exclusion of elements and pieces from various information sources. They might be used to combine two or more WWW pages together, for example, or re-arrange their elements. They might also be used to delete advertising from a WWW page. When an Internet user makes use of filtering software to alter a copyrightable work such as a Web page, does that user infringe the right of the copyright owner to authorize the preparation of derivative works?

Copyright and other laws. Copyright provides a form of "property" rights in some forms of information and permits the exchange of information "products." Other laws like those surrounding broadcasting and telephony were conceived primarily as regulations of activities rather than the distribution of products. As the Internet brings about an increasing overlap between information sold as a "thing" and information distributed as part of a service, conflicts between fundamentally different legal regimes will arise. Even the notion of information as a "product" will cause conflicts. Many of our laws evolved over the centuries to deal with tangible objects in a world in which tangible objects and information products seemed obviously different. As the number and variety of transactions in information products grows, more of these transactions will have the earmarks of transactions in tangible products. That will lead to more frequent and complex interactions between two sets of laws: those that evolved to handle tangible goods, and those—principally copyright law—that evolved to handle information goods. The intersection of copyright law and **Bailment law** is one example. **Contract law**, and especially proposals to add a new section on software licensing to The **Uniform Commercial Code,** may also give rise to issues of conflict between copyright and other legal regimes.

Three patterns of copyright and technology

Copyright law has had to accommodate new technologies repeatedly over the two centuries of its existence. This accommodation gives rise to broadly similar issues time and time again. Those issues can be summarized as issues of **new subject matter**, **new uses** of existing copyrighted works, and **decentralized infringement**.

New subject matter. Some technologies create a new type or a new medium of expression. They give rise to the "subject matter" question: should the new type of expression, or the expression that is recorded in a new medium, fall within copyright's subject matter—i.e., be appropriate for copyright's protection?

Subject matter issues are less in evidence today than in the past. Congress worded the 1976 Act's concept of subject matter much more broadly and generally that it had been before. As a result, most works fixed in new types of *media* no longer give rise to subject matter questions: it is the "work" that is protected, not the medium. Questions can still arise over new types of *works*, though. The menu command structure in the *Lotus v. Borland* case can be analyzed as one such type of new subject matter.

New use of existing works. Second, some technologies create a new way of using existing copyrighted works. These technologies give rise to the "new use" question: does the new use of an existing copyrighted work infringe the author's rights? This has been a troublesome issue for copyright law over its history, arising in connection with phonograph recording of music; radio air play of music; cable-casting of broadcast programs; and others. The issue will likely recur with Internet transmission of a variety of digital works. It is more troublesome than the subject matter issue because the Copyright Act defines "rights" (and hence

"infringement") in ways that are far more technology- and medium-dependent than is its definition of subject matter.

Almost invariably, the arguments over new uses take the same form each time. Copyright owners argue that if others are making money from their works, they deserve a share. Those making the new use argue that their use only advertises or extends the copyrighted works to a wider audience and so should not be burdened with a royalty obligation. Just as invariably, the arguments overlook the central—and largely unanswerable—question: will the new use eventually grow to supplant the old use? If it will, there are strong arguments that royalty payments will be needed to preserve incentives. If it will not, those arguments are much weaker. An appreciation for possible future market effects of a new use technology is essential to good copyright decision making in the present, but seldom in evidence.

"**Decentralized infringement**." Finally, some technologies neither create new forms of expression nor allow new ways of using existing expression, but rather make methods of infringement far cheaper than before and also harder for copyright owners to discover. This sort of technological development raises what can be called the issue of "decentralized infringement."

Decentralized infringement occurs, for example, when the development of photocopy machines makes reproduction of printed materials much cheaper and easier than before, or the development of home tape recording makes the reproduction of music much easier than before, or the development of the personal computer makes the reproduction of computer programs easier, or the development of the Internet makes copying a wide variety of digital materials easier than before, etc.

Decentralized infringement usually raises issues of fair use, proposals for statutory amendment, or compulsory licenses. It typically motivates copyright owners to seek counter-measures: technological developments the purpose of which is to raise the

cost and inconvenience of making unauthorized uses of their works. Often, the issues are never definitively resolved. This may be an appropriate outcome, given that developments in the technologies that raise or lower costs will proceed unevenly and unpredictably.

Digital vs. analog: really different? Arguments that digital works are fundamentally different from analog works depend on an assumption that digital works are easily and cheaply copied. They are therefore arguments about decentralized infringement. For copyright purposes, however, the differences between digital and analog works is not one of technology, but of the cost of unauthorized uses. If technological developments raise the cost or inconvenience of making unauthorized uses of digital works, the assumed differences between analog and digital works will shrink proportionally. Many developments sketched in the Report have just that effect, including watermarks, encryption, dispersed works, proprietary viewers, digital objects, and others. From a copyright perspective, these technologies may end up making the world of tomorrow more like the world of yesterday than like the world of today.

Copyright in a rapidly changing environment

Will copyright decrease in importance in tomorrow's world of digital communications? A conclusion that copyright is less necessary in tomorrow's digital world rests on a crucial assumption: that the digital world will continue to evolve in the way that some parts of that world seem to be evolving now. That evolution features new business models such as giving away certain digital works for free and earning revenue from other services: technical support, updating, advertising. We should not be optimistic, however, about our ability to foresee the future evolution of either technology or new business models, especially those that relate to the Internet: we were not too good about predicting the rise of the Internet and the World Wide Web in the first place.

Individuals and businesses may choose to produce things for which copyright is important, or they may choose to produce other things. The existence of copyright law gives them that option. A copyright possessed by an owner can be either asserted or waived as the public demand dictates. A copyright not possessed can only be "waived," as it were—it cannot be unilaterally created even if the public's good makes the assertion of copyright desirable. Copyright functions in a changing world not to enable a particular technology, business model, or market; but rather to preserve choices among different technologies, business models, and markets. Whether it *should* function this way or not, however, is a policy determination beyond the scope of this Report.

1. Introduction

This is the final report from Project *Looking Forward*. That project represents one avenue by which the Copyright Office has sought to predict the future evolution of the Internet and related digital communications technologies, and to identify the copyright issues that might arise as a result.

This Report is not a report from any individuals or organizations or focus groups or anyone other than myself. Though I have been informed by a great many people, all of whom I thank and express my utmost appreciation to,[2] this Report reflects solely my own views.

During the course of this study, I gave a number of presentations to various audiences on "Internet and Copyright" issues. At many

[2] In addition to those formally listed in *Appendix 8.1 People interviewed*, I express special appreciation to members of the U.S. Copyright Office who were helpful in countless ways, in particular to Register Marybeth Peters, Sandy Barnes, David Fernandez, Mary Gray, Shira Perlmutter, and Jerry Tuben; I also thank William and Mary law student Carrie Schneider for proof reading; and the College of William and Mary, then-law school Dean Thomas Krattenmaker, and most especially Shirley Aceto, for finding a way for me to take the leave necessary for this project.

of these presentations, I was able to get some very helpful questions and suggestions about project *Looking Forward*. I have listed these presentations, though not the attendees individually, in the Appendices, at Section 1.1. Note, however, that I always spoke at presentations as a William and Mary faculty member, not as a Copyright Office member; views expressed at these presentations were my own, not those of the Office.

The Office requested an identification of issues, but not any proposal for their resolution. The resolution of most copyright issues touches on matters of important public policy, matters that can only be addressed with careful deliberation and consultation with affected parties and with Congress.

I thank the Copyright Office, particularly the Register, Marybeth Peters, and the Associate Register for Policy & International Affairs, Shira Perlmutter, for initiating the project, for giving me the opportunity to participate in it by conducting this study, and for providing on-going support and encouragement.

Methodology

I relied in the preparation of this Report on several things. Most of all, I have spent a good deal of time talking with people who have an interest in and knowledge of the Internet. I have also continued to conduct research of my own, both into the legal issues and into the Internet as a technology. I use the Internet on a daily basis, and have found the net itself to be helpful in learning about what is happening with the technology and what is likely to be upcoming in the near future.

In addition, in cooperation with the Copyright Office, I planned and led three small "focus group" sessions, two of them "live" and in-person; the third conducted by e-mail. The first live session was held on the campus of Stanford University, in conjunction with the Stanford law school and in particular with Prof. Carey Heckman, the Director of the Law and Technology Policy Center

there. The second live session was held at the Copyright Office itself in Washington, D.C. The e-mail conference was, of course, in "cyberspace."

About names used in this Report

It is helpful in explaining things to give real-world examples. Often when an actual example would be useful, I refer to particular companies or products or services by name, frequently with a World Wide Web address included. I do not endorse or support or have any affiliation with any of these—or any other—commercial organizations.

This Report also includes a number of images that are "screen captures," that is, images taken directly from a computer screen. Most of these images are of pages from different sites on the World-Wide Web, pages that may themselves be copyrighted. Having concluded that for purposes of this Report the reproduction of these page images is a fair use, I have not obtained permission for their use. Naturally, the copyright status of this Report overall does not affect the copyright status of these images.

About predictions in this Report

The Copyright Office asked me to look at the future evolution of the Internet and related digital technologies, and then to try to predict what new copyright issues that future will raise. This should help the Office to be informed and hence to be prepared to address tomorrow's issues and controversies.

To accomplish that goal, one need not accurately predict a single "future." One can predict many futures, or many different aspects of "the future" and then suggest some, perhaps even differing, copyright consequences. To that end, I have not tried to sketch out a single vision of digital communications of tomorrow, but rather

looked at various pieces of digital communications technology: different mechanisms, functions, user capabilities, and so on. Nor have I tried to ensure that all these various elements are consistent with each other and with a single evolutionary path; perhaps they are, perhaps they are not. My assumption is that it will help the Copyright Office to know what it can about the possible *copyright issues* of tomorrow, not what the world of tomorrow will look like in general.

2. How the Internet Works Today

An appreciation for the "mechanics" of the Internet's functions is very helpful to anyone who wants to understand the legal issues. The salient point about the net is its distributed nature—that is, information flowing through the Internet travels over many different paths from the point of origin to the destination, even during a single "session" of Internet use. This mechanism contrasts sharply with the existing voice telephone network, over which phone calls travel over a single path for the duration of a call.

Two important consequences are that Internet information passes through a great many computers, each of which may be controlled by different individuals or organizations, either within or without the United States; and information travelling over the Internet is "copied" dozens of times as it progresses from origin to destination. This section of the Report explains the mechanics without drawing conclusions as to copyright issues. Later sections

discussing copyright issues will draw on the technical explanations that appear here.

2.1 Mechanics of switching

The Internet is a network for carrying computerized ("digitized") data from place to place. We have had computer networks for many years, long before the rise of the Internet. What makes the latter type of network so different?

Earlier computer networks were centrally "switched," so that all messages between any two points on the network were sent through the central switching computer. These networks are today called "star" networks, because there is a central point in the network—the central switching computer—that has wires "radiating" out to all other computers.

Though all computer networks of the time were "star" shaped in their architecture, different switching technologies were often employed by each of them.

Problems with star networks

In the late 1960's, the Department of Defense, like other computer network users, relied on star-shaped networks for military communication.[3] The Department understood, however, that those networks had at least two problems. First was that they were highly vulnerable. Anything that rendered the central switching computer inoperative—whether a bomb, sabotage, or just "down time"—would simultaneously render the entire network inoperative. Second, because different star networks used different technologies for switching messages internally, they could not communicate with each other. Messages were confined to the network from which they originated.

[3] More on the history of the Internet is available from the Internet Society's Web site. *See* Barry M. Leiner, Vinton G. Cerf, David D. Clark, Robert E. Kahn, Leonard Kleinrock, Daniel C. Lynch, Jon Postel, Larry G. Roberts, and Stephen Wolff, *A Brief History of the Internet*, <http://www.isoc.org/internet-history>, available as of February 23, 1997.

The Defense Department undertook a research project through its research arm, the Advanced Research Projects Agency[4] (ARPA) to remedy these two major drawbacks to existing network technology.

ARPA research

ARPA's research led to an alternative networking technology that successfully avoided both the problems identified by Defense. ARPA created a standard format for electronic messages that could be used between networks to connect them in spite of internal differences; and it devised an interconnection method that was based on many decentralized switching computers. Any given message would not travel over a fixed path to a central computer. Rather, it would be "switched" among many different computers until it reached its destination. The network designers set a limit on the size of a single message. If longer than that limit, a message would be broken up into smaller pieces called "packets" that would each be routed individually. This new type of network switching was therefore called "packet switching."

By creating a system that relied on many decentralized computers to handle message routing, rather than one central computer as was the method for star-shaped networks, ARPA produced a network that could still operate even if many of its individual computers malfunctioned or were damaged. ARPA implemented a prototype network called "ARPANet" to test out and continue development of this new technology.

Unrelated to ARPA's work on this packet switching technology, at about the same time (the early 1980's) the National Science Foundation (NSF) funded the creation of several supercomputer sites around the country. There were far fewer supercomputers than scientists and researchers interested in using them. NSF understood that it would be important to find ways for

[4] At times, ARPA has been known as "DARPA," which stands for "Defense Advanced Research Projects Agency." ARPA and DARPA are the same agency, however, so this Report will use "ARPA" throughout.

researchers to use these computers "remotely," that is, without having to travel physically to the supercomputer site. NSF was aware of the work going on with the ARPANet, and determined that that network might provide the sort of access methods needed to link researchers to the supercomputers.

NSFNet

NSF then funded the construction of its own network for these purposes, a network known as the "NSFNet" and built with the ARPA packet-switching technology. NSFNet connected a variety of local university networks and hence enabled nation-wide access to the new supercomputer centers. The idea of calling this sort of network an "Internet" reflects the fact that its first use was conceived primarily to allow an interconnection among existing incompatible networks; in its early incarnations, the Internet was viewed less as a "network" for its own sake, in other words, and more as a means to connect other networks together.

Thus the first practical, non-prototyped version of the Internet was designed and built to enable researchers to use distant computers. Before long, however, the users of the NSFNet began to realize that they were not limited to just sending data back and forth to computers. They could also send messages to each other. At first, these may have been messages that related to the use of the supercomputers. But it soon became obvious that a message from one researcher to another need not have anything to do with supercomputers: the NSFNet was in fact a very general purpose communications medium. Electronic mail, file transfers, and the like thus arose literally as afterthoughts to the Internet's creation.

2.2 Internet geography

This multi-purpose usefulness of the Internet has fueled its enormous growth. It is possible to connect to the Internet from almost anywhere, though of course the actual number of people and institutions that *are* connected is less than the number that are close enough to obtain a connection because connections carry a cost.

Here is a map showing the places where Internet connectivity was possible as of June 15, 1996. Notice that all but a handful of nations fall within the "connection-is-possible" areas.

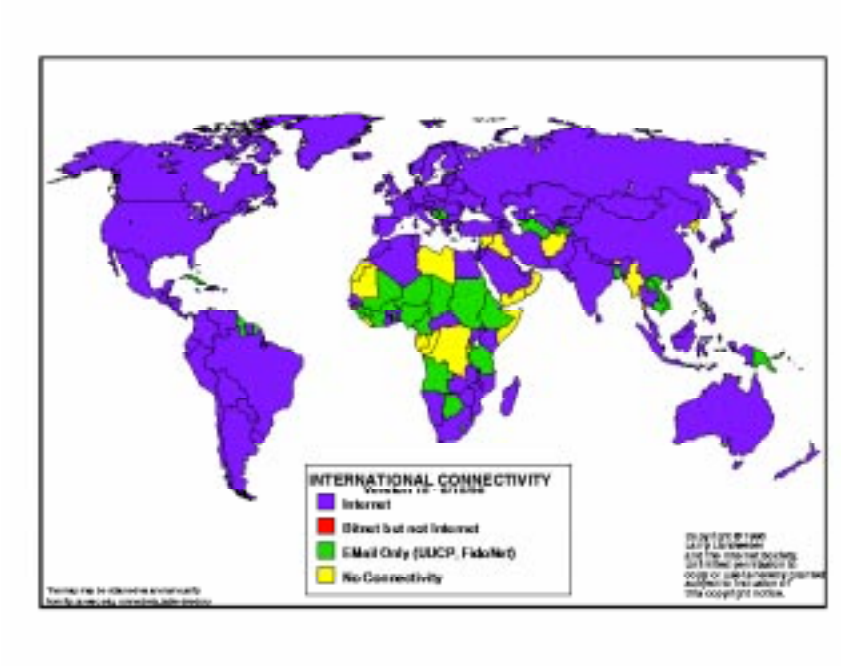

Figure 1: Map of Internet connectivity in June, 1996, from <http://www.isoc.org/images/mapv15.gif> on February 23, 1997.

Here is the same map from a year later, in June, 1997. Note that considerable expansion of connectivity has taken place in the interim.

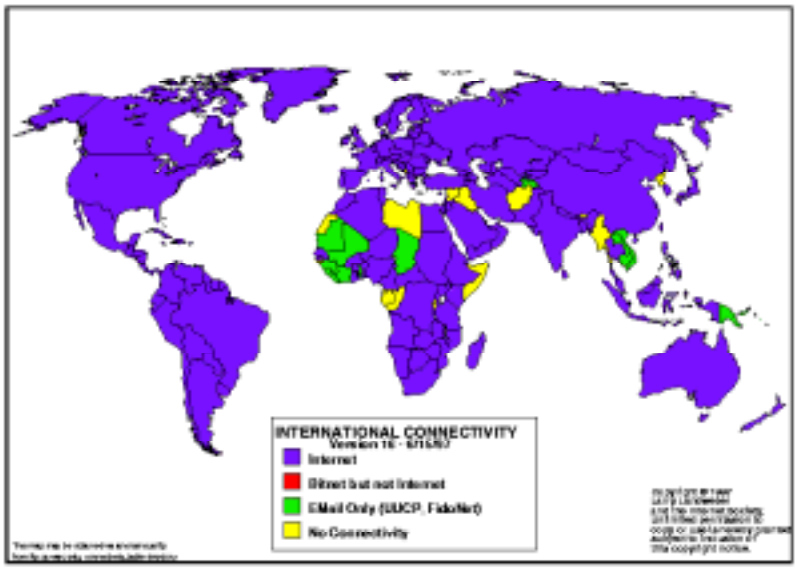

Figure 2: Map of Internet connectivity in June, 1997, from <ftp://ftp.cs.wisc.edu/connectivity_table/Connectivity_Map.color.bmp> on January 25, 1998.

2.3 Internet switching technology

The way information travels across the Internet is mysterious to most people, beyond the simple knowledge that information is broken into "packets" and that these packets get relayed from computer to computer until they reach their destination. Detailed understanding about the architecture of the Internet is not central to the copyright issues, but some understanding will be useful.

Voice telephones and circuit switching

The Internet and its contribution to network technology is easier to understand if one first understands how the telephone network was designed to work. Voice telephony is based on "circuit switching." A "circuit" is the particular path of physical wires over which the conversation will be carried. Typically there are many physical wires going among various locations. These wires will meet at various switching points across the country. When a call is made, it goes to a nearby switching station; there the switch must determine which outgoing wire of many the call should be routed on. That outgoing wire may in turn go to another switching station, which again must find an available outgoing wire; etc. This may happen at many different switching points. Once the various switching points have chosen all the necessary wires, they form an end-to-end path or "circuit"; that path remains constant for the duration of a phone call, whether anyone is actually talking or not. The time delay necessary for the switches to find an available line and making the necessary connection, constitutes the delay one experiences after dialing—the time spent "waiting for a connection."

The disadvantage of this mechanism, compared to the Internet's "packet switching" mechanism, is that it "wastes" the resources of the circuit when there are pauses in the conversation. The advantage is that it ensures that the call will continue without interruption no matter how much the network may become congested. Indeed, congestion in the telephone network only

affects those who are initially trying to place a call. If the network is highly congested, they will be unable to make a call at all and will instead receive a "fast busy" signal.[5]

Packet switching mechanism in contrast to circuit switching

In a packet-switched network like the Internet, however, the mechanism is radically different. All Internet information is digital—represented by a series of high and low voltage values for an electric current that in turn represent the one's and zero's that computers work with. This differs from the telephone system, where phone calls are represented by continuously varying voltages—a so-called "analog" communication. But that is not the crucial aspect of the Internet's form of transmission. Rather it is the fact that digital information is broken up into small "packets" before transmission. Each packet is numbered in sequence and sent out over the network individually. When received at the ultimate destination computer, that computer must re-assemble the packets in the correct order before delivering them to the recipient. Packets may in fact arrive out of order, and quite commonly do because the packets have traveled over quite different physical paths.

The nature of this packet switching mechanism makes it extremely well suited to some forms of digital communication, and less well suited to others. The ideal use of packet switching is for electronic mail. E-mail communication is "asynchronous," that is, it is not a live or "real time" exchange back and forth between two people. An e-mail message that is divided into packets arriving essentially randomly at the destination computer can therefore be reassembled without a delay that is noticeable to the message's recipient. Typical "delays" are on the order of fractions of a second in any event, perhaps reaching seconds or minutes during periods of heavy Internet traffic. Most people are unaware

[5] The usual busy signal that one gets when calling a telephone that is busy is a slow alteration between a tone and silence. When all circuits are busy—not just the telephone one is trying to reach—the same alternating tone and silence is heard, but at about twice the rate.

and unconcerned whether an e-mail they receive was sent five seconds or five minutes ago.

Some digital communications are not "asynchronous," however, and hence are better suited to live or real time operation. A telephone call over the Internet is such an example. A phone call is "synchronous"—it is live and in "real time." When an Internet user places a phone call over the Internet (as an increasing amount of new software allows one to do), the call is digitized at the sending end (converted into one's and zero's). It is then—like an e-mail message or any other Internet communication—broken up into packets.

Like the packets of an e-mail message, the packets of a "phone call message" may well travel over different routes and may arrive out of order. The receiving computer has no trouble re-arranging the packets into the correct order, but this rearrangement takes some amount of time. Again, this delay may only be fractions of a second to several seconds, but the if resulting delays happen in the middle of a spoken sentence, they introduce some "jerkiness" into the telephone conversation with odd and unpredictable delays for both parties.

It is possible to construct a packet-switched network like the Internet so that even phone calls can be transmitted smoothly, without interruption. But "smooth" transmission of real-time information like phone calls is a function of two things: the network's capacity and the amount of use it gets. Any given capacity (called "bandwidth") would allow smooth real-time transmission if the number of users and uses could be limited. Any given number of users and uses could be accommodated if the capacity could be expanded appropriately. At present, capacity at any given time is fixed, and the number of users is not fixed; consequently, real-time information transmission today is often not "smooth" at all.

2.4 User capabilities

The capabilities of the Internet and the World-Wide Web today are well known. Users can send and receive e-mail; they can download files and programs from various sites; they can "browse" various WWW sites to examine their content; they can post materials to a site they own for others to browse.

Web sites in particular are rapidly maturing: just a year or two ago, they were almost entirely text with plain gray backgrounds. Today they are often wildly colorful, with animated movement, "wallpaper" backgrounds, photographic images, and links to live information in databases that range from price lists to airline schedules. A number of programming languages have been created to facilitate Web site animations, including popular ones called "Java" and "ActiveX."

Intranets

More and more organizations are creating in-house organizational networks, called "Intranets," that are based on Internet and World-Wide Web technologies but accessible only from within the organization. The attraction of Internet technology, compared to previous networking technologies, is that it is an "open" standard. That is, the software to create and access Web sites is available from a number of different companies. Many previous networking technologies like Novell *NetWare*, Banyan *Vines*, IBM token ring designs, and the like were "proprietary"—they belonged to and were controlled by a single vendor.

Additionally, the Internet is available from an almost countless number of sites around the world, so that with appropriate security measures like passwords, a user can access even an internal company Intranet from anywhere in the world.

Many of the interesting uses of the Internet will be discussed under the heading *How the Internet Will Work Tomorrow*, specifically the section on *User Capabilities*, at page 155. The most common use today, outside of organizations' Intranets, is simply for individuals to find and retrieve information. Typically finding information on the Web is done with "search engines."

Search engines

A "search engine" is piece of computer software that examines as many pages as possible on Web sites the world over, compiling a list of the location of each word on each such page. In a sense, these search engines create a full-text index of the Internet, in much the same way that Lexis and WestLaw create a full-text search capability for legal materials. Though such a task may sound daunting, in fact the total amount of information presently available on the World-Wide Web is considerably less than that available on either Lexis or WestLaw alone.[6] This may change, of course, as the Internet continues its rapid growth. But storing and providing access to a full text index of the Internet is well within the capability of computers costing only a few thousand dollars today.

Compiling the index and keeping it up-to-date are far more difficult. What happens is that a computer program called a "search engine" starts with a list of one or more Web sites. The engine then requests the top-level ("home") page from each site on its list. When a homepage is retrieved that has links to yet other pages, the search engine requests a copy of each of the pages that these links point to. And if those pages in turn contain links to yet more pages, the search software requests a copy of those pages. And so on, day after day, ceaselessly.

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[6] Personal conversation with Ron Staudt, Vice-President, Lexis-Nexis Corporation, January, 1997.

In all, a typical indexing computer, with a T1 phone line (operating at 1.5 megabits per second) examining about 500 sites at a time, can canvass the entire WWW in about 44 days.[7] Of course, the number of Web sites and hence the amount of information available is growing rapidly; but then it is always possible to double the speed of index compilation by adding a second computer and a second communications line. In practice, most search engines do not exhaustively cover all possible sites. In addition, some search engines pass along material for review by human editors, who rate the pages retrieved on a variety of scales—quality, appropriateness for families, and so on. The creation of such an annotated index obviously takes longer than it does to create a comparable unannotated index.

About a dozen search engines operate today,[8] with names like *AltaVista*,[9] *Excite*,[10] *HotBot*,[11] *InfoSeek*,[12] *Lycos*,[13] *Magellan*,[14] *NetGuide*,[15] *WebCrawler*,[16] *Yahoo*,[17] and others. These and similar search engines form a kind of "card catalog" for the Internet, and as such, are the primary means by which Internet users can find digital information.

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[7] Personal conversation with Brewster Kahle, President of the Internet Archive, February 12, 1997.

[8] Early spring, 1997.

[9] <http://www.altavista.digital.com>.

[10] <http://www.excite.com>.

[11] <http://www.hotbot.com>.

[12] <http://guide-p.infoseek.com>.

[13] <http://www.lycos.com>

[14] <http://www.mckinley.com>.

[15] <http://ms.netguide.com>.

[16] <http://webcrawler.com>.

[17] <http://www.yahoo.com>.

2.5 Who pays for the Internet?

To understand "who pays for the Internet," one needs first to appreciate the difference between the architecture of the Internet's computers, and the architecture of the wires and satellite links that connect those computers. The switching computers are quite decentralized: millions of computers help to handle the Internet's traffic, and no one of them has any control over the others. All such computers are "peers": there is no hierarchy of control of some computers over the other. That is what enables the net to continue functioning even if a number of individual computers falter.

On the other hand, the links between computers—primarily telephone lines, with some amount of satellite and other non-wire forms of communication—are arranged in a hierarchical structure.

Backbone networks

The hierarchical structure of physical links, roughly speaking, runs from "backbone" networks to "regional" networks to "local" networks. At the top level are the highest speed links: very fast telephone lines known as "T1" or "T3" lines. These high speed lines form what is called the "backbone" of the Internet. A number of them criss-cross the country and other countries; the U.S. alone is home to dozens of such backbone lines. Backbone lines for the most part are physically installed and paid for by telecommunications carriers like AT&T or MCI.

Many of these carriers are installing more and newer backbones to accommodate the rising demand for Internet services. As an example, below are two diagrams, taken from the World Wide Web, showing MCI's Internet backbone in 1995 and again as expanded in 1996.

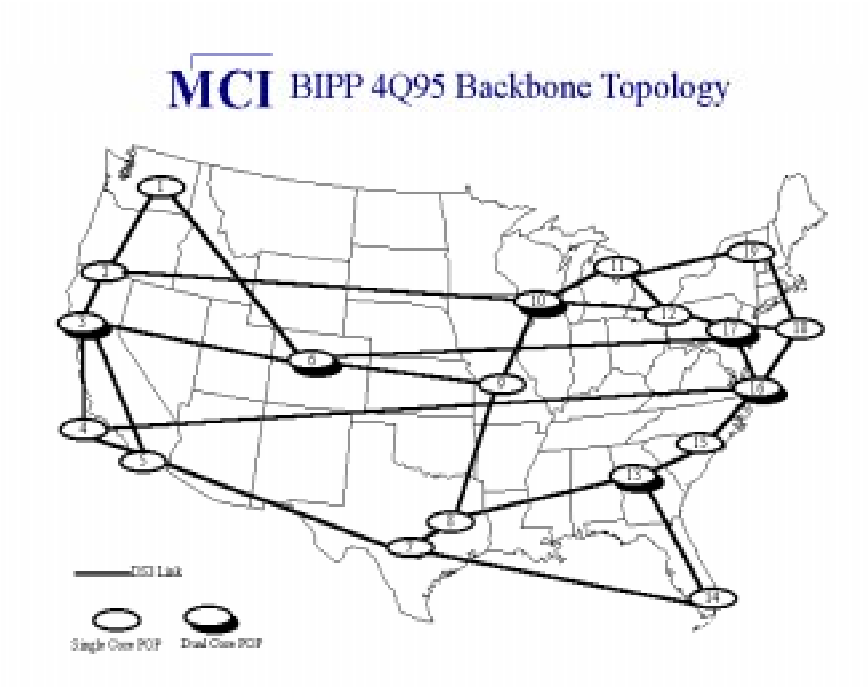

Figure 3: MCI's 1995 Internet backbone network,
from <http://www.mci.net/bipp95.html> on October 28, 1996.

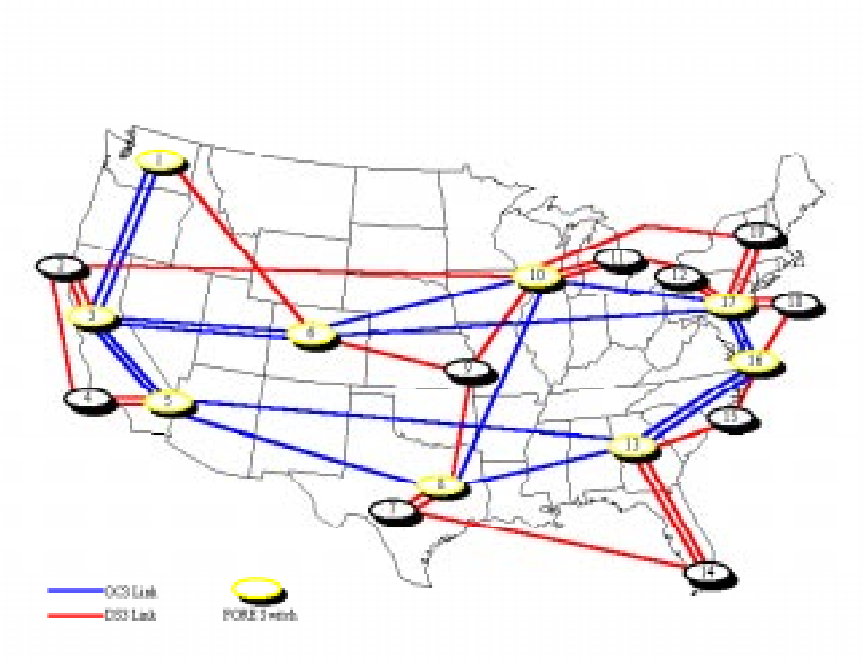

Figure 4: MCI's planned 1996 Internet backbone network, from <http://www.mci.net/bipp96.html> on October 28, 1996.

Regional networks

Other companies, including typically Internet Service Providers, form smaller networks in a given region of the country. These are known as "regional" networks, and may be provided by for-profit entities such as PSINet or UUNet, or by universities or consortia of universities, such as "SURANet," the "SoUtheastern Regional Area Network."

A regional network with no further connections to other networks could only provide services such as e-mail and Web browsing directly within its own area. Regional networks therefore contract with a backbone network to be connected to, and thereby have access to, any place on the Internet that that backbone network reaches. This is the means by which the backbone companies earn revenue from the installation of the backbone.

Local networks

In turn, a regional Internet provider will sell its services to many local networks. A typical university, for example, will install its own campus-wide network to connect all campus computers together. The university bears the expense of stringing the wires and supplying the other necessary hardware and software. This campus network will then have a point of interconnection with a regional network, for which the university will pay (usually) a flat annual fee for the privilege of making the connection.

As a result, local networks are paid for by the entity (university or business or other organization) that installs them. This local entity will contract and pay for a connection to a regional Internet network. The regional provider will then contract and pay for a connection to a backbone Internet network.

Network access points

The backbone networks also interconnect with each other at a dozen or so sites around the U.S. (and other similar sites around the world). These points of interconnection are called "Network Access Points," or "NAPs" for short.[18] The connection is by means of a switching computer which looks at each incoming packet to see where that packet should be routed next. This switching computer is called a "router."

For example, there are NAPs in New York, Washington D.C., San Francisco, and Chicago, where various backbones connect to each

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[18] *See* NSF Press Release 96-45, *The Next Generation Internet: Another Step In The Successful Transition To The Commercial Internet*, August 15, 1996, available as of November 18, 1996, from <http://www.nsf.gov/od/lpa/news/press/pr9645.htm>.

other.[19] When several backbones agree to interconnect at a given point, the connection is, loosely speaking, between "peers" rather than hierarchical. Consequently it is common for the owning companies to agree to interconnect without charging each other any fees.

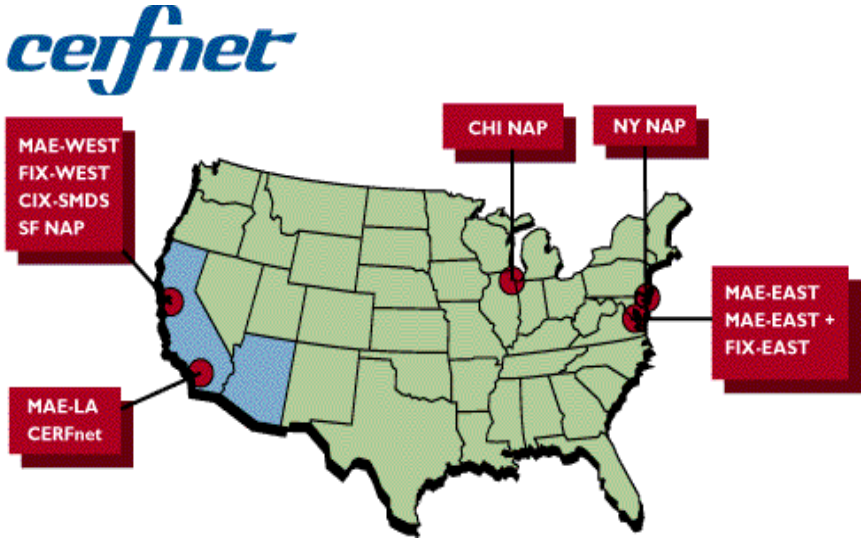

Figure 5: Map showing Internet "Network Access Points," where various backbone networks connect to each other, from <http://www.cerf.net/cerfnet/about/interconnects/NSP-img_map.gif> on October 10, 1996.

[19] An interesting animated demonstration of communication over the Internet illustrating some of the points in the text can be found at an MCI site: <http://www.mci.com/aboutyou/interests/technology/internet/guide.shtml>, as of March 3, 1998.

2.6 How big is the Internet?

Statistics about the size of the Internet are not highly reliable: the decentralization of computers and equipment makes it hard for anyone to calculate how many computers there are exactly, or how many users, or how much traffic is carried over the network. Then too, the Internet is changing and growing constantly, so figures that can be collected are not only suspect at the time, but likely to be soon out of date.[20]

That said, there are a few observations that one can make.

The World Wide Web, as of mid-winter 1996-97, contains a little over two "terabytes" of data.[21] A single "byte" is roughly equal to a single letter of the alphabet or a single decimal digit. A terabyte is a thousand "gigabytes"; a gigabyte is a billion, or equivalently, a thousand "megabytes"; and a megabyte is a million bytes. So two terabytes is about two thousand billion bytes, or 2,000,000,000,000 bytes.[22] For comparison, the Library of Congress holds about 20 terabytes of data.[23] Here is one indication of the size of the Web, quoted from the *Internet Archive*:[24]

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[20] "Public information on the Internet is constantly growing and changing, and it's hard to know exactly how much information is there at any given time. We have collected 500 gigabytes so far. We'll keep you updated on our progress." From the *Internet Archive*, <http://www.archive.org/webarchive96.html> on December 5, 1996 (reflecting a date of Sept. 23, 1996 shown at the bottom of the Web page).

[21] The *Internet Archive*, <http://www.archive.org> as of March 14, 1997.

[22] Usually computer measurements are in units of "1K," which is not 1000 but rather 1024—a round number in the binary number system. Consequently when people use terms like "megabytes" and "gigabytes," they may mean multiples of round decimal numbers (1000's), or they may mean multiples of round binary numbers (1024's). For the degree of accuracy we are dealing with here, the distinction does not matter.

[23] The *Internet Archive*, available as of March 14, 1997, <http://www.archive.org/webarchive96.html>.

- The Alta Vista search engine is based on an index of at least 30 million web pages spread across 275,000 sites.
- Excite [a search engine site] says it has indexed over 50 million pages.
- Our own analysis indicates there are about 450,000 unique web servers (as of December 1996).
- From our crawl so far, the average HTML page is about 5 kb [kilo bytes]. If there are 80 million pages, then the text side of the web is 400 GB [gigabytes].
- From our crawl so far, it appears that the total size of the non-text side of the web (images, [sounds], etc.) is about 4 times that of the HTML side. So we think the total size of a single snapshot of the web is about 2000 GB [gigabytes], or 2 TB [terabytes].
- The mean lifetime of a web object is only 44 days (Chankhunthod et al., USC / UCBoulder) …

[24] <http://www.archive.org>.

3. How the Internet Will Work Tomorrow

The previous sections explained the basic mechanics of today's Internet. The decentralized nature of the net helps to explain, as will be discussed below, some of the challenging copyright issues to which the net has begun to give rise. Similarly, an understanding of tomorrow's Internet will be helpful to assess tomorrow's issues. It turns out, however, that the basic Internet mechanisms of decentralized packet switching are likely to be with us for a long time to come. This section therefore summarizes why that is so, and then goes on to discuss a number of newly emerging uses of the net. It is these new uses, not the net's underlying architecture, that are likely to give rise to tomorrow's copyright issues.

3.1 Mechanics

An easy answer to the question "how will the Internet work tomorrow," is to say "much like today, only bigger and better and faster." That's not too far off the mark, though the notion that the Internet will work "better" tomorrow is not free of controversy. Some schools of thought hold that it cannot continue to function under its present rate of growth and will in some fashion or other "collapse" fairly soon.[25]

A collapse seems unlikely, though it does seem likely that something will have to change in the structure or capacity or pricing of the Internet. The rate of growth in number of computers and users has been exponential in the past several years.[26] Nothing can keep growing in the same way indefinitely; once every man, woman, and child is connected to the Internet, growth of that particular kind—one person equals one connection—will stop. Some very recent estimates suggest that the peak rate of growth in the number of host computers

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[25] In December, 1995, the editor of the widely-known computer newspaper InfoWorld, Bob Metcalfe, said "I predict the Internet, … will soon go spectacularly supernova and in 1996 catastrophically collapse." INFOWORLD, vol. 17, Dec. 4, 1995, p. 61, available as of May 10, 1997, from <http://www.infoworld.com/cgi-bin/displayArchive.pl?/95/49/o05-49.61.htm>. Metcalfe repeated these predictions from time to time in 1996, offering to eat his columns if the Internet did not collapse. INFOWORLD, vol. 18, Nov. 18, 1996, available as of May 10, 1997 from <http://www.infoworld.com/cgi-bin/displayArchives.pl?dt_iwe47-96_24.htm> ("The Internet might possibly escape a 'gigalapse' this year. If so, I'll be eating columns at the World Wide Web Conference in April."). He ended up eating these columns, literally. *See* Sandy Reed, *Fulfilling his promise, columnist Bob Metcalfe dines on his own words*, INFOWORLD, vol. 19, Apr. 28, 1997, available as of May 10, 1997, from < http://www.infoworld.com/cgi-bin/displayArchives.pl?97-o09-17.75.htm>. *See also* Brian Livingston, *Will Too Many Users Destroy the Internet? I Hardly Think So*, INFOWORLD, Dec. 9, 1996, p. 35.

[26] See Robert H. Zakon, *Internet Timeline*, <http://www.isoc.org/zakon/Internet/History/HIT.html> as of October 20, 1997.

connected to the Internet occurred in June, 1997. This estimate shows that number likely leveling off at between 19 and 57 million hosts, with the most likely number being 38 million, in the year 2002.[27] But other things can grow: the number of devices connected to the Internet, for example, or the available bandwidth, or innovations in features, or the location of connection points, and so on.

Of the various things that might change with the Internet in the three to five year time frame, in response to growth, the least likely is the underlying packet-switching protocol. The most likely is an increase in bandwidth coupled with an evolution toward a variety of levels and qualities of service, with different prices for the different quality levels.

Underlying packet-switching, TCP/IP protocol

The basic method of packet switching and the TCP/IP protocol seem destined to remain relatively unchanged. First, the basic method of communication is sound and advantageous and scales well to very large networks, as is shown by the size of the Internet today. Predictions of collapse have not so far proven true, and the Internet continues to grow rapidly.

Another reason that the underlying packet-switching technology is likely to endure has to do with inertia. Engineering decisions made in the original design of the Internet were made by a handful of technology pioneers working together. Today, the number of Internet users has grown so vast, and the number of machines, software, and human investments in the present scheme so gargantuan, that really fundamental change in the next five or so years seems exceedingly unlikely. The process of re-engineering and designing the Internet goes on, of course, but today the coordination required for any change—any change at

[27] Mario Hilgemeier, *Internet Growth - Host Count Turning Point in June 1997*, <http://www.is-bremen.de/~mhi/inetgrow.htm> as of October 20, 1997.

all—includes thousands of people and companies around the world.

For good or ill, then, the inertia (or momentum, if one prefers) created by the Internet's very size and scope will ensure that major design changes will happen very slowly if at all.

That does not mean, however, that there will not arise separate networks based on other technology. That seems likely because research on networking technology proceeds apace. But it is likely that the benefits of connecting with existing Internet-based communications devices will mean that fundamentally different networking technologies will either take a back seat to the Internet protocols we see currently or be used in close connection with them.

Addressing Scheme

Though major revisions in the five-year time horizon are almost prevented by the Internet's size, that size is already necessitating one significant change: an expansion in the size of an Internet "address."

When telephone switching equipment was first in place, telephone numbers consisted of four digits. When the population and the number of telephones grew, phone numbers were increased to seven digits. Now it is common to have to dial ten or eleven digits in large cities. Similarly, the Internet's addressing scheme is now being revised to handle larger addresses and so to accommodate even more networks and computers and devices.

Current proposals call for increasing the size of an Internet address substantially: from 32 bits to 128 bits. This will allow a separate Internet address to be applied not only to all foreseeable computers, but also to all foreseeable "things" for which an address might be desirable. Current thinking is that appliances like toasters and refrigerators will have—or at least can have—their own addresses in the future; even individual light bulbs in one's house may have their own Internet address. This would

allow remote control of devices over the Internet if that proved desirable.

Economics and pricing

Most users today pay a single flat rate for basic access to the Internet. At times, rates are set hourly, though often there is an initial flat rate for a number of hours which, if exceeded, converts to an hourly rate. Increasingly common is true flat-rate pricing: unlimited access for a single monthly fee.

A modem connection using ordinary dial telephone lines presently allows 28.8 or 33.6 or 56 kilobits-per-second access.[28] In some areas of the country, one can acquire an "ISDN"[29] line that operates at about 128 kilobits per second, or a "T1" line that operates at 1500 kilobits-per-second, or even higher speed communication lines. These latter higher speed lines simply cost more than the ordinary telephone lines.

In any event, whatever the terms of the service pricing and basic access speed, the rate usually provides generic "access to the Internet." That means that once one has access, one can use the Internet to send e-mail, or files, or digitized telephone conversations, or interactive video, or whatever.

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[28] A "kilobit" is a thousand bits. About eight bits are needed to represent a single letter of the alphabet. On the matter of modem speeds, *see* press release, "U.S. ROBOTICS SHATTERS SPEED BARRIER: DELIVERS 56 Kbps OVER STANDARD TELEPHONE LINES -- Internet service providers Embrace New x2 Technology; Plan Field Trials & Roll-Out"; Skokie, Ill., October 16, 1996, available as of November, 1996, at <http://www.usr.com/aboutusr/103_64.html>. [Within the year or so following that press release, modems operating at 56Kbs have become common. This evolution shows the difficulty of predicting developments in an industry for which "rapid change" is a gross understatement.]

[29] ISDN stands for Integrated Services Digital Network. It is a technology for telephone lines to communicate at faster than ordinary phone line speeds.

Flat-rate pricing will give way to usage-based pricing

The flat-rate system will almost certainly change to one based more closely on usage because flat-rate pricing is inefficient. When that change happens, if it does, the Internet will begin to exhibit a kind of "divergence" in services and pricing.

Many people are happy just to send e-mail and assume that it will be received within minutes or even hours. Others want to conduct live two-way video conferences with participants identified ahead of time from several different countries and with the use of computerized presentations for all to see "live." It is most unlikely that both the e-mail user and the live video conference user will be satisfied with the same level of service at the same flat-rate price. If all communications are fast and reliable enough for the video-conference user, they will be more expensive than necessary for the individual e-mail sender, possibly leading to economic waste.[30]

Presently too, transmission capacity and speed fluctuates widely with the number of concurrent users. The Internet is very speedy at 3:00 o'clock in the morning on the east coast of the United States; it is far slower at 3:00 o'clock in the afternoon. The inability to ensure ahead of time that an Internet connection will be fast enough for one's needs will frustrate a number of uses. In this regard, the needs of two otherwise disparate groups coincide: large corporations and academic scientists.

Corporations will want to plan large, dispersed meetings by interactive video. They cannot take the chance that the bandwidth necessary to sustain interactive video will not be available. Scientists, too, have to be able to count on high capacity transmissions at times specified far in advance. For example, astronomers frequently reserve time on telescopes or supercomputers or other expensive, shared scientific equipment

[30] Only "possibly" because it might happen that bandwidth is so cheap that it would not be worth differentiating among different levels. The author thinks that is unlikely to be the case, as noted in the text, but it is possible.

years in advance. U.S. astronomers allocated 10 minutes on a telescope in Latin America two years from now cannot take the chance that the necessary capacity to transmit the observational data might not be there; it has to be reserved and guaranteed.

For business, science, and other needs, high capacity bandwidth cannot be left to random fluctuations in service levels. One potential resolution of this problem has been discussed: a differentiation in pricing for different service levels from more usage-based charges for Internet access.

It is possible that pricing will become sensitive enough that any desired amount of capacity can be bought at a moment's notice. If so, corporations and scientists will just pay more whenever they need greater bandwidth. To balance demand and supply through prices in this way, though, would mean that a last-minute request for large amounts of bandwidth would be very costly—much as last-minute airline tickets cost substantially more than those bought weeks ahead of time.

More likely will be a combination of differential prices and waiting times as the mechanism for balancing supply and demand. "Waiting time" can mean the same thing as "delays." That is what happens today when too many people are using the net at the same time. Because the unpredictability of this type of delay effectively prevents both scientists and corporations from planning for high capacity uses, another type of waiting time will arise: reserving bandwidth in advance of the need.

Already, the National Science Foundation is working on a system to do just that. The system, appropriately enough, goes by the acronym "R.S.V.P." NSF will initially test out the RSVP system on a new Internet now under development, the so-called "Internet II."

The pressure for better performance for carrying things like video will likely lead to differentiation of services as well as prices on the Internet. Just as "cars" are not all similarly equipped and

priced, "the Internet" of tomorrow will be less monolithic than it is today. Eventually one will not buy generic "Internet access"; one will buy "e-mail access" or "telephony access" or "video access" or the like and pay separately for each.

Further evidence of the difficulties of flat-rate pricing has come to light since the first draft of this Report was completed. In December, 1996, America Online converted most of its subscribers from essentially an hourly billing system to a flat-rate, single monthly payment system. Immediately, more users went online and stayed for longer periods. As a result, subscribers frequently encountered busy signals and were denied service; AOL was forced to undertake near-emergency measures to provide greater capacity.[31]

Falling costs

The price for basic Internet access services may well fall so low as to ensure near universal access in the U.S. without any substantial governmental action. Thanks to the falling prices that seem relentless in the world of consumer electronics and digital communications, very likely anyone who wants some form of access to the Internet will be able to afford it.

Already today companies have announced plans to offer access for $5 a month—access through ordinary television sets, requiring no additional equipment beyond a simple adapter and keyboard. The signals would be sent into the home by using the "vertical blanking interval" of the television broadcasts (the same part of the broadcast currently used for close-captioning, which would still be available).

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[31] *See, e.g.*, Stanley Ziemba, *Extra Use Swamps AOL's New Capacity; Despite Additional Equipment, Pricing Plan Offering Unlimited Access Leads To Delays*, CHICAGO TRIBUNE, Dec. 13, 1996, at 1.

Encryption

Note: The term "secure" as used in this section is a relative term that refers to how difficult and costly it is to gain unauthorized access to a communication. The more difficult and costly it is, the more secure a communication is. "Absolute" or "total" security is a theoretical concept of no practical relevance here.

Encryption is an essential element of the Internet of tomorrow. There are many sources of helpful information on what encryption is and how it works.[32] What follows is a quick summary.

Security of packet-switched and non-packet-switched communications

Most people's concept of encryption stems from its use as the "secret codes" of wartime and clandestine operations. Much of the work on the technology in the past decades was for just that purpose. Ordinary citizens had little need for encryption: other than by breach of trust by postal workers themselves, paper mail is fairly secure as it is; because few individuals are in a position to communicate over the broadcast spectrum, the security of broadcasts is not an issue for them.[33] Most electronic communications among individuals other than over the Internet are by wired telephone. The telephone system is based on the reservation of a single, end-to-end channel for the duration of a call. Short of a wire-tap or mechanical malfunction, phone calls are private.

The Internet, in contrast, is based on routing information over any number of links, through any number of computers. That is the "packet switching" technology described above.[34] A single e-mail

[32] Especially helpful is Michael Froomkin, *The Metaphor Is the Key: Cryptography, the Clipper Chip, and the Constitution*, 143 U.PENN. L.REV. 709 (1995).

[33] The author does not use CB radio, but imagines that it is not at all a "secure" medium of communication. On the other hand, CB does not seem to be widely used in the way that e-mail is today.

[34] See the section on *Mechanics of switching*, at page 35.

message may travel through dozens of different intermediate computers—each one of which is owned and operated by someone who can, if they want to, intercept and read every message. To be sure, such interceptions will usually be a violation of law: the wire-tap laws applicable to telephones now cover e-mail.[35] But there are exceptions to those laws for "necessary maintenance," which in practice is a substantial loophole because maintenance is necessary operation for anyone who manages a computer. More importantly, detection of an unauthorized reading of e-mail at some intermediate—and for any given message, unpredictable—point on the network is next to impossible.

Consequently, security of Internet communications, including some assurance of privacy, is an altogether different matter than it has been for telephone or paper mail communication.

The inherent lack of security in packet switching communications can largely be overcome with the technology of *encryption*. The technology that once seemed the esoteric subject of military and diplomatic communications, turns out to be both practical and a garden-variety necessity for making Internet communications as private as paper mail or the telephone. For that matter, as more and more communication move to wireless modes, such as cellular telephones, the need for encryption to assure privacy will expand to those realms as well.

"Powerful" encryption

Encryption covers a range of possibilities. Low level encryption might be about as secure as a conversation undertaken in a public supermarket; higher level encryption is more secure; the most powerful encryption cannot be broken by currently available mechanical or computer means.

[35] Electronic Communications and Privacy Act, 18 USC 2701 et seq.

The first uses of encryption were based on a secret code or key. A normal message, called the "plain text," would be converted with a key into an encoded or encrypted version called the "cipher text." This latter version looks like gibberish. Converting a plain text into a cipher text can be done in different ways. A simple way is to shift the letters of the alphabet by a forward certain number of letters. A key of "5-forward" for example would mean that an "a" was replaced with an "f". A "b" would be replaced with a "g," and so on. The recipient must know that the key is "5," and the shift direction was forward, but with that knowledge can decode a message.

But so can a computer, even without that knowledge. All that is necessary is for the computer to try every possible shift of letters and compare each result with either a spelling checker or a table giving the average frequencies of use of each letter in the alphabet—in English, "e" is the most frequently used letter, for example.[36] When a result produces fewer spelling errors than any other, or has a distribution of letters that closely matches that of the language overall, the computer can offer the result for human inspection.

Encryption of this form is obviously not very secure. Greater security can be obtained by converting the whole message into numeric codes: the letter "a" might be "1," the letter "b" a "2," and so on. Then each such number, instead of being shifted by some fixed amount, could be converted with a more complex formula: each number could be squared, or multiplied by a constant, or subject to some other calculation. Or the numeric representations of each letter could be taken in clusters, say 6 digits at a time, and the resulting clusters manipulated by a formula. Once the message is converted into numbers initially, a wide variety of calculations are possible; this makes the

[36] This assumes that the would-be decoder of the message knows what language the message is written in.

encryption more secure. Again, a computer can try using every sort of calculation that it (or its designers) can think of. And in practice, this is not as hard as it sounds: computers can in fact often crack these types of encryption. But it is harder to do than the simple "letter shifting" described earlier.

More recent forms of encryption use newer mathematical techniques that are not possible for even today's most powerful computers to break. In brief, the techniques rely on using longer keys (bigger numbers). The bigger the key size, the more combinations a computer must try in order to decode a message. The simplest way to think about this is to think of passwords. Passwords can be one letter long; or two letters long; or three; or longer. If someone wants to crack a password that is one letter long, they only have to try (or their computer only has to try) 26 possibilities. If two letters are used, the number of possible combinations goes up to 26 * 26 or 676. If three letters, the number of combinations is 26 * 26 * 26, or 17,576. And so on.

Though passwords are not exactly the same thing as encryption, the principle is the same with encryption. By using more and more digits as a key to encrypt a message, a message sender can make it harder and harder for the message to be decrypted by unauthorized recipients.

Single-key versus dual-key encryption

Even with long keys, encryption has until recently required both sender and recipient to have a copy of the same key. This means that the sender must first send a copy of the key to the recipient. In turn, this means that the risk of third parties intercepting the key remains quite high. After all, if one worries that third parties will intercept a communication so that one chooses to use encryption, one must also worry that the same third parties will intercept the transmission of the secret key—thereby voiding all the benefits of the encryption.

This type of encryption is called "single key encryption." Sometimes a key might be in two parts: what the cluster size is,

and what the formula for manipulating the cluster is, for example. But it is still conceptually one key, and whatever the key, it must be known by both sender and recipient.

A more sophisticated form of encryption today uses two different keys. One key is used to encrypt the message; the other, different key, is used to decrypt it. Just as important, *only* the second key will decrypt the message; the key that was used to encrypt the message will not work to decrypt it.[37]

The result is astonishingly useful. One use of this technology is for the person who wants to receive secure messages to publicly distribute an *encrypting* key. Anyone can have this key, and use it to encrypt a message to the recipient. The recipient, though, is the only one who knows the *decrypting* key. Hence the recipient can decode encrypted messages, but no one else can. This could be useful, for one example, for a mail order company advertising on the Internet. The mail order company would publicly distribute its encrypting key; it would almost be like a telephone number. Anyone could use that key to encrypt ordering information, notably including credit card information, and send the message to the company. Only the secret decrypting key in the possession of the company could, however, decode the order and credit card information.

Public-key/private-key encryption

A key that is publicly distributed is called a "public key." A key that is kept secret is called a "private key."

Public-key / private-key encryption can also be used in the reverse situation to that just described for a mail order company. Suppose that instead of using its keys for receiving secure communications, the company wants to send out communications to the public. The company could encrypt its own message with

[37] The process is based on the mathematics of prime numbers, a description of which is well beyond the bounds of this Report.

its own private key. Members of the public receiving the encrypted message could then decode it with the public key.

Since anyone can have access to the company's public key—that is why it is called a "public" key—anyone at all can decrypt the company's message. So why would a company want to do that? Because doing so assures members of the public that the message did indeed come from the company—not from an "impostor" company or anyone else. Remember that the company's public key is the only key that will decrypt a message that was first encrypted with the company's private key. Any other organization claiming to be the same company can encrypt messages all they like, but if they cannot use the real company's private key to do so, the real company's public key will not decode the message—it will remain gibberish.

This latter use of public-private key encryption is an excellent way to ensure authenticity. With other bells and whistles, it forms the basis of what is often called "digital signatures"—a reliable way of ensuring authenticity for digital communications. In fact, a digital signature does not have to involve encrypting an entire message. In some circumstances the message can be in plain text, but have a set of numbers at the bottom. The numbers at the bottom have just enough information to identify the sender, and are encrypted with the sender's private key. The sender's public key will decode that information and hence identify and authenticate that the person claiming to be the sender is in fact the real sender.

In a working system, more steps are involved. In particular, there has to be some way of ensuring that someone who gives out a public key in the first place is the "someone" they claim to be. For example, what would stop Mary Doe from distributing a public key over the Internet, accompanied by the statement "I am L.L. Bean, and this is L.L. Bean's public key. Be sure to use it when you send all your credit card information to me." The generally accepted answer is that we need something like a notary

public or other trusted official or organization that can undertake the initial verification. This role is usually referred to as a "Certificate Authority."[38] If the real L.L. Bean wanted to distribute a public key, the Certificate Authority would say, in effect, "There is a public key now available that was distributed by someone who claims to be L.L. Bean. We have investigated and concluded that it is, in fact, the real L.L. Bean that has distributed this public key." All this requires a fairly extensive computer-communications capability adapted to the purpose, because verification must be available on demand, by computer process, any time someone asks for it. But that capability is rapidly being researched and built today.[39]

The Certificate Authority itself must be inherently trustworthy, which suggests that the first CA's will be established government agencies or banks or comparable financial or other corporate entities.[40]

Public-key/private-key encryption software is beginning to work its way into commercial software products. It will be common tomorrow for nearly any software package that exchanges information over a network—and most will—to deal with encryption quietly in the background, in a user-friendly way. This

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[38] The concept of certificate authorities is well explained in A. Michael Froomkin, *The Essential Role of Trusted Third Parties in Electronic Commerce*, 75 OREGON L. REV. 49 (1996), also available from <http://www.law.miami.edu/~froomkin/articles/trusted.htm> as of October 19, 1997.

[39] *See, e.g.*, a description of the research being conducted at the National Institute of Standards and Technology on what is called the "Public Key Infrastructure" or "PKI," of which certificate authorities are an essential component, at <http://csrc.nist.gov/pki/>, available as of October 19, 1997; *see also, e.g.*, VeriSign Corporation, *Enabling Secure Electronic Commerce Through Digital ID Solutions*, <http://www.verisign.com/about/brochure.html>, available as of October 19, 1997.

[40] CA's can also work in hierarchies: an established CA can certify a less well-known CA, who derives its trustworthiness from the better-known Authority's "blessing." In turn, the less known CA can then certify even less well known CA's, and so on.

software will also understand the notion that a given user may have to deal with quite a number of keys: the user's own private key or keys, and a perhaps large number of public keys from companies, charitable organizations, friends, colleagues, government agencies, and the like. Computer methods for managing a large number of keys are sometimes called "key rings" or generally, "key management."

In sum, communications by paper mail and phone are inherently fairly secure,[41] whereas the Internet's packet-switched technology is inherently insecure. Consequently, encryption is necessary to assure that packet-switched or wireless communications are at least as secure as mail and telephones. Public-key / private-key encryption is a remarkable technology that allows both privacy and authentication. Mechanisms are being built today for providing, on demand over the Internet, the initial authentication that public key distributors are who they say they are. And finally, within the next year or so, ordinary software like word processing and e-mail will come with easy-to-use encryption capabilities built in as a matter of course.

[41] *But see* Froomkin, *The Metaphor Is the Key*, *supra* note 32 at 729, noting that even telephones are less secure than many citizens would think.

Electronic copyright management systems

A number of organizations are working on various schemes to make digital works harder to copy and easier to license.[42] These schemes are often lumped under the single heading "Electronic Copyright Management Systems" or "ECMS." Some of the schemes emphasize the technology of making works "harder to copy"; others emphasize ways of making it "easier to pay for copying." Commonly both elements are present, so the emphasis is a matter of degree.

The most basic systems rely on "secure transmission" of digital materials between sender and recipient. Invariably, over the Internet, this is done by means of encryption. For copyright owners' purposes, simple, single-key encryption alone provides some, but not much, protection. It can prevent a "thief" stationed at an intermediate computer from gaining access to the material, for the material will be gibberish without the necessary decoding key. The authorized recipient of the material can be required to make a payment to the owner before obtaining the key. Once the key is obtained, the recipient can decrypt the material and make use of it. Nothing in the scheme itself, however, prevents the recipient from further circulating either the key (if the owner uses the same key for all encryption), or the decrypted material itself without authority.

For some works, that modest limitation may be more than enough. Many copyrighted materials are short in length and have a short "half-life." A timely newspaper column on a current

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[42] *See* the brief overview in Mark Stefik, *Trusted Systems: Devices that enforce machine-readable rights to use the work of a musician or author may create secure ways to publish over the Internet*, SCIENTIFIC AMERICAN, vol. 276, Issue 3, March 1997 at 68, also available as of March 12, 1997, from <http://www.sciam.com/0397issue/0397stefik.html>.

event, for example, may not have substantial monetary value even when first released, and certainly not as time goes by and the news becomes stale. Thus a mechanism based on encryption that ensures a small payment in exchange for timely access may be all the copyright owner desires. Further, unauthorized recirculation may be limited by nothing more than the little time and trouble it requires, relative to the modest value of the work.

A stronger degree of protection can be created with a centralized source of access to copyrighted material. At one level, this is no more than what many on-line database suppliers like WestLaw and Lexis offer today: the material itself is not "sold" or distributed; rather "access" to the information is sold. The user must enter a contractual relationship with the seller; passwords are issued to authorized users only; the entire database is either too big or is technically restricted in such a way that an authorized user cannot obtain more than a small portion of it at any one time.

But more sophisticated variations are possible. For example, a user might gain access to an entire lengthy work like a novel or movie, but the access is only for purposes of making use of the work while "connected" to the source site. That limitation might be enforced by having the novel or movie kept on the source and sent down in bits as it is being read or viewed; or it might be enforced by downloading the whole thing to the user, but encrypted in such a way that only when and only while an authorized user is connected to the source site will the material be decrypted. Upon disconnection, the material is left in an encrypted state.

Some variations of this scheme are designed to be accomplished with special purpose hardware and software.[43] Others rely on software alone, coupled with WWW browser software. Generally the software approaches involve the creation of a two-part "package," consisting of the actual copyrighted content, along with a set of instructions or terms for gaining access to that content. These "packages" are sometimes called "containers" or "digital containers" or "digital objects"; they are the subject of the next section.

Digital containers, objects

Much research goes on today on the technology of "digital objects." A "digital object" is a unit of information such as a story, a movie, an image, a game, a computer program, or any other informational work, that is encrypted and then "wrapped" inside a software "envelope." The object therefore has two parts: a wrapper, and contents. Of course, the words "wrapper and contents" are used metaphorically here: inside the computer, the whole package is a string of bits. It is convenient to talk about digital objects at a higher, more conceptual level, though, so readers will need to remember that we are just talking about a computer-processable set of bits.

The wrapper—the digital envelope—is not encrypted. Anyone receiving a copy of a digital object will therefore be able to read the wrapper. What the wrapper contains is up to the owner of the object. The expected uses for the wrapper are to contain things like abstracts or summaries of the contents; the name and address

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[43] *See* ROBERT WEBER (Northeast Consulting Resources, Inc.), DIGITAL RIGHTS MANAGEMENT TECHNOLOGIES, SECTION 2.3 HARDWARE CONTAINERS (October, 1995) (describing an implementation of this approach developed by the Xerox Corporation), a report prepared for the International Federation of Reproduction Rights Organizations, available from <http://www.ncri.com/articles/rights_management> as of December 12, 1996.

of the copyright owner; the fees, if any, required by the owner to make that content available; and so on.

The contents of the object would be encrypted and hence not readily readable (or viewable, or listenable, or otherwise perceivable) to the holder of the object.

These digital objects could be distributed widely, or posted on WWW "server" computers that would function like digital retail stores. Users would find these objects through browsing, using online indexes, and the like—much as people find books or software in stores or catalogs today. Once users found an object of interest, they would read the wrapper to learn more about the contents and the terms on which they might access those contents.

A built-in mechanism would also exist for users to make the necessary payment for obtaining access to the contents. The mechanisms currently under consideration vary, but let's consider a typical scenario. A service is available on the WWW that provides bookstore or library-type access to digital objects. A user uses a common WWW browser software package, with a special "plug-in" designed for the purpose, to access this site and to browse through or search with indexing systems the site's holdings. When encountering an object of interest, the user sees the information from the object's wrapper displayed on screen. This display contains a summary of the contents and a price for accessing those contents.

Here, for example, is the way one such container appears on screen:

Figure 6: Screen capture of one form of digital object technology from the IBM Corporation, from <http://www.infomarket.ibm.com/> in the Fall of 1996.

Say the price is $.95, and the user agrees with these terms. The user would then press or click an on-screen button to say "yes, I am willing to pay the $.95 to access these contents." At that point, the click of the button would trigger an entry into an accounting system that would record a transfer of $.95 from that user to the owner of the digital object. The contents of the object would then be decoded (unencrypted) and made available to the user.

Now a lot goes on "behind" this click. The accounting system may be based on debit or credit accounts or on digital cash. That is, the user may have previously had to establish an account by depositing money into the account. This money would be deducted from the user's account and credited to other accounts.

Or the user may previously have needed to establish a line of credit that allows the transaction to be handled like a charge on a credit card. Or there may be a system of "digital cash" in place, where in effect the user transfers "cash" directly over the Internet.[44] Whatever the mechanism, appropriate messages must be sent back and forth among the computers and sites involved. Sometimes this process is described with a line from the movie *E.T.*, by saying that the digital object must "phone home" to register payment and get authorization to decode itself for the user's benefit. But however complex in fact, the whole process only takes a fraction of a second, and so is not obtrusive to the user.

The payment amount would be split up among various parties. The site that is the "retail outlet" would get some of the money, of course, but so would the copyright owner and the provider of the accounting services. But none of this splitting up is in principle any different from what happens with any ordinary retail transaction in a physical store today.

Already today, one version of this system is operational with users and a funds collection and distribution mechanism.[45]

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[44] The mechanism for allowing "digital cash" is complex, but has been worked out in theory and demonstration systems. *See* David Chaum, *Achieving Electronic Privacy*, SCIENTIFIC AMERICAN, vol. 267, Issue 2, August 1992, p. 96. There does not seem to be a strong trend toward wide-spread adoption of such mechanisms at this point.

[45] IBM has implemented a scheme like this that it calls "Cryptolopes," short for "cryptography" or "encryption" and "envelope." See *About IBM Cryptolope Containers*, available from <http://www.cryptolope.ibm.com/wiacc.htm> as of December 11, 1996. A more detailed explanation of this approach, useful as background on digital objects and rights management generally, is INTERNATIONAL BUSINESS MACHINES CORPORATION, INTERNET DIVISION, IBM INFOMARKET RIGHTS MANAGEMENT OVERVIEW (December 5, 1995), available from <http://www.infomkt.ibm.com/ht3/rights.htm> as of December 12, 1996. A more general summary of rights management technologies, including the digital object container idea and other technologies as well, is ROBERT WEBER (Northeast Consulting Resources, Inc.), DIGITAL RIGHTS MANAGEMENT TECHNOLOGIES, *supra* note 43.

"Superdistribution"

Digital objects also offer the possibility of what is called "super distribution." Super distribution refers to a mechanism whereby individuals can buy access to a digital object, and also pass along the object to others who can similarly buy access, and pass along the object to still others, etc. The notion is very much like that of "shareware" today. "Shareware" refers to software that is copyrighted, and for which the author seeks payment, but whose reproduction is not limited by the author. Shareware computer programs are intended to be copied and circulated freely to others. Payment is rendered either on the "honor system" or in order to gain additional features or capabilities. The key point about shareware, and the mechanism of superdistribution, is that distribution is accomplished by individuals to other individuals, not through stores or other commercial entities.

The difference between shareware and the use of digital objects for super distribution is that digital objects would not rely on the honor system. Rather, any user's access to the object would by some technical means be confined to those who have paid whatever fee is called for by the author.

Proprietary viewers

Digital object technology provides a way to wrap up a unit of information and keep it encrypted until decryption is authorized. A common reaction from technologists when told about digital object container technology is to assert that such a technology won't "do any good." They mean by that that once the object's contents are decoded and available "in the clear," as the cryptographic community refers to unencrypted works, the possessor of the information can freely copy and distribute it. Thus all that is necessary for defeating the encryption scheme is one buyer. That buyer will pay for decryption, and can then post the unencrypted information to the Internet, whereupon it will spread like wildfire.

Of course, assuming that this action is prohibited under copyright law, some people will choose to obey the law and not post the information. But there is also a technological response to this situation, that takes the form of "proprietary viewers."

A proprietary viewer is a software package that makes information available to someone, either literally by displaying it on-screen for "viewing," or more generally by making it accessible in whatever way is appropriate to the content. A sound recording, for example, would not be "viewed" but rather "played" or "listened to." The term "viewer" is, however, used for any such access.

The notion that a viewer would be "proprietary" is a bit of a misnomer. The term itself suggests something about ownership, which is perhaps loosely true; but more specifically what is meant by the term is that the viewer program is a special program that "knows about" rights management systems. Such a viewer could, for example, understand that one user may have paid for the right to read the contents of a digital object, but not enough for the right to print those contents on paper; or paid for the right to

watch a movie two times, but not three times. The viewer program would enable display of the contents of the object on a computer screen in the first instance, but not allow printing; or in the second instance, allow two viewings, but not three.[46]

The point of such viewers is that a digital object can be made available to a buyer, without the contents ever being fully "in the clear." That is, there is never a time when the contents are unencrypted and residing as a computer file of information accessible to the buyer or anyone else. Display or other access to the digital object's contents always takes place under the control of the viewer program, and that program is designed to allow the buyer to do only what the buyer has contracted to be allowed to do.

Like any scheme of technological protection, digital objects and proprietary viewers are not insurmountable restrictions. They are based on computer programs; such programs can sometimes be "cracked" or "broken" or "reverse engineered." When that is done, the information is no longer protected against unauthorized copying. But protection schemes will make such efforts harder than otherwise in time, trouble and especially in expertise.

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[46] For a discussion of one particular proprietary viewer technology, *see* Elizabeth Corcoran, *Protecting the Ownership Right to Copyright: Paul Schneck's Technology Tightens Digital Safeguards Over Intellectual Content*, WASHINGTON POST Business Section Supplement, Monday, February 23, 1998, at 5. Also available as of February 23, 1998 from <http://www.washingtonpost.com/wp-srv/WPlate/1998-02/23/016l-022398-idx.html>.

Fingerprinting, watermarking

Some digital materials contain so much information in the form of "bits" that a few of those bits could be altered without the result being noticeable. A digitized image is a good example. A detailed, high resolution digital image might contain several million bits. A handful of those bits could be changed (a few "ones" changed to "zeros," or vice-versa) without the image exhibiting any noticeable difference. Even more than a handful could be altered in a systematic way so that the image changed slightly, but only in overall brightness or coloration. A side-by-side comparison might reveal differences, but a stand-alone copy would appear to the casual eye as the original unaltered image.

For an example of what the differences look like, an example that will not show up well on paper, here are two image "halves." One is plain; the other is watermarked. The reader will have a hard time judging which is which,[47] certainly with this low resolution image in black-and-white (the originals are in color), but even higher resolution images in color may be only subtly different.

Figure 7: One non-watermarked, and one invisibly watermarked, images from the DigiMarc Corporation, from <http://www.digimarc.com/wt_page.html> on December 12, 1996.

A small, systematic, but almost unnoticeable alteration like this can be used to embed identifying information into the digital work. A string of bits representing perhaps a serial number, or an author's name, is "hidden" in the other bits that make up the

[47] Images were obtained from the web site of the DigiMarc Corporation, a seller of the technology that has, of course, an interest in showing that the technology is invisible. Their Web site does not reveal which half of the image is watermarked and which is not.

image. With the right software, this string of bits can be extracted. Moreover, software for working with images can automatically detect the hidden markings and act accordingly—not permit copying, for example.[48] If those bits represent a serial number, the image can then be identified as the particular one—or a copy of that particular one—originally "stamped and numbered" by some author. If serial numbers are logged and recorded somewhere, the author can thus track down the source of unauthorized copies of the image.

The string of bits would not have to represent a serial number, of course. It might contain an author's name, or terms of sales and use, or the name of a library or bookstore from which the image was originally acquired, or the trademark of the software used to create the image, or nearly anything else.

Embedding more-or-less invisible information in a digital object is called "watermarking," after the similarly all-but-invisible markings on paper used to identify the paper's manufacturer. Sometimes the term "fingerprinting" is also applied to this same technology. Here the two terms are used interchangeably.

Other types of digital works are less susceptible to the bit-level alteration of watermarking. A computer program, for example, might be rendered completely dysfunctional if even one, crucial bit were altered. Textual material with a few bit-level changes

[48] One company that has developed this type of hidden marking has reached agreement with a major manufacturer of image editing software to create just this sort of automatic detection. "Automatic detection of the DigiMarc watermark by image editing and browsing tools, such as Adobe's PhotoShop, diminishes the potential for misuse and piracy of your images." <http://www.digimarc.com/let_page.html>, available from the DigiMarc site as of March 14, 1997.

might look as though it contained typos: even a single "one" turned into a "zero" is enough to turn one letter into another.[49]

In general, the types of digital materials that are most easily watermarked are things that have continuous variations (what we think of as "analog" works): photographic images, drawings, sound, video, and the like. Computing—whether mainframes, mini-computers, desktops, hand-held computers, or the Internet—almost always evolves to handle "pure" digital materials like plain text and numbers first, because these materials require relatively little computer storage and processing capacity. Computing comes to handle materials like images, sound, etc.—which nowadays we tend to call "multi-media"—later, because representing those kinds of materials in digital form requires orders of magnitude more "bits" than plain text and numbers and hence requires far more computing power and storage capacity. A picture may be worth a thousand words, but to a computer, a picture will require at least that much more storage capacity and processing time.

But increasingly, the Internet is evolving, like mainframes and desktop computers before it, to be more congenial to these large, analog-like materials. The WWW has evolved to the point where these days it carries quite a lot of such material. Consequently, the ability to watermark digital materials can be useful to those who want to have more oversight of the copying of their information.

Like digital object technology, watermarking is well out of the laboratory already. Commercial companies announced plans to

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[49] Textual and numeric material can, however, be "converted" to an image form. Conceptually, this is like taking a photograph of a page of text and then digitizing the photograph. The result is a digital image that can be watermarked as easily as a photograph of the Mona Lisa. The downside to this process, though, is that the text can no longer be manipulated in, say, a word processing program: it is no longer really "text" to the computer, but is instead a single photograph. Techniques do exist, however, to convert the image back to text. These techniques are known as "optical character recognition" or "OCR."

include watermarking capabilities in commercial products for the desktop computer market some time ago.[50]

Visible watermarks

Watermarking can also be highly visible. It can be used the way the word "PROOF" is sometimes stamped across a photograph to render the photograph viewable, but not commercially valuable. In this capacity, watermarking is obvious and can be used for showing what the commercial version of the image would look like for those who choose to buy it.

[50] *See, e.g.*, Corel Corporation, *Press Release: Corel Corporation Announces the Launch of CorelDRAW™ 7* (October 8, 1996) ("Digital watermarking by DigiMarc Corporation, … can be used in conjunction with either CorelDRAW or Corel PHOTO-PAINT"), available from <http://www.corel.com/news/1996/october/draw7.htm> as of December 12, 1996. The commercial supplier of this particular brand of the technology is the DigiMarc Corporation; on their technology, *see generally* DIGIMARC CORPORATION, WATERMARKING TECHNOLOGY, available from <http://www.digimarc.com/wt_page.html> as of December 12, 1996.

Here, for example, is an image that has a visible watermark applied to it. This particular mark is the logo of the company supplying the image,[51] but it could be anything at all.

Figure 8: Screen capture of a visibly watermarked image from the Corbis Corporation, <http://www.corbis.com> on December 12, 1996.

A buyer can then contract for the full-quality image, and obtain either another distribution of the image with the visible watermark removed by the seller, or some piece of software that will automatically strip out the watermark.

[51] The Corbis Corporation, Redmond, Washington.

Handles

A technology related to digital objects is that of "handles." The notion of a "handle" is based on the fact that digital works have no standard convention for being identified by name; a "handle" would be such a name. We have a long-standing system today of citing and finding printed matter, especially in academic circles. Lawyers know how to identify a precedent: we have a very elaborate system based on volumes and page numbers. Other disciplines have similar conventions for identifying printed materials. Except for especially hard-to-find or unique works like personal letters, references to printed works do not usually contain information about the physical location of the work. One might cite "J. SMITH, *The Nature of the Universe,* 78 JOURNAL OF PHILOSOPHY 301 (1989)," but ordinarily one would not add "Acme University Library, Second floor, Shelf B-27."

Digital objects could have a reference system that imitated such print-based systems, but the mapping of "volume" and "page" numbers onto digital works is strained because digital works do not fall naturally into such divisions.

Moreover, the current system of referring to information on the Internet is not constant. That system—used in the footnotes of this Report—depends more on identifying "locations" than "units of information"; it is more like giving floor numbers and shelf numbers in a reference than would be done with printed materials. The conventional Web citation today is a "URL" or "Uniform Resource Locator" that looks like this:

http://www.acme.com/folder1/document [52]

This reference implicitly assumes that "www.acme.com" is a place on the WWW. The trouble with such "places" is that they are really identifiers for computers, the computers that serve as an organization's host server. Which computer one uses may vary over time: e.g., an organization may acquire a new computer or new Internet supplier and want to switch materials to the new computer. The lack of persistence in references caused by a gradual but constant "movement" in the computers used for Web services is sometimes called "Web rot," for the gradual "decay" of accuracy in Web references.

A "handle" would be a more refined convention for identifying digital works. One such proposal,[53] from the Corporation for National Research Initiatives (CNRI), calls for a particular syntax consisting of a label for an organization, a slash, then a label for the particular document or work. So an article stored by, say, the Copyright Office, dealing with the Internet and copyright, might carry a handle like this hypothetical one:

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hdl:www.co.loc.gov/Internet.copyright_issues
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The "hdl" would identify the citation as a "handle"; the "www.co.loc.gov" would identify an organization—the World Wide Web site of the U.S. Copyright Office, which is part of the Library of Congress"; Internet" might be a computer directory or

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[52] Sometimes brackets, typically angle brackets, are added outside the reference to ensure that ordinary sentence punctuation is not confused with the URL itself. Thus if the above reference were included within the body of a sentence, it would appear as <http://www.acme.com/folder1/document>, so that the comma at the end was clearly not part of the reference.

[53] *See* WILLIAM ARMS AND DAVID ELY, THE HANDLE SYSTEM: A TECHNICAL OVERVIEW (June 23, 1995), available from <http://merlin.cnri.reston.va.us/home/cstr/handle-overview.html> as of December 12, 1996.

folder holding various publications, within which was stored a document labeled “copyright_issues.”

At first glance, this notation does not seem especially different from the URL example shown previously. The syntactical differences are in fact relatively slight. But the difference is not primarily in the syntax and appearance of the references. It is rather that the handle reference is merely the surface appearance of an agreed-upon system of storing and accessing digital objects. And this takes us to the idea of “repositories” for such objects.

Repositories

A repository for digital objects would be like a library or bookstore, but would be designed for continuity. Any author of a digital work could choose a repository, and place the work there. The repository would undertake the function of providing a unique name (handle) for the work, and for ensuring that other indexing and repository services are aware of the work and its handle.

Convergence of media

In a nutshell, the future of information is digital. Nearly all information that is potentially copyrightable—text, images, animations, drawings, motion pictures, music and other sounds, etc.—can be represented by a set of one’s and zero’s comprehensible to computers. In some realms like commercial motion pictures, the use of digital technologies is still supplementary to motion picture photography. Most movies with people and real things in them are filmed on *film*. True, special effects are often created with computers and digital technology, and more movies are being made entirely by computer animation (such as Disney’s *Toy Story*). But the preponderance of movie work today is still with photographic film techniques. Of course, this may change, as it already appears to be doing with television.

Television is beginning to rely more on digital technology. The original capture of a performance by a television camera may or may not still be done with "ordinary" cameras. But a great deal of television is put in digital form for satellite transmission. Television that is sent by satellite directly to a small (roughly eighteen-inch diameter) dish antenna on one's house is in digital form, for instance. The result is purportedly of better quality than wire cable or regular broadcasting. If true, that has nothing to do with the difference between wires and satellite transmissions. Rather, it has to do with the difference between analog and digital transmissions. If wire cable or broadcast television switched to digital format—which is technically feasible[54]—those signals would have the same quality as a satellite transmission.

The number of these digital satellite receiving dishes in use by consumers is growing fairly rapidly,[55] though it is too soon to tell whether this represents a long-term trend or not. But the satellite television example does show one thing: how feasible it is to convert television into digital form. The Internet is also, of course, a medium for carrying digital signals. Hence the Internet is capable of carrying television transmissions and has begun to do so.

Here is a screen capture showing a live television broadcast of an indoor soccer game in Spain, being broadcast over the Internet from Spain. This image was captured with an ordinary home

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[54] *See* Paul Farhi, *The Whole World in His Hands? Murdoch's Satellite TV Plan May Be His Shrewdest Move Yet—if It Flies*, WASHINGTON POST BUSINESS, Sunday, March 16, 1997, p. H1, H7 ("TeleCommunications Inc., the nation's largest cable company … is among those that have begun to introduce … digital 'boxes' that expand the average cable system's capacity to 150 channels. TCI has been testing its digital system in Hartford, Conn., and says it will make the service available to more than 5 million of its customers by year-end.").

[55] *See, e.g.*, Mike Mills, *News Corp. Makes $1 Billion Bid To Enter U.S. Satellite TV Market*, WASHINGTON POST, Tuesday, February 25, 1997, at p. D1 (noting that the number of direct-satellite subscribers at the end of 1996 amounted to about 4.3 million, with projections of 13.6 million in 2001, and 17 million in 2006).

computer with a standard modem[56] and a dial-up connection to the Internet from Virginia.

Figure 9: Screen capture showing live television broadcast of a soccer game in Spain, from <http://www.crtvg.es/tvrede/prividco.htm> on September 6, 1997.

[56] The modem was a 28.8 kbps model running over an analog phone line in the author's home.

Perhaps the Internet will end up carrying television signals on a regular basis because the net's capacity will be dramatically improved, whereupon already-digital television would leave satellites and dish antennas to "move over" to the Internet. Or it might happen in reverse: the Internet might "move over" to a more capable satellite and dish antenna system, joining television that is already there. At least one commercial service has already arisen to provide the equivalent of television's Direct Broadcast Satellite services for Internet transmissions[57] and a similar service provides both television and Internet reception on the same satellite dish antenna.[58] Whether television "moves" to the Internet or vice-versa is simply a difference in the way that progress unfolds, but not in the end result.

New services have been announced that will provide a combination of television and World-Wide Web browsing capability. The idea is that one can be watching television, say a news broadcast. At the bottom of the television screen will be a continually changing list of URL's, each appropriate for the story being broadcast at that time. If a story interests a viewer, the viewer can use a mouse to click—directly on the TV screen—the URL and immediately jump from the television picture to a Web browser to a site that provides more detailed information.

What is true for audio-visual signals is even more true for sounds. Sound alone takes much less transmission capacity that sound-plus-pictures. Digital musical broadcasts are rapidly becoming a reality, and will continue to grow.

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[57] The commercial name is "DirecPC." See more information on <http://www.direcpc.com/about/index.html> as of September 6, 1997.

[58] See the "DirecDuo" site, <http://www.direcduo.com/> as of September 8, 1997.

Dispersed works

Techniques like encryption, digital objects, watermarking, and the like are oriented to units of information that exist in one lump, as it were. The WWW itself, in contrast, is all about dispersing information physically but then connecting it by links. The typical WWW site page, for example, has lots of links or "pointers" to other things. Sometimes these pointers are obviously "pointing" somewhere. For instance, one might see a Web page that says:

> For more information, check out
> Acme's Corporate site.[59]

The user is invited to click a mouse pointer on the underlined words, and understands that doing so will cause a "jump" to the Acme site. We might call this type of link an "out-link," because it directs one's computer to go "out" to another site.

But other links are not as obvious. For example, graphic images that appear on a Web page are not actually located "on" that page. Rather, they are contained in separate image files. The Web page contains links to these image files. When a user visits the site, the host computer will "assemble" the various elements on the page—which might include in addition to images other separate files containing text, animation, sound, and so on—from each of these separate files and merge them on the spot into what appears to the user to be a single, colorful page like in a magazine. Because this type of link pulls information "in" to a Web page, we can refer to it as "in-linking."[60]

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[59] This kind of link in the HyperText Markup Language, or HTML, might look something like this: <a HREF="http://www.acme.com/">Acme's Corporate site..

[60] This kind of link in HTML might look something like this: <img src="picture.gif">.

When some of the in-line links pull in images or other information from another site and another owner, copyright issues are more clearly raised. This latter situation is addressed below, in the discussion of copyright implications under the heading *In-line linking*, at page 171.

Image searching

Searching for images or sounds is obviously different from searching for text. Several techniques are available, however. One search site indexes the words that surround or label images and sound files. One can search for "beach or sky," for example, and find pictures of beaches or the sky.[61] Though relatively unsophisticated in concept (the searching is still for words), this type of searching allows finding quite a lot of audio and imagery.

More sophisticated techniques are being worked on, however, that allow something like "full text searching" of computerized images.[62] Such systems work something like this: Imagine a user seeking an image in an online image database. The user has an idea of what the image either does look like (having seen it before), or what it might look like (having a general idea of what kind of image is appropriate).

The search system presents the user with several quite different images, chosen at random. The user selects the one that seems most like the desired image in color and composition. The system then brings up another selection of images, this time that approximate the chosen image's color, color saturation, layout, and so forth. Again, the user selects the one that most closely

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[61] *See, e.g.*, the *Lycos* site, available as of March 11, 1997, <http://www.lycos.com/lycosmedia.html> ("Now you can search for photos, art, designs, videos, music, noises... everything that the written word can't say. Our multimedia index will link to directly to image and sound files from across the Web!").

[62] The author is not aware of comparable techniques for digitized sound.

resembles the desired image. The process repeats itself until the user finds the right image.[63]

Push versus pull technology

Browsing the Web implies that a user affirmatively "goes out" and looks at various Web sites. Web site pages, in other words, do not just come to a user's computer screen willy-nilly: rather, the user specifies a Web address (a "URL") and presses "enter" or clicks on a hypertext link. When one speaks today of "browsing" the Web, it is this user-initiated process that is meant.

Increasingly, though, new technologies are being developed that send information to a given user without the user's affirmatively undertaking any more than a one-time indication of desire to receive the information. The Web can thus function the way newspaper delivery functions: once the initial arrangement is made, information from one or more Web sites can be "delivered" to the user's computer at regular intervals to be examined at leisure. Because of the development of this form of information access, the previous "go-out-and-get-it" methods are becoming known as "pull" technology. The "subscribe-and-it-will-be-sent-to-you" methods are becoming known as "push" technology.

In reality, both "pull" and "push" information access work the same way: commands are sent from a user's computer to a Web site to request the retrieval of information, typically in the form of Web pages (though perhaps in other formats as well). The difference is in the degree of automation. With "pull" technology, every command that requests information is initiated by a user

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[63] See the experimental image search engine that is part of the on-line collection of the Fine Arts Museums of San Francisco, available as of January 16, 1997, from <http://www.thinker.org/imagebase/index-2.html> (Click the button labeled "Search the Japanese prints"; options are offered to seek an image match based on either color percentages, color layout, or texture.)

sitting in front of a PC at that time. With "push" technology, the user commands a computer program to set up a schedule for information requests. After that, the computer makes the requests in accordance with the user's chosen schedule: hourly, daily, etc. In both cases, the user's computer must issue the request for information, but in the latter the requests are undertaken automatically, whether the user is physically present or not.

As long as the latter requests are handled by the computer more or less "invisibly" to the user, the effect is that of newspaper or paper mail delivery. Users can therefore schedule Web information delivery for regular intervals, such as daily or monthly. Online magazines and news services are obvious candidates for this use. Or delivery might be on a "need to receive" basis. Software updates, for example, might come out on an irregular basis. Whenever they do, they can be sent out on the Web to those who have indicated a desire for that service. That this actually happens by means of a program constantly running on the user's computer that initiates repeated requests over the Web to check for updates at regular intervals matters little; it "feels" as though the updates are "shipped" to the user whenever they are released by the manufacturer.

Whether "push" or "pull" technology emerges as the primary mode of World-Wide Web transmissions depends mostly on the future capacity of the Internet and its pricing. It is possible that the Internet will be like television, with hundreds or thousands or even millions of channels available to anyone. If so, connecting to a given site might be as simple as flipping to another channel on television is today. And if that is true, the distinction between push and pull is unimportant. Users will simply "dial up" whatever they want and be instantly connected at that time. With television today, for news, one flips to the news channel; for weather, one turns to the weather channel. On the Internet tomorrow, such turning of a dial may result in customized news and weather being delivered, specified ahead of time by each subscriber as being of interest to him or her. But whether this is

done with a "push" or "pull" will not matter. The point is rather that customized information will be readily available to all Internet users.

Customized information delivery

There has been talk for years of "personal newspapers" delivered to individuals; several new Web news services now approach that model. These services allow a user to specify what sort of news, weather, sports, and the like that the user has an interest in. These organizations will then gather, on a daily or other specified basis, just the news and information that the user has indicated, for delivery to that specific user. Other users get their own, tailored information.

Microsoft, for example, is now creating "Sidewalk," a format for information relating to individual cities, with an opportunity for subscribers to customize information even more locally than to a particular city. A subscriber will evidently be able to specify, for example, a list of sports teams, bands, comedians, artists, and so on that are of special interest. The Sidewalk service will then notify the user of events relating to those interests.[64]

PointCast is a company that assembles customized news, weather, sports, and financial information in accordance with interests specified by a PointCast user. PointCast then ensures

[64] "Yes, it's D.C.! It's our entertainment scene -- restaurants from Mexico to Ethiopia, music from political satire to all that jazz, movies from blockbusters to classic revivals, sports from the 'Skins and the new downtown arena to your favorite college teams. From Georgetown to U Street, from Manassas, Va., to Columbia, Md. -- It's your personal guide so you can get the most out of this diverse and exciting city. And if you tell us what entertainment means to you, our editors will customize Sidewalk for you every day with the local information you want. Whether it's Old Town dining options, the best margarita in Adams Morgan, or where to grab a burger after a 'Skins game, we'll point you in the right direction. Afraid you'll miss out when your favorite band comes to town? Let us know and we'll keep our eyes open, so you don't have to." From the Microsoft Web site, available as of November 15, 1996 from <http://www.microsoft.com/sidewalk/TeamDC.htm>.

that the user's desktop computer is updated, at intervals the user specifies, with the latest news.[65] Time Magazine, for another example, operates "Pathfinder," which includes a personalized news and information delivery service called "Personal Edition."[66] Other similar services can be expected to arise.[67]

Software agents

Software can automate a lot of activities. The popular perception of this probably first arose with word processors: the computer could do the work of moving words and lines around and re-typing. We are all familiar today with this sort of software automation; indeed, we expect that large businesses will keep their product inventory on a computer, will have computerized ordering, and so on.

We are less familiar with a variant of software automation that is under serious development: software "agents." A software agent is a computer program designed to search regularly and automatically across the Internet to look for things such as

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[65] *See* <http://www.pointcast.com>.

[66] <http://www.pathfinder.com>

[67] E.g., the Lexis-Nexis Information service advertises as follows:

> "LEXIS®-NEXIS® Tracker is for organizations that need to alert their employees to daily news and information regarding their own company, competition or industry... soon after it happens. Specialized Trackers are also available to monitor patents, U.S. legislative bills and other topic areas. LEXIS-NEXIS Tracker delivers to company e-mail or groupware platforms, or through your company's intranet.
>
> "LEXIS®-NEXIS® InfoTailor™ is a personal information agent that brings customized news every morning to your desktop. You tell InfoTailor what you're looking for -- it finds it, builds your personal issue, and delivers it to your in-box or Web browser (limited release). You get the top 20 articles relevant to your profile request, and you can change your profile as often as you like."

See <http://www.lexis-nexis.com/lncc/products.html> available as of June 7, 1997.

information or products or services desired by its "owner," and perhaps even be able to execute contracts for the purchase of goods and services on behalf of its owner.[68]

These "agent" programs can take different forms. One would be a computer program that resides on, and is run on, a user's own computer. The agent program would therefore not physically "travel" on the Internet, but rather would send queries and requests across the Internet; the results would, however, appear to be the same as though the program had literally traveled across the network. Other forms of agent programs might more literally travel. It is possible to create a network within which programs actually are communicated—more or less like e-mail messages—to other locations, perhaps many such locations. Once being delivered to a particular computer, the agent program would then run on that computer to initiate requests for information, or deliver information, or negotiate contracts, and the like. At the completion of that task, the agent program might return to its home computer, or perhaps continue its journey to other computers, as initially arranged by the program's owner.

There is mixed opinion on the desirability and feasibility of these agents. Many in the computer science community see them as an inevitable, exciting, and powerful wave of the future. Many in the commercial community are much less certain of this outcome, and point to a variety of perhaps less exotic alternatives that they argue can do more with less. One alternative is powerful search engines and large databases, for example. The notion is that database and search engine technologies are becoming extremely powerful and sophisticated. A search site that was devoted to

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[68] *See* UCC 2B draft dated September 25, 1997, 2B-102 (definition of "Electronic Agent" as "a computer program or other electronic or automated means used, selected, or programmed by a party to initiate or respond to electronic messages or performances in whole or in part without review by an individual").

tracking prices of certain goods[69] might yield faster answers to a price search than one that was done by an individual agent sent to "crawl" around the Web.

[69] The author happens to know of one such site, <http://www.pdapage.com/default.htm>, as of January 25, 1998, that tries to track the best prices on a type of handheld computer sometimes known a "Personal Digital Assistant" or PDA; doubtless there are others.

3.2 Players and Organizations

The best information available on the "players" in tomorrow's Internet is not good information at all. The companies most likely to be affected by, or to be able to take advantage of, the Internet, are themselves at a loss as to their own future roles.

In only the last two or three years, we have seen huge corporate mergers announced, called off, undertaken, canceled. Large companies have considered mergers with other large companies (IBM and Apple held talks); have acquired other companies (IBM acquired Lotus); have announced mergers and given them up (AT&T, TCI); have merged with former competitors (Symantec acquired former competitor Norton); undertaken partnerships (Microsoft and NBC); and the like.

There is no clear trend in these corporate re-shufflings. At best, one can try to fall back on principles of economic incentives and corporate size and role, hoping that they will provide some insight.

Content providers and carriers

One communications-related phenomenon prevalent today is the blurring of the roles of provider of content, and provider of transmission services. The phone companies just a few years ago were barely in the "content" business at all (with the exceptions of white and yellow pages and directory assistance services). They were, for all practical purposes, entirely in the "distribution" or common carriage business.

The phone companies of today are exploring the provision of content, as cable companies began to do a few years ago. Newer companies like CompuServe and America Online are playing a variety of roles, as they offer both a telecommunications

infrastructure and much of the narratives and imagery that form that infrastructure's content. Other companies that provide Internet access to consumers—the Internet Service Providers—offer little or no content currently, but could change that practice tomorrow.

The rights and responsibilities of these intermediaries, broadly referred to here as "OSPs" for "Online Service Providers," are not yet clear because they do not occupy a single position on the spectrum of content-to-carriage. Even companies like Microsoft that formerly provided an end-product (applications and other software) with little relationship to communications or "content" as we usually think of it, are now "doing it all": providing applications programs; providing communications services (through the Microsoft Network); providing pure content in the form of CD-ROM encyclopedias and the like; and engaging in joint ventures that deliver content (the Microsoft Network and NBC venture called, appropriately enough, "MSNBC").

Economies of scale

Economic analysis suggests that merging for greater size is only advantageous in the long run if it provides economies of scale. This means that (again, in the long run and other things being equal) a single company is not likely to stay in two or more lines of business (such as content and distribution) unless there is some "synergy" between the lines. Microsoft can be successful in the applications program market and CD-ROM encyclopedia market because it has economies of scale in software distribution. In fact, its encyclopedia "Encarta" is licensed from and based on the Compton's encyclopedia; presumably the skills of software research, development and testing are not efficiently transferable to the collection and assemblage of encyclopedic knowledge, so Microsoft does not try to leverage its skills in that area.

With WWW distribution of information products, more traditional distribution mechanisms—that depend on mailing or trucking physical boxes to retail stores, stacking products on shelves, and the like—may prove to be less important than they

have been. If that happens, it may no longer prove advantageous for companies like Microsoft to continue in the encyclopedia business: without economies of scale in the physical distribution of software, and without any particular advantages in the preparation of encyclopedic knowledge, it would have no competitive advantage over the encyclopedia companies themselves. We may, in short, see tomorrow the opposite of the mergers and would-be mergers of today, as companies specialize in segments of the Internet market.

Everyone will not be a publisher

Current digital communications sharply lower the cost of distributing information to others. At the cost of access to the Internet and perhaps a small additional fee, anyone can have a Web page. Not counting hardware costs, the cost of having a commercial service host a Web page is about $30 to $35 a month. It is thus now easy to have a world-wide audience for one's works of authorship. Compared to reaching a world wide audience through print media, this pricing level is staggeringly low. Such a sharp drop in distribution costs leads many to say that "everyone is a publisher" these days. Some even go so far as to say that conventional publishing is dead or will soon be so.[70]

How true is it that "everyone is a publisher" Or that conventional publishing is dying? Certainly digital communications change things. One expects a great deal of information to be accessible world-wide that was not nearly so accessible previously. One expects many new business to arise and grow because they can make use of inexpensive WWW technologies and global access to their services. Academic papers are already coming onto the Web

[70] For interesting speculations about the lowering costs of "publishing," *see* Eugene Volokh, *Cheap Speech and What It Will Do*, 104 YALE L.J. 1805 (1995).

long before they appear in print; this may have the effect of diminishing the contribution of conventional print publishers.[71]

But we might look a little harder at what "publishing" entails. Publishing involves several steps: selection, editing, layout and design, printing and binding, distribution, advertising.

Digital communications mostly apply to the "printing and binding" and "distribution" steps; nothing about a digital world makes it cheaper or easier to select works—to decide what information has value and what does not. Of course, the point about "everyone" publishing is that "selection" will mean "self selection": people will publish their own information themselves, and not go through the selection process of a publisher at all. But publisher selectivity serves a function, namely quality control. Most academic libraries will buy a new book from a reputable scholarly publisher without close examination, relying on the publisher's past reputation for selectivity as a good and low cost indication of quality. Quality control, quality rating, and the like are valuable functions that will continue to have value in tomorrow's world. If today's publishers do not find a way to provide that service, someone else will. Self-publication will require it because those who are not specializing in, and making a living from, reviewing information for its quality will not have the time to review thirty million documents[72] every time they need to know something.

"Layout and design" are functions that are likely to assume an even greater role in tomorrow's world. Most people are not aware of what today's graphic designers do for printed publications, or

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[71] *See, e.g.*, Bernard Hibbits, *Last Writes? Reassessing the Law Review in the Age of Cyberspace*, 71 N.Y.U. L. REV. 615 (1996); *see also*, I. Trotter Hardy, *The Death of Law Reviews—A Reply*, 30 UNIV. AKRON L.REV. 249 (1996).

[72] Computerized search engines do not answer the need. Despite very sophisticated search techniques and algorithms, they still are not able to rate and review sites for quality. Some "search" sites do this, but they do it with human editors.

producers for video commercials. The best works for which they are responsible have a degree of sophistication in their appearance that is invisible as a conscious matter to the average consumer, but that exercises a great deal of unconscious influence. It is already true today, though not often noted by those who believe that everyone will be a publisher, that when "everyone" has a Web site, the sites look amateurish. The most appealing sites are increasingly sophisticated—not just in their technology, though that is certainly a part of it, but also in their design and layout. Attractive dancing and singing Web pages take a lot of effort and resources and talent to create. "Everyone" does not have the time or talent to produce them, so that it is unrealistic to think that everyone will be a publisher on the Internet of tomorrow.[73] At the very least, whether one uses the term "publisher" or not, there will be a sharp difference between "professional" Web sites and "amateur" ones, and the differences will be significant for users.

The distribution of advertising is something that the Web makes cheaper, so that some advertising will certainly be done by individuals. But effective advertising depends on consumer appeal, which depends on cleverness, good design, eye-or-ear appeal, and so on. There is no reason to think that average persons will have any more ability to produce good advertising

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[73] "According to AltaVista, which has indexed a total of about 30 million Web pages, five million of them haven't changed at all since early 1996, and some 424,000 pages haven't been updated since early 1995. 'People have enough enthusiasm to design the sites once -- but it's not clear that they have the resources to update them regularly,' says Louis Monier, the architect of Digital Equipment's search engine. (Wall Street Journal 11 Mar 97)." John Gehl & Suzanne Douglas, *Spring Cleaning Time For Some Web Sites*, EDUPAGE, 11 March 1997. ("Edupage, a summary of news about information technology, is provided three times a week as a service by Educom, a Washington, D.C.-based consortium of leading colleges and universities seeking to transform education through the use of information technology.")

than they have to produce attractive Web sites.[74] Once again, there is a role to be filled by someone here, whether that someone is called a "publisher" or "advertising agency" or something else.

Commercial vs. academic entities

For years, the Internet was an academic research project. It was created by talented academics and computer science researchers. Much of whatever organization we have today is dominated by the structure originally established in a research climate. The cooperative, collegial approach of academics is visible in such Internet institutions as the Internet Engineering Task Force (IETF), a body that anyone can join.

Talks with people in research-oriented institutions, in government, and in private industry, reveal an interesting phenomenon. Those in research retain a sense both that the Internet should be collegially and cooperatively managed and developed, and that it is in fact being so managed and developed.

Those in private industry manifest a different attitude, that the Internet is in no one's hands, though private industry is taking the lead in exploiting and shaping its future.

It is quite common to observe academic researchers engaged in projects similar to those being undertaken privately, notably in the area of digital objects. There's nothing inherently wrong or even wasteful in this sort of competition: if there are several schemes for protecting information objects, users will have a choice, there will be incentives to improve products, and the public will benefit.

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[74] If one watches enough television, one has to question whether some of today's *advertisers* have any sense about consumer appeal either. But the best ads are, it is true, very good indeed--and they are generally done by a concentration of advertising agency talent, not computer technologists.

What is striking about the process, though, is the speed with which private industry is moving relative to that of the academic research sectors. One researcher noted, for example, that in the early days of the Internet, a handful of people could get together and make crucial decisions about network architecture, protocols, addressing, and the like. Nowadays, so many people have a stake in these things, that progress on new, improved standards (for architecture, protocols, etc.) comes more slowly than before. It is a major undertaking to make any changes at all in the underlying technology of the Internet.

What that means is that changes are most rapid when they consist of applications layered on top of the existing structure. Many such new applications are in evidence already: Internet telephony, live radio broadcasting, video, animation, and so on. These are applications that can earn money and are being driven largely—though certainly not exclusively—by commercial interests.

3.3 User Capabilities

Users of the Internet tomorrow will have access to many services. Many of these services will cease to be highly "visible" and will instead become a part of ordinary life.

What follows is a snapshot of a number of significant capabilities that are either operable in a limited way today, or nearing that point.

Internet as backdrop

Many experts agree that both "the Internet" and "computers" will cease to be visible to their users.

We speak of "the Internet" today as an entity—a thing. One connects "to the Internet" for a session. One finds things "on the Internet." The attention to the Internet as a thing in this way will gradually fade, as "the Internet" becomes more and more the mechanism by which digital information is transmitted. Today we do not say that we called somebody "using the voice telephone system," nor do we say that we picked up a television program "over the electromagnetic spectrum."

In just that same way, tomorrow we will stop being conscious of the Internet as a medium and simply take it for granted. The Internet will be assumed, assumed as the medium of digital communications. More and more information will be delivered in digital format, including telephones, radio, television, movies, and music. When we speak tomorrow of "watching television" or "listening to the radio," we may well mean that we are receiving the signals over a digital network—the Internet.

"Ubiquitous computing"

Computers are getting smaller and less expensive. They are already present in many places that are not noticeable: in cars, regulating gas flow and combustion; in smoke alarms; in voice-mail systems; and so on. This trend will continue. Eventually, nearly everything with an electro-mechanical function will also contain a computer and be connected to the Internet.

In one sense, this trend is just a continuation of the gradual shrinking in size of computers. At the very dawn of their development, in the 1940's and 1950's, computers were room-sized pieces of equipment. Later in the 1960's they became refrigerator sized. In the 1980's the personal computer became roughly "television" sized and could fit on a desk. Today, laptop computers are a few pounds in weight, and "hand held" or "personal digital assistant" computers weigh typically less than one pound and fit in pocket or purse. Computers will no doubt continue becoming smaller and more powerful.

But in another sense, the way we perceive "computers" will change. For as computers become more and more numerous and smaller and smaller, we may cease viewing them as "things" and begin seeing them as simply part of the general background of modern life. An analogy may help convey this important shift.

In the eighteenth century, glass for windows was rather expensive. Buildings accordingly had relatively few, if any, glass windows. One would expect that a glass window would therefore be noticeable as such: an eighteenth century guest in a home or store with a large glass window would almost certainly notice it as unusual and striking. Today, there is nothing whatever striking about glass windows: a twentieth century citizen of the United States would not pay any attention to them, glass windows having become so common that they have disappeared into the background of everyday familiarity. To be sure, desktop

computers these days are also familiar to most industrialized societies, but they have not yet "disappeared." We still notice them, think about them as entities, call them "desktop computers," and the like.

In the next few years, they may recede as individually identifiable things. Some predict that computers used for work purposes will stop having an association with particular "owners." Today, we speak of "my computer"; we may note that we cannot take notes or do some other function because we "do not have my computer here." Or we carry several pounds worth of a laptop computer because by doing so, we can be sure to have "our computer" with us when needed. We are much less proprietary and possessive toward paper and pencil, because if we are going to use paper and pencil, we are comfortable using whatever pad of paper and pencils happen to be near. Tomorrow we may do the same with computers. Each computer may be part of something no bigger—and perhaps no more expensive—than a pad of paper. We may simply find them lying on a conference table or in a meeting room—computer pads—awaiting our temporary use.[75]

Internet connections will likewise be almost everywhere. Not only will "computer pads" be readily available for temporary use, but each of these small pads will be connected to a network that allows the computer pad to transmit whatever we have written or spoken or drawn to some other computer storage location. That, of course, is the key to temporary computer use: the information will be easily transmitted back to whatever storage location is always accessible to us.

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[75] Mark Weiser, *The Computer for the 21st Century*, SCIENTIFIC AMERICAN, vol. 265, Issue 3, September 1991, at 94.

Software subscriptions

A lot of mass-market computer software—including computer programs or "applications," as well as "information" and "edutainment"[76] programs—is sold today in physical packages: shrink-wrapped, cardboard boxes bought from retail outlets or by mail order. The same is true for audio CD's, video cassettes, and computer game cartridges, which are either sold or rented as physical packages. Other software is sold on-line in the form of access fees: Lexis and WestLaw, for example, sell information on-line (as well as on disk in some cases). With the Internet, the possibility arises that some of what are today's disk sales might be replaced by on-line distribution.

This might happen in a variety of ways. Some software might be sold entirely over the Internet. Today, some software is given away in this fashion; tomorrow, some will continue to be given away, while other software will be sold for downloading. Other software will be sold as a physical package but the buyer will obtain updates—bug fixes, new features, and so on—over the Internet. This latter mechanism can itself be set up in different ways. A user might "go out" actively to browse a company's Web site to see if updates are available and on what terms. Or the user might subscribe to a service that does the checking for updates automatically. Such a service can be offered by the software seller itself, or by third party "update services" who make it their business to keep track of other companies' software versions and new releases.[77]

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[76] "Edutainment," a contraction of "education" and "entertainment," is a new term that describes multi-media software intended to be both.

[77] One such service, commercially sold by the Cybermedia company under the name "Oil Change," is already operational. See the product description, <http://www.cybermedia.com/products/oilchange/ochome.html>, available as of October 19, 1997. Other companies offer automatic updating of their own software products.

A third-party update service consists of two parts: software loaded on the individual buyer's desktop computer, and a central repository of update information located on the third party's own computer. The software installed on the individual buyer's hard disk makes a record of the various other software programs that the buyer already owns. Meanwhile the company continually tracks other software companies for any new releases or updates they may issue. It makes a record of these updates in its central database. The copy of the software on the buyer's hard disk then periodically and automatically "checks in" with the central database to find out if any of the buyer's software packages have been updated. If they have, the software obtains the necessary updates and installs them. The user is therefore kept up-to-date without having to make an affirmative effort to do so.

Another possibility is that software companies themselves will sell the service of automatic updates, instead of or in addition to a third party update service. When users buy a software package, they will buy an automatic updating service provided directly by the seller. Periodically, the buyer's copy of the software would check in with the seller's database of updates and update itself as necessary. Such updates could be of either enhanced features, as in a word processor; or they might be of information, like the next six month's worth of encyclopedia articles or the next day's baseball scores.

Yet another option is that computer users will never actually buy a software "package" at all. Rather, they will obtain whatever capabilities are needed at the moment by downloading small applications, called "applets," or small amounts of information or facts, at the time they are needed.

The recent development of a computer programming language called "Java" suggests this model for computer applications. Java programs are designed to be downloaded over the Internet at the time they will be used. Currently, these "download-as-needed" programs tend to do modest things: make a drawing move or

rotate; slide a headline from right to left across the screen; change colors; etc. But one possible future development is that such programs would constitute word processing features, or spreadsheet features, and the like. A user wanting to create an outline, for example, might call up an outline processing feature from a seller on the Internet. Such a feature, implemented as a Java or similar program, might be usable for a limited period of time and then "expire," or it might simply disappear when not being used, to be downloaded again when needed again. Payment options would include: a charge for each download; a charge per minute of use; or a flat monthly subscription payment entitling as many downloads of as many features as the user desired.

This approach to software distribution depends on a speedy Internet connection, but a fast enough connection would make it feasible. The possibility of this type of distribution is sometimes coupled with a vision of desktop computing that has the "computer" as primarily a terminal for accessing applications and information over the Internet. Sometimes such a terminal (or its operating software) is referred to as a "thin client," where "thin" means that the device has relatively little processing power itself, and "client" refers to the fact that the device must go to another source, called a "server," to obtain any necessary software. This sort of terminal is sometimes also referred to as a "network computer" or "NC." Again, this vision emphasizes the user's local "computer" as mostly a means of accessing processing power and information from other sources on the Internet.

Whether the "thin client" vision makes sense, or whether desktop computers will instead continue to become more and more powerful, is a matter of some current controversy. The competing visions often carry the flavor of political or religious debate: they have overtones of zealotry and philosophy as much as rational estimations of probable futures. They spring to some extent from different companies' self interest: some companies will stand to gain if the thin client vision proves true; different ones will gain if

it does not. And of course, it is entirely possible that both visions will co-exist, depending on different users' differing needs.

At the least we can say that there is no inevitable "trend" in software distribution technologies. How the market evolves will depend largely on economics, technology, and the legal framework, not on philosophy or history or inevitability. Apart from requirements imposed by law, what matters most are the costs of delivering information over different channels, and users' preferences. For instance, if the development of disk storage mechanisms, like CD-ROMs, were to move slowly and costs remain constant, but the speed of the Internet were to increase rapidly with dropping costs, then more information would be delivered over the Internet relative to disk distribution than is the case today. On-line delivery also provides an immediacy that facilitates impulse buying and instant gratification—things that many consumers highly value.

On the other hand, there is no particular reason to think that disk storage technologies are stagnant. Soon the "digital video disk" or "DVD" technology will become commercially available.[78] This technology increases the amount of information that can be stored on a CD-ROM-like disk by several orders of magnitude over what is possible today.[79] Consumers may also prefer to buy tangible objects: cardboard packages are attractive and "feel" like a more substantial purchase than the abstract experience of downloading invisible bits over a network.

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[78] This sentence was first written in the fall of 1996. In April, 1997, DVD devices began to appear on the market. As of the fall of 1997, they are increasingly appearing in consumer electronic store advertising.

[79] Current CD-ROM format disks hold about 650 million bytes of information. The DVD format holds from 4.7 gigabytes to 17 gigabytes, depending on the number of sides and layers used for recording. The lower number is about seven times the capacity of a CD-ROM and is enough to store a digitized full-length motion picture.

In sum, costs and consumer preferences matter. And inasmuch as both costs and preferences will vary across different types of services and different users, we will likely see combinations of different distribution mechanisms co-existing. For example, small software applications might routinely be bought over the Internet, while a recorded twelve-hour performance of an opera or five years' worth of a television program series might be bought only on a physical disk. Then again, even the latter might be usefully available for network downloading for customers who are willing to pay a premium for extremely high speed network connections. And even downloading of a small application might be more expensive than a one-time purchase without updates of the equivalent application on a disk. Some buyers may opt for the latter, others for network downloading.

Reading from books versus computer screens

It has been said that reading from a computer screen will never be as easy or enjoyable as reading from paper. With the current state of low priced display monitors, and the assumption that we are talking about high quality paper and ink, that observation is probably true. But this observation misses at least three important points.

Advantages of books

First, the advantages of books are a function of many things, but the major things are contrast, resolution, and glare. Printed type in a book is easier to read than type on a computer screen largely because the ratio of dark to light on the pages of a book is much greater than the same ratio on a computer screen. Similarly, the resolution of printed type is much higher than found on the typical work-a-day computer screen. And the pages of a book reflect less glare than the glass of a CRT monitor.

But computer technology, including computer screen display technology, is not static. Like all other aspects of the computer

world, it is evolving rapidly. Laptop computers are a good example. The first screens were 8 or 9 inches diagonally and often used "double scan" technology, a method of display information that is slow and plagued with "ghost" images when the display changes rapidly. Today (only a few years after the advent of laptop computers), it is common to find screens that are 12 or 13 inches diagonally, use "active matrix" technology, and that are bright and crisp—often brighter and more crisp than desktop monitors. Newer technologies for displays have come onto the market just in the few months of project *Looking Forward*.[80]

One does not have to expect technological miracles to expect that screen displays will continue to get better each year. There is no inherent reason why such displays cannot come much closer to the quality of book pages than they do today. Even size is decreasingly a distinction: handheld computers have been on the market for some time, and new ones are announced frequently. A computer weighing a few ounces can contain and display a novel with ease today;[81] tomorrow that capacity and low weight will only improve.

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[80] Devices to project a computer (or other digital) image onto a screen have been developed for some time, but a new technique called Digital Light Processing is now also available:

> "DLP projectors process light digitally using a microchip invented by Texas Instruments called the Digital Micromirror Device (DMD). (The full projection process using the DMD is called Digital Light Processing.) This 1 x 1.5-centimeter chip contains 508,800 tiny aluminum mirrors. Each mirror, representing a pixel in an 848 x 600 array, is digitally controlled by an individual memory cell beneath it. A digital '1' turns the micromirror on; a 'O' turns it off. The activated mirror reflects light from the lamp through the imaging lens and onto the screen." William Bohannon, *Projector Technology Overview*, PRESENTATIONS MAGAZINE, January, 1997, available from <http://www.amug.org/~ccsprez/technology.html> as of October 19, 1997.

[81] The PalmPilot computer by 3Com corporation, which has been on the market since June of 1996, weighs 4.5 ounces, is about the size of a deck of cards, and, using third-party software, can contain and display several novel-length sets of textual material.

Second, people often need to read specific information in brief pieces rather than extended narratives. A novel requires sustained attention; but learning what the population of France is does not. Even with today's screen technology, there is certainly a market for "reading" shorter, more factual excerpts from a computer screen when a longer session with such a screen might prove uncomfortable.

Third, reading, like many things, is a question of relative costs and benefits. If computer screen displays are inferior to book pages, but offer other advantages such as motion, sound, links to other information, gargantuan amounts of text in a small package, intense colors, etc., then many people will opt for the computer display over the book "display" despite the former's inferiority. It follows that even if computer displays *never* reach the sharpness or contrast of print material, they may still offer desirable attributes. After all, a television display today has astonishingly poor resolution compared to the average paper magazine page (even worse than a good computer monitor); and yet, people do watch television. For that matter, it may be a more pleasurable experience to read from sheepskin scrolls or parchment rolls than from the pages of a book. We do not do so, however, because even if the quality of these other materials is higher, the cost of sheepskin scroll publication would be so much higher still that we would opt for the inferior—but *far* cheaper—bound paper format. There is no reason to think that the same thing will never prove true for reading from computer screens.

The belief that we will always rely heavily on printed paper, therefore, or that information producers can always use electronic publishing as a "loss leader" for their "real" market in print materials, is erroneous. Most information in the future will shift from paper to electronic form.

Real time audio and video

The Internet today is already full of sound, if not fury. A variety of technologies exist to provide audio in digital format. For some years now, net users have been able to send and receive audio files "in bulk," that is, digitized audio in files that must be entirely downloaded and then played on one's desktop computer. The more recent development is that of "real time" audio, or a mechanism for playing sounds "live," as they are being transmitted from a distant site. This latter form of Internet audio is known as "streaming" audio, because the sounds arrive in a "stream" of bits that are played as they are arriving.[82]

Streaming audio makes possible digital audio broadcasting, much like radio. Unlike radio, though, the Internet is interactive; that means that it is perfectly possible for users to "call up" audio files and have them played live. This capability is much like having a juke box on call, but with the capacity for an almost unlimited number of CDs or other audio recordings available for playback. Current advertising for this sort of capability draws attention to these possibilities. Here, for example, is an ad from the Web site of RealAudio, a leading producer of Internet audio technology, for a recent version of its software:

- This holiday, give someone thousands of CDs, hundreds of sports tickets, and a front row seat at the opera. …
- Shipped directly to the recipient in a special gift box for the holidays.

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[82] *See, e.g.*, the *RealAudio* site, available as of March 11, 1997, <http://www.realaudio.com>. Regular audio events are now scheduled over the Internet. *See, e.g.*, the *ESPN* site with coverage of NBA basketball games, available on a subscription basis as of March 11, 1997, <http://espnet.sportszone.com/editors/liveaudio/nba.html>.

- Includes Internet audio essentials, including free online time for Internet users and Netscape and Microsoft web browsers.
- Delivers near-CD quality audio over modems with PerfectPlay.[83]

Other radio-like Web sites are appearing with great frequency.[84]

Video technologies are following a similar path. Again, for some time now it has been possible to create a file that consisted of digitized video. Such a file could be sent across the net and downloaded on a desktop computer, where it could be played for viewing. The newer technologies, like those for audio, incorporate a "real time" component to video, allowing it to "stream" onto a desktop computer and be played as it is being sent.[85]

The current quality of Internet video is far below that of television, even with a high-speed (non-modem) connection. Audio quality is pretty good, as audio alone requires substantially less bandwidth than video. But the technologies keep advancing, and Internet bandwidth may well increase enough to make even video of sufficiently high quality to be a major commercial factor. Audio technologies are fast approaching "CD quality" sound, deliverable over today's Internet. The distributors of the well known "Dolby" audio technology, for example, are hard at work on technologies designed specifically for Internet audio

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[83] From the RealAudio web site, <http://www.realaudio.com/hpproducts/playerplus/holidaygift/index.htm> on December 10, 1996.

[84] *See, e.g.*, V-cast, Grit radio, available as of December 16, 1996 from <http://www.grit.com>;

[85] Among other technologies, *see* "VDONet," available as of December 7, 1996, from <http://www.vdonet.com>. As the talking head explains when one first downloads the VDO "player" that allows watching and listening to streaming video, "this isn't a matter of 100's of channels, or even thousands of channels. This means the Internet can carry 30 million channels."

transmission, with an eye toward "music on demand" applications.[86]

Interactive "chat"

For some years the Internet has provided a mechanism for users to have a group "chat." When a member of the group types a message to other group members, the message appears on the others' computer screens immediately. This capability is known as "Internet Relay Chat" or "IRC" or just "chat." The members of the group participating in a chat may be known to each other ahead of time, or may simply join or leave the discussion as they like, "meeting" and "talking with" other group members perhaps for the first time. Commercial on-line services like CompuServe and America Online have also offered a variant of this capability in the form of "chat rooms." The "rooms" description is just a metaphor, but a helpful one because it allows one to speak of "entering" or "leaving" a chat room.

Internet chat is widely used among university students. Chat rooms are one of the most popular features of America Online as well. In both instances chatting's predominant appeal is to a relatively small segment of the population (generally mid-teens to

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[86] *See* Press Release, available as of December 2, 1996 from <http://www.dolby.com/press/imadnet.html> ("New York, September 17 -- Dolby Laboratories has introduced a new implementation of Dolby Digital, called Dolby Net. The new format is a low bit rate version of Dolby Digital and has been developed for low bandwidth applications, such as real time streaming Internet audio. The concept of Dolby Net quality Internet audio has caught the attention of several companies in the industry, and efforts are currently underway to provide this capability to computer users. Progressive Networks recently signed an agreement with Dolby to develop a high quality Internet audio delivery system which will use Dolby Net to provide real-time streaming audio capability. In addition, Liquid Audio has announced a Music on Demand system which will utilize this new technology and allow users to preview music in real time from an Internet server. Users will then be able to purchase and download their selections. A customized version of Dolby Digital will deliver the Compact Disc quality music a user purchases.")

mid-twenties). There is reason to think that it will spread more widely in the near future, however.[87] Aside from whatever general utility the interactive typing of messages has, one thing seems destined to increase interactivity of the "chat" variety enormously: the rise of Internet telephony. "Chatting," largely a metaphor today, may be a more literal description tomorrow. If the Internet facilitated groups that could actually speak to each other, the use of chatting would increase. If interactive video is added to the mix, as it almost certainly will be, use the Internet will begin to replace face-to-face meetings more commonly than is the case now.

It is easy, of course, to overstate people's desires to "meet" virtually. Lots of people prefer face-to-face meetings over video-conferences. But economics has a lot to do with it. Many businesses can be expected to require some meetings with geographically dispersed individuals to be held over the Internet to save money, regardless of the preferences of the individuals involved.

Interactive video will show the value of virtual meetings and increase their acceptance and use. But video is a high-bandwidth use of the Internet that will be more expensive than text-only chats. The development and popularization of interactive video may therefore have the effect of drawing attention to virtual meetings of any sort, including text-only or other low-bandwidth forms of chat. In short, as video chat becomes better known, it will also have the effect of increasing the amount of chat that relies on text only or on text with low-quality images.

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[87] "Forrester Research, Inc. says it won't be long before every major content site has tools that make chat available to its visitors. The capability will encourage repeat-visits to the sites, allow businesses to use their sites for training and customer service, and encourage the development of 'chat clubs' that will create revenue for the site from cover charges and advertising." (COMPUTER INDUSTRY DAILY 12 Aug. 96).

4. Today's Legal Issues

The Internet is changing so rapidly that one can barely separate "today's" from "tomorrow's" issues. Some of the issues that were described as "in the future" in draft versions of this report later became current and went to litigation. Others may well be in litigation by the time this Report is publicly circulated, or perhaps long since resolved. Readers should not give much weight to the identification of issues as "today's" or "tomorrow's." The use of these terms in this Report is as a short-hand for issues that are either more widely recognized ("today's"), or less widely-recognized ("tomorrow's").

A number of copyright issues related to digital communications technology have already arisen in the last several years. Some are the subject of recent legislation or legislative proposals or

international treaty;[88] others exist as a result of a few court holdings, none with definitive Supreme Court resolution.[89] Most of them remain the subject of debate and study. The following discussion will not constitute an exhaustive catalog of such issues; others could doubtless be added to the list. But these are central to the over-arching issue of copyright's accommodation to Internet technology.

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[88] *See, e.g.*, the "Digital Performance Right in Sound Recordings Act of 1995," P.L. 104-39, 109 Stat. 336 (1995) (codified primarily in 17 U.S.C. § 114(d)); the "NII Copyright Protection Act of 1995," (H.R. 2441) and, the "National Information Infrastructure Copyright Protection Act," (S. 1284) (104th Cong. 2d Sess.); the "Computer Maintenance Competition Assurance Act" (H.R. 72, 105th Cong. 1st Sess., January 7, 1997) (available as of March 9, 1997, from <http://lcweb.loc.gov/copyright/penleg.html>. *See* the WIPO treaties and legislative proposals available from the Copyright Office Web site as of March 9, 1997, from <http://lcweb.loc.gov/copyright/wipotrty.html>.

[89] The issue of copyright's applicability to a computer program's menu command structure is one current issue that did reach the Supreme Court, but the Court split four-to-four on the matter. *See* Lotus Development Corp. v. Borland International, Inc., 516 U.S. 233 (1996), *affirming by an equally divided Court*, 49 F.3d 807 (1st Cir. 1995).

4.1 Web posting

Only two or three years ago, the copyright significance of posting information to a Web site was uncertain. Was such a posting a "public distribution?" A "public display?" A "public performance?" Not a "public" activity at all?[90]

Today it is clear that an unauthorized a posting to a Web site does indeed infringe the copyright owner's rights—if not of reproduction or distribution, then certainly of display, or performance, or both.[91] The rest of this Report assumes that that is the case.

Less clear, though, is the question whether such a posting is a "publication." A substantial number of provisions in the Copyright Act make distinctions that turn on the fact of a work's being "published" or not. For example, section 108 permits certain types of reproduction by libraries and archives. Subsections (b) and (c) permit reproduction of works for different purposes. Section (b) permits reproduction "for purposes of preservation and security or for deposit for research use in another library" as

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[90] "It is not clear under the current law that a transmission can constitute a distribution of copies or phonorecords of a work." INFORMATION INFRASTRUCTURE TASK FORCE, INTELLECTUAL PROPERTY AND THE NATIONAL INFORMATION INFRASTRUCTURE: THE REPORT OF THE WORKING GROUP ON INTELLECTUAL PROPERTY RIGHTS 213 (1995) [hereinafter WHITE PAPER]. The WHITE PAPER expressed no doubts, however, that posting to a Web site constituted a public "performance" or "display." *See id*. at 72.

[91] *See* Marobie-FL, Inc. v. National Assoc. of Fire Equip. Dists., 1997 U.S. Dist. LEXIS 18764 (N.D. Ill. Nov. 18, 1997); Central Point Software, Inc. v. Nugent, 903 F.Supp. 1057 (E.D. Tex. 1995); Sega Enterprises Ltd. V. MAPHIA, 857 F.Supp 679 (N.D. Cal. 1994); Playboy Enterprises Inc. v. Frena, 839 F. Supp. 1552 (M.D. Fla. 1993). *See generally* 2 MELVILLE B. NIMMER AND DAVID NIMMER, NIMMER ON COPYRIGHT, § 8.08[A][1] (1997) ("input of a work into a computer results in the making of a copy, and hence . . . such unauthorized input infringes the copyright owner's reproduction right") [hereinafter NIMMER ON COPYRIGHT].

long as the work is "unpublished."[92] Section (c) permits reproduction "for the purpose of replacement of a copy … that is damaged, deteriorating, lost, or stolen,"[93] but only for works that are published and for which reasonable efforts to obtain a replacement copy have proved unavailing.

Many other sections of the Act refer to the same concept for purposes such as helping to determine: whether a work is or is not a "Berne Convention work;"[94] how the author's nationality affects copyright;[95] when the digital transmission of a sound recording shall be subject to statutory licensing;[96] and so on.

Currently, the Copyright Office has not formulated a policy on this issue, though if an applicant for registration considers Web posting to constitute publication, the Office will accept that characterization. Even were that matter definitively resolved, there remains an issue whether the copyright concept of "publication," as defined in section 101[97] is a single concept. For example, the application of the statutory licensing scheme for the

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[92] 17 U.S.C. § 108(b).

[93] 17 U.S.C. § 108(c).

[94] 17 U.S.C. § 101 (definition of "Berne Convention work").

[95] 17 U.S.C. §§ 104 (National Origin) and 104A (Copyright in Restored Works) make repeated reference to the status of a work as published or unpublished.

[96] 17 U.S.C. § 114(d)(2) explains that the statutory licensing scheme of the section will apply to certain public performances of sound recordings if several conditions obtain. One of those conditions is that "the transmitting entity does not cause to be *published* by means of an advance program schedule or prior announcement the titles of the specific sound recordings or phonorecords embodying such sound recordings to be transmitted." 17 U.S.C. § 114(d)(2)(C) (emphasis added).

[97] "'Publication' is the distribution of copies or phonorecords of a work to the public by sale or other transfer of ownership, or by rental, lease, or lending. The offering to distribute copies or phonorecords to a group of persons for purposes of further distribution, public performance, or public display, constitutes publication. A public performance or display of a work does not of itself constitute publication." 17 U.S.C. § 101.

digital audio transmission of certain sound recordings turns in part on whether the transmitting entity has previously "*published* by means of an advance program schedule or prior announcement the titles of the specific sound recordings."[98]

In this context, the term "publication" applies not to a copyrighted work, but rather to a pre-announcement of the performance of copyrighted works. Such an announcement could easily be in the form of a notice posted on a Web site, raising simultaneously the issues of whether such a notice is "published" within the usual meaning of the term for Web postings; and whether the usual meaning of the term for copyrighted works also applies to announcements and notices of such works for the purposes of section 114 and its statutory licensing scheme.

[98] 17 U.S.C. § 114(d)(2)(C) (emphasis added).

4.2 Caching

Computerized information traveling over a network like the Internet sometimes arrives at its destination quickly and sometimes slowly—often painfully slowly, as any frequent "surfer" on the World Wide Web can attest. Speed of communications depends on many things: the speed of the computer that is providing the information initially; the speed of the slowest "link" in the network chain; the number of other users using the same computer or the same network at the same time; the complexity of the information being transmitted (including the number and size of images, for example); and so on. Other things being equal, if a unit of information can originate at a point closer to the ultimate consumer rather than farther, or from a computer that is faster or less congested than another, the consumer will be able to obtain it more quickly.

Mechanisms to do that—to store information temporarily "closer" to the consumer or on a more powerful or less congested computer, in order to speed up access—are generally referred to as "caching." Caching of this sort can take place in a variety of locations. It can be done by a user's copy of browser software on the user's local hard disk, and indeed this is very common today. But it can also be accomplished at the point of one's connection to the Internet, the Internet Service Provider. For example, America Online may cache WWW information on its own computers, so that if an AOL user is browsing the Web and requests the same page of information twice, the AOL computers may be able to supply it without issuing another request across the Internet.

Offline browsing

Another form of caching of more recent origin is denominated "off line browsing."[99] The user buys an offline browser program that can be set to run late at night while the user is asleep. The program will browse the Web, visiting sites that the user has previously defined as being of interest. The program will then copy, not just one page of a web site, but all pages affiliated with a particular site. It will store these pages—perhaps hundreds of them—on the user's own hard disk. Whenever the user wants to, he or she can then "browse" these pages as if doing so over the Web, but in fact doing so from the user's own hard disk at dramatically greater speeds than could be obtained over the Internet.[100]

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[99] *See. e.g.*, advertisements for *OM-Express* by Open Market, Inc. ("Avoid the World Wide Wait"), NetGuide Magazine, October 1996 at p. 29; *Web Buddy* by DATAVIZ, NetGuide Magazine, November 1996 at p. 64; *WebClip* by PaperClip Software, Inc., NetGuide Magazine, November 1996, at p. 130. A particularly interesting new application to expedite "live" Web browsing has recently been announced. The product is called "Net.Jet," and appears to "anticipate" where one will browse next. It does this by pre-loading—another form of caching—all links from the page one is currently viewing. *See* advertisement for net.jet by Peak Technologies, Inc., NetGuide Magazine, November 1996, at p. 146; *see also* the Peak Technologies Web site, available as of November 8, 1996 at <http://www.peak-media.com/netjet/netjet.html> ("Real Time Acceleration: Peak Net.Jet will dramatically speed up your browsing when you are visiting new sites that contain reading material or articles that you spend some time reading. You will find that as you read through different articles on a site, the new pages you go to will load into your browser as if they were already in cache. This is because Peak Net.Jet loads all available links so that it appears to anticipate where you are going to go next, and gets that page ready for you to read.").

[100] As one advertisement, sent to me by a mass e-mailing, puts it:

> You can review hundreds or even thousands of Web sites retrieved by Robo Surfer at an incredibly fast speed because it's all on your hard drive. There's basically no wait time! What might take you hours to do online can be done in a matter of minutes off-line. *It's like having the Internet on your hard drive*!

E-mail message of March 13, 1997 (emphasis added). *See* similar wording posted on the Robo Surfer Web site, available as of March 19, 1997, <http://www.robosurfer.com>.

Caching at all levels is obviously a function of the current state of technology. If the carrying capacity of the Internet were suddenly to be multiplied a hundred-fold (and nothing else, such as the number of users, changed), the need for caching would be greatly reduced or perhaps even disappear. If there are no delays whatever in obtaining information from distant computers, there is no need to cache to eliminate delays. Caching carries its own costs: added complexity of software design, more possibility for error, and added time for the software to determine whether any given unit of requested information is "in the cache" or not. If delays were eliminated, these costs would plainly be a substantial deterrent to undertaking the bother of caching.

Caching is defined as temporary storage, but "temporary" can mean anything from milliseconds[101] to days. Regardless of its duration, though, whenever a temporary copy of information is created, it will likely be a copy not just for computer purposes, but also for copyright purposes.[102] *A fortiori* a temporary copy on a hard disk is a copyright copy because such storage typically does not become erased when the power is turned off. Much caching is in fact accomplished by storage on hard disks, and many caching technologies result in the creation of quite persistent copies. Internet "browser" software often stores information on a user's

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[101] Many personal computer systems provide caching internally, not for purposes of accessing information on the Internet—the focus of this Report—but for even faster access to information stored on a PC's hard disk or RAM memory. Even though access to today's hard disks is at speeds almost unimaginably fast, to a computer, accessing information on a hard disk is dramatically slower than accessing that same information from RAM memory. Consequently, some computers "cache" information they read from the hard disk in RAM. It is also possible to achieve speed gains from caching some information that is accessed from RAM memory in a smaller, faster memory located adjacent to the processing unit. One therefore hears of processor chips, such as the Pentium, which have an "on-board" cache of 256 kilobits or 512 kilobits or the like. The principle of these caches within a single desktop computer is exactly the same as that for access to information over the Internet, but only the latter is addressed in this Report.

[102] See the discussion in the section titled *RAM copies*, at page 128, and sources cited in note 108.

own hard disk, for example, and only infrequently or never erases it.[103]

The issue of caching and copyright is therefore a significant one. Because judicial decisions so far hold that caching constitutes the making of a "copy" under the statute as it now stands, it is unlikely that legislation would be needed to *establish* infringement liability for caching. If we were to resort to a legislative resolution of the caching issue, then, it is likely that the legislation would take the form of "legalizing" caching or perhaps defining some subset of all "caching" behavior and legalizing that subset, while preserving infringement liability for other subsets.

[103] Just to see what was there, the author checked his own computer's hard disk on November 15, 1996. At that time, he had over five megabytes of Netscape cached files dating back two months; 30 megabytes of Internet Explorer 2.0 cached files dating back six months; and 36 megabytes of Internet Explorer 3.0 cached files dating back three months

4.3 RAM copies[104]

Caching is a significant issue in its own right. One can also see it as a microcosm of another issue today: the matter of "RAM copies."

There is much ferment in both technology and copyright circles about the copyright significance of the temporary appearance of digital information in computer memory. Computers have more than one kind of "memory," so it is useful to keep them straight. Most of the time, the concern centers on a computer's "internal" or "random-access memory." Abbreviated "RAM," this internal memory is an essential part of the operation of computers. It where the brain of the computer—the processor—stores the instructions and data it operates on.[105] These days most RAM memory in desktop and other computers lies in one or more computer "chips," which look like small black or gray squares stuck on a printed circuit board. These squares contain quite a number of transistors, resistors, and the like that are microscopically tiny (and covered up in any event by the black or gray outer shell). They have no moving parts, and like the processor chip itself, are therefore "solid state" devices.

Most computers also have another storage memory in the form of "disk" storage. The "disk" may be a floppy disk, or a hard disk.

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[104] Parts of this section have been taken from I. Trotter Hardy, *Computer RAM "Copies:" Hit or Myth? Historical Perspectives on Caching as a Microcosm of Current Copyright Concerns*, 22 UNIV. DAYTON L. REV. 423 (1997) (an article written with the permission of the Copyright Office in conjunction with *Project Looking Forward*; the views expressed in the article are, however, solely the author's own).

[105] Technically most computers cannot "operate" on data in this RAM; they must pull it into various parts, called "registers," of the processor itself to do any actual manipulation. But the distinctions do not matter for purposes of this Report.

This form of storage is also sometimes referred to as computer "memory," but this Report will refer to it as "disk storage" to distinguish it from RAM storage. Disks do have moving parts: the disk rotates. So they are not referred to as "solid state" devices. Commonly today, they work on the principle of a tape recorder: the disk surface is coated with a magnetic material that can selectively be exposed to a magnetic field and thus altered. A specially designed "head" moves over the surface of the disk as it rotates and either "magnetizes" small spots on the disk ("writes") or recognized previously-magnetized spots on ("reads") the disk. Other disk storage technologies involve optical techniques: marking a disk with physical "pits" or tiny spots of dye, for example.

The "RAM copy" issue deals with the other type of computer memory, the solid state or "internal" memory of computers. It is in this memory that a computer must make "copies" of some sort in order to function. This might happen when a computer is looking at a piece of e-mail to determine whether the recipient has an account on that computer, or whether the e-mail must be directed onward to another computer. It might take only a few thousandths of a single second to make that determination, after which the computer is "through" with that piece of (possibly) copyrighted information.

A computer RAM "copy" must also be made in other circumstances, particularly whenever a computer program is run. A program is a set of instructions. If it resides on a disk, it cannot at that point be "run." First, the instructions must be brought into the computer's RAM memory. That is a form of copying (and has been so held; see the next paragraph). In fact, though this discussion seldom comes up in the caselaw, even the copy in RAM is not enough to enable the computer to run the program. For that to happen, the computer must move each of the instructions, often only one or two instructions at a time, into the "CPU," or "central processing unit." It is there that the instructions are actually "obeyed" by the computer. So it is

possible to look at the running of a program as necessitating more than one form of "copying" inside the computer.

Debates go on over the issue whether copyright law should define the term "copy" in such a way that brief instantiations of copyrightable works in computer memory are "copies."[106] The argument that it should not is based on the observation that a reliance on "copying" for copyright purposes arose when "copies" were very tangible, long lasting objects: books, 35mm film reels, audio tape cassettes, etc.[107] These objects are produced deliberately, typically under the direct control of a single entity, such as a record company or a book publisher. Imposing liability for copying in a world of this sort of tangible objects seems to make intuitive sense and be relatively straightforward.

On the other hand, as with caching, a RAM copy is not inherently short-lived. With most personal computers today, the RAM memory is erased when the power is turned off. If the power is not turned off, the memory persists. Other kinds of RAM memory use different technology and retain their data even when the power is turned off. As with caching, then, RAM copies come in a

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[106] *See* Ira L. Brandriss, *Writing in Frost on a Window Pane: E-Mail and Chatting on RAM and Copyright Fixation*, 43 J. COPYRIGHT SOC'Y 237, 239 (characterizing the RAM-copy issue as a "fierce debate[] among scholars"); David Post, *New Wine, Old Bottles: The Evanescent Copy*, THE AMERICAN LAWYER, 103, May 1995. *See also* Jessica Litman, *The Herbert Tenzer Memorial Conference: Copyright in the Twenty-First Century: The Exclusive Right to Read*, 13 CARDOZO ARTS & ENT. L.J. 29 (1994); David Nimmer, *Brains and Other Paraphernalia of the Digital Age*, 10 HARV. J. LAW & TECH. 1 (1996); Pamela Samuelson, *Legally Speaking: The NII Intellectual Property Report*, 37 COMMUNICATIONS OF THE ACM, December 1994, at 21, available from <http://alberti.mit.edu/arch/4.207/texts/samuelson.html>.

[107] Raymond T. Nimmer & Patricia Ann Krathaus, *Copyright on the Information Superhighway: Requiem for a Middleweight*, 6 STAN. L. & POLICY REV. 25, 32 (1994) ("The rights and the preconditions in copyright law flow from a print and mass market era."); OFFICE OF TECHNOLOGY ASSESSMENT, INTELLECTUAL PROPERTY RIGHTS IN AN AGE OF ELECTRONICS AND INFORMATION 59 (1986) (The present system of copyright law, which evolved under the model of print publication, may no longer serve to determine the boundaries of ownership in computer-based methods of creation and dissemination.").

wide variety of types, durations, and purposes. A number of cases, most notably *MAI v. Peak*,[108] have either held or implied that the first step, bringing the instructions from a disk of some kind into RAM memory, constitutes the making of a "copy" of the program for copyright purposes. That is, the process results in the creation of a copy that if not expressly or impliedly authorized or a fair use, is a potentially infringing violation[109] of the copyright owner's rights.

One recent proposal to amend the Copyright Act on this point proposed that temporary copies in RAM for certain, defined purposes, such as maintenance and repair would not be considered infringements.[110] By implication, this legislation supports the view that *other* forms of computer-memory copies, made for other purposes, would continue to be considered "copies" for copyright's purposes.

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[108] MAI Sys. Corp. v. Peak Computer, Inc., 991 F.2d 511, 518-19 (9th Cir. 1993), *cert. dismissed*, 510 U.S. 1033 (1994). *See also* DSC Communications Corp. v. DGI Technologies, Inc., 81 F.3d 597, 600 (5th Cir. 1996); Triad Sys. v. Southeastern Express Co., 64 F.3d 1330, 1335 (9th Cir. 1995), *cert. denied*, 516 U.S. 1145 (1996); Religious Tech. Center v. Netcom On-line Comm., 907 F.Supp. 1361, 1368 (N.D. Cal. 1995); In re Independent Servs. Orgs. Litigation, 910 F.Supp. 1537, 1541 (D. Kan. 1995); Advanced Computer Servs. of Mich., Inc. v. MAI Sys. Corp., 845 F.Supp. 356, 362-64 (E.D.Va. 1994). *See generally* II PAUL GOLDSTEIN, COPYRIGHT § 5.2.1 (1996); 2 NIMMER ON COPYRIGHT, *supra* note 91, § 8.08[A][1]; RAYMOND T. NIMMER, INFORMATION LAW ¶ 4.02[2]-[3] (1996).

[109] Actual liability would be dependent on additional factors such as fair use.

[110] One bill specified this: "(c) MACHINE MAINTENANCE OR REPAIR- Notwithstanding the provisions of section 106, it is not an infringement for the owner or lessee of a machine to make or authorize the making of a copy of a computer program if such copy is made solely by virtue of the activation of a machine that lawfully contains an authorized copy of the computer program, for purposes only of maintenance or repair of that machine, if--(1) such new copy is used in no other manner and is destroyed immediately after the maintenance or repair is completed; and (2) with respect to any computer program or part thereof that is not necessary for that machine to be activated, such program or part thereof is not accessed or used other than to make such new copy by virtue of the activation of the machine." Computer Maintenance Competition Assurance Act of 1997, H.R. 72, 105th Cong. § 2 (January 7, 1997).

Digital information, at least for the foreseeable future, means information that is under the control of computers. With present technology, a digital computer cannot "run" without some sort of "copying" of information and data into the computer's internal RAM memory. Therefore any access to or use of digital information means access to or use of information that is under the control of a computer, and therefore means that some computer program must be executed. If a computer program is executed, a RAM copy is created. In this manner, "access to and use of information" and "copyright" can be tied together; that fact raises a number of other issues discussed below.[111]

[111] See the discussion in the sections titled *RAM copies and personal privacy*, at page 186, and *RAM copies and junk e-mail and other inflows*, at page 190.

4.4 Intermediaries' liability

The Internet has given rise to many organizations whose purpose is to provide individuals with online information services and access to the Internet. These "Online Service Providers" or "OSPs"—or for that matter, any computer on the Internet that forwards information from one point to another—are thus situated between their user-subscribers, and the Web sites to which these subscribers connect and browse. These service providers are therefore sometimes referred to as "intermediaries." A troublesome contemporary issue is whether, and under what circumstances, OSPs should be liable for the actions of their users.

White Paper proposal

A conservative approach would be to rely on existing principles and let courts interpret them. Some argue, however, that legislation should be enacted dealing with the issue. The *White Paper* proposed that OSPs be subject to existing laws, as interpreted by judicial decisions.[112]

OSPs argue that existing laws about innocent infringers, coupled with an express provision for a "transmission" right, would leave them vulnerable to infringement suits in circumstances that many people would agree should not give rise to liability. For example, when a subscriber to an online service sends an infringing e-mail to a large group of persons, the OSP is technically "transmitting" the e-mail, yet knows nothing about it nor can reasonably be expected to read all e-mail on a regular basis. In fact, the OSP might in some circumstances be liable for violating the privacy rights of the e-mail author under the Electronic Communications and Privacy Act.[113]

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[112] *See* WHITE PAPER *supra* note 90, at 114-24, and especially 122.

[113] *See* 18 U.S.C. § 2511:

(continued next page)

What should one make of the issues surrounding copyright intermediaries?

> Interception and disclosure of wire, oral, or electronic communications prohibited. (1) Except as otherwise specifically provided in this chapter any person who—(a) intentionally intercepts, endeavors to intercept, or procures any other person to intercept or endeavor to intercept, any wire, oral, or electronic communication; … shall be punished as provided in subsection (4) or shall be subject to suit as provided in subsection (5).

Section (4) specifies that fines and imprisonment of up to five years may be imposed.

Intermediaries: analysis

Liability for intermediaries can be based on a variety of copyright theories. Intermediaries might be liable for **direct infringement**, sometimes called "primary" liability; or for **indirect infringement**, sometimes called "secondary liability."[114] Indirect infringement liability in turn can be based on theories of either **contributory infringement** or **vicarious infringement**.[115] For any of these theories, liability is not explicitly based the state of mind of copyright defendants, nor on their lack of good faith or lack of negligence—although those elements are very much relevant to the amount of any damages.[116] Copyright law therefore appears at times to impose "strict liability."[117] Standard examples of this type of liability include photo finishers held liable for duplicating photographs,[118] and music cases in which defendants were found liable for copying melodies unconsciously.[119]

A great deal of the debate over the White Paper has been over the issue of whether copyright law ought to be changed in regard to

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[114] *See generally*, 3 NIMMER ON COPYRIGHT, *supra* note 91, § 12.04, at 12-66ff.

[115] *See generally*, 3 NIMMER ON COPYRIGHT, *supra* note 91, § 12.04, at 12-66ff.

[116] See the discussion in the section titled *The tailoring of remedies as a compromise*, at page 142.

[117] *See* WHITE PAPER *supra* note 90, at 115 ("Direct infringers are held to a standard of strict liability. Liability for direct infringement is, therefore, generally determined without regard to the intent of the infringer."); and WHITE PAPER at 123, quoting I PAUL GOLDSTEIN, COPYRIGHT, *supra* note 108, § 1.15, at 45 (1989) ("The exercise of due diligence . . . can reduce, but never entirely exclude, the risk of a copyright infringement claim. Copyright law's rule of strict liability poses particularly hard problems for an intermediary [such as a book publisher], . . . which must accept on faith its author's representation that he originated the work.").

[118] *See* Olan Mills, Inc. v. Linn Photo Co., 23 F.3d 1345 (8th Cir. 1994), discussed in the WHITE PAPER *supra* note 90, at pp. 121-131.

[119] *See, e.g.*, Bright Tunes Music Corp. v. Harrisongs Music Ltd., 420 F.Supp. 177 (S.D.N.Y. 1976); Sheldon v. Metro-Goldwyn Pictures Corp., 81 F.2d 49, 54 (2d Cir. 1936); Northern Music Corp. v. Pacemaker Music Co., Inc., 147 U.S.P.Q. 358, 359 (S.D.N.Y. 1965).

this apparent strictness, at least in the context of liability for OSPs.[120] This debate has shifted to various legislative proposals that have been introduced following the release of the White Paper. Under debate in the Fall of 1997, for example, was H.R. 2180, the "On-Line Copyright Liability Limitation Act," introduced by Representatives Coble and Hyde on July 17, 1997.[121] The bill would exempt OSPs from copyright liability under certain circumstances.[122]

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[120] See WHITE PAPER *supra* note 90, at 114 (section "d. On-Line Service Provider Liability").

[121] "On-Line Copyright Liability Limitation Act," (H.R. 2180) (105th Cong., 1st Sess.), available as of August 24, 1997 from <http://thomas.loc.gov/cgi-bin/query/z?c105:H.R.2180:>.

[122] The bill would add a new section 512 to the Copyright Act, to read as follows:

> Sec. 512. Limitations on liability relating to material on-line.
>
> (a) EXEMPTIONS- A person shall not be liable--
>
> (1) for direct infringement, or vicariously liable for the infringing acts of another, based solely on transmitting or otherwise providing access to material on-line, if the person--
>
> (A) does not initially place the material on-line;
>
> (B) does not generate, select, or alter the content of the material;
>
> (C) does not determine the recipients of the material;
>
> (D) does not receive a financial benefit directly attributable to a particular act of infringement;
>
> (E) does not sponsor, endorse, or advertise the material; and
>
> (F)(i) does not know, and is not aware by notice or other information indicating, that the material is infringing, or
>
> (ii) is prohibited by law from accessing the material; or
>
> (2) in the case of a finding of contributory infringement based solely on conduct for which a person is exempt from liability for direct infringement or vicarious liability under paragraph (1), for any remedy other than injunctive relief under section 502, except that such injunctive relief shall be available only to the extent that all acts required by such relief are technically feasible and economically reasonable to carry out.

Direct infringement

Because both forms of secondary liability—contributory and vicarious—require some sort of participation by the defendant,[123] concerns about the strictness of copyright liability usually center on the possibility that a defendant would be held strictly liable for "direct" infringement.

"Strict liability" is a relatively recent term for what has long been called "liability for innocent infringement." Innocent infringement was discussed during the 1909 Act hearings and during the history of the 1976 Act revisions as well, generating one of some thirty scholarly and significant studies prepared at the request of the Copyright Office.

> The general features of the law of innocent infringement were shaped prior to 1909. … There is considerable evidence that this situation was realized by those participating in the drafting and enactment of the 1909 act; although the problem of the innocent infringer was considered at some length in the hearings, the 1909 statute contained no broad provisions excusing innocent infringers. Moreover, the act eliminated the provision in earlier statutes expressly protecting the innocent seller.[124]

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[123] See the discussion in the section titled *Vicarious and contributory liability*, at page 143.

[124] Alan Latman and William S. Tager, LIABILITY OF INNOCENT INFRINGERS 141, *reprinted in* Subcomm. on Patents, Trademarks, and Copyrights of the Senate Comm. on the Judiciary, 86th Cong., 2d Sess. (S. Comm. Print 1958), COPYRIGHT LAW REVISION, *reprinted in* 2 STUDIES ON COPYRIGHT (Arthur Fisher Memorial Edition 1963) Study No. 25, at 1049 (footnotes omitted).

The 1976 Act did not eliminate this general approach to liability and in that regard remains similar to the previous 1909 Act.[125]

The term "strict liability" is taken from other forms of legal liability such as those for product defects and trespass to real property. Unfortunately, confusion often stems from terminology; references to liability that is "strict" are commonly wrong. The popular perception of the "strictness" of liability in both products liability and trespass cases, for example, is incorrect.

A manufacturer's liability for product defects is not "strict" in any meaningful sense but is rather based on fault.[126] Products liability cases fall into three categories: manufacturing defects, design defects, and warning defects. Liability for manufacturing defects is not "strict" because such defects obviously stem from negligence in manufacturing. The doctrine of "strict liability" operates to create a presumption of the defendant's negligence that relieves the plaintiff of having to prove what happened at the factory when the product was made. Nor is liability for design defects or failure to warn "strict." When liability is imposed it is typically because the manufacturer's design was negligently done, or a warning negligently given.

Liability for trespass to land is based much less on strictness than it is on the law's principle that a remedy should exist for the violation of an exclusive right, and that "ignorance of the law is no excuse"—we do not want to give potential trespassers a reason to remain ignorant of others' rights.

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[125] *See* HOUSE REPORT ON COPYRIGHT ACT OF 1976, H.R. REP. NO. 1476-94, 159-60, *reprinted in* 1976 U.S.C.C.A.N. 5775-76 [hereinafter HOUSE REPORT].

[126] The following discussion is based on AMERICAN LAW INSTITUTE, RESTATEMENT OF THE LAW—TORTS: PRODUCTS LIABILITY 3D, PROPOSED FINAL DRAFT 19 (April 1, 1997) ("[The design defect section] adopts a reasonableness … test as the standard for judging the defectiveness of product designs. … That standard is also used in administering the traditional reasonableness standard in negligence.").

Strictness in copyright cases

Liability for copyright infringement is similarly seldom "strict" in any meaningful sense . *Playboy v. Frena*[127] is a good example. In *Frena*, the systems operator of a computer bulletin board service (BBS) was found liable for direct copyright infringement when his users uploaded and downloaded copyrighted pictures that had been converted to computer-readable form from *Playboy* magazine. The defendant operator claimed not to know what was happening. Although the court responded that his knowledge was irrelevant because copyright liability has no requirement of scienter, in fact, other evidence in the case made clear that the operator did indeed know what was happening. When BBS subscribers uploaded the photographic images, someone—presumably the defendant BBS operator—removed their identifying *Playboy* labels and replaced them with the defendant's own name and that of his BBS.[128]

Instead of representing the application of strict liability, the case is better explained as being based either explicitly on the operator's knowledge—thus satisfying perhaps even an "intent" requirement—or at best as a case of "ignorance of the law is no excuse." The operator may not have thought that what he was doing was wrong, but he was aware of what was going on. We do not want to create an incentive for people to remain willfully ignorant of their legal obligations; *Frena* seems to stand for little more than that and hardly qualifies as an indication of the strictness of copyright liability. The court itself did not use the phrase "strict liability" in its opinion.

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[127] Playboy Enterprises Inc. v. Frena, 839 F. Supp. 1552 (M.D. Fla. 1993).

[128] "PEI's [Playboy Enterprises, Inc.] text was removed from the photographs and Defendant Frena's name, Tech Warehouse BBS, and telephone number were placed on PEI's copyrighted photographs. This is uncontested." *Playboy Enterprises*, 839 F. Supp. at 1559.

The Netcom *and* Marobie-FL *cases*

In at least two other cases, *Religious Technology Center v. Netcom On-Line Communications Services, Inc.*,[129] and *Marobie-FL, Inc. v. National Assoc. of Fire Equip. Dists.*,[130] courts have had an opportunity to impose true "strict" copyright infringement liability on an OSP but have chosen not to do so.

In *Netcom*, the defendant Netcom corporation was an online service provider. A subscriber to its service had uploaded copyright infringing materials belonging to RTC. RTC sued Netcom for both direct and indirect copyright infringement. Before RTC provided notice to Netcom about the possibility of its system containing infringing materials, Netcom did not know about the alleged infringements. For the court to impose liability on such facts would have constituted a form of "strict" liability in the conventional sense—liability without knowledge or fault. Instead, the court did not impose direct infringement liability at all, noting instead that

> the mere fact that [defendant] Netcom's system incidentally makes temporary copies of plaintiffs' works does not mean Netcom has caused the copying. The court believes that Netcom's act of designing or implementing a system that automatically and uniformly creates temporary copies of all data sent through it is not unlike that of the owner of a copying machine who lets the public make copies with it. Although some of the people using the machine may directly infringe copyrights, courts analyze the machine owner's liability under the rubric of contributory infringement, not direct infringement.[131]

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[129] *Religious Tech. Center*, 907 F.Supp. at 1361.

[130] 1997 U.S. Dist. LEXIS 18764 (N.D. Ill. Nov. 18, 1997).

[131] *Religious Tech. Center*, 907 F.Supp. at 1368-69 (citations omitted).

Marobie-FL dealt with the representative of a trade association for fire fighting equipment distributors ("NAFED") who had obtained several computer disks of copyrighted drawings that related to fire fighting equipment. The representative placed a copy of the drawings, or "clip art," on NAFED's World Wide Web site for downloading by Internet users. Circumstances strongly implied that the representative knew that the drawings were copyrighted and that he lacked authority to post them to the Web; the court found on a motion for summary judgment that NAFED had directly infringed the copyright holder's rights.[132]

The issue of concern here was whether the OSP that provided disk storage and Web hosting services to the trade association, Northwest Nexus Inc. ("Northwest"), should be also be found liable on theories either of direct, contributory, or vicarious copyright liability. On the direct infringement claim, the court found no liability:

> the Plaintiff argues that Northwest [the defendant OSP], unlike the Internet access provider in *Religious Technology Center*, serves as more than just a gateway to the Internet because [it] actually stores the files … in its hard drive. Although [this is] a service somewhat broader than the service provided by the Internet access provider in *Religious Technology Center*, the court nevertheless finds that Northwest only provided the means to copy, distribute or display plaintiff's works, much like the owner of a public copying machine used by a third party to copy protected material. Like a copying machine owner, Northwest did not actually engage in any of these activities itself. Accordingly,

[132] Marobie-FL, 1997 U.S. Dist. LEXIS 18764 at [*22].

> Northwest may not be held liable for direct infringement.[133]

In fact, no case to date,[134] other than *Playboy v. Frena*, has purported to impose direct copyright infringement liability on an OSP for acts of its users or subscribers; *Frena* itself can be explained on grounds other than strict liability.

The tailoring of remedies as a compromise

Courts have a variety of ways of responding to the extent of a copyright defendant's ignorance or innocence. Lawyers well understand that "liability" and "damages" and "injunctions" are very different things. The public is less likely to distinguish among them, so that the notion of a party's being "liable" may seem to the public to be an all-or-nothing thing: one is liable and hence must pay a price in fines or punishments; or one is not liable, and hence one pays nothing. But courts tailor remedies much more carefully than that. A copyright defendant can be "liable" and pay a large sum in damages; or be liable and pay nothing in damages, but pay attorney's fees; or be liable and pay no fees at all, but be enjoined from continuing a certain type of conduct.

Public discourse surrounding direct infringement by intermediaries focuses largely on the liability issue. Liability is substantially less important, however, than the amount of damages or other remedies that a court will award—and it is with

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[133] Marobie-FL, 1997 U.S. Dist. LEXIS 18764 at [*29].

[134] February 1, 1998.

variations in remedies that courts have most often handled the question of direct but innocent infringement.[135]

Vicarious and contributory liability

Intermediaries can also be held "secondarily" liable, on the theories of vicarious and contributory infringement.

Contributory infringement

A finding that a defendant is liable for contributory infringement implies two things: first, that the defendant did not itself infringe any copyright rights; and second, that the defendant nevertheless did something "wrongful" in relation to a copyright owner's rights. The "wrongful" element consists of knowledge plus inducement of the infringing act, or as described by Professor Paul Goldstein, "acting in concert with the direct infringer [knowing] of the direct infringement."[136]

An example of a contributory infringement case would be a defendant who manufactures and sells a device whose sole purpose is to enable others to infringe copyrights. Imagine a company that produces and sells a "descrambling" device designed to allow unauthorized viewing of copyrighted satellite television programs and having no other function or purpose. The production and sale of the device do not themselves involve the direct infringement of any copyright rights. The device is sold to facilitate an infringement by others, the buyers of the device. The defendant producer of the device would nonetheless be liable for contributory infringement.

Particularly when infringing use is the only use of the device, it is easy to see that the producer is involved in a sort of wrong-doing;

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[135] *See* WHITE PAPER *supra* note 90, at 119 ("Congress also determined that the innocent infringer provision, which allows reduction of damages for innocent infringers 'is sufficient to protect against unwarranted liability' … ." (quoting HOUSE REPORT at 163, *reprinted in* 1976 U.S.C.C.A.N. 5779).

[136] II PAUL GOLDSTEIN, COPYRIGHT, *supra* note 108, § 6.1.

holding such a producer to some form of indirect infringement liability is not controversial. The issue becomes more controversial as the device in question adds non-infringing capabilities. In the *Sony-Betamax* case,[137] the Supreme Court declared that sales of a device with a "substantial non-infringing" use did not constitute contributory infringement. The NII Task Force's White Paper proposed a standard easier for plaintiffs to prove, that the sale of devices that have the *primary purpose* of infringing constitute contributory infringement.[138] The recent World Intellectual Property Organization treaties do not specify the precise standard, merely requiring in Article 11 that

> Contracting Parties shall provide adequate legal protection and effective legal remedies against the circumvention of effective technological measures that are used by authors in connection with the exercise of their rights… .[139]

The standard for contributory infringement in the U.S. therefore remains that of the *Betamax* case, but with a possibility of being revised legislatively.

Vicarious infringement

Vicarious liability is different from contributory infringement. The twin elements of vicarious liability are first, that someone other than the defendant has infringed a copyright owner's rights, and second, that the defendant bears a relationship to the infringer

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[137] Sony Corp. v. Universal City Studios. Inc, 464 U.S. 417 (1984).

[138] WHITE PAPER *supra* note 90, at 230.

[139] WIPO COPYRIGHT TREATY adopted by the Diplomatic Conference on December 20, 1996, Article 11. Technically, the Treaty does not define a form of contributory liability, but rather creates a new right in copyright owners: the right to a remedy against the circumvention of technological measures for protecting copyrighted works. The copyright owner's assertion of that right might therefore take the form of an allegation that the defendant had *directly* infringed the right to have a remedy against circumvention. But the result is quite similar in effect to right to be free of contributory infringement.

such that it does not seem unfair to hold the defendant liable.[140] The "relationship" in copyright cases is usually expressed as a combination of two things: that the defendant have "the right and ability to supervise" the direct infringer, and that the defendant has "an obvious and direct financial interest" in the infringing activities.[141] The garden-variety cases of vicarious liability for copyright infringement involve a nightclub or restaurant owner who hires a band that performs copyrighted music without authorization. The owner-managers of such establishments are routinely held vicariously liable for the band's infringement.[142]

Courts distinguish financial interests that vary with the amount of infringement from those that do not. A landlord who gets a flat monthly rent regardless of the infringing activities of a tenant will usually be found not to have the requisite financial interest, whereas a landlord who is paid a percentage of the tenant's revenue usually will.[143]

The degree of "control" that a party must exercise to satisfy the "right and ability to supervise" test is a question of practicality. Almost any party who enters a contractual relationship with a potential infringer can put a clause in the contract requiring that

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[140] "For vicarious liability is imposed in virtually all areas of the law, and the concept of contributory infringement is merely a species of the broader problem of identifying the circumstances in which it is just to hold one individual accountable for the actions of another." Sony Corp. v. Universal City Studios. Inc, 464 U.S. 417, 435 (1984) (footnote omitted).

[141] Shapiro, Bernstein & Co. v. H.L. Green Co., 316 F.2d 304, 306-07 (2d Cir. 1963). *See also Religious Tech. Center*, 907 F.Supp. at 1375 ("A defendant is liable for vicarious liability for the actions of a primary infringer where the defendant (1) has the right and ability to control the infringer's acts and (2) receives a direct financial benefit from the infringement. … Unlike contributory infringement, knowledge is not an element of vicarious liability.") (citations omitted).

[142] *See, e.g.*, Wow & Flutter Music v. Len's Tom Jones Tavern, 606 F.Supp. 554 (W.D.N.Y. 1985); Warner Bros. Inc. v. Lobster Pot, Inc., 582 F.Supp. 478 (N.D. Ohio 1984); and other cases cited in II PAUL GOLDSTEIN, COPYRIGHT, *supra* note 108, § 6.2 n.13.

[143] *Religious Tech. Center*, 907 F.Supp. at 1376-77.

the latter not infringe. If such a clause alone satisfied the "control" test, it would encourage perverse results: parties like landlords and restaurant owners would take care *not* to prohibit infringements in their contracts in order to appear unable to control it. Courts instead look for realistic control: actual approval of infringing activities before they take place, for example.[144]

Internet cases: Netcom *and* Marobie-FL *again*

The two cases of Internet intermediaries' discussed in connection with direct infringement also dealt squarely with the issue of secondary copyright liability for intermediaries, *Religious Technology Center v. Netcom*,[145] and *Marobie-FL, Inc. v. National Assoc. of Fire Equip. Dists.*[146] As noted earlier, the *Netcom* case involved a subscriber to *Netcom*, an Online Services Provider. The subscriber sent allegedly copyright infringing material through the Netcom system in the form of e-mail. The copyright owner, RTC, sued Netcom, the service provider.

The District Court held that an intermediary's liability for contributory infringement depended on its having knowledge of, and substantial participation in, the infringements.[147] RTC, the copyright owner, had indeed sent a letter to the defendant Netcom notifying it of the infringements and demanding that the infringing material be removed from Netcom's system. Defendant Netcom was found not to have had any knowledge of infringing activities on its system before receiving this letter. The court also held that such a letter would not necessarily show that a

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[144] *See, e.g.,* Davis v. Dupont de Nemours & Co., 240 F.Supp. 612, 631-32 (S.D.N.Y. 1965) (Imposing vicarious liability on the sponsor of an infringing television broadcast on grounds that the sponsor "had to approve of several steps in the production of the television program. For example, [it] had to consent to televising the story … before work on the production was commenced. Copies of the first draft of the television script (which substantially represented the actual telecast) were sent to [the sponsor], and their representatives sat in on story conferences.") (footnotes omitted).

[145] 907 F.Supp. 1361 (N.D. Cal 1995).

[146] 1997 U.S. Dist. LEXIS 18764 (N.D. Ill. Nov. 18, 1997).

[147] *Religious Tech. Center*, 907 F.Supp. at 1373-75.

defendant had "knowledge," if the defendant could not reasonably verify a party's claim of infringement.[148] It required a factual finding to determine whether the notice was sufficiently detailed and credible as to give the defendant the requisite knowledge of the infringements. If Netcom were found to have had the requisite knowledge, it would have been an active participant in the infringing activities assuming that "simple measures" were available to it to remove the offending messages from its system.[149]

The court denied summary judgment to the defendant on the contributory infringement issue, concluding that the factual findings just noted had to be made. The case settled, however, before those findings were ever made. Hence we do not have a strong precedent (from what would have been a District Court decision in any event) from the case.

Netcom also addressed the issue of vicarious liability for an OSP. The court held that defendant Netcom offered e-mail services for a flat monthly rate, and hence was in the position of a landlord charging a flat monthly rate: it did not receive the "direct financial benefit" from the infringing activity that courts require to meet the test of for vicarious liability.

The *Netcom* court relied in part on the case of *Fonovisa Inc. v. Cherry Auction. Inc.*,[150] for its conclusion that Netcom's flat monthly rate did not constitute a direct financial benefit. *Fonovisa*

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[148] "Where a BBS operator cannot reasonably verify a claim of infringement, either because of a possible fair use defense, the lack of copyright notices on the copies, or the copyright holder's failure to provide the necessary documentation to show that there is a likely infringement, the operator' s lack of knowledge will be found reasonable and there will be no liability for contributory infringement for allowing the continued distribution of the works on its system." *Religious Tech. Center*, 907 F.Supp. at 1374.

[149] *Religious Tech. Center*, 907 F.Supp. at 1375.

[150] 847 F. Supp. 1492 (E.D. Cal. 1994).

was later reversed by the 9th Circuit,[151] which left the *Netcom* court's holding uncertain.

Marobie-FL

The second case, *Marobie-FL, Inc. v. National Assoc. of Fire Equip. Dists*, followed the *Netcom* court's reasoning even though *Marobie-FL* was decided after the 9th Circuit's decision in *Fonovisa*. Recall that *Marobie-FL* dealt with the customer of an OSP, NAFED, that had uploaded copyrighted clip art to its Web site. In the case against the OSP, Northwest, the court addressed both contributory and vicarious liability.

In regard to contributory infringement, the court concluded as the *Netcom* court had concluded that the issue turned on factual findings that prevented a grant of summary judgment for the defendant OSP:

> Based on the evidence presented, it is unclear whether Northwest knew that any material on NAFED's Web Page was copyrighted and, if it did know, when it knew. The degree to which Northwest monitored, controlled, or had the ability to monitor or control the contents of NAFED's Web Page is also unclear. These disputed issues of material fact preclude summary judgment for either party on this theory of liability.[152]

In regard to vicarious liability, the court found that the defendant OSP was not vicariously liable. Vicarious liability turns in part on the defendant's having a direct financial interest in the infringing activities. Here, observed the court, the OSP did not have such a direct financial interest NAFED's infringing activities because

> … [defendant] NAFED paid [defendant] Northwest a one-time set-up fee of $20 and …

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[151] Fonovisa, Inc. v. Cherry Auction, Inc., 76 F.3d 259 (9th Cir. Cal. 1996).

[152] Marobie-FL, 1997 U.S. Dist. LEXIS 18764 at [*30].

> since that time NAFED has paid Northwest a flat fee of $67.50 each quarter. It is also undisputed that the *fee Northwest receives has never changed based on how many people visit NAFED's Web Page* or what is accessed. In other words, *NAFED's infringement did not financially benefit Northwest*. Accordingly, Northwest cannot be held vicariously liable for NAFED's infringement.[153]

Intermediaries: conclusions

The early cases of against OSPs who lack specific knowledge of the copyright infringements at issue, in sum, have concluded: that direct liability should not be imposed; that vicarious liability should not be imposed; and that the imposition of contributory liability will turn on the state of the defendant's knowledge and participation in the infringing activities. True "strict liability" in the sense of liability without any fault whatever by a defendant, then, seems to be exceedingly rare. At the very least, it has yet to be imposed on an Internet intermediary.[154]

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[153] Marobie-FL, 1997 U.S. Dist. LEXIS 18764 at [*31] (emphases added).

[154] Obviously the author does not consider the *Frena* case to be an example of liability without fault. See the discussion in the section titled *Strictness in copyright cases*, at page 139.

4.5 Wide-spread copying

The most obvious feature of the Internet relating to copyright is that a lot of copying in the usual copyright sense goes on. Leaving RAM copies and temporary cache copies and links-as-copies aside, one still observes wide-spread "old fashioned copying" of e-mail, news and other articles, software, Web pages, and so on. Some of this copying may be done with authorization, either explicit, implicit, or statutory as a matter of fair use, but a good deal of it is undoubtedly not.

Any view of today's and tomorrow's Internet has to include recognition of the amount of unauthorized copying that currently takes place without being easily detectable.

Wide-spread copying or other unauthorized uses of copyrighted works is certainly a major issue for copyright owners today. It is less obvious whether this phenomenon poses any issues of copyright law or policy. In any event, the existence of wide-spread copying of digital works falls solidly within a recurring pattern of copyright issues that are here collected under the label of "decentralized infringement." This issue is discussed in more depth under the headings *Decentralized infringement: issues*, at page 259, and *Decentralized infringement: analysis*, at page 264.

4.6 Digital registration and deposit

The most appropriate role for the Copyright Office in registering and accepting deposits of digital materials is not obvious. Because various members of the Copyright Office are already engaged in studying and experimenting with digital registration and deposit, *Project Looking Forward* did not address the issue. Still, the study did turn up some confusion as to the Office's role as a central repository even currently. This section discusses these findings.

The Copyright Office as central repository

Central repositories are often thought to be outmoded in the digital world of the Internet. When an encrypted work—a digital object—can carry with itself all the relevant information about ownership, licensing, and the like, goes the argument, why bother with a central repository like the Copyright Office of the same information?

Many in the technical community accordingly see the role of central repositories as waning for these reasons. The assumptions that underlie the belief in the superfluity of central repositories are not always sound, however. For example, some of the technical researchers interviewed for project *Looking Forward* believe that the purpose of the Copyright Office registration and cataloguing system is to verify and authenticate that the person claiming authorship is in fact the author of the work being registered. There is a modest amount of truth to this view: if fraudulent claims are identified by the Copyright Office's Examining Division, they will be investigated and resolved. But the Copyright Office cannot reasonably be expected to undertake substantial verification and authentication of each of the 600,000

registrations mailed into the office each year, and it does not attempt to do so.

Consequently, arguments that technological means for ensuring authenticity will obviate the need for central repositories of copyright information are based on a faulty premise—that a repository of copyright registrations exists primarily to authenticate submitted materials.

On the other hand, many of those researchers interviewed during project *Looking Forward* are unaware of some of the most important purposes of the current Copyright Office registration and cataloguing system. Much of what makes this facility useful is not just the initial recordation of basic ownership information. It is, rather, the use of that facility to track later assignments and licenses. This is not easily done on a decentralized basis. A digital envelope, for example, that tells its possessor what it costs to read the enclosed, encrypted data, and to whom to forward the money, does not tell the possessor that the copyright ownership of the object was transferred last year to another party and it is to that party that the money should be sent.

To be sure, that observation does not imply that central records of copyright rights are required in a digital, online world; perhaps multiple recordation systems can co-exist, some or all under private, non-governmental operation. The observation does show, however, that one of the reasons suggested for the obsolescence of a central recordation system is dubious.

5. Tomorrow's Issues

In this section, the issues divide into those identified as "pure" copyright issues, and those that involve copyright and its relation to other bodies of law. To be sure, the "law is a seamless web" so that any such breakdown is one of editorial convenience, not substantive import. For that matter, when it comes to the Internet, the Web may be a seamless law, with issues blending into one another in a way that makes them difficult to unravel. But for analytical purposes, one must try to unravel them nonetheless. Here is a brief statement of the issues later addressed in more detail in this section.

5.1 Technology and new issues

With any major new technology like the Internet, there is always a debate over how the technology affects the law. One can look at technology and law from a very abstract perspective and find that nothing whatsoever is "new": every problem of technology and law ends up being a dispute between people, and disputes between people are as old as people. Or one can look closely at the details of any new technology and discover that *everything* is new: "We've never had defamation by *e-mail* before!"

Some sort of middle ground between these extreme perspectives will prove the most helpful. This Report is guided by a simple principle: technology raises "new" legal issues when those issues become "worth thinking about afresh because greater certainty would be helpful."[155]

In turn, greater certainty may be helpful for several reasons,[156] but two have particular relevance in the copyright context.

1. **Statutory language expressly tied to particular technologies**. Some statutes (or court holdings) refer expressly to particular technologies. When a new technology arises, the question follows whether or how the existing language applies to the new development. One approach is to decline to apply the existing words to new media. A new enactment or a new clause is then necessary to accommodate the new technology. When the first question arose as to whether photographs could be copyrighted under the statutory category of "prints," for example, the court

[155] I. Trotter Hardy, *Law and the Internet*, BUSINESS LAW TODAY, March / April 1996, at p. 8.

[156] I. Trotter Hardy, *Law and the Internet*, *supra* note 155 at 10; I. Trotter Hardy, *The Proper Legal Regime for "Cyberspace,"* 55 UNIV. PITTS. L. REV. 993, 1000-1015 (1994).

said no: "prints" meant something altogether different at the time of that category's addition to the statute, and the court declined to broaden its meaning to include photographs—even though the latter were also popularly called "prints."[157]

Another approach to the issue is interpretative: to give a special legal meaning to existing terms so that they *do* apply to the new technology. Courts have broadened the term "writing," for example, so that it now has a gloss that means something like "result of creative endeavor." Whatever the approach, the change in technology requires some kind of response, and hence constitutes an issue raised by the advent of the new technology.

2. **Change in underlying assumptions**. A legal rule may be implicitly based on assumptions about some underlying facts or circumstances, even though those facts are nowhere mentioned or referred to in the rule. When those facts or circumstances change because of technological evolution, an argument arises that the rule should change as well. In the early days of radio, Congress held hearings on the liability of radio stations that broadcast copyrighted music. At one point a bill was introduced—though never passed—that provided immunity from copyright liability to radio stations.

Though the bill said nothing expressly about its underlying rationale, Congressional testimony makes clear that the rationale was the belief that radio would not be financially viable without copyright immunity: no mechanism existed to charge listeners individually, and radio was thought not able to depend on advertising because any station attempting to "put obvious

[157] Wood v. Abbott, 30 F. Cas. 424 (S.D.N.Y. 1866) (No. 17,938).

advertising on the air … would be killed. The public would take care of that. There would be nobody listening to it."[158]

One can easily imagine the situation had the bill passed. When it later became clear that the public *would* tolerate advertising on the radio, copyright owners would have argued that the statue ought to be changed. The change would not be necessitated by statutory language tied to particular technologies, though, but rather by changes in the underlying assumptions of that language.

[158] TO AMEND THE COPYRIGHT ACT: HEARINGS ON S. 2600 BEFORE THE SUBCOMM. OF THE COMM. ON PATENTS, 68th Cong., 1st Sess. 11-12 (1924) (statement of E. F. McDonald, Jr., President, National Association of Broadcasters).

5.2 "Pure" copyright issues

The discussion of issues is in two parts: this section addresses technologies that will raise "pure" copyright issues, those that have relatively little to do with other bodies of law. The next section will address technologies that are likely to raise issues springing specifically from the interaction of copyright law with other bodies of law.

Some Internet trends are quite visible. They result from the enormously greater capacity to send and receive information over huge distances quickly and cheaply. Such a capability will allow the rise of all sorts of new ways for people to communicate, both as individuals and as groups. It is no surprise that the parts of the Copyright Act that are defined in terms of yesterday's communications technologies will give rise to interpretative questions. Here are some examples.

Non-public posting

Today the phrase "World-Wide Web" refers to the public Web, sites that anyone can access from anywhere the Internet is connected. As already noted,[159] posting information on the WWW constitutes a making of the information publicly available, whether considered as a public distribution or performance or display.

But as also previously discussed,[160] another rapidly growing phenomenon today is that of private "Intranets," networks using Internet technology but designed to be accessible only to an organization's employees. The use of Intranets for posting

[159] See the discussion in the section titled *Web posting*, at page 121.

[160] See the discussion in the section titled *Intranets*, at page 43.

information will increase. The groups to which such information will be accessible may grow smaller and more ad hoc. For example, Intranets accessible to every employee in a corporation are common today, but tomorrow it may be just as common to have an Intranet for the sole use of an educational class, a church group, or a work group of a half dozen individuals.

At some point, the accessibility of information may be circumscribed enough to raise the issue whether such information has been made "publicly" available or not.

To be sure, the definition of "public performance or display" in the current Act is drawn without regard to technology directly. The definitions in section 101 of the Act say that:

> To perform or display a work "publicly" means -
>
> (1) to perform or display it at a place open to the public or at any place where a substantial number of persons outside of a normal circle of a family and its social acquaintances is gathered; or
>
> (2) to transmit or otherwise communicate a performance or display of the work to a place specified by clause (1) or to the public, by means of any device or process, whether the members of the public capable of receiving the performance or display receive it in the same place or in separate places and at the same time or at different times.[161]

The definition in part (1) contemplates that groups of people will congregate in a physical location. With the Intranet phenomenon, part (1) raises the issue of whether a "virtual" gathering of

[161] 17 U.S.C. § 101.

individuals outside a family and social acquaintances constitutes a "public."

We can take as a simple illustration a meeting of a corporate Board of Directors, first as a physical gathering, and then as an electronic one. Suppose that a corporation's Board of Directors were meeting face-to-face and that as part of the meeting, a musical composition were played. Assuming that the Board meets at a place that is not generally "open to the public," the question whether the performance of the music was "public" would turn on whether the meeting was at a place "where a substantial number of persons outside of a normal circle of a family and its social acquaintances is gathered." If the Board were small, it is possible that it would not constitute a "substantial number of persons," and the performance would therefore be private.[162] But even groups with as few as twenty-one persons and their guests have been found to be "substantial,"[163] so a larger Board meeting might well be considered public. Let's assume that the face-to-face gathering is indeed large enough to be "public." Obviously, unless some other exemption such as fair use applied, the group would need a license for the composition's performance because it would be, by hypothesis, a public performance.

Now suppose the same Board members were to meet electronically online, in an interactive "chat" room or by means of interactive video conferencing. Suppose again that the same musical work were played electronically. Whatever policy justifications applied to cause the first, face-to-face meeting to be considered "public" would seem to apply here as well. By hypothesis, nothing of apparent copyright significant would have

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[162] "Routine meetings of businesses and governmental personnel would [not be public] because they do not represent the gathering of a 'substantial number of persons.'" HOUSE REPORT at 64.

[163] *See* Fermata Intl. Melodies, Inc. v. Champions Golf Club, Inc., 712 F.Supp. 1257, 1260 (S.D. Tex. 1989), as cited in II PAUL GOLDSTEIN, COPYRIGHT, *supra* note 108, § 5.7.2, n. 21.

changed—not the number of people, the purpose of the meeting, the purpose for using the music, or anything else except the physical presence of the individuals in question. Would the electronic music performance still be "public?"

Presumably an electronic Board of Directors' meeting would not be at a "place" open to the public. Even an online meeting would typically be confined to Board members and others authorized by the Board. So again, that part of the statutory definition would not be satisfied.

But unlike the physical meeting, the virtual meeting might also fail the second part of the test: a meeting "at any place where a substantial number of persons outside of a normal circle of a family and its social acquaintances is gathered." Here, the problem is that "place" is the crucial word but "place" does not readily apply to an online meeting where all the participants are in physically different locations.

One might argue that "place" should be taken metaphorically as a virtual place. The "place" could therefore be said to be "cyberspace." That interpretation would make sense because it would result in comparable treatment of the two meetings, the one physical, the other virtual. Both would be public, or if the numbers were small, both would be private, but in any event they would be treated the same way.

Unfortunately, the notion of "place" in the statute is listed in contrast to part (2) of the definition, which defines "public performance" as also meaning "to transmit or otherwise communicate a performance or display of the work to a place specified by clause (1)"—that is, a public performance includes a transmission to a place where there are gathered a substantial number of persons. The fact that Congress chose to refer to "transmit" in this context means that it contemplated electronic transmissions of at least the radio-television type. The fact that it spoke of "transmitting to a place" suggests that it did not consider

the transmission itself to constitute a "place" (else the wording would be redundant), or that a "place" could be anything other than a physical place (else it would not make sense to transmit "*to* a place").

If that interpretation of "place" as being confined to physical place is correct, then the electronic meeting would not be a public one, even though precisely the same meeting accomplished face-to-face would be public. Consequently the performance of the music during the electronic meeting would not constitute a public performance.

The definition offers yet a third way that the music performed for an electronic meeting might be "publicly performed." The definition quoted above notes that to perform a work publicly includes "to transmit or otherwise communicate a performance … to the public." This part, "to transmit … to the public," is ambiguous. "The public" appears to refer to "the public generally,"[164] and hence would exclude a meeting of a board of directors. On the other hand, "public" might be used as a term of art, but if so, then the definition is circular: a public performance is a performance made to the public. To avoid that circularity, one must fall back on the notion that "the public" here means the larger public and not just "a public." In short, a careful reading of the statute on this point supports the conclusion that music played to a physical meeting of a board of directors might be a public performance, but the same music played to a "virtual" meeting of the same board might not be.

Whether this interpretation is correct, whether a court would follow it, or whether indeed it makes good policy sense, are questions beyond the scope of this Report. But once again, wording in the statute is expressly tied to certain forms of

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[164] *See* the HOUSE REPORT at 64-65 ("a performance made available by transmission to *the public at large* is 'public' ….") (emphasis added).

technology; the Internet is rapidly creating other analogous circumstances, but for which straightforward application of the statute could lead to different results.

"Live" information and display forms

At one time, we might have envisioned the WWW as a giant, but relatively static, information source. That is, individual computer servers and documents would grow in capacity and holdings, like a library, but any individual document would more or less stay as it was when first posted. Obviously there is great value in just this sort of "library" model of the Web, and the Web fits that model in many ways. But even individual servers and documents and pages are becoming far from static repositories of information. A rapidly growing phenomenon is the use of Web page links to connect to an underlying, and changing, database of information. A classic example can be seen in the provision of airline flight information. As of this writing, several Internet sites offer such information, including that of several airlines themselves.[165] The Web interface pulls information from some other source and reformats it for Web display.

Companies are doing much the same thing with internal databases of information, pulling constantly updated information out of them and reformatting it on the fly for Web display.

The techniques for doing this live, constant updating of Web page information are fairly straightforward today, and will only get easier tomorrow. We can expect that nearly anyone with information they desire to get out to the public will do so, at least in part, by means of Web pages. Not just national airlines, but local restaurants, for example, will have location, hours of

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[165] One good example, which relies on links that hide a great deal of underlying complexity to create a very "user-friendly" interface, can be found at <http://www.flifo.com>, available as of December 13, 1996.

operation, and menus constantly available. So will stores and other retail outlets. Much of the underlying layout and design of these Web pages will remain the same, in the way that paper forms make up an unchanging template with variable information. The use of an underlying template with variable information from a computerized database is already common off the Internet today, but the information displays are typically rudimentary: they are literally "forms" and often will not be copyrightable at all.

The difference with Web pages displays is that those aimed at desktop computers, connected to the Internet with high bandwidth communications lines, will be much more elaborate in their layouts, images, sound, video, and the like. In short, they will be much more likely to be copyrightable subject matter.

From the copyright perspective, we will be faced with an overwhelming amount of frequently changing information displays, raising the issues of both copyright registration of rapidly-changing works, and copyright in derivative works.[166]

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[166] Rapidly changing "works" can also describe daily newspapers or newsletters, for which the Copyright Office has well-developed registration procedures. *See* U.S. Copyright Office, Circular 62c GROUP REGISTRATION FOR DAILY NEWSLETTERS, 37 CFR202.3(b)(8), also available as of October 19, 1997, from <http://lcweb.loc.gov/copyright/circs/circ62c>. Web sites pose substantially harder questions than frequently-issued newsletters, however, for Web sites are updated "in place" whereas newsletters are updated in discrete and independent "issues."

Factual information

The World Wide Web is a remarkable technology for making current factual information promptly available. Accessible now primarily from desktop computers, the Web tomorrow will be accessible from cars, portable wireless computers, hand-held devices, and perhaps computer screens situated in public places like airports and store windows. It will be handy to be in an unfamiliar location and have a hand-held Web access device or car-based device[167] tell you where various restaurants or hotels or gas stations or other facilities are in relation to where you are at that very moment. Or to obtain the latest basketball scores,[168] the upcoming weather,[169] or the scheduled departure times for an airplane flight[170] while you are on the way to the airport.

Largely factual information like locations, directions, scores, forecasts, departure times, maps, and so on abound on the Internet today. Some of this consists of lists and nothing more—price lists,[171] recipe lists,[172] event calendars,[173] etc. Others are lists

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[167] *See* Joseph B. White and David Bank, *Soon Drivers Will Be Negotiating Internet Traffic, Too: Guess Which Company Wants To Be First To Break Into This New Market*, THE RALEIGH NEWS AND OBSERVER, February 24, 1998, Tuesday, FINAL EDITION.

[168] *See, e.g.*, the *ESPN* site, available as of March 11, 1997, <http://www.espnet.sportszone.com>.

[169] *See, e.g.*, *The Weather Channel* site, available as of December 15, 1996, <http://www.weather.com>.

[170] *See, e.g.*, the *FliFo* site, available as of March 11, 1997, <http://www.flifo.com>.

[171] *See, e.g.*, the *PDA Page*, listing prices for various small computers, available as of March 11, 1997, <http://www.pdapage.com>.

[172] *See, e.g.*, the *Diana's Kitchen* site, with recipes from readers, available as of March 11, 1997, <http://www.ebicom.net/kitchen/page/favorite.htm>.

with comments—health foods,[174] wine rankings,[175] fitness and nutritional information,[176] and so on. Others may be simple maps or charts: A great deal of this information is essentially factual.

Factual information has always had a limited scope of protection. Since *Feist Publ., Inc. v. Rural Telephone Service Co.*[177] ruled that the white pages of a telephone book were not original enough to constitute "authorship," factual information seems likely to receive even less protection than before.[178] One way that a seller of such information can respond to these narrow limits on copyright protection is to "fancy up" the facts with graphics and colorful background forms, as discussed in the previous section. For maps especially, the addition of original symbols, coloring, shading,

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[173] *See, e.g.*, the *Runners World* site, list of race events for April 1997, available as of March 11, 1997, <http://www.runnersworld.com/calendar/calapr97.html>. *See also, e.g.*, a Web-formatted calendar designed to permit quick copying of event schedules at the *Now-Up-to-Date* site, available March 11, 1997, <http://www.nowsoft.com/plugins/NBA/Atlantic.html> (NBA Atlantic Division team schedules).

[174] *See, e.g.*, the *Runners World* site, available as of March 11, 1997, <http://www.runnersworld.com/nutrition/nusuperf.html>.

[175] *See, e.g.*, the *Wine Spectator* site, available as of March 11, 1997, <http://www.winespectator.com/Wine/Spectator/Archives/19960131/013196fy11.html|63890320865962601324970744479>.

[176] *See, e.g.*, the *FitnessLink* site, available as of March 11, 1997, <http://www.fitnesslink.com/food/eatfit.htm>.

[177] Feist Publ., Inc. v. Rural Telephone Service Co., 499 U.S. 340 (1991).

[178] *See, e.g.*, The National Basketball Association v. Motorola, Inc., 1997 U.S. App. LEXIS 1527; 41 U.S.P.Q.2D (BNA) 1585; 1997-1 Trade Cas. (CCH) P71,705 (2d Cir. 1997) (live broadcasting of sports scores over a pager system held not to be a misappropriation; case not based on copyright); *NBA Calls Foul on America Online's Sports Posts*, NETGUIDE MAGAZINE (December 1996) at 48.

legends, and the like can convert underlying facts into protectible expression.[179]

In the early days of any new computer technology, though, "fancying up" is less possible. Attractive graphics and coloring, for example, require greater computing "horsepower" and communications bandwidth. To be sure, today's desktop computers are quite powerful and routinely handle elaborate graphics and color. But desktop computers are no longer a "new" technology. To see examples of something new, we can look at the so-called hand-held computers. These are devices that weigh about a pound or less, and that fit into a pocket or purse. Already the technology exists to give these devices a wireless connection to faxing, e-mail, and the WWW. Within the next year, the cost and weight of such additional capabilities will fall enough to bring them to a wide market.

But WWW access in particular may operate over a limited bandwidth, relative to networked, desktop computers. That means in turn that much of the information of interest that has a graphic component—maps and directions, e.g.—will at first be fairly simple in design; fancier designs require higher bandwidth. For that matter, maps and directions may at some point be read by other devices, not by human beings. "Getting directions to a restaurant" may eventually be something that one's car does, not oneself. All that would be required is a "smart" car that can guide itself from external signals, a technology that has been in development for some time and is held back more by cost than by

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[179] Fancier graphics and illustrations may not always be what consumers want or want to pay for. It remains true nonetheless that the lesser scope of copyright protection for factual information creates an incentive for creators to add additional even though unwanted materials like graphics in order to increase the level of copyright protection. *See* Jane C. Ginsburg, *No "Sweat?" Copyright and Other Protection of Works of Information after* Feist v. Rural Telephone, 92 COLUM. L.REV. 338, 345 (1995) (arguing that lack of copyright on facts may discourage the creation of exhaustive compilations, even though "[t]he exhaustive compilation may be most attractive to the user").

the need for technological break-throughs. Even with today's human guided cars, a Web access device itself will likely simply give basic factual information, telling the driver when and where to turn.

The significance of all this for copyright purposes is that the information of interest will be heavily factual, not initially "fancied up" with graphics and colors, and hence will have at best a very thin copyright.[180] For Web site owners who would like to charge for essentially factual material, both the general prohibition against copyrighting facts, and the *Feist* case's prohibition against "sweat" copyrights will pose a problem. As noted, factual databases are nothing new; it did not take the Internet to create them. But in the past, the terms and prices for many large databases could be negotiated within a contractual relationship. To some extent, commercial database access, as to WestLaw and Lexis, looks like mainframe computer software a decade or two ago. The packages were expensive and were typically sold on an individual contractual basis. Desktop computer software today, in contrast, is sold as a commodity in "shrink wrap" packages stacked on a shelf. The opportunity for enforceable contract terms in such packages—not to say in the

[180] Databases may acquire protection under database legislation such as the Database Investment and Intellectual Property Antipiracy Act of 1996, H.R. 3531, 104th Cong., or the more recent Collections of Information Antipiracy Act, H.R. 2652, 105th Cong. (introduced by Rep. Coble on October 9, 1997). The precise form of such protection, if enacted, is presently uncertain.

very common "click-on" or "Web wrap" licenses—has been questioned.[181]

Easy WWW access to individuals will mean that access to many kinds of databases will shift to the same commodity basis. Access by individuals might of course be by means of subscription, which will offer an opportunity for contractual agreement. But it also seems likely that there will be a market for one-time, ad hoc, access to factual databases by large numbers of individuals for short periods of time. When tourists are in a strange city, for example, they may want to have access to local information for that city for a week or two, but not for month after month.

Database protection

With easy access to such databases and the "commodification" of database sales, questions of access controls will certainly arise.

For instance, suppose several companies were to provide factual database information, either over the Internet or on a disk, about Chicago. Each of these services offers a large array of information about the city: restaurants, maps, hotels, shopping, entertainment, and so on. Each offers different strengths and weaknesses: one may have the best restaurant information, for example, and another the best hotel information.

Can a competitor take the best restaurant information from one service, the best hotel information from another, the best shopping information from a third, and so on, offering a "cream

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[181] Shrink wrap contracts for software are a topic of considerable controversy today. One appellate decision deals with the issue, ProCD, Inc. v. Zeidenberg, 86 F.3d 1447 (7th Cir. 1996); commentators also address it, e.g., Julie E. Cohen, *Reverse Engineering And The Rise Of Electronic Vigilantism: Intellectual Property Implications Of "Lock-Out" Programs*, 68 S. CAL. L. REV. 1091 (1995); Mark A. Lemley, *Intellectual Property And Shrinkwrap Licenses* 68 S. CAL. L. REV. 1239 (1995). *See also* Robert W. Gomulkiewicz and Mary L. Williamson, *A Brief Defense Of Mass Market Software License Agreements*, 22 RUTGERS COMPUTER & TECH. L.J. 335 (1996); Charles R. McManis, *Taking Trips On The Information Superhighway: International Intellectual Property Protection And Emerging Computer Technology*, 41 VILL. L. REV. 207 (1996); Jonathan E. Retsky, *Computer Software Protection In 1996: A Practitioner's Nightmare*, 29 J. MARSHALL L. REV. 853 (1996).

of the crop" database without ever having to invest much in collecting the information initially? Copyright protection will be far from assured because the information is so heavily factual. Yet plaintiffs are certain to make every argument they can. *Feist* notwithstanding, any database supplier can argue that it exercised enough selection and arrangement to sustain a copyright, so that a copyright claim will likely be raised in any event. Similar scenarios are likely to arise time and again because of the commercial value of factual information.

In a sense, then, we will be looking at a "new use" industry:[182] one that takes tiny amounts from a great many sources and compiles them on the fly into a new service. What makes this a new issue is several things: the information will be heavily factual, and hence will have a very thin copyright, if any—raising problems of just how thin; the information will be taken in small amounts from each database owner, raising the question whether the amounts are de minimus or a fair use; and the new use industry that extracts from many of the existing suppliers may at first appear actually to benefit those suppliers by providing advertising value.

Avatars

Computers can create three-dimensional figures and animate them. The best technology today can be quite effective in creating characters that appear to talk and move: witness the computer-animated Disney movie *Toy Story*. This animation can also be done in response to ad hoc human control, as is true with many video games where characters move, turn, jump, attack, and so on in immediate response to the game player's directions expressed through joy sticks, buttons, and similar controls.

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[182] The various types of issues that arise with copyright and new technologies are discussed in the section titled *Three Patterns of Copyright and New Technology*, at page 238; see especially the section on *New use of existing works*, at page 240.

Experiments are already underway on the Internet in allowing users to create animated figures to represent themselves for purposes of on-line interactive discussions. These figures are popularly termed "avatars." They are rather crude at present, though there is every reason to think that they will become increasingly detailed and realistic (or unrealistic, as their creator prefers).

Some obvious questions will arise from this technology: Can one copyright one's avatar? Does this bring into play other legal issues like trademark and right of publicity? Can an avatar become a "person" in the way that corporations are considered legal persons? And if so, can an avatar own a copyright? A copyright in itself as a fictional creation?[183]

Internet broadcasting

Today, a number of radio stations are broadcasting their performances directly over the Internet, simultaneously with their over-the-air broadcasts. The cost of becoming an "Internet radio station" is substantially less than becoming a broadcast radio station. For one thing, a license is not needed from the FCC, so one enormous cost—and one limit on the number of broadcasters—that stems from the requirement of dealing with the FCC proceedings is avoided by the Internet radio station.

The analogy of Internet "radio" with broadcast radio is very strong; in fact, the Internet radio organizations are encouraging exactly that analogy with explicit comparisons to ordinary radio. RealAudio, for example, is a company that provides live audio services over the Internet today. It advertises its software as

[183] See the interesting discussion of using electronic "persons" as a way to ensure privacy found in Curtis E. A. Karnow, *The Encrypted Self: Fleshing out the Rights of Electronic Personalities*, 13 J. COMP. & INFO. LAW 1 (1994). More general discussions of electronic persons may be found in 37 COMMUNICATIONS OF THE ACM (Special Issue: Intelligent Agents), July 1994 (as cited in Karnow at 9 n.35).

having "Preset Buttons, like a car radio, that take you straight to your favorite RealAudio sites. It also has a scan feature that lets you scan the Web for live music, radio, sports, and news."[184]

One can expect, then, an increase in the number of such "radio" stations. For those stations that are already broadcast entities, and have been paying ASCAP and BMI royalties, the issue may be whether that existing royalty payment means that royalties have "already been paid" and further royalties are not owed. [185] The issue may thus be cast in the form of a question of contract interpretation: what exactly does the contract provide in the way of a license to "broadcast?"

In-line linking and framing

Everyone familiar with the WWW understands that an enormous advantage of the Web is that most documents and sites contain "links" to other documents and sites. That is the whole point of the WWW: it would not be a "web" or be "world-wide" if it did not contain links to other information.

Fewer people presently understand that "links" come in several flavors. The ones just referred to are perhaps the most commonly thought of; they might be described as "links out" to other information. Another type of link is referred to as an "in-line link," which in contrast to the first type might be thought of as "links in" to other information.

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[184] *See* <http://www.realaudio.com/tmaplus/index.html>, available as of August 20, 1996. A subsequent check on August 30, 1997, showed this similar text being used: "Use the 40 RealPlayer Plus preset buttons to take you straight to your favorite news, music, and sports sites, just like with a car radio."

[185] The author understands from informal conversations with those in the music licensing field that as of March, 1997, some Internet audio sites are paying ASCAP and BMI royalties, and that others are not.

An in-line link is a pointer to a document somewhere on the WWW that causes that document to appear to be located on the "receiving" site. Let us say that Web page owner *A* puts up a document on *A's* web site. Part of that document contains a link to a picture located on, say Web site *B*. Many such links are used to direct a user "out" to another image or bit of text. Typically, such a link will be represented in text form by the use of a blue type font, often underlined as well. A user understands that "clicking" on the blue text will cause a jump to some other document, and perhaps some other computer.

But the in-line link, in contrast, in effect *pulls* the other image or bit of text into the current document for display. In other words, the user looking at site owner *A's* Web page will see on that page an image that actually was "pulled in" from site owner *B's* Web page, even though it appears to be a part of *A*'s page. For all practical purposes, it *is* a part of *A*'s web page, at least as far as the viewing user is concerned.

This has already happened once in a way that raised—but did not resolve—the copyright issue. An individual at the Princeton University for a while kept an in-line link to the "Dilbert" cartoon of the day. The cartoon appears on copyright owner United Media's site,[186] but to browsers of the individual's site, the cartoon appeared to be residing "there." Reportedly, United Media sent the individual a "cease and desist" letter, after which he ceased and desisted the in-line linking.[187]

When the first draft of this Report was written in the fall of 1996, this section ended with these words: "Certainly this [in-line linking] is an issue that will be revisited in the future. Because it

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[186] *See* <http://www.unitedmedia.com/comics/dilbert> .

[187] The author recalls seeing the matter discussed in an online discussion group, but otherwise has no authoritative reference for the cited fact. He notes that the only significant issue for this Report's purposes, however, is that no court or legislative conclusion was reached on the matter.

involves technology that is already working today, one can expect the issue to arise fairly soon." By February, 1997, a law suit involving "in-line linking" had in fact been filed.

Framing

A site on the WWW known as "TotalNews" provides links to a variety of other news sites on the Web, including CNN, CBS, NPR, and others. The linking mechanism was initially implemented in such a way that the news organizations' Web pages appeared to be "on" the TotalNews page. This particular variant of in-line linking is popularly known as "framing," as it involves a border from one site—the frame—surrounding or edging the content from another site.

Here is a screen capture of the TotalNews home page, taken on March 9, 1997.

Figure 10: Screen capture of TotalNews home page, from <http://www.totalnews.com> on March 9, 1997.

Though it may not be apparent, the screen image consists of several different parts. The overall screen shows a Web browser and its menus and button icons along the top. Within the browser's window appear several images from the TotalNews site. These images are divided into several "frames" or segments. One of these frames appears along the left side of the page and contains a series of buttons with the names of various news organizations: FOX News, MSNBC, and so on. To the right of this narrow frame is a wider one that contains the TotalNews logo and a compass rose. At the time of the litigation, when a user clicked on one of the buttons in the left side frame, that frame remained in place, but the content of the larger frame with the compass rose was replaced with content from the selected news site.

This next screen capture shows what happened, for example, when a user clicked on the "CNN Interactive" button.

Figure 11: Screen capture showing what appears after clicking on the "CNN Interactive" button in the left frame of the TotalNews home page, from <http://www.totalnews.com> on March 9, 1997.

Notice that the frame or border on the left and bottom of the screen remained the same, and the small address window showing a URL continued to display the TotalNews Internet address.

On February 20, 1997, some the news organizations[188] listed in the left frame filed suit against TotalNews, alleging a number of causes of action including misappropriation, trademark dilution, trademark infringement, false designation of origin, tortious interference with contract, and copyright infringement.[189]

The complaint was not specific in its allegation of copyright infringement as to which rights are involved. Presumably the issues would include whether the TotalNews site was copying or

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[188] The Washington Post, Cable News Network, Times Mirror, Dow Jones and Reuters New Media.

[189] Paragraph 30 of the complaint states:

> At the heart of Defendants' wrongful conduct is a practice known as "framing" that causes Plaintiffs' websites to appear not in the form that Plaintiffs intended, but in an altered form designed by Defendants for their own economic advantage. The totalnews.com website consists of lists of numerous "name-brand" news sources, including the famous trademarks exclusively associated with Plaintiffs in the public mind. When a user of totalnews.com "clicks" on one of those famous trademarks with the computer mouse, the user accesses a Plaintiff's corresponding website. (In Internet parlance, the trademarks here function as "hyperlinks": areas on the screen that, when clicked on, take the user directly to another website.) Plaintiff's site, however, does not then fill the screen as it would had the user accessed Plaintiff's site either directly or by means of a hyperlink from a website that does not "frame" linked sites. Nor does Plaintiff's URL appear at the top of the screen as it normally would. Instead, part of Plaintiff's site is inserted in a window designed by Defendants to occupy only a portion of the screen. Masking part of Plaintiff's site is the totalnews.com "frame," including, inter alia, the "TotalNEWS" logo, totalnews.com URL, and advertisements that others have purchased from Defendants.

The Washington Post Company v. Total News, Inc., (S.D.N.Y. February 20, 1997) 97 Civ. 1190 (PKL).

publicly displaying or publicly performing or creating a derivative work of the works at issue.

TotalNews case settled

In June, 1997, the case was settled;[190] we do not, therefore, have any judicial resolution of the issues involved. As of early 1998, the TotalNews site was no longer consistently framing other sites. Here, for example, is the site as of February 23, 1998. The basic layout is similar to that of a year ago.

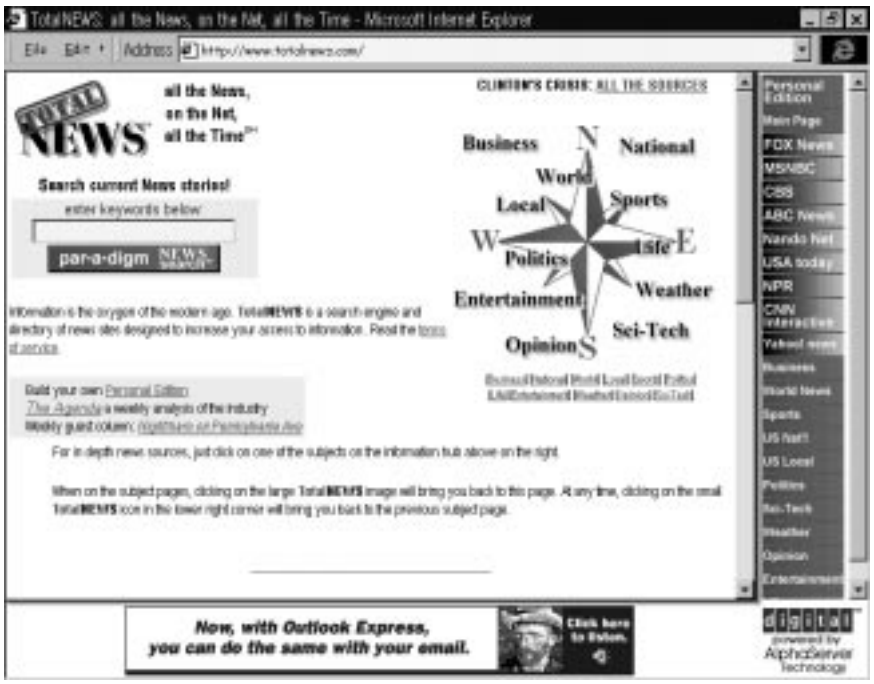

Figure 12: Screen capture of the TotalNews web site, from <http://www.totalnews.com> on February 23, 1998.

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[190] *See* STIPULATION AND ORDER OF SETTLEMENT AND DISMISSAL, 97 Civ. 1190 (PKL) (S.D.N.Y. June 6, 1997), available as of October 19, 1997 from the BNA ELEC. INFO. & POLICY L. REP. (online version), <http://www.bna.com/e-law/cases/totalset.html>.

This time, a click on the "CNN Interactive" button causes a new window to open without framing.

Figure 13: Screen capture of the TotalNews site after clicking on the "CNN Interactive" button. Notice that a new window has opened and that the CNN site is no longer framed. From <http://www.totalnews.com> (in the background) and <http://cnn.com> (in the foreground) on February 23, 1998.

Regardless of these particular instances of framing, the technology is widely used on the Internet. Technology also exists for Web site owners to prevent other sites from framing them,[191] but not everyone is aware of either the technology or the likelihood of framing. The issue therefore remains open as a legal matter. The general issue here is one of a "new use" of existing

[191] The technical community is aware of the matter: *see* Arnoud Engelfriet, *Frames FAQ: Avoiding getting 'framed': Is there a way to prevent getting framed?*, <http://www.htmlhelp.com/design/frames/faq/framed.html>, as of February 28, 1998. For those who wonder how an obscure reference like this one can be found: the author visited a search engine site on the Web, entered the search request "html code to prevent site being framed." The sixth response was a reference to the Engelfriet site.

copyrighted works, a matter discussed in more depth under the heading *New uses: analysis*, at page 256.

Authorization and extra-territoriality

The Internet facilitates communication across national borders, and naturally raises issues relating to the use and exploitation of copyrighted works in other countries. A little-examined provision of the 1976 Act may come into play when works under U.S. copyright protection are used abroad.

The 1976 Act for the first time included a right of copyright owners both "to do *and to authorize*" the various exclusive rights of copyright ownership.[192] The legislative history of this provision explains that "use of the phrase 'to authorize' is intended to avoid any questions as to the liability of contributory infringers."[193]

One issue that arises with regard to this language is whether it was intended only to codify existing case law on contributory infringement, or whether it created in effect a new right of authors. In many cases, there will be no difference between these two interpretations, so the question is not of practical importance. For example, suppose an individual bought a large quantity of video cassettes of popular motion pictures. This individual then began renting the cassettes to others with an express statement that the rentals were suitable and intended for the purpose of public performances.

If those renting the cassettes in fact publicly performed them, the performances would clearly infringe the owner's rights. But the party originally renting out the cassettes would just as clearly violate the owner's rights as well: that party would be liable under existing interpretations of the contributory infringement

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[192] 17 U.S.C. § 106 (emphasis added).

[193] HOUSE REPORT at 61.

doctrine because a direct infringement would have occurred. It would be liable also for "authorizing" a public performance under any plausible interpretation of that term.

Other cases can arise, however, in which the difference is more significant. Two illustrations are foreign actions, and private performances or displays.

American copyright law is considered not to have "extraterritorial effect."[194] That means that acts done outside the United States do not infringe United States copyright law. Publicly performing a movie at a theater in another country, for example, does not violate American copyright law (it might or might not violate the law of the other country). Suppose a defendant in the United States lawfully acquired copies of a motion picture, though not the performance rights, and began authorizing the motion picture's public performance in another country where such performances are lawful. The foreign entity arranging for the performance would not be liable under its own law, by hypothesis. This same party would not be liable for a violation of U.S. law because our law is not extraterritorial. The question is: has the American defendant authorizing the foreign performances violated any copyright rights?

If the "authorize" clause in the Copyright Act only codifies the doctrine of contributory infringement, the defendant is not liable. The contributory infringement doctrine generally requires that a direct infringement takes place somewhere. No one can "contribute" to an infringement, goes the argument, if there is no infringement to which to contribute.[195] Because the foreign acts do

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[194] *See, e.g.*, Subafilms Ltd. v. MGM-Pathe Communications Co., 24 F.3d 1088, 1095 (9th Cir. 1994) (mentioning the long history of decisions so holding).

[195] *See* Sony Corp. v. Universal City Studios. Inc, 464 U.S. 417 (1984).

not constitute infringement, the U.S. defendant cannot be liable for contributory infringement.[196]

If, on the other hand, the term "authorize" is an independent copyright right, then what the American defendant is doing is "authorizing" a public performance. Authorizing a public performance, goes the argument, is a right of the U.S. copyright holder regardless of whether the foreign performance is lawful or not. Hence the American defendant would be liable for copyright infringement.

The Ninth Circuit has determined that the former interpretation is correct: that "authorize" merely codifies existing doctrine on contributory infringement, and that liability for contributory infringement depends on the existence of a direct infringement under U.S. law.[197] The decision has not been well received by all commentators, however, some of whom suggest that nothing in the Act requires the existence of direct infringement for a violation of the "authorize" right,[198] nor has the matter reached the Supreme Court.

A second example of how the difference in interpretation of the "authorize" language matters is in regard to private performances and displays. Suppose a motion picture company were to post a full-length feature film on its Web site for the purpose of individuals' viewing. Suppose that another Web site under different ownership provides an in-line link to the motion picture site in such a way that individuals can see the movie, but only surrounded by additional art work or video or sound provided by the second site. (This would constitute a situation much like that

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[196] Subafilms Ltd., 24 F.3d v. MGM-Pathe Communications Co., 24 F.3d 1088 (9th Cir. 1994).

[197] Subafilms Ltd., 24 F.3d 1088.

[198] *See, e.g.*, II PAUL GOLDSTEIN, COPYRIGHT, *supra* note 108, § 6.3.2; RAYMOND T. NIMMER, INFORMATION LAW, *supra* note 108, at ¶ 4.10.

of the "framing" case discussed elsewhere.[199]) The motion picture copyright owner may object to the presentation of its movie in this fashion (whether such an objection *should* be legally valid or not is another question). The individuals viewing the movie would not infringe the owner's rights: by hypothesis they are making "private" performances, which are not within the copyright owner's right of control. The motion picture site would be engaged in "publicly performing" its own movie, but would of course be doing so itself voluntarily.

The second site's liability would then depend in part on how one interprets the "authorize" clause. Again, if the clause merely codifies existing contributory infringement doctrine, the second site would not be liable. With no direct infringement by individuals, there is no contributory infringement.[200] But if "authorize" is an independent right, the second site might be liable for "authorizing public performances."

Why "public," if the second site enables access by private individuals? The argument would be that the second site was not directly infringing, because it was not copying the movie.[201] An in-line link does not itself cause the making of a copy—that only happens when an individual browses the second site, not when the second site creates the link to the motion picture company's site. The individuals viewing the movie would, again, not be

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[199] See the discussion of the "TotalNews" case in the section titled *In-line linking and framing*, at page 171.

[200] *But see* II PAUL GOLDSTEIN, COPYRIGHT, *supra* note 108, § 6.3.1.2 ("Nothing in the text of legislative history of the 1976 Act makes direct infringement a condition to contributory infringement."). *See also* RAYMOND T. NIMMER, INFORMATION LAW, *supra* note 108, at ¶ 4.10 (noting that "[a] dispute exists about whether the 'to authorize' language" creates a right that stands independent of any requirement that there be a direct infringement).

[201] One could also argue that the second site *was* directly infringing the public performance right. The argument here simply addresses a different question. On the direct infringement issue, please see the discussion of the "TotalNews" case in the section titled *In-line linking and framing*, at page 171.

directly infringing because they would be making private performances. However, the second site has enabled the public to come to the second site and see the movie "performed"—albeit technically performed from the copyright holder's site. The argument would be that the second site has not itself performed but has done the equivalent: it has authorized the public performance of the movie.

Implication

This argument is not necessarily persuasive. Rather, the argument, and the "foreign performance" example, merely illustrate that the Internet permits all sorts of indirection with pointers, links, and so on, by which copyrighted content can be pushed and pulled through many types of intermediaries. These links to links to links in turn enable individuals to engage in even more activities "in the privacy of their own home" than ever before, raising the general issue of what this Report calls "decentralized infringement."[202] They also enable a considerable amount of activity to take place outside the physical borders of the United States. For both reasons, then, the Internet will encourage copyright owners to look for new theories on which to base claims of infringement. An obvious such theory under these circumstances is that of the "authorization" right of section 106.

[202] See the discussion in the section titled "*"Decentralized infringement"*, at page 240, and as more fully discussed at page 259.

Works of visual art

As discussed elsewhere in this Report,[203] the 1976 Copyright Act has managed to avoid a great many old controversies over the medium of fixation of a work. Past versions of the Act defined copyright's subject matter partly in medium-specific terms, which naturally caused question to arise whenever a new medium of fixation was invented. This happened most famously with "piano rolls," the development of which caused great debate over whether such a roll was a "copy" of a musical composition.[204]

Were the same situation to arise again today, we would not trouble over it. Protection would apply to the "musical work," regardless of the form in which it was fixed—whether sheet music, or a phonograph recording, or a piano roll. We have defined away the "medium of fixation" issue that so bedeviled courts construing earlier copyright acts because Congress has now shifted copyright's focus away from tangible fixations altogether. Perhaps a good contemporary example is that of audio CD's and CD-ROMs. At one time, we might have had to question whether such tangible objects were suitable copyright subject matter. Today, works on CD or CD-ROM are clearly protected precisely because the tangible objects are *not* the subject of copyright. Rather, it is their contents—the works of authorship such as "musical compositions"—that are the subject of copyright protection.

Unfortunately for the digital future, a recent amendment to the Act has reverted to establishing protection on the basis of a medium-specific provision. The amendment extends rights of "attribution and integrity" (two kinds of "moral right") to a new

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[203] See the discussion in the section titled *Subject matter: issues*, at page 244, and *Subject matter: analysis*, at page 246.

[204] *See* White-Smith Music Pub. Co. v. Apollo Co., 209 U.S. 1 (1908).

category of "works of visual art" in section 106A.[205] Works of visual art are not defined as "works" in the usual 1976 Act's medium-neutral way, but are defined as particular types of tangible objects, including "painting[s], drawing[s], print[s] or sculpture[s] … or … still photographic image[s]."[206]

The problem for the digital world of tomorrow is that any one of those works, including sculpture, can be "embodied" in a digital form.

Visual art can be computerized

For two-dimensional works, the embodiment is straightforward: a painting can be digitized, as can a drawing or print. More to the point, a digital image can be created *initially* on a computer. All manner of computer software these days exists for the purpose of helping artists and illustrators create computerized images, or for retouching and altering existing images.

For sculpture, the digitization of a work may be less obvious, but it is still entirely possible. A three-dimensional work can be digitized as a three-dimensional object represented inside a computer. Such a work can be displayed on a computer screen, rotated, subjected to various lighting and shadow effects, and so on. The concept of "virtual reality" depends on computer creation of three-dimensional spaces and objects in this way. One also frequently sees computer-created new car models, or DNA structures, or human bodies, or new buildings, etc. being displayed this way in advertisements and science programs. The computational mechanism for creating a representation of a three-dimensional object depends on fairly complex mathematical calculations, using principles of solid geometry and other math beyond the scope of the Report (and its author). But it is well established today.

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[205] 17 U.S.C. § 106A.

[206] 17 U.S.C. § 101.

Second, a three-dimensional work such as a sculpture can also be represented as a set of instructions for creating the work in tangible form. These instructions might be the same as those necessary only to represent the object, or might be different. The instructions might be designed for a human being to execute, but perhaps more problematic—because there is less room for human intervention and the issue is more clearly drawn—the instructions can also be in a form that is used by an automatic milling or other machine to create the three-dimensional object directly from tangible matter. The relationship between such a work and the underlying instructions would then be much like the relationship between a video game in actual appearance and the computer program instructions for creating a video game.

Can there be a computerized "work of visual art?"

Thus we have several possible situations of concern to copyright. First is that works that clearly fall under the visual rights amendment—say, prints, limited edition photographs, or limited edition sculptures—can be represented as digitized objects inside a computer. Do these digitized versions of the protected works also acquire the same protection as their original tangible manifestations? Can artists object if a computerized versions of their works are altered? Or are displayed with the artist's name removed? Do the digitized versions "count" as part of the "200 copies" that are allowed before a work of visual art ceases to be such a work? If there exist 200 paper prints and one digital copy of the print, does the work fall outside the definition of a "work of visual art?"

Second, what about works that are created initially on a computer and that perhaps exist only in computerized form? Can such works constitute "works of visual art" as defined in the statute? Can an image created on a computer be a "print?" Can a set of computer instructions for creating a three-dimensional object be a "sculpture?"

It might be thought that these questions would never arise. But copyright's history suggests that whenever the protection of

subject matter is defined in terms of particular technologies—particular tangible fixations—the question of new forms of fixation for the same general type of thing will almost inevitably arise.

RAM copies and personal privacy

Many citizens worry about a loss of personal privacy because of apparently easier and easier access to data that is computerized. One individual obtained a copy of the state of Oregon's motor vehicle records and posted them on the Internet.[207] This caused much consternation among citizens, whose driving history, though previously a "public record" in the legal sense, now became a very "public record" in the factual sense. Other examples abound; organizations exist to promote privacy[208] specifically because of the concern that electronic records and Internet access mean a loss to a society that puts any value on "being left alone."

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[207] *See, e.g.*, Steven D. Jones, *Oregon Should Keep DMV Records Public*, THE BUSINESS JOURNAL [of Oregon], September 16, 1996 ("In August, a computer enthusiast posted on the Internet license records from Oregon's Department of Motor Vehicles and touched off a firestorm. The names and addresses of drivers have always been available to the public for the trouble of going to a DMV office and paying a nominal fee. But posting the thousands of names where anyone could easily see them triggered outrage from a population already offended by privacy violations by everyone from credit agencies to telemarketers."), available from <http://cgi.amcity.com/portland/stories/091696/editorial2.html> as of October 19, 1997. Oregon motor vehicle records are also available for purchase on a CD-ROM titled *Motive Power for Oregon*, described as "a list of passenger vehicles from the Oregon Department of Motor Vehicles. This includes pickups, vans, and sport utility vehicles up to 1 ton capacity. You can select vehicles by make, body style, and year, and by the owner's location (city, county, or zip codes). You can use this information for direct mail or market research." From <http://www.computerassistance.com/> on October 19, 1997. Public concern about driving records has also led to a federal law, the Driver's Privacy Protection Act of 1993, part of Pub. L. No. 103-322, Sept. 13, 1994, 108 Stat. 2099 (codified at 18 U.S.C. § 2721 et seq.)

[208] The Electronic Privacy Information Center (EPIC), <http://www.epic.org>, is one such organization, for example.

On the surface, these privacy issues do not seem to raise copyright issues. But privacy rights are relatively weak in the United States, where the "default" legal rule is usually that there is no privacy right.[209] The privacy of credit,[210] e-mail,[211]and education[212] records, for example, is a function of special laws enacted for specific purposes. Absent those specific laws, those particular types of records would not have to be kept private. Moreover, many straightforward privacy causes of action may be preempted by the Copyright Act itself.[213] If one kept a secret and embarrassing diary, for example, and a thief stole and published it, one might have to sue the thief for copyright infringement.[214] Even though the heart of the complaint would be that one's privacy had been invaded, the fact that a "diary" is a literary work and that the right being pursued was to stop the public distribution of that literary work, might well mean that copyright's preemption

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[209] *See generally*, Joel Reidenberg and Gamet-Pol, *The Fundamental Role of Privacy and Confidence in the Network*, 30 WAKE FOREST L.REV. 105 (1995). Many states recognize some form of privacy, but often it applies specifically to the commercial use of one's name or likeness. The requirements for recovering for the disclosure of personal information are difficult to meet: typically, one must prove that the disclosure of personal information not only was offensive to the plaintiff, but would also be offensive to a person of ordinary sensibilities. *See* W. PAGE KEETON at al., PROSSER AND KEETON ON TORTS 857 (5th ed. 1984). The fact that a defendant had scoured the World Wide Web and assembled a dossier of one's likes, dislikes, habits, age, ages of family members, trips taken, etc. etc. would almost certainly not be remediable under most states' privacy law.

[210] The Fair Credit Reporting Act, 15 USC 1681 (1992).

[211] Electronic Communications Privacy Act, 18 USC 2510 et seq, 2710 et seq. (1986).

[212] Family Educational Right to Privacy Act (Buckley Amendment), 20 USC 1232g (1993).

[213] *See* 17 U.S.C. § 301.

[214] *But see* 1 NIMMER ON COPYRIGHT, *supra* note 91, § 1.01[B][1][c], stating in regard to the tort of invasion of privacy that "inasmuch as the essence of the tort does not lie in [reproduction, distribution, performance, or display], pre-emption should not apply."

provision in section 301 governed and that the action would have to be cast in the form of copyright infringement.[215]

At present, copyright does not apply to most "personal information" because such information is usually factual and hence cannot be considered an original work of authorship. So a common situation of concern to some—the unauthorized gathering of "dossiers" with lots of personal profiling—might not be actionable on a privacy theory: privacy law might not make the gathering unlawful, or copyright law might preempt a privacy action in any event. Yet a copyright action would not likely be able to redress the harm either, because at issue would be factual, hence uncopyrightable, information.

On the other hand, computers depend on temporary copying in memory to function at all.[216] Any information that is extracted automatically, i.e., by computer, from a given user will typically cause some form of computer processing on *that user's* computer. For example, when a user browses the WWW with browser software, the various sites browsed may be able to gather certain information about that user. Frequently the "server" software running at a site that provides access to Web pages can find out a visiting user's name and e-mail address by querying the user's browser. Commonly today, when this happens, it happens without the user's knowledge. But for it to happen, the user's copy of the browser software must perform some action.

If that action causes the making of a temporary copy in RAM of something to which the user can assert an ownership claim—whether by being an author, or, more likely, by being granted an interest by contract—the user may be able to put forward a copyright infringement theory against the site attempting to

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[215] One might well be successful in a copyright action on these facts, of course.

[216] See the discussion in the section titled *RAM copies*, at page 128.

collect the personal information. The user would announce in some fashion (presumably through the software itself) that any attempt at collection of the user's personal data was not permitted. If a site nonetheless collected that data, the user would claim that such a collection necessarily required the copying of software into the *user's* computer without authorization and hence was a copyright violation.[217]

Ownership, exclusive rights

There might seem to be a problem with this theory in that for any user to have standing to sue, the user must be a copyright "owner"—one who possesses an exclusive copyright right.[218] At first blush, it might appear that a company selling millions of copies of its software would be selling it on the basis of a *non*-exclusive license to each buyer. Users who are non-exclusive licensees do not themselves have standing to sue.[219]

But things would not have to work that way. The seller might be able to create an exclusive license for each individual buyer to use

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[217] To be sure, the matter can quickly become complicated. Browser software is usually acquired from third parties—it is not the sort of thing that is easily "home grown." The producers of browser software are in a position, in other words, to condition the use of their own software on a user's giving up any right to control data gathering in the way just outlined. But users might connect a small piece of additional software to their browser in the form of a so-called "plug-in" software package. This smaller plug-in might then have to be invoked any time a visited site tried to collect personal data from the user's browser. This invocation of the plug-in software module, rather than the browser software itself, might form the basis of the user's claim of unauthorized use, and hence form the basis of a copyright infringement claim for the gathering of personal data. Of course, browser producers might then condition the use of their browsers on the user's agreement not to incorporate such plug-ins, etc. etc. etc. But whether this escalating battle of conditions and permissions would actually take place depends in part on whether browser producers have any interest in preventing their browser users from being able to stop the collection of personal data. If they do not have such an interest, then it seems quite possible that they would permit the sort of claim here described.

[218] 17 U.S.C. § 501(b) provides that "The legal or beneficial owner of an exclusive right under a copyright is entitled … to institute an action for infringement. … ." Section 101 defines a "Copyright owner" as the owner of a particular exclusive right.

[219] By negative implication of 17 U.S.C. § 501(b).

the software on that user's particular machine. In that fashion, each such buyer would have the exclusive rights to create whatever copies on that particular user's computer would be necessary to cause personal data to be divulged to a data-gathering Web site. The user would therefore be a copyright "owner" of that exclusive right and be able to sue the gathering Web site for copyright infringement when personal data was collected.

RAM copies and junk e-mail and other inflows

A widely held concern these days centers on "junk e-mail," the use of Internet e-mail for advertising purposes sent out in bulk amounts.[220] One recent controversy featured an Internet bulk e-mailer that routinely distributed over a million pieces of advertising e-mail every day. America Online subscribers were recipients of many of these e-mails. On behalf of its subscribers, AOL instituted technical measures to prevent these messages from being circulated. The company involved sued to enjoin AOL from preventing it from doing so. Plaintiffs' argument was that AOL was a "state actor" and as such, fell under the First Amendment's prohibition of speech restrictions. The court found, however, that AOL was not a state actor and that the First Amendment accordingly did not apply to it.[221]

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[220] The author himself receives many such bulk e-mailings. Particularly offensive to his personal sensibilities are messages announcing that one has been subscribed to a distribution list. One must then take affirmative steps to be *removed* from such a list. E.g., "Disclaimer: According to our resources the enclosed information may be of interest to you. If you wish to be Removed and receive no further issues simply send an E-mail message and type REMOVE in the subject …" E-mail to the author received on March 12, 1997. This particular solicitation, a bulk mailing of various small "classified ads," included information on making money from the Internet by … sending out bulk e-mail through the company's service:

(continued next page)

This sort of situation may well arise again, perhaps in a context that makes the First Amendment argument less apposite.[222] Would copyright apply? It seems unlikely at first blush, but it is far from impossible that it would. When an individual sends another individual a piece of e-mail, various software functions must be invoked by the recipient. An e-mail program of some kind must run, for example. Even before the intended recipient's own e-mail program is started up to read the message, the OSPs computers have somewhere along the line already run other communications programs to connect to the Internet, to acknowledge and adjust to various communications "protocols" or standard ways of communicating with other computers, to process incoming and outgoing queues of mail messages and the like. In short, for anyone to receive an e-mail, including an individual OSP subscriber, quite a number of computer programs must be run.

Under current technology and case law interpretations, the running of a computer program necessitates the making of a "copy" of the program. Either a copy is made from a disk storage system into RAM memory, or copies of the program residing in

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> Every minute of the day 7 new people log on-line. That's 10,080 people per day! Is that unbelievable or what? Do you know what that means? That's 10,080 new business prospects per day! There are over 55 MILLION prospects waiting for you right now! By the end of the year in '97 there is expected to be over 120 MILLION people on-line! As you can simply tell, there is no end to this. Let's face it. There are many large companies investing MILLIONS of dollars per day on the Internet, and for one reason only. They know this is where their business is going to be by the year 2000. Marketing on-line can be a very difficult task, but it doesn't have to be. Here at [company name deleted], can make [sic] your On-Line Marketing effort a successful experience for you.

[221] *See* Cyber Promotions, Inc. V. America Online, Inc., Nos. 96-2486, 95-5213 (E.D. Penn. Nov. 4, 1996). *See also* a similar case, CompuServe v. Cyber Promotions, Inc., (S.D. Ohio No. C2-96-1070 October 23, 1996), discussed in 1 BNA ELECT. INFO. POLICY & LAW 718 (Nov. 1, 1996).

[222] For example, with junk mail to a government-owned site.

RAM memory may be copied to other locations in that same memory.[223]

That means that a sender of an e-mail is in some sense the initiator of the running of a number of software programs on the recipient's computer(s). Suppose the recipient announced, ahead of time, to the sender that the sender was not "authorized" to cause the copies of the recipient's e-mail and communications programs to run and that accordingly, the sender had no right to send any more e-mail. At least after that notification,[224] would the sender who ignores that announcement be a copyright infringer?

Other bodies of law might more straightforwardly apply to this situation. A theory based by analogy on "trespass to land" might make sense, as the author has argued elsewhere.[225] But other theories like this might be preempted by the Copyright Act, and if not preempted, might be coupled with a copyright action in a given case. In either of the latter instances, a court faced with the copyright question will have to address it. Granted, having a recipient of copyrighted subject matter (e-mail) sue the *sender* for copyright infringement (based on the sender's unauthorized creation of "copies" of the recipient's e-mail processing *programs*) may seem odd. But cyberspace raises all sorts of odd new possibilities, of which this is only one.

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[223] See the discussion in the section titled *RAM copies*, at page 128.

[224] Before such notification, the situation would likely be interpreted as an implied license or fair use.

[225] *See* I. Trotter Hardy, *The Ancient Doctrine of Trespass to Web Sites*, 1996 J. ONLINE L. art. 7, <http://www.wm.edu/law/publications/jol/hardy.html>.

Hypertext links out

Does copyright apply, in a fashion similar to that just described, to prevent unwanted hypertext links to one's site? A recent case in Scotland's Shetland Islands suggests how a dispute might arise. Rival online newspapers compete in the Shetlands, a community of some 24,000 residents. One online paper copied headlines from the other, and included hypertext links to the other paper as well. That way readers of the first paper could, if they chose to "follow" the links, also read the complete articles in the rival newspaper's online edition.

The paper whose headlines had been copied sued to stop both the copying of the headlines, and the linking.[226]

Under U.S. law, a headline would likely be considered a "short phrase or title" and hence not be copyrightable.[227] So the question in the U.S. would be whether the copying of headlines, along with links or pointers to another's site, constituted any sort of copyright infringement. One way to address the issue is to analogize this activity to that of in-line linking as discussed elsewhere.[228] Or it could be addressed as a possible violation of the copyright owner's right to "authorize."[229]

But another way to analyze it is this: Whenever an individual user clicks on a link and browses another site, the browsing causes computer programs to execute on both the user's computer and

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[226] *See Scottish Court Orders Online Newspaper to Remove Links to Competitor's Web Site*, 1 BNA ELECT. INFO. POLICY & LAW 723 (Nov. 1, 1996).

[227] *See* U.S. Copyright Office, *Circular Circular 34: Names, Titles, Short Phrases Not Copyrightable* (Jan. 19, 1996) (available from the Copyright Office World Wide Web site, <http://lcweb.loc.gov/copyright/circs/circ34> as of February 1, 1998); *see generally* 1 NIMMER ON COPYRIGHT, *supra* note 91, § 2.16.

[228] See the discussion of the "TotalNews" case in the section titled *In-line linking and framing*, at page 171.

[229] See the discussion of the authorization right in the section titled *Authorization and extra-territoriality*, at page 178.

the site being visited (as well as one or more intermediate sites). Can the visited site declare that its computer programs are only authorized for execution (being copied into RAM) by individuals who reach the visited site by following certain links but not others? Note that by expressing the infringement in terms of copying / executing software, the visited site can avoid the issue of "public" versus "private" performance: the infringement from execution of software under the RAM-copy doctrine is based on the making of a copy of the software, not on public performance or display.

Changes in pricing structure

The Internet, as already noted,[230] is likely to exhibit "divergence," with different service quality levels becoming available at different prices. This change from today's more generic access arrangements does not seem directly related to copyright law. Yet it may prove to be. Many people have a strong belief in the Internet as not just a technology but as an *institution*—as a fundamentally equal-access and hence very "democratic"[231] institution. As the Internet becomes more specialized to accommodate greater performance, it will in some senses become less a technology of generic and hence "equal" access, and hence may come to be perceived as increasingly less democratic.

That view in turn will likely lead to some public pressure to "regain" the access that will have been "taken away" by the evolving technologies of the Internet as it begins to differentiate in services and prices. Some of this pressure may be brought to bear on copyright law. The pressure on copyright law may take the form of urging alterations in copyright's protection to ensure

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[230] See the discussion in the section titled *Economics and pricing*, at page 57.

[231] The author uses the term "democratic" because he suspects that that is how many people will phrase it. Multiple levels of differing service qualities has nothing to do with "democracy" in the pure political science sense, of course.

greater access to information, as by expanding the exceptions to copyright's subject matter or by being reluctant to define its subject matter differently from today. Or the pressure may take the form of urging a greater scope for fair use inquiries, or in the form of a desire to include the First Amendment more explicitly in copyright controversies.

Computer-generated works

The idea that computers can generate works of authorship is not new. Concerns about copyright and computer-generated works have arisen and been discussed at some length.[232] The issue is this: Authorship involves an original creation,[233] which implies a human author. Humans can program computers to create, and the resulting computer programs can clearly be original and copyrightable; but what about the output of the computer program? The traditional answer has been that a computer cannot be a copyright "author" because computers are not human.[234]

Unfortunately, there has been very little in the way of definitive judicial or legislative resolution of these ownership and rights issues. That is largely because very few computer-generated works have been the subject of litigation. Perhaps few works have been the subject of litigation because few of them have had enough merit to make their unauthorized copying or display or performance a temptation to others. If that is true, then the picture may soon change. Computers are getting better all the time. They get faster, more powerful, and more sophisticated. If computer

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[232] *See, e.g.*, NATIONAL COMMISSION ON NEW TECHNOLOGICAL USES OF COPYRIGHTED WORKS, FINAL REPORT 43-46 (1978) [hereinafter CONTU REPORT]; *see generally* I PAUL GOLDSTEIN, COPYRIGHT, *supra* note 108, § 2.2.2.

[233] Feist Publ., Inc. v. Rural Telephone Service Co., 499 U.S. 340 (1991).

[234] *See* CONTU REPORT, *supra* note 232, at 45 ("The eligibility of any work for protection by copyright depends not upon the device or devices used in its creation, but rather upon the presence of at least minimal human creative effort at the time the work is produced.").

poetry today is not very good, then it will be better tomorrow. Computer-generated art will be better in general, and it takes no great stretch of the imagination to suppose that computer-generated works will before long be good enough that others will want to copy or display or perform them.[235]

That means that the issue of ownership and rights in such works will become a much more serious one in the future. Indeed, one need not think in terms of Shakespeare-like quality for such works to see the potential issues. Computers can draw maps, for example. Maps can be copyrighted. Computer-generated maps can be and are used on the World-Wide Web, where with today's technology they are easily found and copied.

What if a private company produces its own computer program that accepts government-gathered, public domain satellite data, and uses those data to create colorful, artistic maps, with colors and symbols and an overall style that were "chosen" by the computer itself? The generating computer program is of course copyrighted, but is the map? And if copyrighted, is it owned by the company? One might think the answer would be "yes, who else would own it?" But copyright ownership hinges on the exercise of creative expression. The product of creative human expression on these facts was the original computer program, not the map.

One might object here that the range of choices in colors, symbols, and the like all had to be input into the computer in the first place by a human programmer or designer, and hence would have been "created" by that person at that time. But that is not necessarily so. The computer might have been instructed to browse the World-Wide Web to look for map examples. By so doing, it might have collected a great deal of "knowledge" about maps and how

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[235] *See* CONTU REPORT, *supra* note 232, at 46 ("[T]he Commission recognizes that the dynamics of computer science promise changes in the creation and use of authors' writings that cannot be predicted with any certainty.").

they are drawn from looking at other maps, whether of human or machine origin. In short, the computer in question might have "learned" its style of map making the way humans learn style: by looking at the examples of others.

Would one still say that the expression embodied in the map in question is authored by a human programmer? Perhaps, by convention, one might choose to reach such a conclusion. But it would be a matter of convention, not by any means a straightforward application of current copyright principles.

Multiple authorship

Multiple authorship of copyrighted works is not a new idea.[236] But often multiple authorship of a single work[237] has been accomplished by a handful of individuals: two authors of a song, for example, or a team of three or four authors working on a scholarly treatise. Motion pictures have typically required larger groups—producers, directors, actors, composers, camera operators, scenery designers, costume designers, sound technicians, and so on—but typically all these individuals will be employees in a contractual relationship with a single entity like a movie studio. Contracts of employment and the Copyright Act's "works-made-for-hire" provision[238] can clarify most of the questions involved in allocating the copyright rights resulting from such a large scale project.

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[236] The first United States copyright act expressly provided that "from and after the passing of this act, *the author and authors* of any map, chart, book or books … shall have the sole right and liberty of printing, reprinting, publishing and vending such map, chart, book or books … ." 1 Stat. 124, 1st Cong., 2d Sess., c.15 (1790) (emphasis added).

[237] Multiple authors of a compilation like an encyclopedia raise different issues. Such works are typically not considered to be of "joint" authorship any more than a collection of different short stories or poems is considered a "joint work" among the various authors.

[238] 17 U.S.C. §§ 101 (definition of "work made for hire") and 201(b).

Outside of motion pictures, large groups of multiple authors do not seem a common phenomenon. This seems likely to be the result of the difficulty and expense of bringing together a larger number of authors and coordinating their efforts.

One thing the Internet seems very likely to bring—indeed, already brings—is lower communication costs. Lower communication costs among potential authors mean that the barriers to the creation of multiply-authored works will fall, and with that fall we can expect to see a substantial increase in the number and type of works that have multiple authors.[239]

In a sense, the issue of multiple authorship will still not be "new." But whenever the frequency of an activity like multiple authorship increases, a sufficiently large increase in quantity may eventually lead to a qualitative difference. With *markedly* lower communications costs, it is likely that *markedly* more and perhaps different interactions among multiple authors will take place. For example, it is easy with the Internet today to ask a thousand or a million people to participate over a network in authoring a copyrightable work—something that though theoretically possible even in, say, the 18th century, would never earlier have been contemplated. As the Office of Technology Assessment once observed, "In a world where there are many authors of one work ... a law based on the concepts of originality and authorship may become too unwieldy to administer."[240]

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[239] *See generally* Jane C. Ginsburg, *Putting Cars on the "Information Superhighway": Authors, Exploiters, and Copyright in Cyberspace*, 95 COLUM. L. REV. 1466, 1469-1472 (1995).

[240] OFFICE OF TECHNOLOGY ASSESSMENT, INTELLECTUAL PROPERTY RIGHTS IN AN AGE OF ELECTRONICS AND INFORMATION 6 (1986).

Libraries, archives, search sites

The Internet is full of archives of old e-mail and newsgroups articles. The creation and upkeep of these archives requires more disk space and perseverance on the part of the archive owner than it does anything else—with automated indexing systems widely available, the talents of a trained archivist or indexing professional are not used. Yet the resulting archives can be very helpful: many Internet users experience the phenomenon of remembering a message they saw from a month or two ago that contained information they now want. Being able quickly to go an archive site and pull up the message is a great convenience and time-saver.

On the other hand, archives exist by making copies of works that for the most part are copyrighted: e-mail messages. Most of these archives are available to be searched at no charge. My own experience with asking members of Internet discussions how they react to having their "works" copied and stored leads to several conclusions. First, many Internet participants are aware of the archives' existence and do not object to having their messages copied and stored in this searchable fashion. Second, if the archives began charging for their services, many, though certainly not all, of those affected would feel differently about the matter. Third, many people are not aware that their old e-mail messages may be residing somewhere on the Internet and can be found by anyone the world over.[241]

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[241] The author once searched on a search site for references to his name and found a publicly-accessible archive site that held at least one copy of a private e-mail sent only to one other person and never given to or authorized for use by the archive site. The author does not know how this happened. Unrelated to this incident, the author once came across a comment on the Web from which perhaps historians and androids would take more comfort than others: "Our web-crawling robot may visit you soon!" (from the *Internet Archive* site, as of December 5, 1996, <http://www.archive.org/>).

At least one site on the Internet has undertaken the ambitious project of archiving the entire World Wide Web. The *Internet Archive*[242] has a computer connected to the Web by a high-speed connection that continually pulls in copies of Web sites twenty-four hours a day, every day. The organization states its mission this way:

> Internet Archive is gathering, storing, and providing access to public materials on the Internet such as the World Wide Web, Netnews, and downloadable software. The Archive will provide historians, researchers, scholars, and others access to this vast collection of data (reaching ten terabytes), and ensure the longevity of the information.[243]

And the archive is growing, like the World Wide Web, at a prodigious rate. Here is their growth chart:

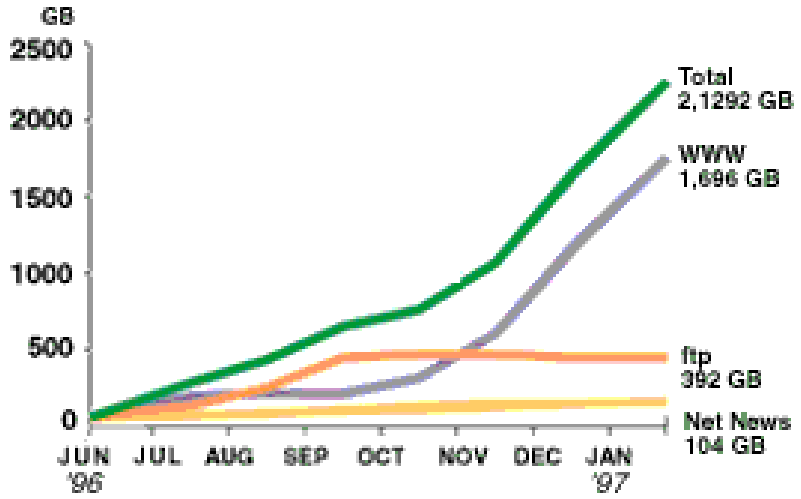

Figure 14: Information gathered and stored at the Iinternet Archives, from <http://www.archive.org> on March 14, 1997.

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[242] From <http://www.archive.org> on December 5, 1996.

[243] From <http://www.archive.org> on December 5, 1996.

Statutory provisions for archives

Archives are explicitly mentioned in the Copyright Act: section 108 deals with the special issues of both libraries and archives. The provision was adopted primarily for what we think of as libraries and archives in the physical sense: a public library of books and magazines, a university library of books and scholarly journals, etc. And, as is so common with the Copyright Act, the rights and responsibilities defined in section 108 are primarily aimed at just those sorts of tangible materials: books, journals, and magazines. The rules of section 108 easily apply to such common activities as a library's making a copy of a magazine article for a patron; copying a chapter from a book for inter-library loan; or providing unsupervised photocopy machines for patron use.

"Libraries and archives" in tomorrow's world, though, will often be the type of electronic sources just described. What makes an on-line library valuable is that its holdings can be searched and read from a distance, over the Internet. When that happens, though, words in the statute like "make a single copy" begin to make less sense than they did for tangible books and journals. Does a remote user browsing the library "make a copy" of the materials? In one sense, this is no different from the general question of copyright, copying, and the Internet. It re-invokes the idea of "RAM copies" and their copyright significance, as discussed elsewhere in this report. [244]

But section 108 is much more specific than section 102 or 106, and hence will make judicial interpretation of the provision less flexible than is the case with those more general provisions. For example, section 108 (b) invokes a highly problematical concept: that to be authorized, certain copies must be in "facsimile" form.

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[244] See the discussion in the section titled *RAM copies*, at page 128.

Facsimile copies of printed text

In addition to the issue of whether "providing access" to an on-line archive is the same as "making a copy," courts or the Copyright Office will still have to face issues like this: is the scanning of a page of text that produces a digital image the making of a "facsimile" copy? The legislative history of section 108 makes clear that "facsimile copies" do not include converting printed text into full-text-searchable databases like Lexis or WestLaw.[245] But it is unclear whether creating a computerized, digital *image* of a page, just as if it were the digital image of a drawing or photograph, constitutes a "facsimile" or not.[246]

The answer may turn on the purpose for which the limitation to "facsimile" copies was adopted. Typically limitations like this represent an implicit limitation on the amount of harm to a publisher's market that can occur from the permitted copying. We know at least that Congress was concerned that "systematic copying" not be allowed to serve "as a substitute for subscription to or purchase" of a work.[247] So it is reasonable to conclude that the concern over facsimile copying was similar: Congress most likely wanted to confine copies to facsimile form to ensure that an entire new market—for online full-text retrieval—did not arise to

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[245] The legislative history of section 108 explains that "Under this exemption, for example, a repository could make photocopies of manuscripts by microfilm or electrostatic process, but could not reproduce the work in 'machine-readable' language for storage in an information system." HOUSE REPORT at 75, *reprinted in* 1976 U.S.C.C.A.N. 5689.

[246] *See also* WHITE PAPER *supra* note 90, at 86, which concludes that section 108's "exemption does not allow for replacement of a published work by reproduction in digital form (*at least when the original copy of the published work was not in digital form*)." (emphasis added). Senator Ashcroft introduced a bill in late 1997 that would, among other changes to the Copyright Act, strike the references in section 108 to "facsimile" copies, leaving the surrounding clauses equally applicable to digital and non-digital works. *See* Digital Copyright Clarification and Technology Education Act of 1997, S. 1146, 105th Cong., § 203 September 3, 1997.

[247] 17 U.S.C. § 108(g)(2). *See also* HOUSE REPORT at 77-78.

jeopardize the production of the information in the first place. If the Act allowed a library or archive to produce computer-readable text from a printed text and to offer remote access to that computer-readable version, the result might substantially reduce sales of the printed original. Reduced sales would mean a reduced incentive for the publisher to continue to produce the printed texts in the first place. A limitation on libraries and archives to the making of facsimile copies helps to ensure that no such reduction in incentives occur.

If that is so, then how would Congress or courts view the making of digital "facsimile" copies of printed originals? The likely answer is that Congress would have intended to allow libraries or archives to make digital facsimile copies when doing so would not substantially reduce the incentive of the original publisher to produce the published material in the first place. How much a publisher's incentives to publish would be reduced depends in part on how close a substitute a digital facsimile copy is for the original printed text. The more easily the copy can substitute for the original, the less likely it is that Congress would have intended to allow the copy. The less it can substitute, the more likely that Congress would have intended to allow it.

Congress evidently thought that allowing machine-readable text versions would constitute too much of a substitute for printed materials; that seems to be the reason for the current limitations on reproduction in machine-readable format in section 108. So one relevant question is this: how easy is it to make a machine-readable version of the text from a digital facsimile? If it is very easy to go from printed page, to digital facsimile copy, to machine-readable copy, then perhaps Congress would not have wanted to allow such copies; if it is very difficult or costly, then perhaps Congress would have wanted to allow them.

The answer to that question in turn depends on the current state of technology. Technology can facilitate copying, and technology can impede copying as well. The situation today can change

tomorrow—that is one reason the Copyright Office commissioned this study and *Report*. Today, the answer to the question "how easy is it to turn a digital facsimile copy into machine-readable form" is simple: it is very easy. The necessary technology is widely available and inexpensive; it is that of Optical Character Recognition, or "OCR."

OCR is often thought to apply only to converting an original printed page into machine-readable text, but in fact, when an OCR "scanner" examines a page of printed text, it does so by first creating a digital facsimile copy in the associated computer's memory. That is precisely what the process of "scanning" entails: the creation of a digital facsimile copy. The OCR software then examines the digital facsimile copy and converts that image into a machine-readable form. If one begins this process with a digital facsimile copy already, one simply saves the step of scanning. Indeed, this is how computers can "read" incoming fax transmissions to produce a machine-readable version of a fax.

In short, unless the technology arises to prevent OCR conversion of digital facsimile copies, it will be quite easy to produce machine-readable texts from such facsimiles. This fact in turn argues that Congress would not want section 108 to allow a library or archive to create digital facsimile copies of printed texts. To be sure, this conclusion is based on the assumption that Congress was concerned about the ease of substituting certain copies for the original. To the extent that other policy judgments were or become a factor, Congress might well prefer a different outcome. But in the meantime, the issue may arise in litigation under the statute's current wording, and it will pose interpretative problems for the court that must deal with it.

Facsimile copies of digital text

The previous analysis has dealt with digital facsimile copies (graphic images) of printed pages. Another issue is whether libraries and archives can rely on section 108 to create digital facsimile copies of texts that were originally in digital, not printed, form themselves. Here the analysis divides into two parts. First, what about digital originals that are only images (pictures) of text, containing no directly machine-readable text at all? Second, what about digital originals that are in machine-readable format to start with; can a library create a "facsimile" copy of such an original? What would a "facsimile copy" consist of?

The first question can be analyzed just like the issue of facsimile copies of printed originals. To the extent that Congress was concerned that machine-readable versions of texts would constitute too much of a substitute for printed versions, it would likely reach the same conclusion for digital images of text. Namely, if OCR can quickly turn copies of such originals into machine-readable text, then Congress would probably want to prevent that outcome by disallowing library copying of such works for patrons under section 108. Conversely, if a digital image of text were formatted or prepared in such a way that it made OCR creation of machine-readable formats difficult or costly, then Congress probably intended to allow libraries to make such copies for patrons.

The second question is more difficult. What does section 108 imply for a library that holds an originally machine-readable version of textual materials? Is it possible to make a "facsimile copy" of such a work? That depends on what Congress intended by the word "facsimile." If "facsimile" means "in the same form as the original," then of course the answer is yes: one can create an identical copy of digital, machine-readable texts; the result is a copy in the same form as the original. Hence it would be a "facsimile copy."

On the other hand, it is possible that the word "facsimile" does not mean "in the same form as the original," but instead means something more like "analog format." That is, Congress may have used "facsimile" to mean precisely the opposite of "in the form of machine-readable text."

Obviously, each of these interpretations leads to completely different conclusions about section 108 and library copying of originally machine-readable texts. If "facsimile" means "same form as original," then libraries are allowed under section 108 to create copies of machine-readable originals. If "facsimile" means the opposite of "machine-readable," then of course libraries are not so allowed.

Search sites as reproductions

The Internet is full of sites that exist to provide an index to the rest of the World Wide Web. These sites—like Lycos, Magellan, AltaVista, etc.—have been mentioned before.[248] They are different from archives in that they attempt to create an index to other sites, not to provide a backup copy of the other sites.[249]

Yet, the search sites operate by extracting words from other World Wide Web sites and storing them in a searchable database. The search sites can also, if they choose to do so, store information in the index about the relative position of each word extracted from another Web site. In other words, it is possible to create an index much like Lexis or WestLaw: one can ask to find all Web sites or

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[248] See the discussion in the section titled *Search engines*, at page 44.

[249] It is possible to combine the functions of archiving and indexing, of course. *See* Rajiv Chandrasekaran, *Seeing the Sites On a Custom Tour*, WASHINGTON POST, Thursday, September 4, 1997, at E1 (the *Internet Archive* [see text at note 242, *supra*] has spun off a service called "Alexa," that provides sophisticated indexing to the World Wide Web through the linking of related words and phrases).

pages in which the word "car" appears within five words of "boat."

If an index is that detailed, it can be used to recreate the full text of each indexed site (though not the graphic images or sounds or video or other aspects of Web pages). Or to put it another way, the storage medium containing such an index would constitute a "material object[] … in which a work [viz., textual or largely textual Web pages] is fixed … and from which the work can be perceived, reproduced, or otherwise communicated, either directly or with the aid of a machine or device,"[250] and hence would constitute a "copy" of the Web pages it indexed.

In short, search sites raise some of the same issues that Internet archives raise.

A practical convention has arisen on the Internet that provides a means for Web site owners to specify that they do not want their sites or pages to be indexed. If the owner includes a file with a special name and contents[251] in the same area of computer storage

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[250] 17 U.S.C. § 101.

[251] The software that search sites use to compile indexes is often known as a "robot." The file name that by convention causes the indexing not to take place for a given Web page is "ROBOT.TXT." The convention is not widely used. *See* CHARLES P. KOLLAR, JOHN R. R. LEAVITT, AND MICHAEL MAULDIN, ROBOT EXCLUSION STANDARD REVISITED (June 2, 1996), as of March 25, 1997, <http://www.kollar.com/robots.html> ("It has been pointed out in some discussion on the /robots.txt mailing list that the current standard is not widely in use. Louis Monier, in a posting to this list, reckoned that only about 5% of all sites visited by his robot at Alta Vista at that time had a non-empty /robots.txt files. This is supported by information gathered from recent spidering logs at Lycos. We found that only 6% of all requests for the /robots.txt files resulted in a status code 200. There are any number of reasons why this may be: the people who set up web servers simply don't know about the standard, the people who set up the web servers are not the same people who control the content of the web site, and there is little effective communication between them, this number reflects the number of the sites on the web that really need to exclude information from robots."). *See also, e.g.*, the discussion of "robots" files in relation to a particular search engine, the one at the *Internet Archive*, <http://www.archive.org/webmasters.html>, as of March 3, 1998.

as the Web pages, most searching software will not include the site in an index. Presently, the technique is voluntary: the special step does not disable the searching software, but instead simply indicates the owner's preference. The owners of most indexing software in practice program their software to comport with the convention, but again, this is simply a widely followed convention, not something inherent in Internet technology. Other proposed Internet standards are more sophisticated, allowing a Web site owner to specify whether a given page may or may not be indexed, whether subsequent pages linked from the current page may be indexed, and so on.[252] These proposals might continue to be voluntary conventions, or they might take on a stronger role as required technical standards.

If we assume for a moment that the index of a search site either does, or at least under some circumstances, can constitute an infringing[253] "copy" of the sites indexed, an interesting issue arises. So far, the techniques and proposals for avoiding indexing call for *affirmative steps* by Web site owners. In effect, they create a presumption that one's Web site may be indexed, unless one takes steps to prevent it. As affirmative steps, the techniques suggest the issue of "formalities" under the Berne Convention.[254] Since the

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[252] *See, e.g.*, MICHAEL MAULDIN AND MICHAEL SCHWARTZ (for the World Wide Web Consortium), SPIDERING BOF REPORT, available as of March 25, 1997, <http://www.w3.org/pub/WWW/Search/9605-Indexing-Workshop/ReportOutcomes/Spidering.txt>.

[253] An index might be deemed a "fair use" of the indexed sites, of course, or some other feature of the law might result in a finding that indexes are not infringing.

[254] *Berne Convention For The Protection Of Literary And Artistic Works, Paris Act of 1971* [hereinafter *Berne Convention*], ART. 5(2) ("The enjoyment and the exercise of these rights shall not be subject to any formality"), S. TREATY DOC. NO. 27, 100th Cong., 1st Sess. (1989), *reprinted in* 3 SOURCES OF INTERNATIONAL UNIFORM LAW E325 (Konrad Zweigert & Jan Kropholler, eds. 1973), and the World Intellectual Property's Web site, <http://www.wipo.org>, specifically at <http://www.wipo.org/eng/iplex/wo_ber0_.htm> as of February 4, 1998.

United States joined the Berne Convention [255] (March 1, 1989), formalities in our copyright law are not permitted.

The issue yet to be addressed, therefore, is whether judicial enforcement of a requirement that Web sites affirmatively indicate a desire not to be copied constitutes a "formality" and is hence disallowed under Berne.

The argument that it would be a "formality" is straightforward: copyright owners (of Web sites) must take an affirmative step to retain copyright protection; such a step is obviously a formality. Though Berne does not require member countries to establish all possible authors' rights, it does specifically guarantee the right to "reproduce" copies, which is at issue here.

A counter-argument is also possible, however. The language of the Convention's Article 5(2) provides that "[t]he enjoyment and exercise of these rights shall not be subject to any formality."[256] Possibly, the rule prohibiting formalities applies to any formal steps required to retain "copyright" rights in some aggregate sense. In the case of Web search sites (and archives), the issue is whether the copyright owner must take formal steps to preserve *one particular copyright right*—the right not to be copied in the form of a comprehensive textual index—out of a larger bundle of rights that are otherwise preserved without formalities. Put another way, if Berne disallows the use of formalities to condition the existence of "copyright rights," does it also disallow the use of formalities to condition the existence of a single right out of many?

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[255] Berne Convention Implementation Act of 1988, 102 Stat. 2853-2861 ("An Act to amend title 17, United States Code, to implement the Berne Convention for the Protection of Literary and Artistic Works, as revised at Paris on July 24, 1971, and for other purposes.")

[256] Berne Convention, *supra* note 254, at art. 5(2).

Metered use

The use of digital information can be monitored by a computer. That is, given that the information is "computerized" in the first place, it requires a computer to display or perform or copy or otherwise make use of it. If a computer is necessarily controlling the use of the information, the computer can be programmed to monitor that use.[257]

Although "monitoring use" sounds Big Brotherish, the term is used here only in the context of clocking or counting access, where a typical reason for doing so is to charge a fee for the access. And if a fee is to be charged, then absent some statutory restriction to the contrary, the charging party can choose on what basis the charge is to be levied: perhaps per view, or per "screenful," or per minute, or for that matter, per second or per word displayed. To be sure, technology today does not make it feasible to account for each nanosecond or each bit examined; but that is a function of whatever the current technology is. Perhaps tomorrow even such a detailed level of resource accounting might be practical.

If "nanoseconds" and "bits" are not worth monitoring today, it does seem plain that computers can at least monitor something much more finely grained than, say, a "two-hundred page book." Indeed, a computerized World Wide Web site can easily monitor the "pages" or screenfuls of text or the number of images or the seconds of animation that a user consumes at a given Web site.

"Fine grained metering"

People speak of this phenomenon as "finely-grained metering" or "metered usage" or in similar terms. Of course, metering by time or pages is not at all unknown in today's world, or even in the

[257] Of course, a computer that is controlling information will not necessarily be so programmed. One can acquire digital materials for storage on one's own personal computer, for example, without that computer being set up to perform monitoring of what the user does.

past. Time metering has been used for years with large mainframe systems as exemplified by Lexis, WestLaw, and other suppliers of commercial information from a centralized information "warehouse." Other examples of metering occur in many parts of the economy besides in the information business: per-mile charges for rental cars; per day charges for video rentals; per hour charges for legal services; per day charges for hotel stays; per hour charges for renting certain power tools; per page charges for copying or printing at a copy shop; and so on.

Metering is a semantic issue

The choice of describing something as "metered" or "not metered" is partly a semantic issue or a matter of common practice, and not at all the black-and-white distinction that it appears to be at first sight. One could argue, for example, that books sold in bookstores *are* "metered" for pricing purposes. The metering does not take place with respect to pages read or seconds consumed in reading, but rather with respect to "number of books bought." That is, a buyer is charged on a "per book" basis, which itself is a form of metering. Similarly, a per-screen-displayed charge for viewing information on a computer screen can be seen as *not* metered: after all, the reader is free to read and re-read a given screenful as many times as desired.

But as a matter of customary practice today, many people tend to think of "books" as representing information access that is not metered; they tend to think of digital information that can be accessed only with a per page or per second charge as representing the contrasting regime of "metering." Despite the fact that this terminology can be gainsaid, as noted, we can accept this popular characterization for purposes of the following discussion.

Metering is controversial

One might be surprised to discover that the idea of paying for more information in the future on a metered basis (usually with respect to individual pages or seconds) is at all controversial. But it is. Examining the issue in the light of the differing perspectives on "promoting progress" and "balancing" that have been

delineated above will help to show why the controversy arises, and precisely what it is that is controversial about "metered usage" pricing.

The resistance to metered pricing seems is based on the fact that current copyright law, especially the parts that deal with the first sale doctrine[258] and fair use,[259] is implicitly premised on assumptions about the relevant facts[260]—in particular, the typical manner in which information is accessed.

The first sale and fair use doctrines assume—again, according to one view of copyright—that much information is in the form of books and other printed material. In regard to books, the first sale doctrine makes perfect sense—indeed, the doctrine was almost "designed" for books. A book is a tangible object that can easily be lent, resold, discarded, and so on. The first sale doctrine is all about what a buyer of a tangible object like a book can do with that object in just those ways.

The scope of fair use for books is not so well defined, but of course that is a product of the fair use doctrine, not the nature of books. More to the point, the scope of fair use with regard to books is likely to be about as extensive as it will be for anything. Books are generally published and distributed without any face-to-face contact with the book buyer, making contracts over minor or temporary uses impractical; books are certainly used widely in education and for scholarship; books are frequently copied in small amounts and less commonly copied in their entirety; and so on. The scope of fair use for books may therefore be quite large without causing any significant detriment to the copyright owner.

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[258] 17 U.S.C. § 109.

[259] 17 U.S.C. § 107.

[260] See the discussion in the section titled **Change in underlying assumptions**, at page 155.

Digital works seem more ill-at-ease with a first sale doctrine than books simply because they are not (usually) tangible objects that one can hand over to a friend or throw in a trash can. Digital works may also lose some of the attributes of books that make the latter so well suited to many fair uses. For example, digital works may come from a producer who, thanks to e-mail and the WWW, is quite easy and cheap to contact. This may argue for a lesser scope of fair use in practice for such works.[261]

The crucial point, by this argument, is that in an earlier day, the scope of first sale and fair use were based on the assumption that most information is in the form of books and tangible materials. That is, the scope of first sale and fair use were assumed by Congress to be large because when adopted, they *were* large. If digital technologies have the effect of shrinking the number of works for which first sale or fair use makes sense, goes the argument, then Congress should reconsider the scope and principles that underlie those doctrines and change them to preserve the same broad scope of first sale and fair use that we have presently with print technologies. Note that the principle undergirding this argument is the belief that the proper balance between authors and users is a matter for Congress to establish, and the belief that Congress has done so in past enactments.

Contrary view

Those who tend not to accept this argument tend to believe that the proper balance of interests is not to be achieved by Congress, but rather by individuals, on a transaction-by-transaction basis. If one adheres to this view, one concludes that whatever balance of interests is currently reflected in typical copyright transactions is much more the product of business practicalities and the current state of technology than it is of any conscious policy of Congress.

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[261] *See generally* Wendy Gordon, *Fair Use as Market Failure: A Structural and Economic Analysis of the* Betamax *Case and its Predecessors*, 82 COLUM. L.REV. 1600 (1982).

Congress's conscious policy would have been to establish the general framework of copyright rights.

Thus, according to this different view, if metered pricing establishes a system of information access that changes the scope of fair use or makes the first sale doctrine less appropriate, those changes are not objectionable. Rather, they simply mean that changes in technology may bring about new realities. Moreover, if users want to continue to buy books for which they can exercise their first sale rights, the argument goes, they are free to do so. If enough people continue to prefer books to electronic access—perhaps in part because of the wider scope of first sale and fair use with books—then publishers will be happy to continue to supply books.

Notice that the principle undergirding this argument is the belief that the proper balance between authors and users is a matter for private parties, in individual transactions between authors and users, to establish.

Filtering

Concerns over the content of the Internet often center on pornography and the protection of children from material that their parents consider inappropriate. These concerns have given rise to an array of "filtering" technologies. Filtering technologies, or "filters," consist of computer software that screens all material received over computer communications lines for specified criteria. The criteria might be the presence of certain key words; or the presence or absence of certain previously identified Internet addresses; or anything else that the developers of filters might design. The point of filters, of course, is to screen out unwanted Internet information, or to screen "in" (i.e., only permit) desired information.

Though filters originally were conceived as a defense against pornography, they can also be used for other purposes. One such

purpose is the selection of content on the basis of a user's interest in order to create "personalized newspapers." Another is the elimination of advertising.

Filters may also raise copyright issues that are roughly similar to those raised by framing technology.

Take this hypothetical example. Suppose there were a Web site, *alpha.org*, that was a heavily visited site for general information; it contained no pornography or material that was in any way objectionable. It did, however, contain advertisements. These advertisements were carefully located on the various pages of the *alpha.com* site in ways calculated to catch the eye and attention of site visitors.

Suppose a filtering company sells a software filter that can be set to recognize Web site advertisements and either delete them entirely—causing the other elements on the page to slide up and fill in the gaps—or replace them either with blanks or pictures or other materials unrelated to the deleted ads. A user buys this filtering software and uses it to eliminate the advertisements when viewing the *alpha.com* site.

Web pages like those at the hypothetical *alpha.com* are copyrightable subject matter: they contain literary works in the form of textual material and often contain pictorial or graphic works in the form of images, photographs, drawings, and the like. The filtering software in this example is altering the Web pages that it filters. Does this alteration amount to the unauthorized preparation of a derivative work?[262] If so, is the preparation

[262] 17 U.S.C. § 106(2) gives copyright owners the exclusive right to prepare "derivative works", defined in § 101 as

(continued next page)

nevertheless a fair use by the individual user? Is the producer of the filtering software liable under any theories of direct or indirect infringement liability?[263]

> work[s] based upon one or more preexisting works, such as a translation, musical arrangement, dramatization, fictionalization, motion picture version, sound recording, art reproduction, abridgment, condensation, or any other form in which a work may be recast, transformed, or adapted. A work consisting of editorial revisions, annotations, elaborations, or other modifications which, as a whole, represent an original work of authorship, is a "derivative work."

[263] Direct and indirect, or "secondary," liability are discussed in the section titled *Intermediaries' liability*, at page 133.

5.3 Copyright and other laws

Fundamentally different technologies are often governed by fundamentally different sets of legal principles. Until fairly recently, information technologies have differed from each other in fundamental ways and hence have been governed by different legal principles. Books, to take one example, are quite different from radio broadcasts in both their underlying technologies (printing press and paper versus broadcasting over the radio-frequency spectrum) and in the way the different industries are structured as businesses. The book business depends on the production and distribution of tangible objects that are sold on a per-unit basis. The radio business depends on delivering a service at no charge to the end user, but with revenue earned from advertising.

Not surprisingly, the legal principles that govern these two industries and technologies are different as well: the book business is largely governed by general copyright principles. The radio business is subject to copyright principles (radio programs and music are copyrightable subject matter), but is even more strongly affected by the regulations of the Federal Communications Commission, regulations designed to promote the FCC's determination of public interest.

Today we witness the phenomenon of technological "convergence"—the fact that many forms of communication, once quite separate in their technological origins, are becoming simply different facets of a single stream of digitized information bits. Both "books" and "radio" can today be delivered over the same digital networks such as the Internet.

Motion pictures and phonograph records also illustrate the point. Motion pictures originated with celluloid film; phonograph records originated on wax cylinders and wax disks. The idea of

putting sound on motion pictures took years to develop, and when it was done, it was done with what were in effect still separate technologies, but that coexisted on the same strip of celluloid film.

Today, computers can easily turn motion pictures and sound and radio and television and books into a stream of digital impulses, all of which can be transmitted and stored using the same media. To be sure, different computer programs may be required to "play back" these different digital streams, so in this sense text, sound, motion pictures, etc. still remain different technologies at some level. But much of the legal regime that has surrounded different technologies in the past has dealt with other differences than these: differences between the printed press and the broadcast press, for example, have been based on assumptions of limited bandwidth available to the latter.[264] "Limited bandwidth" is no longer a concept that makes sense applied to digital streams of text and audio transmitted over the Internet.[265]

The phenomenon of convergence implies that formerly independent bodies of law like copyright and communications law may no longer operate so independently. This section addresses several such possibilities, some perhaps more obvious (the relation of copyright law to communications law, e.g.), than others (the relation of copyright law to bailment law, e.g.).

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[264] Compare Miami Herald v. Tornillo, 418 U.S. 241 (1974) with Red Lion Broadcasting Co. v. FCC, 395 U.S. 367 (1969) and FCC v. Pacifica Foundation, 438 U.S. 726 (1978).

[265] Reno v. American Civil Liberties Union, 521 U.S. 1, 46, (1997) ("Finally, unlike the conditions that prevailed when Congress first authorized regulation of the broadcast spectrum, the Internet can hardly be considered a 'scarce' expressive commodity. It provides relatively unlimited, low-cost capacity for communication of all kinds. The Government estimates that '[a]s many as 40 million people use the Internet today, and that figure is expected to grow to 200 million by 1999.'").

Copyright and communications law

Television and cable broadcasting are governed by a complex combination of communications regulations under the oversight of the FCC, and copyright law, the latter mostly under sections 111 and 119 of the Copyright Act. This system, though complicated, is in place and working. Rights in content are generally copyright rights; the right to broadcast or transmit a television program is, however, generally controlled as a matter of communications law.

The issues here arise for familiar reasons: detailed provisions of the statute were enacted in response to a given technology and the industry that made use of it; when the technology and the industry players evolve, it becomes increasingly difficult to determine Congress's intent. At times, Congress makes statutory amendments; at times courts or agencies are forced to interpret provisions written for an earlier day. In the case of communications, section 111 of the Copyright Act was designed for television and cable TV as it existed in the 1970's. Judicial interpretations have extended the concepts in some instances. In 1984, for example, a court determined that passive satellite carriers were to be given the same treatment as cable systems.[266] Statutory amendments have also been relied on to keep pace with television technology: in 1994, for example, the definition of "cable system" was extended to include carriage by "microwave."[267] Administrative regulations have also been used,

[266] Hubbard Broadcasting, Inc. v Southern Satellite Systems, Inc., 593 F. Supp. 808 (DC Minn 1984), *affd* 777 F.2d 393 (8th Cir. 1985), *cert denied*, 479 U.S. 1005 (1986), *reh. denied*, 479 U.S. 1070 (1987), *reh. denied*, 488 U.S. 961 (1988).

[267] Satellite Home Viewer Act of 1994, Pub. L. No. 103-369 (codified at 17 U.S.C. § 111).

as when the Copyright Office provided clarification of the definition of "cable system."[268]

For the most part, though, sections 111 and 119 are premised on a particular industry structure: broadcast television stations regulated by the FCC, whose signals are picked up and re-transmitted by cable or satellite carriers. The Internet also carries video signals, however, and this fact alters the underlying premises of the Copyright Act provisions.

Suppose an enterprising individual decides to pick up a television broadcast signal on an ordinary television, digitize it, and send it back out over the Internet. This would not be particularly hard or expensive to do today, and certainly will be easier and cheaper tomorrow. The individual would be surprised to learn that he or she might have become a "cable system" by definition:

> A "cable system" is a facility, located in any State, Territory, Trust Territory, or Possession, that in whole or in part receives signals transmitted or programs broadcast by one or more television broadcast stations licensed by the Federal Communications Commission, and makes secondary transmissions of such signals or programs by wires, cables, microwave, or other communications channels to subscribing members of the public who pay for such service.[269]

This provision might be interpreted such that "subscribing members of the public" meant "cable subscribers" in today's

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[268] 62 Fed. Reg. 18,705 – 18,710 (1997) (to be codified at 37 C.F.R. § 201) ("The Copyright Office of the Library of Congress is adopting final regulations recognizing that satellite master antenna television (SMATV) systems are eligible as cable systems under section 111 of the Copyright Act to obtain a compulsory license to retransmit broadcast signals to their subscribers. The regulations provide guidance as to who should file and how to report distant signals.").

[269] Copyright Act, § 111(f).

sense; in that case, perhaps "Internet subscribers" would be considered not to fit the definition, and therefore the individual re-transmitter would not be a "cable system."

On the other hand, what about the Online Service Provider that carried the individual's re-transmission? Such an entity would appear to "receive[] signals transmitted or programs broadcast by one or more television broadcast stations licensed by the Federal Communications Commission, and make[] secondary transmissions of such signals or programs." The OSP also receives subscription fees for its services. Would that mean that the OSP must make a payment for a compulsory license, just as existing cable systems are required to pay under section 111(d)(1)(B)?[270] Would it mean that an OSP who affirmatively sought to pay such a fee must be allowed to carry television signals? Would such an OSP fall under the jurisdiction of the FCC?

Already several radio stations are "broadcasting" their programs over the Internet; increasingly, so are television stations.[271] Technologically, it is quite possible to do both today, though a live video signal requires so much more capacity than radio's audio signals that such video "broadcasts" are often unsatisfactory. Soon they may not be so unsatisfactory, however. Suppose that the capacity of the Internet improves just enough, or

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[270] "(i) 0.675 of 1 per centum of such gross receipts for the privilege of further transmitting any nonnetwork programming of a primary transmitter in whole or in part beyond the local service area of such primary transmitter, such amount to be applied against the fee, if any, payable pursuant to paragraphs (ii) through (iv); (ii) 0.675 of 1 per centum of such gross receipts for the first distant signal equivalent; (iii) 0.425 of 1 per centum of such gross receipts for each of the second, third, and fourth distant signal equivalents; (iv) 0.2 of 1 per centum of such gross receipts for the fifth distant signal equivalent and each additional distant signal equivalent thereafter; …"

[271] Lists of live video sources are available at several places, including <http://midibiz.w1.com/stream/stream.htm> and the RealPlayer site, <http://www.timecast.com/events/rvstationsf.html> as of September 6, 1997. *See generally* Jeff Caruso and Kate Gerwig, *Is The Internet Ready For Broadcast?*, INTERNETWEEK, February 23, 1998.

the technology of video compression improves just enough, that television stations decide to transmit their signals over the Internet as well as—or in lieu of—their regular broadcasts over the "ether." We might call such transmissions "netcasts."

Assuming that the FCC did not affirmatively waive or withdraw its jurisdiction over such television stations, the mere fact of the stations' netcasting their programs could immediately turn every part of the Internet carrying the signals into "cable systems" by the definition of "cable system" above. That is, any computer or other switching equipment owner that performed packet-switching services on the Internet would be "a facility … that in whole or in part receives signals transmitted … by one or more television broadcast stations licensed by the Federal Communications Commission, and makes secondary transmissions of such signals or programs by wires, cables, microwave, or other communications channels to subscribing members of the public who pay for such service."[272] Note that the definition only requires that there exist members of the public who pay for a subscription to such services; it does not require that the subscription or payment be made directly to any particular one of the packet-switching intermediate computers on the Internet.

Because of the packet-switched architecture of the Internet, it is impossible for one who transmits a communication to know over what parts of the Internet the communication will be carried. The result could be either that every part of the Internet—including, e.g., most American universities—became a "cable system" by definition, or else that different computers on the Internet would become cable systems for the duration of their carrying a television signal, and then cease being a cable system whenever they were not carrying such a signal. They would each owe a compulsory license fee, a fee based on a complex calculation

[272] Copyright Act § 111(f).

involving the carriage of "programs in whole or in part" and "distant signal equivalents" and "non-network programming" and the like. Nearly all of these calculations would be impossible for an entity owning a computer on the Internet to calculate.

Without question, this result would be extremely awkward and clearly not what Congress had in mind when it enacted section 111. Yet, that is how the language of the statute appears to apply, leaving a situation in which courts or regulatory agencies may have to ignore a statute's plain wording in order to avoid unreasonable results.

Analysis

One reason cable and broadcasting regulations are so complicated is that before the 1976 Act, cable operators were not considered to infringe copyright rights when they picked up and re-transmitted television broadcasts.[273] The Supreme Court had determined that cable carriage did not constitute a public performance of the copyrighted programs being carried.[274] That decision allowed cable systems to bring in programming from far away and cable-cast it locally in competition with local broadcasters. This result seemed unfair to local broadcasters, who were paying syndication fees to national networks, only to find themselves in competition with cable companies cablecasting the same programs without paying the same fees—and often with a better quality signal to boot.

The Federal Communications Commission therefore set up a regulatory regime outside of copyright that governed the

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[273] *See* Stanley M. Besen and Robert W. Crandall, *The Deregulation of Cable Television*, 44 L. & CONTEMP. PROBS. 77, 91 (1981) (noting that the then-General Counsel to the FCC, Henry Geller, believed that had the courts declared cable carriage to infringe copyright performance rights, the FCC would have "relax[ed] or eliminate[d] its distant signal rules.").

[274] *See* Fortnightly Corp. v. United Artists Television, Inc., 392 U.S. 390 (1968); Teleprompter Corp. v. Columbia Broadcasting Sys., Inc., 415 U.S. 394 (1974). See the further discussion of these cases in the section titled *Cable*, at page 252.

retransmission practice.[275] The rights inhered not in the content being broadcast, but in the act of broadcasting itself. In short, a parallel set of rights was created to deal with a situation in which copyright rights were found not to apply. But copyright was not eliminated in television programs. To the contrary, such programs are clearly copyrightable as "audio visual works." For many purposes, then, such as the right to produce a video-taped version of a television series, copyright rights in television content will govern the transaction. Yet for other purposes, namely broad- and cablecasting, the rights involved are a complex mixture of copyright law, communications law, and FCC regulations.

Copyright and bailment law

One thing the WWW seems to promote is a reliance on information that is physically stored elsewhere. Research on the Web means finding computerized information that is stored on someone else's computer. This much is quite conventional and well understood today. Interesting evolutions of this basic concept are underway. It is possible already, for example, to use another computer for back-up storage of one's own data. The notion is that most users do not conscientiously back up their own files onto a floppy disk or tape or other mechanism; so a commercial service can arise that provides automatic back-ups over the Internet.[276] This situation is the opposite of conducting research to find information created by others; it is the placement of one's own information elsewhere, in the hands of another.

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[275] *See* Besen and Crandall, *supra* note 273, at 92-93.

[276] *See* James Karney, *Online Storage Services Provide A Virtual Vault for Your Data*, PC WORLD, October 8, 1996, at p. 50 (describing two commercial products, *WebStor* from the McAfee Associates, Inc., and *Surefind* from Surefind Information Inc. Both provide a way for Internet users to back up information on other sites on the network for a monthly fee of about $10.

The situation immediately invokes the common law of bailment. A commercial site that retained information on behalf of others would be a bailee. That would be true if "information" were considered "property" under the common law, as certainly seems the case.[277] So the possibility exists that the law of bailment might come into play. Among other issues that might arise: the storage company "scrambles" the stored data making all or part of it useless; the storage company loses the data through accidental erasure; the storage company goes out of business and the data can no longer be located; the storage company accidentally discloses data to the wrong party; and so on.

Are these actions redressable by copyright law? By bailment law? Does copyright preempt bailment law on this point? Does the answer turn on whether the information is in fact copyrightable or not?

Another twist on this scenario might occur this way. An information supplier sells or licenses a software package to an end user. The package might be computer software in the usual sense of a word processor or spread sheet program, etc., or it might be mostly data, as an encyclopedia, or anything that is intended to be stored on the purchasing user's own hard disk. Suppose the seller conditions the sale on the user's agreement that the user will

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[277] *See, e.g.*, the House Report on extending copyright to dramatic works in 1897, H.R. Rep. No. 1191, pp. 2-3 (because American playwrights have produced works "that have brought credit to us as a nation, [and] constitute *property* in the fullest and best sense of the term, there would seem to be no good reason why this species of literary production should not be surrounded by the same measure of protection as is accorded to other classes of *property*.") (emphasis added); Dowling v. U.S. 473 U.S. 207, 216 (1985) ("Thus, the *property* rights of a copyright holder have a character distinct from the possessory interest of the owner of simple 'goods, wares, [or] merchandise,' for the copyright holder's dominion is subjected to precisely defined limits.") (emphasis added); Harper & Row, Publishers, Inc., v. Nation Enterprises, 471 U.S. 539, 555 (1985) ("The author's control of first public distribution implicates not only his personal interest in creative control but his *property* interest in exploitation of prepublication rights, which are valuable in themselves and serve as a valuable adjunct to publicity and marketing") (emphasis added).

agree to try out the product for some defined period of time--that is, that the user will not remove the program from the hard disk for that time. This is the bailment situation "in reverse," where the buyer becomes, in effect, the bailee. Would such an agreement be based on any copyright rights? Would it be enforceable as a matter of contract law, or would copyright preempt any attempt to enforce the contract? If so, would copyright itself allow the seller to have a remedy?

All these bailment situations have some sort of analog with physical goods being held by a bailee, so in that sense they are not unprecedented. But what makes the situation with stored information interesting is both the novelty of application for bailment law, and even more, the possibility that the Copyright Act's section 301 might preempt bailment law. If so, then the Copyright Act will have to be interpreted to answer questions such as: does copyright ownership of information include the right to prevent that information from being damaged or destroyed?[278]

Traditionally, copyright in the U.S. has not included such rights. They tend to fall under the rubric of "moral rights" and be affiliated with European and other nations' systems of copyright law. But more and more we are harmonizing our intellectual property laws with those of other countries. Specifically, we have included a few, modest, "moral rights" in our copyright law with

[278] The situation here discussed has some similarity to the question whether ownership of copyright reproduction rights confers the authority to demand physical possession of a copy of a work in order to effect one's reproduction right. *See* Community For Creative Non-Violence V. Reid, 1991 U.S. Dist. LEXIS 20227; COPY. L. REP. (CCH) P26,860 (D.C. D.C. 1991) (issuing order permitting sculptor Reid to have temporary access to a sculpture physically in the possession of CCNV for the purpose of making a mold, following the decision in Community for Creative Non-Violence v. Reid, 490 U.S. 730 (1989), *affirming* 846 F.2d 1485 (D.C. Cir. 1988)).

regard to "works of visual art," as already discussed.[279] In terms, such rules would not apply to, for example, information in the form of a file of text. But such a file, stored off-site with a commercial company, could easily be an image or drawing or otherwise fit—or arguably fit, which raises another interesting question of statutory interpretation[280]—within the Act's definition of "work of visual art."

"Pull-down-as-needed" software components

Other instances of dispersed storage are possible. A popular notion these days is that not just "information," but executable computer software, may be stored at dispersed locations around the Internet. One possible future is that users will have no more than a bare-bones set of communications programs stored on a local computer. Whenever the user needs to do anything, like word processing or spreadsheet manipulation, the user will access the WWW and "pull down" for short-term use, whatever bits and pieces of software are needed to accomplish what the user wants to do. This would likely entail "pulling down" software in small components, each of which performs some small function.

For example, if the user desired to do word processing, a rudimentary word processing program would be downloaded on the spot from a Web site somewhere. Whenever a more sophisticated function were needed, say a search and replace function, that function would be downloaded automatically as another component. The running of a spelling check might result in the downloading of yet another component for spelling, and so on.

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[279] See the discussion in the section titled *Works of visual art*, at page 183. Note that the United States also provides some "moral rights" under other bodies of law, such as unfair competition, especially the Lanham Act's section 43(a), which proscribes false designations of origin.

[280] See the prior discussion in the section titled *Works of visual art*, at page 183.

The advantage of this approach to computer software is that the user can always have the latest versions (if desired), and will also only pay for those components actually used. If a given user never used the "equation editor" in word processing, e.g., the user would never download that component and hence would never have to pay for it. Spelling checkers could similarly be customized for different applications. If a user were writing a legal brief, a "legal brief" spelling checker could be downloaded; if writing a letter to a friend, a "letter to friends" spelling checker could be downloaded.

The disadvantage of this approach is the potential for delay. With the current implementation of the WWW, signing on to the Internet and finding the software one wanted and accessing and downloading it would almost certainly be intolerably slow for most people. But that situation could easily change tomorrow: bandwidth is likely to improve; services are likely to be differentially priced, making higher quality of service a possibility for those who are willing to pay for it; and so on.

If this mechanism for software "distribution" were to come into being, what copyright consequences would ensue? The pull-down-as-needed model might alleviate some of the concern that software producers feel about wide-spread copying of their products. Rather than selling "products" as such which, once they reach the hands of consumers, are generally easy to copy, a software company would be selling a service: access to the latest and most appropriate software components. That access would likely be on a subscription basis, and would replace the sale of individual packages with periodic updates. The availability of a constantly changing database of software components, accessible only over a communications link and only on a subscription basis, would make copying the software much harder than if it were a static, stand-alone package.

Copyright and contract law

The pull-down model may also give rise to questions about liability for the failure to supply needed software components when they were needed. On the one hand, the issue might be solely one of contract, likely arising under the new UCC Article 2B if it is adopted.[281] The terms of a subscription agreement would be such a contract, much as users contract with an online services company for services. If the contract called for needed components to be available on such-and-such terms, the only issue between user and servicing company would be whether those terms were satisfied, or how those terms should be interpreted. But in any event, contract law, not copyright law, would be invoked to answer the questions.

On the other hand, we have not fully resolved the matter of copyright preemption of contract law.[282] The particular problem often centers on the boilerplate agreements printed on software packages. Often these agreements are contained inside the package where they are not visible from the outside at the time of purchase. Since many software packages come to market encased

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[281] Most UCC 2B drafts seen by the author have contained a definition of "access contract" similar to this one from the September, 1997, draft: "'Access contract' means a contract for electronic access to a resource containing information … ." In turn "information" is defined to include computer programs. The February, 1998, draft revises the definition slightly, but would still govern contracts for "pull-down" software components as they are described in the text: "'Access contract' means a contract for electronic access to, or electronic information from, a separate electronic resource or facility containing information." UCC 2B, Section 2B-102, Definitions, at 20 (February 1998) (emphasis in original to show changes from previous draft). See generally the discussion in the section titled *Copyright and the Uniform Commercial Code*, at page 231.

[282] *See, e.g.*, I. Trotter Hardy, *Contracts, Copyright and Preemption in a Digital World*, 1995 RICHMOND JOURNAL OF LAW AND TECHNOLOGY, <http://www.urich.edu/~jolt/v1i1/hardy.html> (April 1995). See also sources cited *supra*, note 181.

in a clear plastic wrapper or "shrink wrap,"[283] these contracts are often termed "shrink wrap contracts." The Seventh Circuit has held that a shrink-wrap contract for software was to be interpreted as a valid contract, not preempted by copyright.[284] But an earlier case in the Fifth Circuit, *Vault Corp. v. Quaid Software Ltd.*,[285] held that a state statute validating the terms of a shrink wrap license was preempted by copyright law.

However these cases may play out in the future, there is at least a possibility that some contract terms that take the form of "shrink wrap" licenses might be preempted.

"Web wrap" or "click wrap" contracts

How would this doctrine apply to accessing software components from a Web site? Such arrangements are like subscription services, where the contracts are likely to be less of a shrink wrap and more of a standard contract as one might sign with an OSP or for that matter, a magazine company for a subscription. But that is not the only possible model of component software access. As with factual data like the location of restaurants,[286] another model is the ad hoc arrangement: a user with no previous agreements with a software producer might discover a need for a certain software component "on the fly," so to speak. The user might then request some form of software to travel out over the Web to locate and download the appropriate software component.

If the software component were in fact obtained in that fashion, the supplying software company would almost certainly include the terms and conditions of use as part of a boilerplate document

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[283] The "wrap" obviously refers to the plastic wrapper. The "shrink" part of the term comes from the type of plastic used: it is applied a bit loosely during manufacturing, whereupon it is exposed to a heat source that causes the plastic to shrink and thereafter fit snugly on the cardboard packaging material.

[284] ProCD v. Zeidenberg, 86 F.3d 1447 (7th Cir. 1996).

[285] 847 F.2d 255 (5th Cir. 1988).

[286] See the discussion in the section titled *Factual information*, at page 164.

somewhere.[287] That document would likely reside on the company's supplying Web server computer, where it would receive about the same attention from an accessing user as a shrink wrap license inside a cardboard box receives from a buyer. If so, then it is equally possible that such Web-based contracts, which these days are being called "Web wrap" or "click wrap" contracts, could be preempted by copyright law. The issue has arisen explicitly in the effort to revise the Uniform Commercial Code to include a section, Article 2B, dealing with licenses of information products. Article 2B is addressed in the very next section.

Copyright and the Uniform Commercial Code

Parallel to the Copyright Office's project *Looking Forward*, members of a working group from the American Law Institute and the National Conference of Commissioners on Uniform State Laws have been developing a proposed modification to the Uniform Commercial Code. The proposal calls for a new section, Article 2B, that would deal with license transactions in information and software.

Obviously, "information and software" are part of the subject matter of copyright law; that fact raises the possibility of inconsistency between the new UCC provision and existing or future copyright enactments.

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[287] Here is one typical boilerplate warning on a Web site, appended to a copyright notice: "© 1996, 1997 Scientific American, Inc. All rights reserved. No part of this material may be reproduced, translated, transmitted, framed or stored in a retrieval system for public or private use without the written permission of the publisher." From <http://www.sciam.com/index.html> as of October 20, 1997. Note that the language prohibits "framing," a subject discussed elsewhere in this Report. See the discussion in the section titled *In-line linking and framing*, at page 171.

As with copyright law and the common law of contracts, in principle, no conflict should arise. Reduced to their essentials, copyright law and the Uniform Commercial Code are complementary, not contradictory, bodies of law. Copyright law creates a form of property rights in information. Contract law specifies the terms of contracts relative to that property. Just as a rental car agreement and the rules of personal property ownership over cars would not normally conflict, so copyright and the new UCC law, if adopted, would not necessarily conflict either.[288]

For the most part, the two bodies of law do seem to be complementary, and deliberately so: at one point, the draft's Section 2B-312(b) said that:

> If technical or scientific information is developed during the performance of the agreement, *to the extent that federal intellectual property law does not control*, the following rules apply . . . .[289]

This language allows for the possibility that federal laws like copyright might govern a situation, and if they do, they would prevail. Only if they did not would the terms of the UCC provision apply. That is one mechanism for ensuring that different areas of law remain in their separate spheres without problems of overlap.

Later versions of the draft have taken a different approach to reconciling any potential conflict between copyright and commercial law. The provision just quoted was later revised to read:

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[288] UCC 2B draft dated February, 1998, notes in a preliminary section on *Intellectual Property Overlay* that "A contract defines rights between parties to the agreement, while a property right creates rights against all the world. They are not equivalent." February, 1998 Draft, at 15 (emphasis in original).

[289] UCC 2B draft dated January 20, 1997 (emphasis added).

> If technical or scientific information is developed during the performance of the agreement, *as between the parties*, the following rules apply … .[290]

Again, the provision is designed to prevent any conflict between federal copyright law—which applies to those who are not a party to a contractual transaction—and the UCC law of the states, which would apply only to the parties to a contract.

Still later a new provision was added to the draft explicitly referring to the possibility of federal preemption of contract law:

> A provision of this article which [sic] is preempted by federal law is unenforceable to the extent of such preemption.[291]

The Reporter's notes explain that the possible preemption of an Article 2B provision is itself an issue of federal, not state, law:

> The basic principle of preemption is supplemented in licensing law by the fact that federal competition, antitrust, and intellectual property rules provide a basis for courts to monitor some practices in licensing … . State law cannot control or alter those rulings. They involve determinations about federal law and policy that go beyond state law. Article 2B takes no position on the complex competition, social policy and other issues present here. It simply sets out basic contract principles governing the contractual relationship in information transactions. It governs the contractual relationship, [whereas] federal law and policy determines whether a particular

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[290] UCC 2B draft dated May 5, 1997 (emphasis added).

[291] UCC 2B draft dated September 25, 1997 Section 2B-105. This section was unchanged as of the February, 1998, draft.

> contract in a particular setting is barred by federal law.[292]

This language explains that the existence and resolution of any conflict between copyright and contract law is itself an issue of federal law. As a federal law issue, such conflicts cannot be resolved in a state law like the Uniform Commercial Code.

Other provisions, as proposed, may be less successful in avoiding conflict. One draft of proposed section 2B-307 offers rules on the interpretation of information license transactions. The meaning of the entire provision is not obvious on a first reading:

> A license grants all rights expressly described and all rights within the licensor's control during the duration of the license which [sic] are necessary to use the rights expressly granted in the ordinary course in the manner anticipated by the parties at the time of the agreement. A license contains an implied limitation that the licensee will not exceed the scope of the grant. Use of the information in a manner that was not expressly granted or withheld exceeds this implied limitation unless the use was necessary to the granted uses or would be legally permitted in the absence of the implied limitation.[293]

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[292] Reporter's Note to UCC Section 2B-105, draft dated September 25, 1997.

[293] UCC 2B draft dated September 25, 1997 (Section 2B-307). The February, 1998, draft contained essentially similar language: "A license grants all rights expressly described and all rights within the licensor's control during the duration of the license which [sic] are necessary in the ordinary course to use the expressly granted rights. A license contains an implied limitation that the licensee will not exceed the grant. Use of the information in a manner that was neither expressly granted nor expressly withheld does not breach this implied limitation if the use was necessary to the expressly granted uses, or would be legally permitted in the absence of the implied limitation."

The Reporter's notes help to make clear what might otherwise be difficult to draw out of the last sentence. The provision explains that licenses impliedly restrict the licensee from making any uses of information different from those that are within the scope of the license. If a use of the licensed information is possible that is neither expressly granted nor expressly withheld, the provision creates a presumption that the use may not be made, subject to two exceptions. The licensee may make that unspecified use if first, the unspecified use is necessary to enable the expressly granted uses; or if second, the unspecified use is otherwise legally permitted. The reporter's notes to this section give "fair use under copyright law" as an example of a use that might "otherwise be legally permitted."[294]

This seems to pose no issue for copyright law, but the issue is inherent in the negative implications of the provision. The section deals with implied conditions—that is, the interpretation of a license contract that does not expressly specify anything about a particular use of the licensed information. The implication is that uses "otherwise legally permitted," such as fair use, would *not* be permitted if they are expressly disclaimed. In short, the proposed section embodies a concept that is subject to some disagreement in the copyright community: that the scope of fair use may be eliminated by a license contract, even a "shrink-wrap" or "click wrap" license contract.

At bottom, the issue of tension between contract law such as the UCC on the one hand, and copyright law on the other, can be explained this way:

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[294] "[T]he implied limitation is not exceeded if the use would have been permitted by law in the absence of the implied limitation. Thus, scholarly use of a direct quotation from a licensed text not covered by confidentiality restrictions would likely be a fair use and would not conflict with the implied limitations." Reporter's notes following section 2B-307 (September 25, 1997 draft) (emphasis in original).

As the February, 1998, UCC-2B draft notes, property law provides ownership rights. Contract law governs the terms on which ownership rights are waived. If federal law is the source of property rights, and state law the source of contract rights, no conflict arises. In general, that is the case: federal copyright law provides a property right in information; contract law governs the terms on which those rights are waived by their owner. But if copyright law defines more than just ownership rights—if it also defines the terms on which ownership rights are waived by their owner—then federal law is to some extent a form of contract law. And to that extent, this form of federal "contract" law may well conflict with state contract law.

The difficulty here, and the source of arguments among various copyright interest groups, is that parts of the copyright law like the fair use provision can be viewed as a limit *either* on property rights, *or* on contract terms. If viewed as the former, no conflicts are created with the UCC-2B's section 2-307. If viewed as the latter, copyright law might preempt the section in some contexts.

6. Analysis

Even though the Internet is new and poses new challenges for our copyright law, "technology" as such and a constant change in technology are certainly not new. To the contrary, inventors and innovators and entrepreneurs have been changing the landscape of American life ever since the country's founding. Not surprisingly, copyright law has had to accommodate new technologies repeatedly over the two centuries of its existence.

The previous sections of this Report have focused on particular Internet technologies and the copyright issues those technologies raise. This section looks back in time to earlier technologies and copyright issues. With the perspective of history, one can see that the intersection of copyright law and new technologies gives rise to broadly similar issues time and time again. Those issues, or "patterns" as this Report calls them, can be summarized as issues of new copyright subject matter, new uses of existing copyrighted works, and decentralized infringement.

This final section of the Report describes these recurring patterns and puts Internet and copyright issues within their context.

6.1 Three Patterns of Copyright and New Technology

Changes in technologies have historically given rise to new copyright issues. In looking over a number of past and present technology-related copyright questions, one can see that the changes, whether raised by interpretative difficulties, or changing factual assumptions, or for any other reason, tend to fall into a few familiar patterns. The most frequent patterns are three:

1. New subject matter questions
2. New use questions
3. Decentralized infringement questions

New subject matter

Some technologies create a new type or a new medium of expression. They give rise to the "subject matter" question: should the new type of expression, or the expression that is recorded in a new medium, fall within copyright's subject matter—i.e., be appropriate for copyright's protection?

The question really applies in two different contexts. The first is that of a new form of "work" that exists regardless of the medium of its fixation. "Sound recordings," for example, can exist in a variety of media: phonograph records and piano rolls from the turn of the century; audio CDs; computer hard disks; etc. The second context is that of the medium itself. If "music" in sheet music form is copyrightable, then is music when it is recorded on a phonograph? As we will see, this second question has largely been resolved today under the 1976 Act, though the first question has not been.

Throughout its 200-year history, copyright law has seen a steadily expanding list of copyrightable "subject matter"—things that were determined, by judicial interpretation or by statute, to be appropriate for protection under copyright. The first copyright statute, enacted in 1790, included simply "maps, charts, and books" within its protection.[295] Today's copyright law has seen protection extended to musical works, dramatic works, sound recordings, works of pantomime, computer programs, computer screen displays, architectural works, and more.

These subject matter expansions have arisen for different reasons. Some were necessary to accommodate truly new technologies: photography, for example, was a relatively new medium when Congress determined to add "photographic prints" as a distinct category of copyrightable work in 1865.[296] Other expansions have not been in response to technological changes, but to changing perceptions of existing technologies or of the need for their protection. Musical compositions, for example, have been with us for a very long time; yet, they were subsumed under the copyright category of "books" until being added explicitly to the statute as copyrightable subject matter in 1831.[297] Similarly, the right to perform dramatic works—also of ancient origin—was not given explicit copyright protection until 1856.[298]

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[295] Act of May 31, 1790, 1st Cong., 2d Sess., 1 Stat. 124.

[296] Act of March 3, 1865, 38th Cong., 2nd Sess., 13 Stat. 540. *See* CONG. GLOBE, 38th Cong., 2nd Sess. 1337 (1865).

[297] Act of Feb. 3, 1831, 21st Cong., 2d Sess., 4 Stat. 436. Protection was available from the very first Copyright Act for "books." Composers who sought protection for sheet music could therefore register their music as a "book."

[298] See 11 Stat. 138 (1859).

New use of existing works

Second, some technologies create a new way of using existing copyrighted works. These technologies give rise to the "new use" question: does the new use of an existing copyrighted work infringe the author's rights? For example, musical compositions as such were copyrightable after 1831, well before the advent of radio in the 1920's. When radio stations began playing musical compositions "on the air," however, litigation soon arose over whether such a playing constituted a "performance for profit" of the composition—and hence a copyright infringement under the 1909 Act.

The situation was precisely the same with the arrival of cable television in the 1960's. Cable television began as a means of strengthening the signal of distant broadcast stations, especially in the valleys of mountainous areas. These cable stations picked up broadcast signals from the airwaves and passed them along to cable subscribers without seeking permission from the broadcast stations or paying royalties. Again, litigation arose over whether such re-transmission by cable constituted a "public performance" within the scope of the copyright owner's rights.

"Decentralized infringement"

Finally, some technologies neither create new forms of expression nor allow new ways of using existing expression, but rather make methods of infringement far cheaper than before and harder for copyright owners to discover. This sort of technological development raises what can be called the issue of "decentralized infringement."

The photocopier and the video recorder are obvious examples of dramatically lowered cost of making copies of paper documents and television programs. The advent of 8-track audio cassette technology in the 1960's gave rise to a bootleg industry for

copying and selling the tapes. Making such copies was lawful under federal law until 1972.[299] Similarly, the rise of digital technologies has made copying far cheaper and more widespread than was once the case. The issue here is: how should copyright law respond? Should these decentralized infringements be declared no longer infringing? A fair use? Should copyright owners assert their rights when they can, and let the undetected infringements continue?

[299] *See* Pub. L. No. 92-140, 85 Stat. 391 (1971); *see also* Goldstein v. California, 412 U. S. 546 (1973) (discussing California's state law approach to the problem).

Another pattern: contract interpretation

These three types of issues are not the only ones that are worth thinking about. Another recurring theme in the history of copyright and new technology is the difficulty of contract interpretation. It often happens, for example, that as technology changes, the parties to copyright licensing agreements disagree over how the contract applies to the new technology. For example, a contract that granted "dramatic rights" in 1880—before the invention of the motion picture—might cause a dispute over whether the granted rights include "motion picture rights" some twenty years later, when motion pictures had been invented;[300] or a grant of "motion picture rights" in 1923, when "talkies" were not commercially viable, included the right to make a talking version of the movie years later, when they were;[301] or a grant of rights in 1939 to include an orchestra's performance in a "feature picture" might cause a dispute fifty years later over whether that clause included distribution in the form of "video cassettes;"[302] or a grant of publication rights in free-lance articles for newspapers and magazines between 1990 and 1993 might cause a dispute in 1997 over whether inclusion of the articles' text in electronic databases was within the publishers' right to revise "collective works."[303]

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[300] *See* Kalem Company v. Harper Brothers, 222 U.S. 55 (1911); *see also* G. Ricordi & Co. v. Paramount Pictures, Inc., 89 F.2d 469 (2d Cir. 1951) (dramatic rights granted in 1901, before movies were widely popular).

[301] *See* L. C. Page & Co., Inc. v. Fox Film Corp., 83 F.2d 196 (2d Cir. 1936).

[302] *See* Philadelphia Orch. Ass'n v. Walt Disney Co., 821 F. Supp. 341 (E.D.Pa. 1993).

[303] *See* Tasini v. New York Times Co., 93 Civ. 8678 (S.D.N.Y. Aug. 13, 1997), 1997 U.S. Dist. LEXIS 11988.

These issues are troublesome and often expensive for the parties to resolve, but they tend to be self-correcting. They are matters of contract, not of overall law or policy, and parties to future contracts can adapt those contracts to changing times.

The focus of this Report is on matters important to the government's policy-making function; the Report therefore does not address issues of contract interpretation, even though they are issues that arise because of new technology.

6.2 History and Analysis of the Three Patterns

In each of these problem areas—subject matter, rights, and decentralized activities—our legal system has shown a variety of responses.

Subject matter: issues

The issue of photography as a new type of copyrightable subject matter was litigated in 1866;[304] the court concluded that photographs did not fit within any of the existing categories of protectible subject matter and hence were not copyrightable.[305] The decision was moot, however, because by the time the court decided the case, on the basis of facts that had arisen a few years earlier, Congress had extended protection to photography as copyrightable subject matter through a legislative enactment.[306] The enactment appears to have generated almost no commentary or argument in Congress.[307]

The status of motion pictures as a subject matter of copyright was first resolved not by Congress but by court decision, a decision in which protection was extended by analogy to the already-

[304] Wood v. Abbott, 30 F. Cas. 424 (S.D.N.Y. 1866).

[305] Wood, 30 F. Cas. at 425.

[306] Act of March 3, 1865, 38th Cong., 2nd Sess., 13 Stat. 540.

[307] Senator Edgar Cowan first reported a bill to include photography within copyright's subject matter, Senate Bill No. 468, on February 22, 1865; the bill was promptly passed. *See* CONG. GLOBE, 38th Cong., 2nd Sess. 981 (1865). About a week later, the same bill was passed by the House without objection. *See* CONG. GLOBE, 38th Cong., 2nd Sess., 1337 (1865). The next day, March 3, 1865, President Lincoln signed it into law. *See* CONG. GLOBE, 38th Cong., 2nd Sess., 1337 (1865).

protected subject matter of still photographs.[308] The court concluded that a movie was essentially a long—a very long—photograph.

Sound recordings as copyrightable subject matter generated enormous controversy during the 1905 and 1906 hearings on what became the 1909 Act.[309] At issue then were piano rolls and phonograph records. Were such fixations of sounds copyrightable? The debate was strident enough that nothing was done under copyright law to protect sound recordings until 1971.[310] That protection was continued under the 1976 general revision, though with certain limitations not applicable to other subject matter.[311]

Much attention was focused on the subject matter question in the 1976 revision, with the goal of trying to craft a statute that would not require frequent amendments as technology continued to evolve. For the problem of recurring inventions of new media of fixation, this effort was largely successful. The approach used was that of "generalizing" copyright's subject matter to make it independent of any particular medium of expression. We have moved over the last 200 years from a Copyright Act that protected "maps, charts, and books,"[312] a list that as noted emphasizes tangible media, to today's Act that protects "works of

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[308] Edison v. Lubin, 122 F. 240 (3d Cir. 1903). Congress later amended the Act to provide explicit recognition of motion pictures as part of copyright's subject matter. *See* Act of August 24, 1912, 37 Stat. 488.

[309] *See Revision of Copyright Laws: Hearings Before the Joint Committee on Patents*, 59th Cong., 1st Sess., (June 1906), *reprinted in* E. FULTON BRYLAWSKI, 4 LEGISLATIVE HISTORY OF THE 1909 COPYRIGHT ACT, Part H (1976) [hereinafter BRYLAWSKI].

[310] See 1971 amendments to the Copyright Act, *supra* note 299.

[311] Authors of sound recordings, unlike other authors, have no right to control the public performance of their works, 17 U.S.C. §§ 114, 115, other than a narrowly defined right in relation to digital audio transmission. 17 U.S.C. § 1001 et seq.

[312] See the first federal copyright law, *supra* note 295.

authorship," a phrase chosen to emphasize the abstract "work" rather than the medium in which the work is embodied. By leaving copyright's subject matter as an abstraction, today's statute accommodates tomorrow's new media of fixation, whether "now known or later developed,"[313] more easily than almost any other issue raised by new technology.

Subject matter: analysis

"More easily" does not mean "with no difficulty whatsoever." Even under the 1976 Act, subject matter issues that spring from new media of fixation have not always been resolved as cleanly and simply as the statutory language suggests. Notably in the 1980's, it took a major, highly contested case, *Apple Computer v. Franklin Computer Corporation*,[314] to determine that although computer programs written on paper or on a disk were the subject matter of copyright, so were computer programs fixed in read-only memory. One would have thought that the "medium-neutral" design of the 1976 Act would have made this an easy answer to reach.

But in general, questions about new subject matter that arise from new media of fixation are likely to be less difficult than other issues, namely the development of new types or categories of subject matter. Perhaps the best recent illustration of this problem was the First Circuit's decision in *Lotus v. Borland*,[315] a case involving the question of extending protection to the menu command structure of a computer program.

The court's analysis centered on the idea-expression dichotomy, and particularly on whether the menu hierarchy was a "method

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[313] 17 U.S.C. § 102(a).

[314] 714 F.2d 1240 (3rd Cir. 1983).

[315] Lotus Development Corp. v. Borland International, Inc., 49 F.3d 807 (1st Cir. 1995), *affirmed by an equally divided Court*, 516 U.S. 233 (1996).

of operation."[316] But for purposes of this Report, the case can also be characterized as one in which the "thing" in question was a "work of authorship," but did not clearly fall within one of the existing categories of protectible works, even the most applicable one of "literary works."[317]

We can certainly treat a menu command structure as a "work of authorship" because it was created by human beings exercising originality, choice, selection, and the like.[318] The command structure was not as clearly a "literary work," however. The argument against its being one rests on arguing that "literary work" has acquired some sort of gloss—perhaps that a literary work is "linear"—appears in left-to-right or top-to-bottom sequence.[319] A menu command structure is not linear; it is hierarchical and rarely appears to its users even as a complete hierarchy. It has a kind of three-dimensional quality to it that makes it seem quite different from more traditional "literary works." On the other hand, the menu command structure can be described in words, numbers, or other indicia;[320] or it can be

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[316] The Court concluded that the Lotus 1-2-3 menu hierarchy was a "method of operation" and was hence not copyrightable. Lotus Development Corp., 49 F.3d at 815.

[317] In the actual case, the court did not address the issue whether the menu command structure was a "literary work" or a "work of authorship" generally. The closest it came was an implication that the menu hierarchy might be "original expression," therefore further implying that the hierarchy might also be an original work of authorship: "[W]hile original expression is necessary for copyright protection, we do not think that it is alone sufficient. Courts must still inquire whether original expression falls within one of the categories foreclosed from copyright protection by § 102(b), such as being a 'method of operation.'" 49 F.3d at 818

[318] The author does not argue that his analysis is "correct" and certainly not that the court's analysis the case was "wrong." The analysis is put forward instead to make a point about the case—and by extension, the broader problems of copyright and new technology—by putting it in a perspective that happens to be different from that of the court's.

[319] This gloss of "linearity" is not identified in any literature of which the author is aware.

[320] 17 U.S.C. § 101, definition of "literary work."

assimilated to a pictorial or architectural drawing in the form of words on a flow chart. Thus, one can also argue that menu structures do fit comfortably within the category of literary works.

Lotus can be seen as falling in between the cracks of the subject matter definition: a "work" but not clearly a "literary work." As such an in-between case, *Lotus* was destined to give the courts interpretative trouble in spite of the high level of generality that the 1976 Act gives to the concept of "work of authorship."

New uses: issues

For new uses, our legal system has responded in a variety of ways, but we have never developed a highly general strategy for dealing with new uses in the way that we have for dealing with new subject matter. An informal look at the history of new uses shows that they have always been more contested and controversial than the subject matter question, even before the 1976 Act's divorce of "work" from "medium" made the latter issue easier to resolve. We have a number of examples.

New uses of music

Both the phonograph (and piano rolls) at the beginning of the 20th century, and radio around the 1920's, were new means of using existing works: musical compositions. We can look at both, starting with the phonograph.

Composers of the 1900's era wanted to be able to collect royalties from phonograph and piano roll companies that hired orchestras to record their compositions. The law at that time did not give them the right to do so. The issue was cast in the form of a decision whether or not the new use constituted an unauthorized "copy" of the existing work.

The argument whether it should be considered a copy arose during the Congressional hearings leading up to the 1909 Act.[321] Debates in the hearings were long and rancorous, with enormous amounts of testimony and debate over that single issue. At the time, composers' primary source of income was apparently the sale of sheet music to individuals and to orchestras and bands for live performances. "Music in the home" meant a family member playing the piano live, using sheet music of the latest popular tunes or classics. Popular composers like Victor Herbert and John Philip Sousa made large sums of money from these sheet music sales.[322] Consequently, nearly all participants on both sides of the debate focused on sheet music sales: whether a composers' right to control the making of recordings would help or hurt composers' income from the sale of sheet music.[323]

Compulsory license resolution

The debate was resolved by a compromise in the form of a "compulsory license,"[324] but the essential lesson of the story is that the sheet music market for home sales eventually dried up,

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[321] Three hearings took place, in June of 1906; again in December of that year; and finally, in March of 1908. *See* REVISION OF COPYRIGHT LAWS: HEARINGS BEFORE THE JOINT COMMITTEE ON PATENTS, 59th Cong., 2d Sess., (June 1906), *reprinted in* 4 BRYLAWSKI, *supra* note 309, Part H at 102 (1976); REVISION OF COPYRIGHT LAWS: HEARINGS BEFORE THE JOINT COMMITTEE ON PATENTS, 59th Cong., 2d Sess., (Dec. 1906), *reprinted in* 4 BRYLAWSKI, *supra* note 309, Part J (1976); REVISION OF COPYRIGHT LAWS: HEARINGS BEFORE THE JOINT COMMITTEE ON PATENTS, 60th Cong., 1st Sess., (Mar. 1908), *reprinted in* 5 BRYLAWSKI, *supra* note 309, Part K (1976).

[322] Sousa was described by one witness at the hearings as someone who "bestrode the musical world like a colossus." 4 BRYLAWSKI, *supra* note 309, Part H at 145 (statement of S. T. Cameron representing the American Graphophone Company). Sousa himself noted that "You can take any catalogue of records of any talking machine company in this country and you will find from 20 to 100 of my compositions on it." 4 BRYLAWSKI, *supra* note 309, Part H at 24 (statement of composer John Philip Sousa).

[323] *See, e.g.*, 4 BRYLAWSKI, *supra* note 309, Part H at 333 (statement of Paul H. Cromelin, representing the Columbia Phonograph Company) ("We claim, gentlemen, that there has been no more potent influence than the talking machine and the piano player and these various mechanical devices in bringing about [an increase in sheet music sales of 163 percent in six years].").

[324] Act of March 4, 1909, 35 Stat. 1075, § 1(e).

more or less killed off by the phonograph and the soon-to-be invented medium of radio.[325] Certainly today, the market for "music in the home" is satisfied by sales of recorded music (CD's, tapes, etc.) that exceed by orders of magnitude the market for sheet music sales.

Radio

Radio has a different history. As with the advent of the phonograph, the advent of radio marked a new use of existing musical compositions. Again, not surprisingly, composers wanted the right to demand royalties from radio broadcasts of their music. The first battleground was in the courts, not in Congress. The Copyright Act of 1909 had consumed enormous Congressional energies and had been enacted with great fanfare. Had radio existed at the time, it doubtless would have consumed even more Congressional time and attention. But as it was, the issue whether radio infringed the rights of the composer's whose music it played arose a bit later, the first case, *M. Witmark & Sons v. L. Bamberger & Co.*, appearing in a New Jersey court in 1923.[326]

The question at that time centered on whether radio airplay of music was "for profit." The statute granted composers a right to license "public performances for profit."[327] That playing a song over the radio constituted a public performance was not in

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[325] By 1924, roughly 7 to 8 million phonographs were in use, compared with about 5 million pianos and less than a million player pianos. COPYRIGHTS: HEARINGS ON H.R. 6250 AND H.R. 9137 BEFORE THE COMM. ON PATENTS, 68th Cong., 1st Sess. 168 (1924) (Statement of E.C. Mills). Later, it was radio that nearly drove the phonograph recording business out of business. *See* ROLAND GELATT, THE FABULOUS PHONOGRAPH: FROM EDISON TO STEREO 265 (1965) ("by January 1933, the record business in America was practically extinct").

[326] M. Witmark & Sons v. L. Bamberger & Co., 291 F. 776 (D.N.J. 1923).

[327] 1909 Act, § 1(e) (Composers "have the exclusive right … [t]o perform the copyrighted work publicly for profit … .").

question;[328] the contention was over whether such a performance was "for profit," given that radio stations then, as today, did not charge their listeners a fee. The court held that radio airplay of music was "for profit," inasmuch as the radio station in question was set up and operated by a department store that advertised itself on the radio and that sold radios and similar equipment.[329]

Legislation to provide immunity to radio stations, premised on assumptions that radio stations were operated for good will purposes and had no means of obtaining revenue, was introduced in Congress shortly after the *Witmark* case, in 1924.[330] The sponsor, Senator Dill, argued that listeners would never tolerate advertising on the radio and hence that "Congress ought to encourage free radio to the great masses of our people by providing that th[e] copyright law should not apply."[331] Dill feared that, if radio broadcasters were forced to pay copyright fees, "good up-to-date music" would be driven off the air or little stations would be driven out of business.[332]

The bill did not pass. Less than two years later, further hearings showed that in that short intervening time, seventy percent of all

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[328] Although the *Witmark* court did not treat the issue of whether radio broadcasts were public performances as an open question, the issue was in fact litigated a few years later in Jerome H. Remick & Co. v. American Automobile Accessories Co., 5 F.2d 411 (6th Cir. 1925) (finding that radio broadcasts were a "public performance").

[329] *Witmark*, 291 F. at 779.

[330] *See* TO AMEND THE COPYRIGHT ACT: HEARINGS ON S. 2600 BEFORE THE SUBCOMM. OF THE COMM. ON PATENTS, 68th Cong., 1st Sess. 1 (1924).

[331] TO AMEND THE COPYRIGHT ACT: HEARINGS ON S. 2600 BEFORE THE SUBCOMM. OF THE COMM. ON PATENTS, 68th Cong., 1st Sess. 4 (1924).

[332] TO AMEND THE COPYRIGHT ACT: HEARINGS ON S. 2600 BEFORE THE SUBCOMM. OF THE COMM. ON PATENTS, 68th Cong., 1st Sess. 5 (1924).

radio broadcasts had begun carrying paid-for advertising that generated cash income to the stations.[333]

Since the *Witmark* decision and the failure of various bills of the day to attain majority support, radio stations have been subject to a requirement for obtaining licenses to broadcast copyrighted music. In practice, the licensing is handled through musical licensing collectives like ASCAP and BMI.

Cable

Other technologies help to fill out the picture of diverse treatments of different new uses of copyrighted works. Cable television[334] arose as a way of bringing broadcast television to a wider audience. Rural homes in the 1950's, especially those in valleys or on the far side of mountains, were often unable to receive television signals with sufficient clarity.

It seemed a logical improvement for someone to erect a large receiving antenna on, say, the top of a mountain, and "pipe" the received signal along a wire cable to those rural homes. Even the early name for cable reveals these origins. The first term coined was "CATV," which stood for "Community Antenna Television."[335] Quite simple in concept, the idea of bringing television signals over a wire instead of through the air, was novel. Initially it was seen as merely an adjunct to or extension of

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[333] TO AMEND THE COPYRIGHT ACT: JOINT HEARINGS ON S. 2328 AND H.R. 10353 BEFORE THE COMM. ON PATENTS, 69th Cong., 1st Sess. 5 (1926).

[334] Parts of the discussion of cable television have been drawn from I. Trotter Hardy, *Computer RAM "Copies:" Hit or Myth? Historical Perspectives on Caching as a Microcosm of Current Copyright Concerns*, *supra* note 104.

[335] *See* Fortnightly Corp. v. United Artists Television, Inc., 392 U.S. 390, 391 (1968). *See also* MARY ALICE MAYER PHILLIPS, CATV: A HISTORY OF COMMUNITY ANTENNA TELEVISION 4 (1972).

broadcast television.[336] But it was successful, and the cable industry began to grow.

Not surprisingly, the copyright owners of the television programs being picked up by cable receiving antennas and transmitted to additional homes began to demand royalty payments from the cable companies. These demands were refused; lawsuits for copyright infringement followed shortly thereafter. Two similar cases involving these facts reached the U.S. Supreme Court a few years apart, in the *Fortnightly*[337] and *Teleprompter*[338] cases.

The issue in both cases was whether a cable station that, without authorization, received and further transmitted a copyrighted program should be held to be a copyright infringer.[339] Plaintiff's theory was that such a transmission constituted a "performance" of the copyrighted works. As the performances were to the public and for profit (cable companies were not, to put it in Justice Holmes's famous words, "eleemosynary institutions"[340]), and were accomplished without permission or royalties, plaintiffs argued that they infringed their copyright rights.

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[336] *See Fortnightly*, 392 U.S. at 399 ("Essentially, a CATV system no more than enhances the viewer's capacity to receive the broadcaster's signals … .") and 400 ("Broadcasters procure programs and propagate them to the public; CATV systems receive programs that have been released to the public and carry them by private channels to additional viewers.").

[337] Fortnightly Corp. v. United Artists Television, Inc., 392 U.S. 390 (1968).

[338] Teleprompter Corp. v. Columbia Broadcasting Sys., Inc., 415 U.S.. 394 (1974).

[339] *Fortnightly* dealt with broadcast signals picked up from the local area and transmitted over cable. *Teleprompter* dealt with broadcast signals picked up from distant markets. For purposes of the discussion in this report, both raise the same issues.

[340] Herbert v. Shanley, 242 U.S. 591 (1917). One early cable system was created by John Walson, part owner of an appliance store, in 1948 to boost sales of television sets in the local, rural area. Initially given away, this cable service proved so popular that the very next year, 1949, Walson began charging $100 installation fee and $2 per month. PHILLIPS, *supra* note 335, at 8-9.

The defendant cable companies argued, quite straightforwardly, that merely by picking up a signal and passing it on, they did not "perform" anything.[341]

Conclusion: no liability

The Supreme Court found for the defendant cable companies, determining that cable systems did not "perform" the shows they transmitted. This conclusion was founded largely on the reasoning that cable companies were merely passive carriers[342] that did not rise to the level of "performing" in the ordinary sense of that term—or as the Court put it, "Broadcasters perform. Viewers do not perform."[343] The Court viewed cable as merely an extension of broadcast television: it noted that cable systems "have nothing to do with sponsors, program content or arrangement. They sell community antenna service to a segment of the public for which [broadcasters'] programs were intended but which is not able, because of location or topographical

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[341] "The petitioner maintains that its CATV systems did not 'perform' the copyrighted works at all." *Fortnightly*, 392 U.S. at 394.

[342] Note that the cable companies were not "passive carriers" as that term is often used in connection with telephone companies or Internet Service Providers. In the latter cases, the carrier is in a contractual relation with the sender of the information in question. With the cable companies, there was no contractual relation with the sender—the broadcasting companies—at all. In addition, cable companies have the ability to choose what signals to receive and re-transmit, and to what audiences they will perform the retransmission.

[343] *Fortnightly*, 392 U.S. at 398. The Court announced that it would not simply look to the ordinary meaning of the word "perform," noting instead that "at the outset it is clear that the petitioner's systems did not 'perform' the respondent's copyrighted works in any conventional sense of that term, or in any manner envisaged by the Congress that enacted the law in 1909. But our inquiry cannot be limited to ordinary meaning and legislative history … ." *Fortnightly*, 392 U.S. at 395 (footnotes omitted). But in fact, the majority opinion largely *did* limit itself to ordinary meaning, especially in concluding that: "Broadcasters perform. Viewers do not perform. Thus, while both broadcaster and viewer play crucial roles in the total television process, a line is drawn between them. One is treated as active performer; the other, as passive beneficiary." *Fortnightly*, 392 U.S. at 398-99 (footnotes omitted).

condition, to receive them without rebroadcast or other relay service by community antennae ...."[344]

Cable grew big

The cable industry did not long remain merely an adjunct to broadcast television. Although its growth has been heavily influenced by a variety of FCC rulings so that we cannot ascertain what "pure" economic and "pure" copyright forces might have brought about, we can say at least that when Congress revised the Copyright Act in 1976, the cable industry was a major economic force. By roughly the mid-1970's, nearly 3500 cable operators served 7700 communities, reaching 10.8 million homes and earning revenues of $770 million.[345] Cable was well beyond the point of simply extending existing broadcast signals to a wider and rural audience. It had become an alternative network, competing with broadcast networks[346]—and for that matter, growing much more rapidly in urban, affluent areas than among the rural poor.[347]

Very much as had happened with recorded sound a generation earlier, debates over cable's copyright obligations raged back and forth during the negotiations, studies, and hearings on the 1976 Act.[348] In the end, as with the phonograph, a compromise was reached: cable companies would pay a royalty, but the royalty

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[344] *Fortnightly*, 392 U.S. at 401.

[345] H.R. Rep. No. 94-1476 at 88.

[346] II PAUL GOLDSTEIN, COPYRIGHT, *supra* note 108, § 5.8.2 at p. 642.

[347] *See* PHILLIPS, *supra* note 335, at 171-72 ("industry leaders have recently expressed concern for a *neglected* sector of the American public—the rural dweller.") (emphasis added; statement published in 1972).

[348] *See* Jessica D. Litman, *Copyright Legislation and Technological Change*, 68 ORE. L.REV. 275, 332 (1989) ("It took eleven years and the combined efforts of the Copyright Office, the bar associations, the House and Senate Subcommittees, the FCC, and the White House Office of Telecommunications Policy to force interested parties to reach an agreement on the revision bill's treatment of cable television.").

would be fixed by Congress and copyright owners would have no choice but to accept that royalty.[349]

New uses: analysis

Why so many dilemmas over new uses? In part the issues arise so often because the 1976 Act deals with "new uses" in the form of copyright "rights," and these rights are defined in terms of current technologies to a far greater extent than copyright's subject matter is defined. One early question that arose with regard to the World Wide Web, for example, was whether "posting" a document on an Internet-connected machine is a "public distribution," or the making of copies, or the contribution to the making of copies, etc. One reason we have to struggle with that factual setting is that the notion of "copying" or "distributing" is premised on some sort of physical medium—whereas copyright's notion of subject matter is not similarly premised.

These past "new use" technologies[350] show that different technologies receive different legal treatment regarding the question whether the new use infringes copyrights. Of the three illustrations of the phonograph, radio, and cable television, all were exemplified by an initial few years of no infringement liability—the years before any infringement suits were filed, or before Congress enacted legislation. After that, they differ. Radio from early on was subject to private contractual arrangements under a regime of normal copyright liability, established by judicial decision. Phonograph recording was heavily debated in Congress, and was subjected to a compulsory license. Cable

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[349] *See* Jessica D. Litman, *Copyright, Compromise, and Legislative History*, 72 CORNELL L.REV. 857 (1987). *See also* the current statute, codified at 17 U.S.C. § 111.

[350] The author has chosen industries that he thinks are representative of various approaches taken. The list is not intended to be exhaustive or statistically significant.

television was found to bear no infringement liability by the Supreme Court, and then fell under a compulsory license regime adopted by Congress in the 1976 Act.

Despite these differing legal outcomes, the new use issue unfolds in a surprisingly predictable way. When a new use of copyrighted works arises, made possible by some technological development, the debate over requiring that new-use industry to pay royalties takes about the same form each time. On the one hand will be the copyright owners' arguments that "this is my music / writing / software / computer interface / etc., I own it, and I should have a right to a share of the money that others make from its use." On the other will be the argument that "these works are already in existence, we are simply promoting the sales of your works in other markets, and consequently no further incentive in the form of a right to receive royalties is necessary." And if the facts support the claim, the additional argument may be made that "we have already paid for the use in some existing medium."

Representatives of the phonograph recording industries in the 1900's strongly argued to Congress that records merely served as advertising for the sheet music market;[351] radio station owners in the 1920's argued that radio served similarly to advertise the sales of sheet music;[352] library photocopying of journal articles in the 1950's and 1960's was described by some as primarily an advertisement for the journals;[353] the Supreme Court found that

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[351] See text accompanying note 323, *supra.*

[352] *See* TO AMEND THE COPYRIGHT ACT: HEARINGS ON S. 2600 BEFORE THE SUBCOMM. OF THE COMM. ON PATENTS, 68th Cong., 1st Sess. 31-32 (1924) (statement of Charles H. Tuttle of the National Association of Broadcasters).

[353] John C. Koepke, *Assessment of Documentation Practices in Reprography*, *in* REPROGRAPHY AND COPYRIGHT LAW 50, 53 (Lowell H. Hattery and George P. Bush, eds. 1963) ("The small journal will tell you that photoduplication actually increases its circulation rather than decreases it. … We have talked to many librarians who have told us that, after seven or eight requests for an article that may have appeared in a rather obscure journal, they have found it desirable to begin to subscribe to the journal … .").

cable television in the late 1960's merely promoted broadcast television;[354] more recently, representatives of a World Wide Web news site argued that "framing" others' web sites benefited the sites framed.[355]

The right question about incentives

Unfortunately, these arguments about incentives miss the mark. The question is not whether an incentive is necessary when works of authorship like music already exist and a technology like the phonograph or radio or cable television is new. The question is rather whether the new technology will grow sufficiently important that it will displace existing uses—the uses that do generate royalty income and hence provide a present incentive. If the new use industry ends up displacing present uses, then a new incentive in the form of royalties from the new industry's use will be needed. If it does not, then a new incentive is not needed.

The problem, of course, is that without foresight, neither Congress nor the courts can know which growth path a new-use industry is likely to follow. Will the new use remain forever an aside to some existing market, potentially[356] only a minor source of income to copyright owners; or will it outgrow and dominate that existing market, potentially becoming the major source of income for copyright owners; or something in between?

The problem therefore reduces itself to a familiar one: decision-making under uncertainty. The decision-maker must approach a copyright new use question with the understanding that accurate predictions of the future are impossible.

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[354] See note 336 and accompanying text, *supra.*

[355] "'A lot of news organizations are very pleased by what [TotalNews is] doing,' because TotalNews generates more visitors to their sites, said Lisa Farringer, a Washington attorney representing TotalNews." David S. Hilzenrath, THE WASHINGTON POST, Feb. 11, 1997, Tuesday, Final Edition, at D01.

[356] The new use is only "potentially" a source of income because whether it is or is not an actual source depends on how the copyright issues are decided.

Decentralized infringement: issues

For decentralized infringement, the history is much the same as with new subject matter and new uses questions: different technologies have received different responses.

The decentralization issue often springs from changing costs that make certain uses of works so cheap that they are no longer centralized and hence no longer "visible" or readily controllable by copyright owners. But it is not just *advances* in technology that can bring about this situation. In the 19th century, for example, it was common for "hit-and-run" theater troupes to travel to small towns in the United States and give unauthorized play performances. The technology of communications and transportation—in those pre-telephone, pre-airplane days—was such that it was hard for a rights organization in, say, New York, to learn of a traveling troupe performing for one or two days at a small town in the Midwest in time to do anything about it. As a House Report noted in 1894, in regard to the "professional play pirate": "It is difficult and in many cases impossible to serve him with injunctions and court orders, because of his migratory habits; and as he is in almost every instance entirely without attachable means, it is impossible to satisfy a money judgment against him, however culpable he may be, and whatever injury he may have occasioned to the author or owner."[357]

Eventually, Congress responded to these hit-and-run drama performances with an amendment to the Act that sharply increased the penalties for infringement of dramatic works, hoping perhaps to provide greater deterrence through greater punishment.[358]

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[357] H.R. Rep. No. 1191-53, at 2 (1894).

[358] *See* H.R. Rep. No. 1191-53, at 2 (1894).

More commonly, the situation does, however, relate to advances in technology. Photocopy machines in the 1950's and 1960's make such an example. Much debate went on in CONTU over photocopying's significance for copyright law.[359]

Private guidelines

One result of the deliberations over photocopying was that Congress essentially immunized certain actors—principally libraries—for providing photocopy machines, as long as the requisite notice about copyright was clearly posted. It left the liability of individuals who make photocopies to be assessed on a case-by-case basis as a matter of fair use. Additional guidelines came as a result of private bargaining between affected interest groups in the form of the "educational fair use guidelines."[360] In essence, these guideline constitute a kind of "promise" or "assurance" from various copyright owners that if various copyright consumers (like "educational institutions") make no more than some defined amount of copying of copyrighted works, the owners will not sue for infringement. The agreements do not have the force of law and are not legally binding[361]—certainly not on any organizations that were not a party to the discussions. Moreover, they say nothing about the results of copying that exceeds the guidelines: such copying may or may not constitute a fair use of the works in question.[362]

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[359] *See* CONTU REPORT, *supra* note 232, at 47-78.

[360] AD HOC COMMITTEE ON COPYRIGHT LAW REVISION, AUTHORS LEAGUE OF AMERICA, AND ASSOCIATION OF AMERICAN PUBLISHERS, INC., AGREEMENT ON GUIDELINES FOR CLASSROOM COPYING IN NOT-FOR-PROFIT EDUCATIONAL INSTITUTIONS WITH RESPECT TO BOOKS AND PERIODICALS, *reprinted in* HOUSE REPORT at 68ff [hereinafter CLASSROOM GUIDELINES].

[361] Marcus v. Rowley, 695 F.2d 1171, 1178 (9th Cir. 1983).

[362] "There may be instances in which copying which [sic] does not fall within the guidelines stated below may nonetheless be permitted under the criteria of fair use." CLASSROOM GUIDELINES at 68.

Several comparable negotiations among interested parties have been going on in response to the digital age. These groups meet under the umbrella term "CONFU," for "CONference on Fair Use."[363] Separate CONFU groups have been addressing guidelines for use of copyrighted works in several contexts: "Digital Images," "Distance learning," "Electronic Reserves," "Multimedia," "Interlibrary Loans," and "Use of Software in Libraries."[364]

Statutory immunization and compulsory license

The recording of music, such a major area of controversy in the 1909 Act revision, has also been a major issue even under the 1976 Act. The advent of home audio taping equipment is a classic case of new technology making decentralized infringements readily possible. At first, the question was one of new subject matter: sound recordings as such—as distinct from the music the recordings contained—were not copyrightable. Lack of subject matter protection gave rise to the phenomenon of "bootleg" audio tapes. In 1971, Congress amended the Act to extend protection to sound recordings as copyrightable subject matter in direct response to that problem.[365] But the decentralized infringement issue was lurking in the background, as the cost of home audio taping fell.

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[363] Helpful information on CONFU can be found at the PTO web site: <http://www.uspto.gov/web/offices/dcom/olia/confu/> as of October 18, 1997.

[364] *See* <http://www.uspto.gov/web/offices/dcom/olia/confu/conclutoc.html> as of October 18, 1997.

[365] *See* House Report on the Sound Recording Amendment of 1971, H.R. REP. NO. 487, at 2 (1971) ("Existing Federal copyright law … protects the owners of copyright in musical works … but there is no Federal protection of sound recordings, as such. As a result, so-called 'record pirates' … can and do engage in widespread unauthorized reproduction of phonograph records and tapes without violating Federal copyright law.").

The issue surfaced in Congress when digital audio recording was developed along with an accompanying fear by music copyright owners that widespread "perfect" copying of music would soon follow. After much debate, Congress settled on the imposition of royalty on the importation or sale of digital audio recording devices and on blank digital tapes.[366] An arbitration panel then allocates this royalty "pool", [367] much as is done with cable television.[368]

Fair use versus contributory infringement

Decentralized infringement has sometimes created a tension between the doctrines of fair use on the one hand, and contributory infringement and its cousin, vicarious infringement, on the other. Suppose, for example, a new type of machine were invented that brought about a sudden decrease in the cost of high quality book printing and binding. This new machine, let us say, allowed individuals to make copies of books in their homes—not only to duplicate individual pages of books, but also neatly to size, trim, stitch, and bind them complete with an attractive paper dust jacket. Assuming that this hypothetical new machine encouraged individuals to begin to copy books at home with increasing frequency, as it likely would, we would see a new instance of decentralized infringement.

What would authorized publishers do? It would be difficult for them to bring a legal action against the individuals involved: it would be hard to identify them, for one thing; it would be a bad form of public relations; relief in the form of damages would

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[366] *See* 17 U.S.C. §§ 1003, 1004.

[367] *See* 17 U.S.C. § 1007. Cable compulsory licensing revenues are allocated as prescribed under 17 U.S.C. § 111(d).

[368] The division of the tax on blank tapes is specified in more detail than is the division of royalties from the cable television industry. *Cp.* 17 U.S.C. § 111(d)(3) with § 1006(b)(1) and (2).

likely be too small to justify the litigation; and injunctive relief would run only against the parties to the action, not against others.

Very likely, then, publishers would proceed not against the individuals using the machine in their homes, but rather against the manufacturer or seller of the new machines. The grounds for suit would be contributory infringement: the seller of the machine was contributing to the infringement of copyright by others. The significance of this response to decentralized infringement is that it makes use of the contributory infringement doctrine to bring about a "*re*-centralization" of the infringement, from large numbers of private individuals back to one or a few identifiable sellers. The seller would undoubtedly raise the defense that copying books at home for personal use is a fair use.

Of course, this has not happened with books, but essentially this situation has arisen with other technologies such as video recording devices—today's VCR. In the case of VCRs, the *Sony*[369] decision found that making tapes of free broadcast television shows at home to watch later and then erase was a fair use. The Supreme Court concluded that because the conduct was a fair use, it was not directly infringing, and because there was no direct infringement, the manufacturers of the video tape machines could not be liable for contributing to anyone's infringement.

Other decisions on other facts have come out differently. In one case,[370] a defendant offered the services of selling blank audio tapes of a length specified by each customer. Ordinarily, one would not expect the sale of blank tapes to constitute any sort of infringement, direct or contributory. But facts brought out in the case showed that tapes of non-standard length were only used for

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[369] Sony Corp. v. Universal City Studios. Inc, 464 U.S. 417 (1984).

[370] A&M Records, Inc. v. General Audio Video Cassettes, Inc., 948 F. Supp. 1449, 1461-62 (C.D. Cal. 1996).

one purpose: to produce bootleg copies of commercially recorded music. The court found that the customers' taping was an infringement, and consequently that the seller of the blank tapes was liable for contributory infringement.

Quite similarly, contributory infringement has emerged as a factor in cases involving online service providers. More detailed discussion of the doctrines of contributory infringement and vicarious liability can be found in the section of this Report that discusses *Intermediaries' liability*, at page 133.

Decentralized infringement: analysis

The issues surrounding decentralized infringement are two: first, that enforcing an owner's copyrights is difficult; and second, members of the public often perceive that anything they can do in the privacy of their homes, for non-commercial purposes, must be lawful.

Do nothing

One response to this situation is to do nothing. If it is practically impossible for a copyright owner to enforce rights against individuals, then the owner will not try to enforce them. If individuals think what they are doing is lawful, and copyright owners are not seeking to enforce rights against such individuals, then there may be no need for anybody to do anything.

To a great extent, this has been the response to many instances of decentralized infringement. Private guidelines about the educational uses of photocopies, for example, do not apply to individuals outside the educational environment; individuals continue to copy small amounts of printed materials; courts have not definitively determined that such copies are a fair use or are infringing; consequently we are living with much decentralized infringement by photocopy machine and that's that. Similarly,

home taping of music before the 1992 amendments to the Copyright Act[371] was a situation of decentralized infringement that no authoritative decision had ever ruled to be a fair use or infringing.

"Doing nothing" about an issue sounds almost un-American, but there is much to be said for it in the context of copyright and new technology. Technology changes rapidly; a court decision or a statutory response that is apt today may be inapt or irrelevant tomorrow. Waiting until things "settle down" may often be appropriate.

Increase penalties

Another response is that of the 19th century Congress responding to theater troupes: increase the penalty for infringement to such a level that the occasionally punished individual serves as an "example" for others. This sounds harsh, but it is nonetheless a common response of legal systems to any situation in which monitoring and enforcement are difficult.[372] Stiff jail sentences for individual drug offenses—as opposed to large-scale distribution or sales—might be an example: drug offenses such as possession by individuals are notoriously difficult to detect.

With decentralized infringement of copyrights, however, the "offenders" are not likely to see themselves or other similar citizens as "wrong-doers" in any serious way. The imposition of stiff punishments for decentralized infringement of copyright,

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[371] Pub. L. No. 102-563, 106 Stat. 4237 (1992) (codified as amended at 17 U.S.C. §§ 1001-1010).

[372] *See* RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 230 (1992) (citing the imposition of death by boiling in oil for the difficult-to-detect crime of poisoning in the middle ages, and hanging for horse thievery in 19th century America); *see generally* Gary S. Becker, *Crime and Punishment: An Economic Approach*, 76 J. POL. ECON. 169 (1968).

though far from out of the question, might therefore be politically difficult.

Educate the public

"Public education" is another response. Many of those interviewed during project *Looking Forward* who are or represent copyright owners spoke of the need to educate the public about copyright.[373] The National Information Infrastructure Task Force's White Paper contained a substantial section dealing with the issue of public education specifically.[374] There is much to be said in the abstract about educating the public about copyright principles. It is hard to argue against the public's becoming more knowledgeable about any area of legal rules that affects their behavior.

In some sense, educating the public in this way constitutes an acknowledgement that when "everyone becomes a publisher,"[375] then everyone has to learn the rules of publishing. Such a conclusion would not be unprecedented. Before the development of automobiles, horses were a major form of transportation. When cars were first invented, they were few in number and driven by a small percentage of the population. Eventually, though, "everyone" became a car driver. When that happened, we did not insist that people continue to follow the rules appropriate for

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[373] Indeed, education about copyright and the Internet may be easier today than it was, thanks to the Internet itself. It is straightforward and inexpensive to post information about policies, including copyright policies, and many organizations do so. *See e.g.* GEORGIA HARPER, UNIVERSITY OF TEXAS SYSTEM, OFFICE OF GENERAL COUNSEL, COPYRIGHT LAW IN THE ELECTRONIC ENVIRONMENT, available from <http://www.utsystem.edu/OGC/IntellectualProperty/lib_fac.htm> as of December 17, 1996.

[374] WHITE PAPER *supra* note 90, at 201-210.

[375] That "everyone might become a publisher" does not imply that commercial publishers will fade away. But it is certainly true that "everyone" has the capability of reaching millions of other people using the Internet.

riding horses; rather, when everyone became a driver, everyone had to follow the rules appropriate to driving. Analogies are never perfect, but as with driving, one could argue that when everyone is a publisher, everyone should follow the rules of publishing. Those rules include copyright.

Make it lawful

A widely offered counter-argument is that when everyone begins to engage in certain conduct, and feels that that conduct is or ought to be lawful, then the law should change to make that conduct lawful. This is a kind of "throwing in the towel" and saying that if nothing can be done to stop certain conduct, like "home copying," then the wisest course is to accept what cannot be changed and declare the conduct to be lawful. Behind this argument is also the belief that declaring conduct that cannot be stopped to be unlawful has the effect of encouraging disrespect for the law generally and is affirmatively a bad idea.

Yet, we do not reach this conclusion in many other areas of public life. We accept the existence of widespread traffic violations but continue to insist that they are still violations. In part, this is because changing the traffic rules to reflect what many people actually do might have the effect of changing what people actually do. That many people exceed the speed limit, for example, is not a good argument for eliminating speed limits; if one were to eliminate them, more people would speed than do now and the result might be highways that are less safe than otherwise.

Behavior changes

If decentralized copyright infringement were declared lawful, what change in behavior might we see? Would the resulting new behavior, if any, be harmful?

Many people would answer: nothing would change. Circulating others' e-mail messages is done today, e.g., even if it is technically an infringement; if it were legalized tomorrow—according to this

argument—the only difference would be that millions of Internet users would no longer be in possible violation of copyright. Similar arguments could be made about home taping of music, the copying of others' Web sites, and so on.

This argument may be correct as far as it goes, but it misses an important point. The changed behavior that one should be concerned with is any relevant person's behavior, not just that of the individuals who first come to mind.

Suppose that Congress declared, to take a quick example, that all e-mail was in the public domain. Those who presently circulate others' e-mail messages (and *lots* of people do) would no longer be technical infringers of copyright; the issue of "fair use" would no longer need to be considered, because a prima facie case of infringement could not be made out in the first place.

What else might happen? Perhaps businesses would start up to intercept private e-mail in order to create searchable libraries of e-mail messages. That might mean that every trivial e-mail message anyone ever sent would become a permanent record, open to public review and scrutiny. Whether that would be good or bad, it would be a change in the behavior of someone—the start-up business—even though not the individuals that we might first think about in fashioning some sort of new rule.

This same issue has echoes in the recent *Michigan Document* ("MDS") case[376] and related cases.[377] In MDS, educators assembled compilations of copyrighted materials and had them reproduced for students by a professional copy shop. In a suit by copyright owners against the copy shop, the district court found this

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[376] Princeton Univ. Press v. Michigan Doc. Servs., Inc., 855 F. Supp. 905 (E.D. Mich. 1994), *rev'd*, Princeton Univ. Press v. Michigan Doc. Servs., 74 F.3d 1512 (6th Cir.), *reh'g en banc and opinion vacated*, Princeton Univ. Press v. Michigan Doc. Servs., 74 F.3d 1528 (6th Cir.), *aff'd* 99 F.3d 1381 (6th Cir. 1996).

[377] *E.g.*, Basic Books v. Kinko's Graphics, 758 F.Supp. 1522 (S.D.N.Y. 1991).

conduct not to be a fair use. The Court of Appeals reversed, finding that is was a fair use. The entire court reversed again in an en banc opinion that found the activity not to be a fair use.[378]

For this Report's purposes, it is not necessary to say that one or the other opinions was right or wrong. The case overall helps to illustrate a point about decentralized infringement. Assume that individual students make compilation copies for themselves "all the time." That is, let us assume that this is a classic case of decentralized infringement. Should we declare the conduct lawful, on the grounds that "everybody does it all the time?" There is certainly an argument for doing so, and doing so comports with many people's intuitive sense about what is or is not "wrongful."

On the other hand, a declaration that the students' conduct is lawful may bring about a change in behavior—not necessarily that of the students, but rather of others: professors, for one, or commercial copy shops for another. Under a rule of no liability, professors may be more willing to assign compilations, and copy shops more willing to make the copies, than they might otherwise have been under a rule of liability. If that were to happen, it would mean that individual copying is a situation in which a change in the rules might inadvertently change behavior—albeit that of others than first identified.

Technological responses

A great deal of the response to decentralized infringement is not legal at all: it is technological. Copyright owners often attempt to make unauthorized uses harder or more expensive through implementation of technological protection measures.

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[378] *See* Princeton Univ. Press, 99 F.3d 1381, note 376 *supra.*

Such responses might include deliberate decisions such as adding some form of "copy protection" to computer video games so that an original disk must be present for the game to operate, or printing text on red-colored paper to reduce the quality of photocopies, or "scrambling" satellite signals so that would-be viewers must buy a "descrambler" box to see the programs.

Other responses may simply take advantage, deliberately or by happenstance, of "natural" technological restrictions on unauthorized uses. For example, the *National Geographic* magazine is printed on extremely high quality, coated paper, which provides excellent reproduction of photographs. Unauthorized copies of the magazine on ordinary photocopy machines would not constitute much of a substitute for the originals because the inexpensive reproduction technology of photocopying today is vastly inferior to the *Geographic's* high quality printing.

It is sometimes thought that the amount of Internet copying is related to the fact that digital works can be "perfectly" copied, and at low or trivial cost. Digital works are said to stand in marked contrast to "analog" works, which cannot be perfectly copied. Hence, it is said, copyright faces grave difficulty in adapting to the digital world. There is some truth to this contrast in the two types of works, to be sure, but much less truth than is commonly realized. The implications of this observation—that digital and analog works are less different than often thought—for tomorrow's copyright issues are substantial.

A typical analog work would be a cassette tape with music recorded on it. When that tape is copied, the quality of the second tape is lower than the original tape. If that second tape is itself copied, the quality of the third tape will be even lower. The same thing happens when one photocopies a page of text: the first copy is likely to be quite clear, but a second one will be a little worse, a third one even worse, and so on. Every generation of copy is inferior to the one that preceded it.

But take a digital work like computer program residing on a computer hard disk. If it can be copied at all, the copy will not have degraded one iota, but will be exactly like the original in every way—a perfect substitute for the original. Second and third and fourth generation copies will also be perfect substitutes.

Difference between analog and digital not inherent

The assertion that digital and analog works differ radically because the former can be perfectly copied misses the mark. For purposes of copyright law, the perfection of copies is not the point. The point is the cost of making an adequate copy. The difference between digital and analog works is therefore not one of technology, but of economics: the time and trouble and expense of making an adequate copy. The following discussion will collapse the notions of "time and trouble and expense" into the single term "cost," with the caveat that "time and trouble" are as much a part of "cost" as any actual dollar outlay.

Difference lies in cost of copying

The difference between analog and digital works matters because often the cost of making an adequate copy of each type of work is quite different. As in the example of the photocopies and audio tapes mentioned already, analog copies seem to "go downhill" rapidly in quality. But just how rapidly depends not only on the analog nature of the medium, but on the quality and sophistication of the recording equipment used in making both the original and the copies. Very high quality analog recording equipment may be able to make several more generations of useful copies of a tape than lower quality equipment. If these copies are adequate for one's purposes and inexpensive, they can be "perfect enough," even though in analog form.

Textual material makes, however, a better example. Can a book—a traditional, paper-and-ink-book—be perfectly copied? Of course it can. Publishers do it all the time: they produce books in thousands of copies for sale. And every one of those books is a "perfect" copy—perfectly substitutable for any other copy.

Anyone can make a similarly perfect copy of the same book. All that is necessary is to hire someone to set the type or scan or key in the text; to proof-read and correct the resulting text file; to hire someone to use a word processor or page layout program to arrange the layout; to print the text out; to hire someone to make whatever photo-offset or other process "master" copy is necessary from the printed pages; to hire a printer to print the book; to hire someone else if needed to stitch and bind the book into a cover; and so on. The technology of paper-and-ink books, in short, does not *prevent* anyone from making a perfect copy of a book. Indeed, the publishing industry depends on the fact that publishing technology *allows* the making of multiple perfect copies. It is rather the *cost* of making such copies that stops most unauthorized individuals from doing so (and perhaps the threat of being sued—another kind of cost).

What happens if copying costs go up?

Again, for copyright purposes, the differences between digital and analog works is not due to any inherent quality of these two types of media, but is a simple function of the cost of copying. And a crucial corollary to that point is this: if something—a legal regime, a technology, a business model, or anything else—has the effect of raising the cost of copying digital works, then other things being equal, the difference between such a work and the same work in analog form will go down.

What would make the cost of copying digital works go up?

One obvious thing is encryption, coupled with a proprietary viewer. Both topics have been discussed under the headings *Encryption*, at page 61, and *Proprietary viewers*, at page 76.

Other technologies will also undoubtedly arise that raise the cost of copying digital works. Even the nature of the World Wide Web today imposes higher copying costs than is often realized. Typical Web documents are "dispersed": they have many links to graphic images, for example. Copying an entire page with one button press is often not possible: a single button press will save a

document's "skeleton," but not all the separate files that contain graphic images.

For example, here is a screen capture of a popular audio site on the World Wide Web as it appears from a Web browser:

Figure 15: Screen capture from <http://www.audionet.com>, showing the site as it normally appeared on November 11, 1996.

If one attempts to save this page with a single keystroke,[379] to one's own desktop computer, many of the graphic images, which are stored on the original site in separate files, will not be saved. The result will be that the structure of the page, and some of its text, will be saved but many of the images will not be. With the particular example page just shown, the result of saving the page with a "single keystroke" is shown in the following illustration.

[379] By using the "File—SaveAs" command.

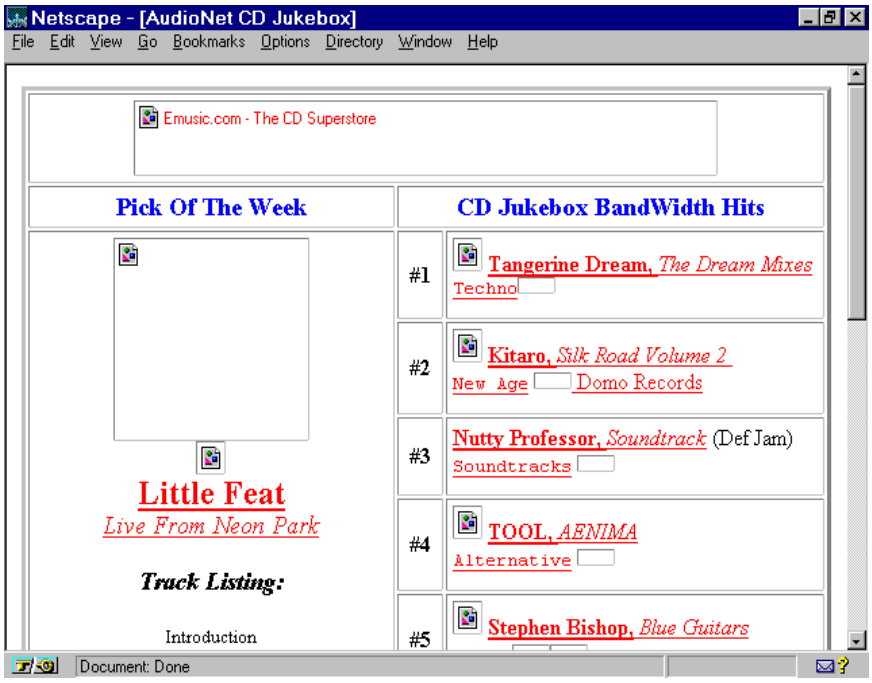

Figure 16: Screen capture of the Web page in Figure 15 saved with a "single button press" (actually using a browser's "File Save As" menu command and reloaded into the browser as a file from the author's disk storage).

One can, with more keystrokes or with special software, save all of the graphic images as well. This example is not meant to show that capturing all elements of a Web page is impossible—it is not. Rather, this example shows how the World-Wide Web encourages the assembling of computerized information from different computers and files within those computers. Pages that consist of a variety of materials that only appear to be co-located on a single virtual "page" constitute a type of compound or "dispersed" document. These documents are harder to copy than simple documents for which all information is located in a single file on a single computer.

JAVA programs

The recent attention paid to the "Java" programming language also shows that information on the WWW is not always available for "one click" downloading. Java is a programming language designed with the World Wide Web in mind. It contains simple

and concise ways of describing many of the things that owners of World Wide Web sites would be likely to want to do: create small animated graphic images or scroll text in a moving banner across the page, for example.

A World Wide Web page created with Java is not just an unchanging set of text and graphic images, to be displayed to anyone who requests it, like a book on a library shelf. A Java-created Web page is actually a container for one or more Java programs. These programs can take different action, depending on who the user is who is viewing the page, or how that user answers different questions. The "page" can therefore look very different to different people because the display is created "on the fly" and does not exist as a static entity.

Indeed, one complaint of software users about dynamically-created pages that have been generated by Java programs is that some generations of Web browsers have no mechanism to print out the page on paper.[380] Such technologies as Java therefore can serve to raise the cost of making perfect copies and consequently to reduce the difference between analog and digital works.

Many of the new technologies discussed earlier[381] serve as technological methods of raising the cost of making unauthorized uses of copyrighted works and hence as responses to the issue of decentralized infringement.

To the extent that these technologies—encryption, watermarks, digital objects, proprietary viewers, and the like—raise the cost of unauthorized uses above the benefits of such uses, the

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[380] *See* Ed Scannell, *Net-It product supports full printing under Java*, INFOWORLD, posted August 29, 1997, at <http://www.infoworld.com/cgi-bin/displayStory.pl?970829.wnetit.htm> ("Corporate users recently have been complaining about their inability to print graphical elements of documents from [certain] Java-based applets").

[381] See the discussion in the section titled *How the Internet Will Work Tomorrow*, in particular the section titled *Mechanics*, at page 54.

technologies will lessen the extent of decentralized infringements. Even micro-payments that allow finely grained metering of information transactions (the "half-a-penny per page-viewed" concept) are a response to decentralized infringement. By sharply reducing the cost of authorized uses of copyrighted works, micro payments serve to make the cost of unauthorized viewing relatively much larger. Hence, such payment schemes serve to increase the (relative) cost of infringement and therefore tend to reduce the amount and extent of such infringements.

Summary and conclusion on decentralized infringement

Technological or social changes sometimes bring about a situation in which the cost of engaging in behavior defined as copyright infringement goes sharply down. When that happens, the incidence of the behavior may well go sharply up. Phenomena like travelling 19th century theater troupes and technologies like jukeboxes, photocopying, and home audio tape recording all fit that description.

Our legal system has historically responded in a variety of ways, from greatly increased punishments to serve as a deterrent, to compulsory licenses with royalties set by Congress, to voluntary private guidelines. Other approaches include a judicial holding that such conduct is a fair use or impliedly licensed; greater efforts at public education about copyright; legislation to declare the conduct no longer to be infringing; and the development of new technologies like encryption to make unauthorized use of copyrighted materials harder or more costly.

6.3 Copyright in a rapidly changing environment

Will copyright decrease in importance in tomorrow's world of digital communications? The assertion that it will is made not only by some who are not lawyers or copyright experts, but also by some who are. It is worth trying to understand what this means.

One assumption underlying this view is that the Internet encourages new business models for authors. These new models depend not on selling discrete units of information—the older models—but on giving away such units in order to sell access to other forms of information or other products or services altogether.[382]

[382] *See, e.g.*, Esther Dyson, *Intellectual Value*, *WIRED* magazine no. 3.07, available as of October 5, 1997 from <http://wwww.wired.com/wired/3.07/features/dyson.html> ("Intellectual property that can be copied easily likely will be copied. It will be copied so easily and efficiently that much of it will be distributed free in order to attract attention or create desire for follow-up services that can be charged for.") (quoting from the December, 1994 issue of Dyson's *Release 1.0*, itself available as of October 5, 1997 from <http://www.edventure.com/release1/1294.html#youknowme>). *But see* Dyson's own limitation on others' use of her own intellectual property: "Occasionally it makes sense to put materials into the public space to foster and participate in the discussion of important issues. We encourage distribution of this document, but do ask for fair use: Don't remove our name from our words when you quote or reproduce them, don't change them and don't impair our ability to make a living with them." Available as of October 5, 1997 from <http://www.edventure.com/release1/1294.html>.

For example, both the Microsoft and Netscape corporations essentially give away[383] their competing, and very sophisticated, software "browsers": the "Internet Explorer" and "Navigator," respectively. These are the tools that enable one to access the World Wide Web and see all the multi-media enhancements that are evolving on Web sites: elaborate typography, graphics, animation, sound, and so on. A great deal of other software is also given away by various vendors, sometimes in the form of "trial" versions, but even as enhancements to existing products or as stand-alone products that are meant for permanent, free use.

New business models

In addition, yet other business models may also arise. It might be possible, for instance, for a software company to give away a major software product as long as it can sell something else to accompany that give-away. This "something else" might be a reference manual and user guide that are published on paper and have all the copyright attributes and protection that books on paper have traditionally had. Or the company might sell service and support to those who choose to pay for it. Or software companies might give away the initial product but charge a subscription fee for continued updates as well as technical support.

New business models might mean that authors would rely less on copyright law in the future than they have in the recent past. But there are two important responses to this observation. First, the future is not predictable. Second, even if new business models mean less direct reliance, does it follow that Congress or the

[383] Microsoft gives its browser software away currently; Netscape sells a version of its browser, but also provides free downloads of various versions. Upcoming releases of a number of Microsoft products will apparently incorporate Web access tools as integral parts of other pieces of software—or would incorporate them if the incorporation is not barred by a court for reasons of antitrust concerns. If one buys these other packages, such as the Microsoft Office family of products, Web browser capability will come along with the package. This will apparently also be true of other similar software packages, such as Corel's office suite, and may well prove true for others like the IBM/Lotus "SmartSuite" product line.

Copyright Office needs to *do* something? Or should *refrain* from doing something?

Decreasing reliance on copyright?

The conclusion that copyright is less necessary in tomorrow's digital world rests on a crucial assumption about the future evolution of the Internet and digital technology, namely, that the digital world will continue to evolve in the direction that some parts of the digital world seem to be evolving now. It is true that some software is now being given away, as the browser software example shows. But the assumption about copyright's role in the future is an assumption that giving away software will continue as a desirable practice for the indefinite future. Can we confidently predict that future?

The Internet and its growth and importance today were largely unpredicted developments. Few people ten years ago, or even five years ago, foresaw what is so often and accurately termed the "explosion" of Internet technology, with the emergence of world-wide e-mail for ordinary citizens,[384] access to libraries and information around the globe, and the like. Even more, the rise of the World Wide Web, based on hypertext linking, was entirely unforeseen just a few years ago.[385] Yet it is that wholly unforeseen development of WWW technology that has fueled the Internet's explosion and led to the current predictions about the decline of copyright's importance.

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[384] Academics, especially scientists, were making use of some of these Internet capabilities years earlier than others.

[385] Vannevar Bush's visionary thinking in 1945 about hypertext (*see* Vannevar Bush, *As We May Think*, ATLANTIC MONTHLY, no. 176, pp. 101-108, July 1945) is not relevant here because it did not occur at a time in which a mechanism to implement the vision existed. Besides, it would be inaccurate to say that before 1945, the WWW was unforeseen, but that after that large segments of the population expected its creation. As a practical matter, then, it is fair to say that the Web was unpredicted even a very few years before its invention, and that the degree of color, sound, animation and the like that we see today was unpredicted even for some time after that invention.

Even if these unforeseen developments account for new business models, and even if less reliance on copyright is a result, how do we know that even newer unforeseen developments will not happen again? We should not be optimistic about our ability to foresee the future evolution of technology, especially Internet-related technology. It may be possible, as this Report has tried to do, to examine current technology research and current developments in technology to predict their copyright consequences in the short-term future. It is another thing entirely to try to predict technologies that are not known or being worked on today.

A world of revolutionary change has been taking place in digital communications over the last decade; there is no reason to think that revolutionary change cannot happen in the next decade. In short, it is ironic that many people, having utterly failed to foresee the current state of technology today and the role of copyright in that state, conclude that they can foresee the state of technology tomorrow and the role of copyright in that state.

It is not just technology that is hard to predict. The public's needs and desires are also unpredictable, and that calls for flexibility. We can use computer software as an example. Public demand may swing the software industry toward a model of give-away software, with payment being made for technical support or printed manuals. If that happened, the copyright on software as such might assume decreased importance to the software industry.

But it is equally true that public demand might swing toward software that is so easy to use that it required no technical support and no manuals. If that happened, copyright on software as such would assume increased importance.

Much of the discussion of new models also focuses on the computer software industry specifically. The idea that software may be given away, with payment made for manuals, technical

support, upgrades, and the like is plausible—although there is no sign that this is actually happening for more than a tiny fraction of all commercial software. But that argument in terms only applies to computer software and perhaps only to some software. Computer software itself is but a fraction of the market for copyrightable material. Though anything could happen, it does not seem likely at present that new business models will allow movie producers, for example, to give away their movies and make money by selling manuals and technical support. Or that music producers could do so, or the producers of computerized clip art, or any of scores of other information producers for which "technical support" or any other collateral service is not a useful offering.

Copyright as preserving choices

To sum it up, the importance of copyright is not nearly so much that it has served in the past as "the" way that producers of information products earn revenue. Copyright's significance is rather that it continues to give producers a *choice* of what to produce and a choice of business models to sustain that production. A copyright possessed by an owner can be either asserted or waived as the public demand dictates. A copyright not possessed can only be "waived," as it were—it can not be unilaterally created even if the public's desires make the assertion of copyright desirable. Copyright owners, in short, may choose to produce things for which copyright is important, or they may choose to produce other kinds of things. In a changing world, the preservation of these choices is helpful to the public.

Therefore, even if it turns out that copyright protection is less important for some information products in the future, that fact by itself does not support an argument that the copyright statute should be changed.

7. Conclusion

The Internet is a loose collection of computers and standards that permits worldwide transmission of digital information. “Digital information” can be almost any kind of information: text, pictures, music, motion pictures, television broadcasts, music, and so on. All of these things exist and are being circulated over the Internet; all are subject to copyright protection. Because the Internet and digital technologies permit new ways of creating, using, and duplicating works of authorship, they raise new issues for copyright law.

Understanding those issues requires some understanding of Internet technology generally, and of particular technologies especially relevant to copyright law. The significant points about computer networks generally are that they handle digital information of any sort; and that they break up transmitted information into small “packets” that are routed through many different computers under the control of many different people and organizations.

Particular technologies of importance to copyright include:

Electronic Copyright Management Systems—methods of making digital works either harder to copy or easier to license or both. They can take many forms, but a common form is that of a "digital object."

Digital objects—a work of information that has been bundled in a kind of "wrapper" or "envelope." This wrapper or envelope contains information about the rest of the contents, such as an abstract or the terms and conditions for use of the contents. Typically, some form of encryption protects the contents.

Encryption— a means of encoding information so that it cannot be read or used without the proper key.

Proprietary viewer—a computer program that keeps a digital object always under its control, allowing it to be used only in ways that have been authorized.

Watermarks—an alteration to a digital work like an image or photograph or motion picture that is unnoticeable to the human eye, but that contains identifying information like the name of the copyright owner, the rightful possessor, the terms and conditions of use, etc.

Dispersed works—works that are difficult to duplicate because they consist of different parts and pieces located in different files and on different computers, or because they are created "on the fly" by computer programs.

Today's Legal Issues

A number of copyright issues are well known, though not necessarily well settled. Among them are these:

Does posting information on a Web site constitute "publication?"

Does temporary storage, called "caching," constitute an infringement of copyright? Is it a fair use, or impliedly licensed?

How should intermediaries like online service providers be treated for copyright purposes?

Should copyright law respond to the existence of widespread copying of digital materials? If so, how?

Tomorrow's Issues

Other issues are less well known, but rapidly arising. They range from minor and technical issues of interpretation, to more fundamental policy questions. They include:

When "public" is defined in relation to "places," can the online world be a "place?"

How should the Copyright Office or courts handle questions of what exactly is copyrighted about constantly changing, constantly updated information on Web sites?

When a large part of the value of information may be in its factual accuracy, and facts are not copyrighted, how will lines be drawn between original and unoriginal factual expression?

Can computerized representations of oneself, often called "agents" or "avatars," be copyrighted?

Should Internet radio and television be treated for copyright purposes the way broadcast radio and television are treated? Or the way cable television is treated? Or the way books and printed matter are treated?

Does it infringe any copyright rights to include part of someone's WWW site within a border or "frame" on one's own site?

Should the right to authorize be interpreted as identical to the right to prevent contributory infringement?

Can works of visual art include digital works, when the definition of "visual art" is derived from tangible media?

When another's computer requests information from one's own computer, or attempts to send unwanted e-mail to one's own computer, does that process initiate an unauthorized copying of computer software and hence a copyright infringement?

Does a movement from "bulk" pricing for information access, like that done traditionally for books or movies, toward a more finely grained pricing "per byte" or "per second" imply the need for changes to copyright law?

Will computer-generated works grow in sophistication enough that serious questions will arise over the degree of their human creativity and hence copyrightability?

Will the Internet facilitate collaboration among ever-larger numbers of authors in a way that makes determining copyright authorship problematical?

Do unauthorized Internet archives and repositories infringe any copyrights? Or are they a fair use or impliedly licensed?

Do search sites that contain enough indexing information to reconstruct entire Web sites and other works infringe any copyrights? Or are they a fair use or impliedly licensed?

If information can be measured in very small units—very finely "metered"—does that metering implicate any issues of copyright law or policy?

Will the use of software "filters" to delete, re-arrange, or re-position information from a variety of sources implicate copyright law's right to make derivative works?

To some extent, copyright law is based on the notion of information as something that can be exchanged. Other information laws like broadcasting are based more on the act of distributing information. What happens at the intersection when "distributing information" and "broadcasting" seem to be converging?

Does copyright's creation of a form of "property" rights conflict with other property-based legal rights like bailment law?

Will state contract law, in particular the proposed Uniform Commercial Code section 2B on software licensing, conflict with any copyright rights?

Three patterns of copyright and new technology

Copyright law has a long history of accommodation to new technologies. The need for accommodation almost invariably appears in the form of three "patterns" of issues: **new subject matter**, **new uses**, and **decentralized infringement**.

If a technology creates a new medium of expression, or a new type of expression, it raises the subject matter issue: should the new medium or new expression be copyrightable? The 1976 Act generalized the concept of subject matter to "works of authorship" rather than "media," so that new media as such rarely raise this issue today. New types of expression like a computer program's menu command structure continue to raise subject matter issues, however.

Many technologies create a new way of using existing copyrighted works. These technologies give rise to the "new use" question: does the new use of an existing copyrighted work infringe the author's rights? Because copyright rights have always been, and still remain, defined in terms of current media and

current methods of exploitation, the development of new media and new methods continues to plague copyright policy makers. One crucial question about a new use technology is whether it will eventually eclipse or supplant some existing uses. Unfortunately, that question requires predictions about technology, business, and consumer tastes that are difficult to make.

Finally, many technologies sharply lower the cost and inconvenience of making unauthorized uses of copyrighted works. Technologies like photocopying, home audio taping, and personal computers are good illustrations. This development, here labeled "decentralized infringement," increases the amount of unauthorized use and simultaneously makes the identification or monitoring of the actors involved difficult. Commonly the development raises, and creates some tension between, the doctrines of fair use and contributory infringement. It also spurs technological developments like encryption, watermarks, and so on, the purpose of which is to re-raise the cost or inconvenience of making unauthorized uses.

Arguments that digital works are fundamentally different from analog works depend on an assumption that digital works are easily and cheaply copied; hence these arguments invoke the issue of decentralized infringement. For copyright purposes, however, the differences between digital and analog works is not one of technology, but of the cost of unauthorized uses. If technological developments raise the cost or inconvenience of making unauthorized uses of digital works, the differences between analog and digital works will be reduced proportionally.

Copyright in a rapidly changing environment

Copyright protection is sometimes thought to be contingent on particular business models such as the sale of tangible copies of works. In circumstances where technology facilitates other models, such as advertising-supported Web sites, copyright may seem less important. By itself, however, this observation does not support arguments for changes to copyright law. Moreover, the contours of new technologies are not easily foreseen—and consequently neither are the business models appropriate to those technologies. Copyright in a rapidly changing technological environment therefore functions less to support a particular business model than it does to support the ability of future copyright owners to choose the appropriate business model, whatever that may prove to be.

8. Appendices

Three appendices follow. The first is a list of (and an expression of deepest thanks to) the people who participated in project *Looking Forward* as interviewees or conference attendees.

The second is a list of the presentations that the author made in connection with the project.

Finally, appendix three is a short glossary of terms used in this Report.

8.1 People interviewed

During the course of project *Looking Forward* many people very generously spent time talking with me and members of the Copyright Office about the Internet and copyright. I am exceedingly grateful to them and hereby repeat my private thanks to them in this more public forum: *thank you*.

Some of them met with me individually; others attended one of the three focus group sessions held with other members of the Copyright Office; some spoke with me by phone; others, not here identified, made helpful comments on various presentations concerning the project. The focus groups meetings took place on September 13, 1996 (Stanford University, Palo Alto, California); October 23, 1996 (the Copyright Office, Washington, D.C.); and from November 4 – 15 (an electronic conference with individuals from around the country).

This Report reflects my views alone, however, not those of any of the people who participated in these conversations.

Listed alphabetically, with their affiliation at the time, they are:

1. Allan Adler (Association of American Publishers)
2. Nick Anthony (Recording Industry Association of America)
3. Fritz Attaway (Motion Picture Association of America)
4. Stanley M. Besen (Vice President, Charles River Associates, Inc.)
5. Marjory Blumenthal (Computer Science and Technology Board, National Research Council)

6. Scott Bradner (Computer Science, Harvard University)
7. Timothy J. Brennan (Senior Economist, Council of Economic Advisors, Executive Office of the President)
8. Jack Brown (Brown & Baine)
9. Dan Burk (Assistant Professor, Seton Hall Law School)
10. Kaye Caldwell (President, Software Industry Coalition)
11. Scott Carr (DigiMarc Corporation)
12. Tim D. Casey (MCI)
13. Edward Cavazos (Andrews & Kurth, LLP)
14. Vint Cerf (MCI)
15. Julie Cohen (Assistant Professor of Law, University of Pittsburgh)
16. Kenneth D. Crews (Associate Professor and Director of the Copyright Management Center, Indiana University School of Law)
17. Jeff Crigler (Cryptolope Project, IBM)
18. G. Gervaise Davis III (Davis & Schroeder)
19. Dan Duncan (Information Industry Association)
20. Jim Dunstan (Haley Bader & Potts PLC)
21. Jesse Feder (Policy Planning Advisor, U.S. Copyright Office)
22. Kelly L. Frey (Director of Strategic Development, Copyright Clearance Center)
23. Jordan Glogau (IP2, CopySite)
24. Jonathan Hart (Dow, Lohnes & Albertson)

25. Peter Harter (Netscape Corp.)
26. Don Heath (President and CEO, the Internet Society)
27. Brady Hoak
28. Liz Hogan (MCI)
29. David R. Johnson (President and Chief Executive Officer, Counsel Connect)
30. Andrew Johnson-Laird (Johnson-Laird Inc.)
31. Brian Kahin (Counsel, Interactive Multimedia Association, and John F. Kennedy School of Government)
32. Robert E. Kahn (President, Corporation for National Research Initiatives)
33. Tom Kalil (Executive Office of the President)
34. Ivan P. Kaminow (IEEE Congressional Fellow Committee on Science, U.S. House of Representatives)
35. Robert A. Kreiss (Professor and Director, Program in Law & Technology University of Dayton School of Law)
36. Bruce Lehman (Assistant Secretary of Commerce and Commissioner of Patents and Trademarks)
37. Mark Lemley (Professor of Law, The University of Texas School of Law)
38. Larry Lessig (Professor of Law, University of Chicago Law School)
39. Mary Levering (Associate Register for National Copyright Programs, U.S. Copyright Office)
40. Melissa Smith Levine (Legal Advisor, National Digital Library Project, Library of Congress)

41. Jessica Litman (Professor of Law, Wayne State University Law School)
42. Patrice Lyons (Offices of Patrice Lyons, PC)
43. Mark Manasse (Research Staff, Digital Systems Research Center)
44. Susan Mann (National Music Publishers Association)
45. William Marmon (MCI)
46. J.D. Marple (Business Software Alliance)
47. Tim May
48. Steve Metalitz (Smith & Metalitz)
49. Don Mitchell (National Science Foundation)
50. Michael R. Nelson (Special Assistant, Information Technology, Office of Science and Technology Policy)
51. Ray Nimmer (Leonard Childs Professor of Law, University of Houston Law Center)
52. Susan Nycum (Baker & McKenzie)
53. Ron Palenski (Gordon & Glickson)
54. Maria Pallante (Policy Planning Advisor, U.S. Copyright Office)
55. Shira Perlmutter (Associate Register for Policy & International Affairs, U.S. Copyright Office)
56. Chris Pesce (CORBIS Licensing)
57. Marybeth Peters (Register of Copyrights, U.S. Copyright Office)
58. Joseph C. Pistritto (Vice-President, Systems Engineering, PointCast)
59. John Podesta (Visiting Professor of Law Georgetown University Law Center)

60. David Post (Visiting Associate Professor of Law, Georgetown University Law Center)
61. Margaret J. Radin (Professor of Law, Stanford University Law School)
62. Joseph Reagle (MIT W3 Consortium)
63. Paul Resnick (AT&T)
64. Carol Risher (Association of American Publishers)
65. Eric Roberts (Professor, Computer Science Department, Stanford University)
66. Paul Russinoff (Recording Industry Association of America)
67. Tony Rutkowski (Vice President, Internet Business Development, General Magic, Inc.)
68. Pamela Samuelson (Professor, School of Information Management and Systems and School of Law, University of California at Berkeley)
69. Charles Sanders (Harry Fox Agency)
70. Eric Schwartz (Proskauer, Rose)
71. William I. Schwartz (Morrison & Foerster LLP)
72. Cary Sherman (Arnold & Porter)
73. Emery Simon (Executive Director, Business Software Alliance / APSI)
74. Eric Smith (International Intellectual Property Alliance)
75. Oliver Smoot (Executive Vice President, Information Technology Industry Council)
76. Virginia Sorkin (Library of Congress)
77. Terri Southwick (Law Offices of Terri Southwick)

78. Marcia Kemp Sterling (Vice-President, Bus. Dev'l, and General Counsel, AutoDesk)
79. Carlton Stockton (MCI)
80. Hal Varian (Dean and Professor, School of Information Management and Systems, University of California at Berkeley)
81. Jim Warren
82. Wendy Wechsler (Walt Disney)
83. Jonathan Whitehead (Recording Industry Association of America)
84. Terry Winograd (Professor of Computer Science, Stanford University)
85. David Wittenstein (Dow, Lohnes, & Albertson)

8.2 Presentations

1. Library of Congress personnel (July 30, 1996)
2. The Center for Innovative Technology ("All Hands" meeting) (August 5, 1996)
3. Visiting Russian Librarians at the Library of Congress (October 17, 1996)
4. Dayton University Conference (November 2, 1996)
5. *Copyright Office Speaks* seminar (November 7, 1996)
6. The Copyright Society of the USA, Washington Chapter (November 13, 1996)
7. William and Mary law school alumni (December 3, 1996)
8. Virginia Bar Association Intellectual Property section (January, 1997)

8.3 Glossary

Browser: A computer program designed to access computers on the World Wide Web—that is, computers that use the HTTP communications standard.

Caching: A technique for temporarily storing information that is or might be sent from one point to another over the Internet. The point of the temporary storage is typically to speed access to the information. This can happen either because the "cache" is stored on a computer that is closer to the end user than the original source of the information, or that is more powerful than the original source computer, or contains more access ports, or for any other reason.

Cyberspace: A metaphorical allusion to communications conducted over computer networks, especially the Internet.

Digital object: A unit of information that has been bounded and identified in a way that renders it easy to index, locate, use, and exchange. The technique for doing so usually creates the "object" in two parts: encrypted contents (the "inner" part), and an unencrypted description (the "outer" or "wrapper" part). The "wrapper" typically describes the contents and specifies any conditions for use of the contents.

Digital signature: A technique for authenticating the sender of digital information. The technique relies on a mathematical calculation done on the contents of a unit of information to produce a unique number. If subsequent identical calculations produce the same number, then the information contents have not been altered.

Framing: The use of hypertext links to information on the World Wide Web in a way that makes that information appear to be located on a computer other than the one it is actually located on. The technique causes the display of information from one site to appear surrounded by the display of a second site. The information (graphics, text, etc.) from the first second site appears to be "framed" by the second site.

HTTP: See "World Wide Web," below.

Hypertext: A method of creating links from one information source to another. Originally it was used as a means for connecting information in textual form to other information in textual form—one document to another, and another, and another, etc.—hence the term hyperTEXT. Today the technique is to link together a variety of different kinds of information, not just text, but the term persists.

In-line linking: Another term for "framing."

Internet: A world-wide collection of computers owned by different people in different places that can communicate digital information to one another using one or more of several communications standards. The Internet is not a "thing," but a loose affiliation of computers that share communications standards.

Intranet: The use of Internet communications standards for the transmission of digital information within a company or organization.

Java: A programming language that makes it easy to program certain actions that are frequently called for on the World Wide Web. Other programming languages can do the same things a Java program can, but using Java often requires far less programming labor.

Search engines: Computer programs that continually or regularly examine large numbers of sites on the World Wide Web and index their contents. The results—the indexes—are commonly made available to the public at Web sites designed for that purpose, called "search sites." Often the terms "search sites" and "search engines" are used interchangeably.

Server: A computer used to store information that is designed for retrieval by others. A "Web server" is a computer that serves as a host for information that can be accessed over the World Wide Web.

Super distribution: A concept for allowing end users (consumers) to distribute digital works directly to other end users in a way that allows a third-party copyright owner to earn royalties (if desired). "Super" distribution is intended to contrast with "normal" distribution, which depends on a central facility like a store to distribute items and to track sales for royalty purposes.

URL: Universal resource locator. A standard way of identifying a computer file name, the computer on which it resides, and the communications standard that can be used to interact with that file. URLs look like this example: <http://www.wm.edu/law/publications/jol> (the angle brackets are a convention of print publications to mark off the URL itself from surrounding punctuation). The "http" indicates "hypertext transport protocol," which is the communications standard for most World Wide Web communication. Other communications standards include "ftp" and "gopher," which lead to URLs that look like <gopher://acme.com> and <ftp://somewhere.something.org>.

Watermarking: A technique for subtly altering a small percentage of the bits that make up a digital work. The

alteration is invisible or nearly so to the human eye, but can be detected by computer programs designed for that purpose. To be invisible, the alteration must be to a work for which a small change is not noticeable or crucial: in practice, that means watermarks are used on images and sounds, as opposed to text. The alteration itself can contain information such as names, addresses, numbers, etc. Typically the purpose of the watermark is to contain an author's or copyright owner's name, or the means of contacting an owner or agent to gain permission for certain uses, etc.

World Wide Web: All the computers and their contents that can be accessed using a particular Internet communications standard, namely "HTTP" or the HyperText Transport Protocol. Often used inter-changeably with the term "Internet" because so much of the Internet is commonly accessed by means of this standard.

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