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Intellectual Property Rights: Competing Interests on the Internet

by

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1. Introduction ¹

The legal rules and policies underlying the definition, granting, and enforcement of intellectual property rights (IPRs) are among the most important of Europe's interests in the development of a European Information Society. This paper examines many of the technical, economic, and social issues that need to be considered in the area of intellectual property rights. It begins with a brief introduction to the copyright and patent IPR systems and the European Union, national, and international systems governing the definition and enforcement of these rights. The introduction highlights inconsistent treatments of copyright and patent rights under existing law which are particularly important for the future of the European Information Society.

The remainder of this paper analyses the level and nature of copyright protection of authors and publishers in distributing information over communication networks that use the emerging global information infrastructure. We outline the characteristics of the social constituencies who are benefiting from development of the information infrastructure and identify their expectations. We consider the security issues involved in providing IPR protection to authors and publishers and some of the opportunities and constraints for improving protection. These security issues are then considered in the light of developments in the way revenues are generated through the provision of information services on telecommunication networks. The final section argues that the costs and benefits must be weighed in any further extensions of copyright protection and offers some suggestions for weighing policy alternatives.

2.0 The Costs and Benefits of IPR Protection

Technological, social, and economic innovations in the generation and distribution of information are occurring at a rapid pace as well as supporting 'convergence', the bringing together of voice, text, audio, and visual materials together in a common digital format. The ideal of convergence is a bit stream encompassing all forms of electronic communication in which information can be stored, manipulated, and exchanged over telecommunication networks and delivered on demand to individual users' computers or 'multimedia' equipment. Accompanying these technological innovations are shifts in the meaning of time, place, and distance due to the growing use of information and communication technologies. These shifts open opportunities and are providing impetus to the restructuring of people's work, recreation, and learning activities as well as how they interact with one another in pursuing these activities. They are creating new preferences and new markets which alter how people earn their living and spend their money and time. A defining characteristic of the information society is that the activities of creating, distributing, and consuming information are of growing importance in the lives of citizens.

At the centre of these developments is the potential for dramatic improvement in the capacity of telecommunication networks to distribute information in digital format. As this potential is gradually realised, it is providing a system for interconnecting information production and consumption activities on a global basis. Such a system could provide support for an enormous range of production and consumption activities throughout the world and it is referred to as the 'global information infrastructure' or

GII. In practice, however, the GII exists only as an abstract idea, a potential that may or may not be realised depending upon future developments.²

What is happening now is growing attention to the improvement of national information infrastructures and to a European-wide information infrastructure. Within Europe, there is a determination to make innovative contributions to the construction of information infrastructures. The legal rules and policies underlying the definition, granting, and enforcement of intellectual property rights (IPRs) are among the most important of Europe's interests in the construction of these information infrastructures.

Intellectual property laws extend the right of property protection under law to creations such as inventions, literary or artistic works, or trade marks. After a particular creation is granted protection under one of the several systems of IPR law, it may be sold or licensed. The goals that may be served by extending property right protection to creations include: 1) promoting invention and the authorship of new work by safeguarding the right of creators from others who may simply copy their ideas or works, 2) encouraging the dissemination of ideas and the disclosure of inventions to foster the creative activities of others, and 3) protecting the rights of authors to be recognised and to receive income from their work. IPR protection attempts to balance society's interest in the disclosure and dissemination of ideas by creating an exclusive right to control and profit from invention and authorship. It is possible to have too little protection, thereby reducing the incentives for invention and authorship. It is also possible to have too much protection, which will discourage the adaptation and improvement of ideas.

IPR protection interacts, and sometimes conflicts, with competition, trade, and social policy.³ The exclusivity of IPRs may create market power. This may be a concern if it is achieved through the exclusive control of some other asset such as the only site for a shipping dock. In trade policies, the search for reciprocity and competitive markets may conflict with international differences in intellectual property protection. Social policies seek to promote education, health, environment protection, and a host of other objectives. In many cases it is necessary to use intellectual property to achieve these objectives.

With some exceptions, the right of the creator to legal protection is absolute, without regard to who violates IPRs or for what purposes. The cost of creating the incentives for invention or authorship through IPR protection is born by social actors as well as private commerce. Although, none of these conflicts provides a compelling reason to alter existing systems of IPR protection, it must be recognised that this system has costs as well as benefits. The following section sketches the copyright and patent system by focusing on principles and institutions that are particularly relevant to the development of advanced telecommunication services and the information infrastructure.

3.0 Intellectual Property Right Systems

Systems for granting rights in intellectual property embody and reflect legal doctrines and principles that are particular to the development of legal systems. For example, France developed a particular interest in the idea of protecting the author's right to

control the copying and potential modification of their work. By contrast, copyright law in England emerged from a desire to regulate competition and was endorsed in the United States constitution as a means to 'promote the Progress of Science and the Useful Arts.'⁴ The British and United States' motivations for protecting the commercial interests of publishers have been emphasised in economic analyses of copyright law although elements of the French tradition of *droit d'auteur* such as *droit moral* (the moral rights of authors to be identified and to avoid alteration of their work without permission) and *droit de suite* (the right of authors to benefit from the subsequent sales of their work) are a continuing influence in efforts to bring together varying national systems of copyright protection.

Copyright law grants the owner of a copyright on particular types of works an exclusive right to control the making of copies, broadcasting, or other forms of distribution of that work to the public.⁵ A broadly accepted definition of what constitutes a work is that it includes 'every production in the literary, artistic and scientific domain, whatever may be the mode or form of its expression.'⁶ This definition encompasses much of the information that might be created for distribution in a GII. Its coverage, however, is not quite as universal as the definition suggests and substantial national differences continue to exist.⁷ This has led to efforts to clarify existing law in several areas including: a) the protection of databases which may consist of compilations of individual pieces of information that may not be granted copyright individually,⁸ b) multimedia works whose components may be individually copyrighted but can be more efficiently protected if the work as a whole is protected, and c) works that may be 'transmitted' over a network.⁹

Works must also meet certain standards of originality to qualify for this right. Copyright protects how ideas are 'expressed' rather than the ideas themselves, but the line between expression and ideas is often unclear. For example, no-one owns the copyright to the idea of a detective novel but a work that closely copies the plot ideas of a detective novel may be in violation of copyright even if no sentence is exactly the same. The line between idea and expression is particularly important for software and multimedia because the innovative character of these works may reside in their 'look and feel' to users and because of the relative ease by which a particular 'expression' may be modified by the use of software authoring techniques. These problems are active areas of litigation within national copyright systems.

National standards for the protection of IPRs were among the first efforts by European countries to harmonise their legal systems through international agreement. Signatories of the Berne Copyright Convention of 1886 agreed to enforce the copyright of foreign authors according to their own copyright laws and to enact national laws addressing copyright coverage and other issues. The Berne Copyright Convention is monitored by the World Intellectual Property Organization (WIPO). The Berne Convention was a major step toward harmonisation of European copyright enforcement since it allowed legal action in the country in which a violation occurred regardless of the nationality of the author. Successive agreements during this century have extended the minimum rights granted by The Berne Convention, e.g. for public performances, and the cinema. Its international significance has been enhanced by the addition of the United States in 1989 and many developing countries as signatories. The Berne Convention provides an

international framework for copyright enforcement for the protection of many of the forms of information that can be made available using information infrastructures.

The Berne Convention does not, however, determine what the level of protection is to be in any particular signatory country. The existence of relatively weak protection in some non-OECD countries was influential in the establishment of the Trade-Related Intellectual Property Rights (TRIPS) agreement, part of the General Agreement on Tariffs and Trade (GATT) Uruguay Round agreements. The TRIPS agreement articulates the norms for national law suggested in the Berne Convention and allows for trade sanctions against non-complying nations. For such sanctions to occur, a national complaint must be lodged by a signatory with the World Trade Organisation (WTO).¹⁰ From a developing country viewpoint, TRIPS may create exposure to trade sanctions in actions stemming from GII development that are difficult to detect or enforce. This may create an impediment to the diffusion of information and communication technologies in these countries.

In addition to IPRs in the exchange of information, the development of the information infrastructure requires substantial investment in inventions, the subject of patent law. The grant of a patent gives the applicant the exclusive right to the use of the invention in exchange for disclosing how a person skilled in the art of the patent's subject could understand and work the invention. Patent systems, like copyright systems, originate in national legislation and are increasingly governed by international agreements such as The Paris Convention for the Protection of Industrial Property (1883).¹¹ Unlike the Berne Convention which dispenses with the formality of copyright application among signatories, the Paris Convention applies only to the rights of foreign nationals to apply for, and be granted, patents on the same terms as residents of the signatory countries. Although the criterion for granting patents varies between countries, it generally includes an element of novelty, some practical use, and an inventive step (i.e. a step that will not be obvious to a person skilled in the subject matter of the patent).

In the effort to build a European information infrastructure, patents raise two main issues. The first is the use of patents to develop control over an area of technology for reaching customers such as the development of 'set-top boxes' or other equipment for the receipt of audio-visual and data transmissions.¹² The second is the possibility that equipment developed to upgrade and extend business use of the European information infrastructure may be based on patented technologies that raise entry barriers and reduce competition, reducing the extent of interconnectability and interoperability of the network and thereby defeating the aim of creating a seamless European information infrastructure.

There are two basic issues that need to be considered in establishing policy in the area of IPR to serve the goal of building information infrastructures for the information society. The first is the level and nature of copyright protection to be afforded to authors and publishers in distributing information over information infrastructures. The second is how to weigh the balance between encouraging innovation in advanced information and communication technologies and the possibility that control and effective ownership of such innovations might be concentrated and lead to undesirable outcomes. The second of these issues is dealt with here.

Issues of control and effective ownership of the European information infrastructure are, in the first instance, matters of regulatory policy.¹³ IPRs may support the extension of this control through the software or hardware interfaces that govern interconnection within the information infrastructure. With regard to software interfaces, the European Union software directive provides that an authorised user of a computer program may obtain the necessary information to achieve interoperability of that program with other software. It prohibits the conduct of this activity for developing, producing or marketing a computer program that is substantially similar in expression. This is a significant limitation of copyright protection to achieve the goals of interconnectivity and interoperability of information infrastructures. With regard to hardware interfaces, no similar protection for interoperability exists.

In advanced information and communication technologies, what is accomplished by embedding a technical system in hardware and what is accomplished through the use of software is a matter of design choice. The European Commission directive on software creates an incentive for producers of advanced information and communication networks to embed interfaces in hardware in order to achieve the higher level of IPR protection afforded by the patent system. This is because patent law allows interfaces to be patented. Patent protection includes the use of the patented idea in the design of interconnectable or interoperable interfaces.¹⁴ The use of hardware patents to control interfaces in the information infrastructure can create ‘gatekeepers’ that fragment or delay the progress toward network interconnectivity and interoperability. If patent law was to be modified to support this goal, this would be a major change with far reaching consequences in terms of the impact it would be likely to have on the construction of a ‘seamless’ interconnected and interoperable European information infrastructure.

The same effect could be achieved through regulation if regulatory policy is used to prohibit the use of patent protection to control portions of the European information infrastructure. Such directives might be similar to those supporting implementation of Open Network Provision (ONP).¹⁵ This case, however, is more complex because it would involve regulating technology designs whose interfaces are not yet part of the network information infrastructure and which are supplied by players that are non-European. It would be possible, nevertheless, to devise a threshold test that would engage regulatory action when a patented interface technology seems likely to play a significant role in construction of the information infrastructure. Practical solutions to this problem are necessary because interconnection and interoperability are vital in developing the information infrastructure for the European information society. IPR protection should not provide for higher levels of protection to interfaces implemented in hardware than those for software interfaces.

The next sections are devoted to the analysis of the level and implications of copyright protection that may be afforded authors and publishers in distributing information using information infrastructures.

4.0 Social Constituencies in the Information Society

The motivations for the supply of information and the interests in accessing this information can be discerned by examining publicly accessible information services.

These services include Minitel, the Internet, other research or university oriented computer networks, information service providers such as CompuServe, and services provided by hardware or software companies such as Apple Computer's eWorld or The Microsoft Network. The reasons for developing these networks and for supplying information to them include, for example, the aims of contributing to publicly available information, of promoting activities such as research and education, and generating commercial revenues. Users or subscribers to these networks have a diverse collection of reasons for accessing this information. They are often suppliers of information themselves such as when they communicate political, cultural, and social views or share practical information, 'post' research results, and offer goods and services for sale.

Two striking features shared by almost all of these systems is the large amount of material that is contributed without charge and the use of networks to communicate information that is not subject to copyright. At the same time, however, commercial networks provide and promote access to information that is subject to copyright. A rapidly growing stock of such information is also found on non-commercial networks. These observations suggest the need for a closer examination of producer and user motivations in using these networks and the definition of the constituencies associated with different uses.

4.1 Three Constituencies

Broadly, copyright protection plays a different role for three different constituencies of individuals and organisations. The first 'public domain' constituency makes either no use, or limited use, of copyright protection. The second 'related revenue' constituency uses copyright protection to maintain control over the content of works, but its members benefit from the wide dissemination of copies. The third 'direct revenue' constituency seeks direct control over who may make copies for sale in the market place. A given organisation or individual may be a member of one, two, or all three of the constituencies.¹⁶ By examining these constituencies, it is possible to identify potential conflicts in economic or social interests of the members of these constituencies with respect to copyright protection.

4.1.1 The Public Domain Constituency

This first constituency represents producers of information and it consists of those who receive a benefit from the dissemination of their work that is unrelated to their receipt of revenue or income. It also includes people who simply want to make a contribution of information. Associated with this constituency are users who are interested in information for personal and commercial reasons (e.g. the monitoring of publicly disclosed research results to identify commercial opportunities).

A substantial amount of the information provided on forerunners of the global information infrastructure such as Internet and commercial bulletin board services is non-commercial. The authors of much of this information are seeking the broadest possible dissemination of this information and they do not charge the receivers. Examples include researchers who wish to share scientific data, individuals exchanging political viewpoints, and teachers sharing useful teaching materials or their insights about education.

Both the producers and users in this constituency support the inexpensive distribution of public domain information using information infrastructures. Producers often have an interest in copyright protection in accord with *droit moral* to ensure that the content of their contribution remains unaltered and that they are recognised as the author of the material they contribute.

Although the non-commercial motivations of information producers in the public domain constituency are important, the public domain distribution of information also generates commercial opportunities. For example, direct commercial returns available from public domain information are realised by information service providers who charge for access. This group includes the larger commercial information services, Internet Service Providers, as well as an enormous network of bulletin board services. In addition, the desire of these producers to enhance the value of their contributions supports the creation of books, magazines, and software tools for improving the display qualities and usability of public domain information especially in the Internet context. Users' interest in finding useful public domain information is also supporting a growing market for guides to information services and the creation of electronic databases and search engines to improve the likelihood of discovering useful information.

4.1.2 *The Related Revenue Constituency*

A second constituency of information producers has an interest in distributing information without direct payment for the receipt of that information. However, the members of this constituency do expect that the distribution of information will increase their future revenues or income. This group includes businesses that provide information with the expectation that it will improve their positions with investors, citizens, and with customers. Information which falls in the categories of public relations and advertising is generally costly for businesses to deliver to their existing or potential customers and the spread of World Wide Web access to the Internet appears to offer a means of reducing some of these costs. Similar advertising and promotional activities are conducted by charitable and non-profit organisations that rely on voluntary contributions.

There are important differences between the practice of advertising and public relations activities within information infrastructures and the use of traditional media such as newspapers, magazines, and particularly direct mail. In these traditional media, the study of the demographic characteristics of 'target' audiences leads to highly selective and focused strategies for achieving exposure. More sophisticated approaches for exposing individuals to advertising and promotion messages by the use of information infrastructures are emerging quickly. This process is bringing concerns of the user community about controlling the receipt of such information to the fore.¹⁷ One of the attractive techniques is to monitor and analyse individuals using their information service requests and other information about them. As a result, concerns about individual privacy are becoming more important among the users in this constituency.

Innovative uses of existing information infrastructures (including physical exchange of information on discs among individuals and the distribution of discs or CD-ROMs with printed magazines) are being made by the producers of so-called 'shareware' computer programs and other variants of information products. These producers promote the copying of their products and exhort users to make a financial contribution if they use

the product for more than investigation and trial. There are some indications that this strategy does lead to commercial returns for some producers.¹⁸ Accompanying the growing interest in shareware is the distribution of 'trial' versions of software products. Trial versions are unlike shareware in that they are limited versions of the full commercial version which is usually distributed through ordinary software retail channels.

Another innovative use of the existing information infrastructures by the related revenue constituency includes companies that offer 'post-sales' support to customers such as fixes or upgrades to software products (e.g. Digital Equipment Corporation operates one of the world's largest Internet sites for this purpose). Distribution of this information is a complement to the sale of products and services in which the primary copyright or other contractual protections are established outside the information infrastructure. In rapidly changing product and service markets, this type of connection with customers can provide information which supports product improvements and helps to retain customer loyalty thus contributing to future sales.

In general, the members of the related revenue constituency identify connections between the information distribution capabilities of the information infrastructure and their other business activities. Virtually all of the conventional methods for promoting products or customer interest have equivalents in the information infrastructure including new product announcements, hints and tips for product use, and customer inquiry services.

This definition of the interests of the related revenue constituency highlights the copyright implications of the 'related revenue' application of the information infrastructure. A boundary between the 'related' and 'direct' revenue is drawn in terms of the *distribution of the product* using the information infrastructure in the latter case, and the *distribution of information about the product in the former*. Copyright protection issues are more significant for those companies that are using the information infrastructure directly to distribute their products.

One category of activity that bridges the related revenue constituency and the direct sale of products and services *delivered* using information infrastructures is 'mail order' services. Growth in the numbers of companies offering mail or other forms of non-infrastructure delivery for products and services has been very rapid particularly following the liberalisation of the regulations on the commercial use of the Internet. Mail order companies share an interest with those who deliver goods and services using the infrastructure. Both have an interest in developing methods of accepting payment for goods and services through funds transfer using the information infrastructure and secure methods of receiving credit card information from users.

The related revenue constituency has a substantial interest in preventing the alteration of the information its members provide (e.g. limitations imposed on the use of trial versions of software) through the use of copyright protection in the form of the *droit moral* restriction on the 'mutilation' (i.e. alteration) of a work. No court case has tested the limits of copyright protection of this type of information distribution to our knowledge and it is possible that activities, such as the practice of encouraging users to make copies of shareware to give to others, may raise new legal issues. However, it is

reasonable to conclude that existing copyright rules will be adequate to defend the integrity of this information from modification and to defend the commercial interests involved in these activities.

Users of information provided by the producers in the related revenue constituency face problems of searching and filtering information that may be of value to them just as they do when they are participating as members of the public domain constituency. This interest generates demand for guides and directories and related revenue information producers are often identified in guides to public domain information. It is unclear whether users in this group are, at present, distinct from the users of public domain information. In the future, however, these user groups may develop distinct identities corresponding to social differences and preferences between individuals who avoid advertising messages and those that seek them out.

4.1.3 The Direct Revenue Constituency

The third constituency of producers and users has an interest in selling and buying information goods and services using information infrastructures. Producers in this group need a means of protecting the value of their goods and services from those who would like to receive them without paying. This group is interested in a high level of IPR protection and other types of protection to insure that those who value their products and services will actually pay to receive them.

Markets created by members of this constituency for their goods and services are based upon: 1) winning a share of existing markets for information distribution using other media (i.e. information infrastructures eventually will deliver audio, audio-visual, and multimedia products), 2) creating new information products and services that may be subject to copyright protection but that is not distributed using other media, and 3) creating new services that use the telecommunication features of the information infrastructure (e.g. videophone services). IPR is particularly important in the first two markets. And the role of patent protection discussed above is important in the case of equipment used for the creation of the third market.

The sale of information products and services that can be distributed using other media relies upon developments outside the IPR domain. For example, it is often assumed that the costs of reproducing and distributing information products fall dramatically when such information is distributed via communication networks. However, the manufacturing costs of creating copies of information embedded in other media are already quite low. For example, in book publishing, the costs of manufacturing a copy are a small fraction of the price paid for the book. The other components of the price cover the costs of retailers and distributors who promote, stock, and deliver books; the costs of the publisher in promoting the work as well as absorbing losses on copies of books that are not sold; and the author's costs. Distribution and unsold inventory costs may be reduced by electronic distribution, but some or all of the costs that distributors and retailers incur in promoting copyrighted works must be covered by publishers or borne by electronic distributors. A similar situation applies to compact discs, packaged software (where the author and publisher are usually the same), and pre-recorded audio and video tapes.

Information infrastructures are likely to continue to compete with other media for

distributing copyrighted works such as books and pre-recorded audio or video recordings. Consideration of competition between media for the distribution of information helps to explain why a very high level of intellectual property protection may be sought by publishers as a pre-requisite for choosing to distribute works over information infrastructures.

This does not suggest, however, that electronic distribution media create business opportunities that are identical to those in existing markets. For example, the publishers of academic journals have long sought effective price discrimination methods that would allow them to charge higher prices to libraries and lower prices to individuals. A number of more sophisticated approaches are now becoming available for electronic journals such as 'site licenses' at the level of the university or even nationally. Electronic distribution may also encourage new business strategies that take advantage of differences between electronic and physical means of distribution. For example, the publication of literary works with attractive bindings and typography is likely to continue even if lower priced copies of these works are made available using electronic information services.

Information distribution using the information infrastructure may also take the form of broadcast audio or television programmes. Broadcasts, including those made by public broadcasters, are subject to copyright and the rebroadcast or commercial copying of broadcasts are generally held to be violations of copyright under the Berne Convention, supported by European directives and national copyright laws. As broadcasting becomes part of the information infrastructure, copyright protection to prevent copying of broadcasts for commercial gain will need to apply in the context of the information infrastructure. For instance, high performance features of the information infrastructure such as video links can be used to redirect broadcasts or distribute copies of them. Video-on-demand access or content may be misappropriated and unauthorised access to interactive services may occur. Effective copyright protection is necessary to allow the information infrastructure to compete with physical distribution, to cope with the problems of electronic distribution of copyrighted broadcasts, and to protect other information that is distributed using the information infrastructure.

Producers and users in this constituency who exchange goods and services over the information infrastructure have an interest in the development of electronic payment mechanisms including credit card entry, validation, and the development of cash transfer methods. The main issue in this area concerns the search for effective protection of payment mechanisms. It is unclear what mechanism will achieve broad market success.¹⁹ It is likely that a payment mechanism will be protected using one or more types of IPR protection. Experience in credit card markets indicates the potential for development of oligopolistic rivalry in this area.²⁰ However, it may be possible for a company to develop an internationally accepted standard for creating cash on the network and to reinforce its dominant position in this market with IPR protection. Such a company could become very large even though its profits on individual transactions would be small. Producers and, to a lesser extent, users in the third 'direct revenue' constituency have a unique interest in copyright protection. Both have an interest in the development of effective payment mechanisms that afford secure and reliable means to make payments for products and services distributed using the information infrastructure.

3.2 *Shared and Conflicting Interests between the Constituencies*

The three constituencies make different use of copyright protection and rely upon it in different ways. In addition, producers and users in each group have different interests in the effectiveness of copyright protection and the vigour of copyright enforcement. If the greatest social benefit is to be derived from the activities of the members of these constituencies, it is necessary to consider their shared and conflicting interests. The main interest of producers in the public domain group is in retaining some acknowledgement that they have created a work. Many works are in the public domain and they may be copied, modified, or excerpted without raising user concerns and many users voluntarily comply with standards for identifying authorship.

The public domain constituency comes into conflict with the other two constituencies in the production and receipt of information that violates copyright protection. Suppliers who incorporate copyrighted works without authorisation in their own creations and users who receive unauthorised copies of copyrighted works are legally liable for the commercial damage that these activities may cause. Similarly, a particular information producer may have violated copyright when his or her work is substantially similar in expression to a work that is protected. Legal defences against copyright infringement cannot be based on inadvertence or ignorance. As a result, any rise in the level of intellectual property protection and enforcement has the effect of increasing the liability of both producers and users. Users are much more likely to be included in the liability risk because network technologies greatly reduce the distinction between producer and user. Using these technologies, virtually anyone can become a publisher with a small investment.

As in other cases of liability, the policy or legal alternatives are to: a) increase the level of monitoring and avoidance of risk in order to reduce liability, b) insure against the risk of liability, c) accept the risk in the hope of escaping a legal liability judgement, or d) attempt to transfer the liability risk to another party. These choices are being made by producers and users as well as information service companies in the public domain constituency. Alternatives a) and b) lead to an increase in the costs that potentially must be borne by the members of the public domain constituency. Alternatives c) and d) may lead to higher costs for the members of this group depending on future changes in the level of copyright enforcement. Thus, there are clear conflicts of economic interest between the members of the public domain constituency and the members of the other two constituencies.

The conflict in interests between the related revenue and direct revenue constituencies is less direct. To the extent that higher levels of protection for copyrighted works lead to an increase in costs either directly or indirectly in terms of the convenience of access to the information produced by the 'related revenue' group, the economic interest of this group will be damaged. This is because its principle interest is in easy and low cost access to information.

If it proves to be possible to develop a widely accepted and secure means of transferring copyrighted information between producers and customers then the conflicts between these groups might be resolved and they could co-exist.²¹ However, technical means of

protection are imperfect and therefore the interests of the direct revenue constituency continue to be in conflict with the public domain and related revenue constituencies. As a result, public policy, including policy on copyright protection, must weigh the balance between each constituencies' respective interests and devise solutions.

4.3 Security of Intellectual Property Rights On the Information Infrastructure

Any assessment of these interests needs to be made in the context of an examination of the relationship between copyright protection and security issues. This relationship involves the security of particular types of information from unauthorised reproduction, and the security of the information infrastructure from being used to transmit unauthorised copies. If a reliable means of securing an individual's works was available, this would ensure that all of the costs of this security were paid for by those who benefit. Enhancing the security of the information infrastructure itself could impose costs on all users of network-based services and could have the result of sustaining, rather than ameliorating, conflicts in the interests of the three constituencies. Neither type of security is widely accepted or effective.

4.3.1 The Security of Different Types of Copyrighted Information

Information and communication technology systems are designed to transmit and store information by creating perfect copies of information at the lowest possible cost. Information infrastructures using these technologies, may dramatically reduce the costs of making identical and unauthorised copies of copyrighted material. Concern about the security of information stored and transmitted over information infrastructures is a central issue in determining whether copyright protection can be realistically provided.

There are several routes to reducing, and perhaps eliminating, security problems in the transfer of copyrighted information but none of these is costless. Each imposes costs on producers and users that may or may not be necessary depending upon the extent of copyright protection that is desired and enacted into law. When these costs fall on producers and users who are not in the direct revenue constituency, conflicts of interests between the constituencies continue to exist.

The first way of enhancing security involves technologies that prevent the unauthorised reproduction of copyrighted electronic works. A number of such technologies have been devised throughout the history of the computer industry and especially since the development of personal computers. Computer manufacturers generally have chosen not to implement technological means in support of IPR protection, e.g. individual computers are not easily distinguished and therefore no reliable link can be made between a particular computer and a copyright license. It is unclear whether this method was not adopted because computers are more valuable with more software, the risk of computer users refusing to buy the products of a manufacturer who chose to incorporate such a method of protection, or the opinion of computer manufacturers that such devices could be overcome. The hardware-based copyright protection methods that have been devised take the form of 'keys,' or add-ons. This method is desirable insofar as it imposes all of the costs of copyright protection on those who benefit from it. However, only a small number of software products require the use of such a key, and adoption of such 'add ons' has remained below the threshold needed for widespread use.

A hardware solution, if it were to be effective would allow software programs that would check for the key. Other forms of information distribution, such as the distribution of audio-visual material would require that the 'reader' of such software check for the key. A variant of the hardware key technique, the 'master disc' method, was attempted for one leading software product (Lotus 1-2-3) and other smaller companies, but it was unpopular with users and was abandoned.

A second method of protection is to embed copy control schemes in the installation software accompanying software packages. This only applies to executable software programs and it excludes other means of distributing information that might be accessible using alternative 'readers'. Users are resistant to this technique for a number of reasons including hardware failures that destroy legitimate copies of software or other information.

A third method is to link users and individual copies of information together. This technique requires a user to identify him or herself and receive authorisation codes from the software manufacturer. This technique has been used successfully for expensive software such as for mainframe computer installations, but it is costly and may be resisted by users. This technique has been employed effectively in the CD-ROM market where copies of particular programs may be 'unlocked' by acquiring the appropriate access code. This technique can be used in information networks if the key is linked to a individual copy of a program. This requires that producers devise methods of customising the identity of every program that is downloaded. The only way around this method is to devise fraudulent identity codes or 'keys'.

Other technologies may emerge in the future. Until a major innovation occurs or producers win user acceptance of one or more of the three existing approaches, there will be no fully effective mechanism for safeguarding IPRs in software or other information distributed between personal computers. This applies to the various components of the information infrastructure as a whole. The absence of a broadly accepted standard for copy protection in the personal computer world does not mean that hardware or software-based protection schemes will not emerge for other equipment used in the information infrastructure. In the absence of a highly reliable technological method for copyright protection, attention must turn to methods that discourage, rather than eliminate, copyright violation.

A starting point for discouraging large-scale copyright violation operations is to include methods for labelling individual copies of software and other types of information so that it is possible to trace the provenance of a copy. This technique, accompanied by a registration procedure, offers a method of detecting the legitimate owner of any copy. The inspection of copies for which the user could not demonstrate authorised use would be interpreted as suggesting that copyright violation had occurred. Enforcement in this area raises legal and practical problems and it is practical only for pursuing large scale copying operations or organisations. Preventing the elimination or modification of identifying marks by encryption techniques offers additional assurance that an original copy can be identified.

Marking techniques and registration procedures require some user co-operation. This may be encouraged by a mixture of encouragement and warning. Making these

procedures convenient and cheap for authorised users would also encourage their acceptance. The use of these techniques to reduce the risks of wholesale copying is likely to encourage greater use of the information infrastructure for the distribution of copyrighted information.

At present, there are no broadly accepted standards for reliable copy protection of software and other information that can be distributed using the information infrastructure. However, methods of identifying the provenance of information can be improved and users can be encouraged to co-operate with registration procedures.

It is often argued that the highest possible protection is necessary to prevent damage to the commercial interests of the owners of information. However, if a high level of protection increases the costs of legitimate transactions or reduces the value of the information to the users after they have received it, a high standard is not likely to be in the interest of either producers or users. If it is accepted that the costs of copyright protection should be paid by the producers and users who benefit, then it follows that members of the public domain and related revenue constituencies should not have to make financial contributions to these costs. It can also be argued, however, that the costs of copyright protection should be imposed on all producers and users of the information infrastructure. According to this view, there are social benefits in building information infrastructures. The expenditure on information infrastructures represents a fixed cost and the addition of more users potentially would reduce the costs for all users. In this view, the public as a whole should make contributions to the costs of research to improve protection methods because of their broad applicability throughout the information society.

It is likely that existing methods of protection will be improved. However, they will continue to fall short of the stringent levels of protection that generally have been sought by the 'direct revenue' constituency. It is therefore necessary to consider how copyright violations using the information infrastructure can be reduced or eliminated.

4.3.2 Controlling Copyright Infringement Uses of the Information Infrastructure

The components of the information infrastructure - telecommunication, cable, broadcast microwave, and cellular networks - support electronic commerce and trade. As the capabilities of these networks are enhanced, and with the possibility that they may converge to a common digital format, existing services will be adapted to the new environment. Since the costs of enhancing the capabilities of existing networks are considerable, network operators and service providers have a substantial interest in determining how these networks can be used for information distribution to generate new sources of revenue.

The distribution of copyrighted information is one of the many new revenue generating activities that can help to pay for the costs of enhancing the value of the information infrastructure. Some proportion of customers will be willing to pay higher access and service charges to obtain enhanced connections that will allow them to receive copyrighted information in audio-visual, audio, still image, and computer file formats for business, social, entertainment, and education purposes. Current trends in the use of communication systems provide insight into the interaction between copyright, security, and architectural issues.

International uses of telecommunication networks for data communication have developed, first, in the academic and public sector focusing on the dissemination of information and the reduction of the costs of communication in support of research and public functions. The main goal of these developments has been to provide the least expensive and restrictive means of accessing and distributing information.²² With the growing use of advanced telecommunication services in the commercial activities of business, new incentives regarding control of information distribution are emerging. Despite the different origins of data communication systems, the different parts of the network can be bridged together. Public telecommunication operators have established standards for interconnection to allow the flexible interconnection of new capacity within their systems and to enable the interconnection of systems that they do not directly control. They have also allowed, or been forced to accept, a broader set of interconnections with the networks of other commercial enterprises who compete with them.

These two systems have different approaches to security issues. Business telecommunication systems are based largely on proprietary standards that will be retained for some time because they have attractive performance characteristics and a large installed base. The research community has pioneered a second approach by finding a common denominator with which virtually all existing systems can comply. The implementation that has received broadest acceptance is the Internet based on a public standard, the Transmission Control Protocol/Internet Protocol (TCP/IP) protocol. This system has been tested for a wide variety of information transfer needs over the past thirty years.

Despite its popularity, the Internet faces serious problems in the area of copyright protection because of security issues. The Internet is regarded by many business information system managers as being hazardous to company security and many such enterprises have constructed 'firewalls' to separate corporate networks (Intranets/Extranets) from the Internet. Such 'firewalls' have been constructed, not only to prevent the loss of control over proprietary information (including liability for copyright infringement), but also to prevent importation of viruses and the occurrence of other security problems such as service interruptions.

Significant improvements in Internet security for business use require security features such as user monitoring and authorisation. This will increase the costs of Internet use to the public and users. It raises important issues about privacy (user monitoring of electronic mail) and democratic protection (who will do the monitoring). As the Internet is increasingly heavily used by public domain constituency, it is unclear who will pay for these increased costs. Thus, the conflict between the public domain and direct revenue constituencies in the use of the information infrastructure is likely to continue.

5.0 Conclusion

The absence of a broadly accepted and reliable technological solution, together with the problems of increasing security in the use of information services based on the use of the Internet, brings the interests of the 'public domain' and 'related revenue' constituencies into direct conflict with the interests of the 'direct revenue' constituency.

As exposure to problems of copyright infringement increases, there is likely to be growing pressure to constrain or regulate public access to public networks. An alternative may be to subject public networks to increased monitoring and security procedures, thereby increasing costs and compromising user privacy. In either case, it will be important to know what is being lost as a result of strengthened copyright protection and what might be gained. This will require improved means of monitoring the implications of efforts to achieve stronger IPR protection for the users in the public domain constituency including their effects on the availability of public domain information and on user privacy.

In order to weigh alternative policies that are likely to have a negative impact on the three constituencies, it will be necessary to have improved ways of monitoring their respective sizes and activities. The continuing failure to develop a broadly accepted and reliable means of copyright protection for information distributed over public networks raises questions about the seriousness of the need to strengthen copyright protection or enforcement. There is a growing need to examine the effectiveness of copyright registration systems and the reasons that many existing copy protection schemes have not been used broadly for all modes of information distribution using the information infrastructure.

The European Commission is likely to face continuing pressure from the 'direct revenue' and 'related revenue' constituencies to strengthen copyright legislation and eliminate national disparities in favour of a common 'single market' set of standards. The diffusion of reliable technical means of securing IPRs is likely to be slower than some advocates of technical solutions have forecast. When they are adopted, they are likely to spread unevenly across and within different sectors. The costs and other consequences of various methods for copyright protection, such as user monitoring and other security-related measures, are likely to reduce the accessibility of 'public domain' information and this is inconsistent with the social goals of the European Information Society.

We have outlined some of the conflicts which exist between the interests of the 'public domain', 'indirect revenue', and 'direct revenue' constituencies in the control of the production, distribution, and use of information. In order to distinguish between the rhetoric and practices of the members of these constituencies more accurate and complete studies of the implementation of existing IPR legislation is needed together with more effective measures of the use of information infrastructures in Europe. The social and economic viability of the European Information Society will be strengthened or weakened in the light of the way conflicting interests in the IPR field are resolved for existing and future information infrastructures.

Notes and References

- 1 The research for this paper was supported in part by funding from the STOA programme of the European Parliament. Robin Mansell is Professor of Information and Communication Technology Policy and W. Edward Steinmueller is Professor of the Economics of Technical Change and Innovation, both at the Science Policy Research Unit (SPRU), University of Sussex. They direct the SPRU research centre, Information, Networks & Knowledge (INK).
- 2 See R. Mansell and U. Wehn (eds) (1998) *Knowledge Societies: Information Technology for Sustainable Development*, for the UN Commission on Science and Technology for Development, Oxford University Press.
- 3 See R. Mansell and W. E. Steinmueller (1996) 'Intellectual Property Rights: Key Issues and Problems', FAIR Working Paper No.6, Science Policy Research Unit, November; and W. Hulsink (1996) 'Intellectual Property Rights in Europe's Digital Era: The Coordination Problems of Creative and Collecting Societies', FAIR Working Paper No. 10, Science Policy Research Unit, December.
- 4 P. A. David (1992) 'Intellectual Property Institutions and the Panda's Thumb,' Center for Economic Policy Research (CEPR), Stanford University, CEPR Publication No. 287, April.
- 5 D. I. Bainbridge (1994) *Intellectual Property*, Second Edition. London: Pitman Publishing, p. 25.
- 6 The Berne Convention Article 2(1).
- 7 See European Commission (1988) 'Green Paper on Copyright and the Challenge of Technology: Copyright Issues Requiring Immediate Action,' COM (88) 172 final, 7 June, pp. 45-53 for a discussion of specific gaps in existing national laws.
- 8 For example, compilations (e.g. digests of facts) are not necessarily covered under the Berne Convention. Print compilations have been protected by certain countries and not in others. In Europe, in 1992, the Commission proposed that electronic compilations be protected from unauthorised 'extraction', see European Commission (1992) 'Proposal for a Council Directive on the Legal Protection of Databases' COM (92) 24 final - SYN 393, Brussels, 13 May and European Commission (1993) 'Amended Proposal', COM (93) 464 final - SYN 393, Brussels, 4 October; and European Commission (1997) 'Copyright and related rights in the information society, Proposal for Directive/Background', Brussels, 10 December.
- 9 On these points see European Commission (1995) 'Green Paper on Copyright and Related Rights in the Information Society' COM (95) 382 Final, Brussels 19 July; US Information Infrastructure Task Force (1995) 'Intellectual Property and the National Information Infrastructure: The Report of the Working Group on Intellectual Property Rights', Section I.A.9., 'International Implications', Washington, DC., pp. 130-154, and Japanese Institute of Intellectual Property (1995) 'Predicted Problems and Possible Solutions for Administering Intellectual Property Rights in a Multimedia Society', Tokyo, June.
- 10 See GATT (1994) 'Agreement on Trade-related aspects of intellectual property rights, including trade related counterfeit goods', Geneva.
- 11 D. I. Bainbridge (1994) *Intellectual Property*, Second Edition. London: Pitman Publishing. p. 255.
- 12 See R. Mansell (1996) 'Telecommunications in the UK: Controlling the Information Society Gateways', *Telematics and Informatics*, Vol. 13(2/3), pp. 141-156.
- 13 R. Mansell and W. E. Steinmueller (1995) 'Policy Options for the New Telecommunications', Final Report, STOA Programme of the European Parliament, Science Policy Research Unit, University of Sussex and MERIT, University of Maastricht, 17 October.
- 14 Patent protection plays an important role in the standards process, leading to partial solutions such as patent 'grant backs' which endorse the validity of the property right while requiring that it be licensed on a non-discriminatory basis.
- 15 European Commission (1996) 'Proposal for a European Parliament and Council Directive on the application of open network provision (ONP) to voice telephony and on universal service for telecommunications in a competitive environment (replacing European Parliament and Council Directive 95/62/EC)', European Commission, Brussels, 11 September.
- 16 These constituencies do not represent completely homogeneous categories and the interests of the members of each group must be assumed to change over time. A more detailed analysis would reveal additional insights into potentially conflicting positions, a task that is beyond the scope of the present paper.
- 17 European Commission (1995) 'Green Paper on the Protection of Minors and Human Dignity in Audiovisual and Information Services', OJ No C 93/1, Brussels, 24 October; European Commission

- (1996) 'Directive 96/9/EC of the European Parliament and of the Council of 11 March 1996 on the legal protection of databases', OJ No L 77, Brussels, 27 March.
- 18 L. Takeyama (1994) 'The Shareware Industry: Some Stylised Facts and Estimates of Rates of Returns,' *Economics of Innovation and New Technology*, 3(2), pp. 161-172.
- 19 L. Srivastava and R. Mansell (1997) 'Electronic Cash and the Innovation Process: A User Paradigm' FAIR Working Paper No. 35, Science Policy Research Unit, March.
- 20 See D. Sayers (1997) 'Electronic Payment Systems: A Horizontal or Vertical Future?' FAIR Working Paper No. 16, Science Policy Research Unit, February.
- 21 For assessments of technical measures to secure networks see R. Mansell (1997) 'Technical Innovations, Policy and Strategy', in A. Dumort and J. Dryden (eds) *The Economics of the Information Society*. Luxembourg: Office for Official Publications of the European Communities, pp. 219-224; R. Mansell and W. E. Steinmueller (1996) 'Securing Electronic Networks', FAIR Working Paper No. 7, Science Policy Research Unit, November; and D. Sayers (1997) 'Name-linked Data Legislation: Current Practice and Enforcement Issues for the Information Society', FAIR Working Paper No. 15, Science Policy Research Unit, February.
- 22 Only a portion of the activities of the academic and public sector is engaged in such public dissemination activities; other uses of data communication networks by these users are similar to those of the business users.