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PROTECTING U.S. INTELLECTUAL PROPERTY RIGHTS AND THE CHALLENGES OF DIGITAL PIRACY

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ABSTRACT: According to U.S. industry and government officials, intellectual property rights (IPR) infringement has reached critical levels in the United States as well as abroad. The speed and ease with which the duplication of products protected by IPR can occur has created an urgent need for industries and governments alike to address the protection of IPR in order to keep markets open to trade in the affected goods. Copyrighted products such as software, movies, music and video recordings, and other media products have been particularly affected by inadequate IPR protection. New tools, such as writable compact discs (CDs) and, of course, the Internet have made duplication not only effortless and low-cost, but anonymous as well. This paper discusses the merits of IPR protection and its importance to the U.S. economy. It then provides background on various technical, legal, and trade policy methods that have been employed to control the infringement of IPR domestically and internationally. This is followed by an analysis of current and future challenges facing U.S. industry with regard to IPR protection, particularly the challenges presented by the Internet and digital piracy.

[1] This paper represents solely the views of the authors and is not meant to represent the views of the U.S. International Trade Commission or any of its commissioners. The invaluable assistance of Heidi Colby, Laura Polly, Monica Reed, and Wanda Tolson is gratefully acknowledged. Please direct all correspondence to Christopher Johnson, Office of Industries, U.S. International Trade Commission, 500 E Street, SW, Washington, DC 20436, telephone: 202-205-3488, fax: 202-205-2018, *email: cjohnson@usitc.gov.*

PROTECTING U.S. INTELLECTUAL PROPERTY RIGHTS AND THE CHALLENGES OF DIGITAL PIRACY

Introduction

According to U.S. industry representatives, intellectual property rights (IPR) infringement has reached critical levels in the United States as well as abroad.[1] The speed and ease with which the duplication of products protected by IPR can occur has created an urgent need for industries and governments alike to address the protection of IPR. New tools, such as writable compact discs (CDs) and, of course, the Internet have made unauthorized duplication not only effortless and low-cost, but anonymous as well. At the same time, an increasingly digital world has spawned vigorous debate about how to maintain the appropriate incentives afforded to creators of copyright content, given the ease of digital copying, while continuing to provide for certain non-infringing uses of works for socially beneficial purposes. In turn, this debate has highlighted international differences in views among industrialized nations and developing countries.

The protection of IPR has long been a fractious issue. While the United States established copyright, patent, and trademark protections early on in U.S. history, these issues were first addressed internationally in the 1880s with the Paris and Berne Conventions. Despite subsequent attempts to adequately address intellectual property issues globally, IPR protection remains a challenge. Industries deeply dependent on the development of intellectual property, including software, entertainment media, and pharmaceuticals,[2] are those most affected by the lack of adequate protection of this property abroad. Because of an inadequate level of protection, many potential markets are unavailable to U.S. manufacturers due to the proliferation of commercial piracy.[3]

Thus, IPR protection has become a pressing issue with respect to international trade. The international community agreed on common IPR rules and enforcement programs during the last global round of trade negotiations establishing the World Trade Organization (WTO), and established new copyright norms in the World Intellectual Property Organization (WIPO) "Internet" treaties,[4] which bring copyright into the digital age. However, problems remain in the implementation of these norms. For instance, the United States and other industrialized countries continue to urge many developing countries to live up to their new obligations by implementing the necessary legislation and enforcement mechanisms with respect to protecting intellectual property.

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[1] U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

[2] For more information on U.S. industries significantly affected by IPR infringement overseas, see Benedicte Callan, *Pirates on the High Seas: The United States and Global Intellectual Property Rights* (New York: Council on Foreign Relations, Inc., 1998), p. 14.

[3] Commercial piracy covers a range of unauthorized uses which result in commercial advantage to the infringer. This includes unauthorized reproduction of physical product, reproduction in intangible ways (Internet, etc.), physical distribution and sale, transmission (including Internet transmissions), public performances, public exhibitions, broadcasting, cablecasting, satellite transmissions, and the like.

[4] The World Intellectual Property Organization (WIPO) "Internet" treaties refer to the WIPO Copyright Treaty (WCT) and the WIPO Performances and Phonograms Treaty (WPPT), which will be discussed in more detail later in this paper.

U.S. industries are affected in a number of different IPR areas, including patents, copyrights, trademarks, semiconductor layouts (i.e., mask works), geographic indications, industrial designs, and trade secrets. However, this paper will primarily address protections for copyrights and, to a lesser extent, patents.[5] Many of the most significant international trade disputes involving copyright issues have been in the software, consumer electronics, and entertainment media industries. This paper begins by discussing the merits of IPR protection and its importance to the U.S. economy. It then provides background on various technical, legal, and trade policy methods that have been employed to control the infringement of IPR domestically and internationally. This is followed by an analysis of current and future challenges facing U.S. industry with regard to IPR protection, particularly the challenges presented by the Internet and digital piracy.

The Case for IPR Protection: Balancing the Rights of Innovators and Society

The costs of developing new products in intellectual property-related industries, particularly in copyright industries such as software, entertainment, and publishing, and patent-based industries such as pharmaceuticals and chemicals, can be very high.[6] Developing a new software operating system, movie, book, or drug can cost millions or even billions of dollars. The Pharmaceutical Research and Manufacturers of America states that its members spent over $30 billion in discovering and developing new drugs in 2001.[7] This investment is very risky since the product under development is not assured success in the market place.[8] Only a small percentage of new drugs, software programs, books, or music recordings become financially successful for their producers.

The greatest expense by far in bringing most intellectual property-dependent goods to market is in development rather than manufacture or duplication. While the costs and risks involved in product development are high, the costs of product imitation or intellectual property theft are generally low. Once a successful book is published, it may be replicated with little effort. A successful new software program may easily be copied or transmitted via the Internet. A drug developed and approved by the government for marketing after extensive research and development and clinical testing by the developer can often be duplicated with relatively inexpensive chemical ingredients and processes.

Because individuals or companies developing new products would not do so unless they felt they had a good chance of receiving an adequate return on their investment, governments often provide a minimum level of market exclusivity to inventors or developers of products, particularly those that benefit

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[5] Other types of IPR issues will be discussed briefly in a section later in this paper on the WTO Agreement on Trade Related Aspects of Intellectual Property Rights (TRIPs).

[6] Bob Goodlatte, "Stealing Entertainment," *Washington Times*, May 27, 2002, pp 1-3, found at Internet address *http://www.washtimes.com*; Michael P. Ryan, *Knowledge Diplomacy: Global Competition and the Politics of Intellectual Property* (Washington, DC: Brookings Institution, 1998), pp. 4-10; and Keith E. Maskus, *Intellectual Property Rights in the Global Economy* (Washington, DC: Institute for International Economics, Aug. 2000), pp. 57-60.

[7] "PhRMA, Health Care Advocates to Fight Efforts by Generic Industry to Jeopardize the Progress in Medical Research," *PhRMA News Release*, Feb. 25, 2002, p. 1, found at Internet address *http://www.phrma.org*, retrieved Feb. 26, 2002.

[8] Maskus, *Intellectual Property Rights in the Global Economy*, pp. 57-60.

consumers and society.[9] For example, pharmaceutical and other inventions may receive patent protection from governments to provide their developers with minimum periods in which they may exclude others from practicing their patented inventions. Authors of books, computers software, movies, music, and other related works, meanwhile, upon creation of their work, secure copyright protection in their "expression" of ideas, though not in the ideas themselves. Conferring intellectual property rights such as copyrights and patents encourages individuals and companies to continue to develop creative works of art and entertainment, and technologically advanced products such as pharmaceuticals, that are perceived to greatly benefit a society. In the United States, the purposes of U.S. intellectual property policies have been to "promote public welfare; private property rights have been the means to that end."[10]

Nevertheless, there have always been diverse opinions on the amount of exclusivity that should be provided to a protected product or process.[11] One result of market exclusivity is that it permits the intellectual property rights holder to demand higher prices than he otherwise could if he faced competition in providing the protected product. Some argue that stiff intellectual property protection obviates the expressed purpose of benefiting the economy or society since it puts the price of protected products out of the reach of poorer persons.[12] In response, the rights holders indicate that products would never be developed if the developer could not be assured of a certain minimum level of market exclusivity to provide some assurance it could recover its costs and make a sufficient profit to make the risks of development worthwhile.[13]

Copyright laws have often attempted to strike a balance between the rights of the consumer and society and the rights of the innovator to benefit from his creation.[14] For example, although the period of exclusivity for U.S. copyright law has been lengthened to a period approaching two lifetimes of the author, limits have been placed on its scope in such a way as to benefit society as a whole even during the time the work in question is protected.[15] Further, protection provided to software and other works is limited in scope to cover only the expression, and not the idea itself.[16] Thus, a copyright may be obtained for a story in its written form but not for the idea of its plot, or for a software operating system such as Microsoft Windows but not for the general concepts or ideas underlying the operating system. Also, the "fair use"[17] doctrine has emerged in U.S. copyright law to allow shared uses of small portions of publications (for example, in the face-to-face classroom setting), and even copying of small sections of

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[9] Bernard Hoekman and Michel Kostecki, "Intellectual Property," ch. in *The Political Economy of the World Trading System: From GATT to the WTO* (Oxford: Oxford University Press, 1997), p. 146.

[10] Ryan, *Knowledge Diplomacy*, p. 6.

[11] One scholar states that "[there] is a sound justification for public interest in defining and sustaining [IPR] rights in order to overcome the natural failure of markets to encourage investment in new technologies and artistic works." But, he continues, "there is also justification for distributing the fruits of such invention and creation widely to consumers at relatively low cost." Maskus, *Intellectual Property Rights in the Global Economy*, p. 9.

[12] Edgardo Buscaglia and Jose-Luis Guerrero-Cusumano, "Quantitative Analysis of Counterfeiting Activities in Developing Counties in the Pre-GATT period," *Jurimetrics Journal*, Winter 1995, p. 223.

[13] National Academy of Sciences officials, meeting with USITC staff, Jan. 15, 2002; and U.S. industry representatives, telephone interviews by USITC staff, Feb.-May 2002.

[14] Ryan, *Knowledge Diplomacy*, p. 7.

[15] Ibid., p 10.

[16] Section 102(b) of the U.S. Copyright Act (17 U.S.C. 101 et. seq.).

[17] "Fair use" is an important element of U.S. copyright law, representing the principle that the public is entitled, without having to ask permission, to use copyrighted work if it does not interfere with the copyright holder's market for a work. Electronic Frontier Foundation, *Unintended Consequences: Three Years Under the DMCA*, V.1.0 (May 3, 2002), found at Internet address *http://www.eff.org*.

copyrighted works for purposes such as reporting, criticism, commentary or quotation, and other scholarly and journalistic uses.

Many developing countries have in recent years come to recognize the importance of IPR protection to the development of their economies.[18] However, especially in the patent area, a number of developing countries continue to assert that IPR protection harms their economies. For example, the existence of patent protections and the associated higher prices could affect the availability of advanced agricultural inputs and medicines in developing countries. Leaders of some developing countries have also argued that their societies can never advance educationally or technologically if they do not have lower cost access to products stringently protected by developed countries. That being said, U.S. industry representatives point to recent studies conducted by industry groups as well as new studies commissioned by international organizations such as the World Intellectual Property Organization (WIPO). These studies demonstrate or aim to demonstrate that increased IPR protection in developing countries would lead to greater numbers of jobs, increases in the amount of tax revenue collected by a government, increased opportunities for foreign direct investment (FDI), and increased economic welfare in general.[19]

Importance of IPR Industries to the U.S. Economy and the Costs of Infringement

IPR industries are among the fastest growing in the world and are particularly important to the strength of the U.S. economy. They are characterized by above average growth in employment and higher than average wages and salaries. A study completed in 2002 showed that the share of U.S. gross domestic product (GDP) accounted for by U.S. copyright-based industries, including all types of computer software, printed materials, movies, home videos, CDs, audiocassettes, and other media products, rose during 1977-2001 at an annual rate of growth of 7 percent, compared to 3 percent for the remainder of the U.S. economy.[20] In 2001, those industries accounted for $531.1 billion in value-added, or almost 5 percent of GDP. Meanwhile, domestic employment in copyright-based industries more than doubled from 1977 to 2001 to 4.7 million workers, representing an average annual rate of employment growth of 5 percent, or almost three times the rate of the U.S. economy as a whole.

Foreign sales and exports by U.S. copyright businesses amounted to almost $89 billion in 2001, an increase of 11 percent from 1999. In 2000, the seven members of the U.S. motion picture industry alone

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[18] Hoekman and Kosteck, "Intellectual Property," p. 148.

[19] Sahid Alikhan, *Socio-Economic Benefits of Intellectual Property Protection in Developing Countries* (Geneva : World Intellectual Property Organization, 2000), pp. 61-63; Edward, Mansfield, "Intellectual Property Rights, Technological Change, and Economic Growth," in *Intellectual Property Rights and Capital Formation in the Next Decade*, Charles E. Waler and Mark Bloomfield, eds. (Lanham: University Press of America, 1988), pp. 107-145; Maskus, "The International Regulation of Intellectual Property," 134 *Weltwirtschaftliches Archiv* (1998), p. 154; Maskus, *Intellectual Property Rights in the Global Economy*, pp. 45-46; Business Software Alliance (BSA), *Contribution of the Packaged Software Industry to the Latin American Economies* (New York: PricewaterhouseCoopers, Sept. 1999), pp. 1-53; and U.S. industry representatives, written communications with USITC staff, Jan. 2003.

[20] Stephen Siwek, *Copyright Industries in the U.S. Economy: The 2000 Report* (Washington, DC: Economists Inc., 2000), p. 1.

earned over $12.5 billion in film, television, and home video revenues in over 154 foreign countries around the world.[21]

Because of the importance of intellectual property industries to the strength of the U.S. economy, mounting revenue losses due to foreign IPR infringement are alarming to U.S. industry and government officials. In a February 15, 2002, report to the United States Trade Representative (USTR), the International Intellectual Property Alliance (IIPA) estimated losses due to copyright piracy in 51 selected countries for 5 copyright-based industries to be almost $8.4 billion (table 1).[22] Business and entertainment software were particularly affected. The Business Software Alliance (BSA) reports that losses due to Internet piracy have been rising rapidly in recent years, and are believed to contribute to an increasing percentage of overall global piracy losses.[23] BSA has pointed out that over one-third of all personal computer software was pirated in 1999, and it estimates that by 2008 software piracy will cost the U.S. economy 175,000 jobs, $4.5 billion in wages, and nearly $1 billion in tax revenues.[24]

[21] Motion Picture Association (MPA), *Trade Barriers to Exports of U.S. Filmed Entertainment*, 2002 Report to the United States Trade Representative, Dec. 2001, p. iv.

[22] The IIPA estimates that total global losses due to piracy at $20-22 billion annually, since losses in countries such as the United States and EU member countries are not included in the 51 selected countries for which estimates were made above. For further information on how these estimates were made, see International Intellectual Property Alliance (IIPA), *2002 Special 301 Report on Global Copyright Protection and Enforcement, Feb. 15, 2002,* appendix A and pp. 1-5.

[23] BSA, "Enhancing Trade Opportunities," *Trade Policy News*, 2000-2002, p. 1, found at Internet address *http://www.bsa.org*.

[24] BSA, "Software Theft - Stopping the Piracy of Intellectual Property," 2000-2002, *Copyright Policy News*, p. 1, found at Internet address *http://www.bsa.org*.

Table 1
Estimated 2001 U.S. sales losses due to copyright piracy in 51 selected countries

U.S. Industry	Estimated Losses
	(Millions of dollars)
Motion Pictures	1,288.0
Sound Recordings	2,034.7
Business Software Applications	2,653.5
Entertainment Software	1,761.1
Books	636.4
Total	8,379.7

Source: International Intellectual Property Alliance, 2002.

Quantifying the economic losses to copyright industries as a result of Internet piracy is extremely challenging.[25] Accordingly, none of the estimates of trade losses due to IPR infringement cited above take into account piracy on the Internet.[26] However, to demonstrate its growing importance, some officials have stated that illegal, inexpensive, and free music swapping services such as those of Napster were largely responsible for a 7-percent drop in worldwide music revenues.[27] Movie companies, represented by the Motion Picture Association MPA,[28] reportedly, "[are] determined not to let that happen to them."[29]

Technical, Legal, and Trade Policy Measures for Protecting IPR

U.S. industry and government have used various technical, legislative, and trade policy approaches to combat IPR infringement as it became more prevalent in domestic and overseas markets. Through trade policy, the United States has attempted to export its own high technical, legal, and enforcement standards for addressing IPR piracy to overseas markets; however, the U.S. model is challenged to keep pace with the rapid emergence of digital technology and Internet piracy.[30]

[25] Keith E. Maskus points out the difficulty of quantifying the effects of IPR losses due to piracy, since "Unlike tariffs and taxes, IPRs are not readily measurable." Maskus, *Intellectual Property Rights in the Global Economy,* p. 88.

[26] Eric H. Smith, President, International Intellectual Property Alliance, in a letter dated Feb. 15, 2002, to the United States Trade Representative, in response to a Request for Public Comment on the Identification of Countries Under Section 182 of the Trade Act of 1974, as amended ("Special 301"), 66 Fed. Reg. 66429 (Dec. 26, 2001).

[27] Hillary B. Rosen, "The Record Labels' Pirate Slayer," *Washington Post,* June 19, 2002, p. H4; and Frank Ahrens, "'Ranger' vs. the Movie Pirates," *Washington Post*, June 19, 2002, pp. H1 and H6.

[28] The Motion Picture Association of America (MPAA) is the motion picture industry's trade association. The international counterpart to this organization is known as the Motion Picture Association (MPA).

[29] Ahrens, "'Ranger' vs. the Movie Pirates," *Washington Post,* June 19, 2002, p. H6.

[30] U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

Technical Protection Measures

One broad category of solutions to IPR problems is based on the use of technical innovation.[31] In order to protect intellectual property from competitors and pirates, businesses have frequently incorporated physical or technological barriers into their products. The purpose of such barriers is to ensure that others cannot claim the products as their own. Further, such technological barriers prevent others from engaging in circumvention to gain unauthorized access to works or the exercise of rights owned by the copyright holder (including the right to reproduce). In theory, when such technical protection measures (TPMs) are effective, they can allow rights holders to distribute their material over international borders without fear of piracy. Still, technical protection measures are not foolproof.

The modern era has seen an abundance of attempts to protect copyrighted products via technical means. As technology has improved, the various means used by industries to prevent the illegal copying of information by necessity have become more complex. Interestingly, their effectiveness has decreased over time, as approaches to circumvent the mechanisms have matured even faster.[32]

Many of the earliest efforts to address digital piracy were made by the information technology industry. An effective way for software manufacturers to ensure that only those authorized to use their products would do so was to make any unauthorized copies unusable. When software was distributed primarily on floppy disks, manufacturers would often encode errors on or deliberately destroy certain unused parts of the disk, which only the authentic installation program would know to avoid.[33] This "destructive" approach has been used for years in many industries, and can even ruin an illegal user's equipment. Recently, technology that produces loud bursts when listening to a pirated CD was unveiled. Reports indicate that the generated sound waves can damage sensitive circuitry.[34]

An early method used by the software industry that endures today is the use of "activation technology." The concept behind activation technology is that only legitimate license owners should be able to install a piece of software (or listen to a song, or have access to content, etc.). One primitive approach was the use of manual look-ups, where a question would be posed about the hard-copy manual that came with the software, such as asking for a word printed on a given line and page.[35] Since the manual could not be copied as cheaply and easily as the software itself, this proved effective for a time until the pervasiveness of the Internet on which the manual could be easily transmitted made cheating easy and consumers began to backlash against the method's cumbersome nature. Similarly, some companies required the validation

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[31] This section presents information on more recent forms of technical protection measures. It is intended to serve as background for discussion of the effectiveness of technical means in comparison to other methods for controlling piracy internationally, and is not meant to be a comprehensive look at the topic. Many alternative sources are available for a more complete analysis including, National Academy of Sciences, *The Digital Dilemma, Intellectual Property in the Information Age* (Washington, DC: National Academy Press, 2000).

[32] "A 'Speed Bump' vs. Music Copying," *Business Week*, Jan. 9, 2002, found at Internet address *http: www.businessweek.com*, retrieved May 20, 2002.

[33] Microsoft Corp.,"Microsoft to Debut New Anti-Piracy Features in Windows 2000 and Office 2000," Feb. 10, 2000, found at Internet address *http://www.microsoft.com*, retrieved May 23, 2002.

[34] "Anti-Piracy System Could Damage Loudspeakers," *CD Media World*, found at Internet address *http://www.cdmediaworld.com*, retrieved Aug. 20, 2002.

[35] Dan Vekhter and Jim Peng, "Software Piracy," Stanford University class project, spring 2000, found at Internet address *http://cse.stanford.edu*, retrieved May 23, 2002.

of unique codes in order to use a piece of software. Only by valid registration could a user obtain an acceptable code, often located on the outside of the box.[36]

Activation technology has evolved over time and is still used with some effectiveness despite numerous efforts to circumvent it. According to one Microsoft Corporation official, activation technology is effective in reducing piracy overseas, "where copyright laws are less well understood and enforced."[37] A related technology is the dongle, an electronic device externally plugged into a computer's input port. The software will look for the dongle before launching, and if not present the software will not run. Similar to the "tough-to-copy" concept that drove manual usage, dongles are difficult to reproduce and nearly impossible to distribute efficiently. While rare today, they were a useful (but often controversial, as the market rebelled against their awkwardness) way to control the mass reproduction and distribution of copyrighted material, especially overseas.[38]

Encryption is a common method used to protect digital content. An encryption algorithm is run on the content before it is distributed, and only devices that understand the algorithm can reverse it; thus only certain devices can access the content in its original form. While encryption is largely effective, hackers can circumvent the technology once the algorithm is discovered. The Content Scrambling System (CSS), used in the digital versatile disc (DVD)[39] industry and discussed in more detail in a later section, has been one encryption application to achieve modest success.[40] Every movie distributed on DVD by each of the major studios uses CSS technology; therefore every DVD player must have a license to decrypt the CSS language.[41] Even the largely successful CSS code has been cracked--leaving the DVD industry vulnerable to pirates despite a wide-reaching ban on attempting to break the code.[42] Encryption technology can be hardware-based, software-based, or a hybrid such as the CSS technology, depending on where and how the protection mechanism is embedded.[43]

To improve upon the basic encryption strategy, several methods have evolved that fall under the classification of "watermarks" and "digital fingerprints" (also known as steganography). Watermarks have been considered extensively by record labels in order to protect their content.[44] However, some argue that "watermarking" is better suited to tracking content than it is to protecting against reproduction. This technology is based on a set of rules embedded in the content itself that define the conditions under which one can legally access the data. For example, a digital music file can be manipulated to have a

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[36] "Microsoft to Debut New Anti-Piracy Features in Windows 2000 and Office 2000," Microsoft Corp., Feb. 10, 2000, found at Internet address *http://www.microsoft.com,* retrieved May 23, 2002.

[37] Will Poole, Corporate Vice President, Microsoft Corporation, written testimony for the House Judiciary Committee, Subcommittee on Courts, the Internet and Intellectual Property, June 5, 2002, found at Internet address *http://www.microsoft.com*, retrieved June 17, 2002.

[38] U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

[39] Also referred to as digital video discs.

[40] CSS does not prevent copying--it only stops one from fast forwarding certain parts and only in certain regions. See *http://nickyguides.digital-digest.com*.

[41] Information Technology Industry Council (ITI), "Copyright Protection & Technology Mandates," found at Internet address *http://www.itic.org*, retrieved Oct. 30, 2001.

[42] Evan Hansen, "Ban on DVD-cracking code upheld," *CNET News.com*, Nov. 28, 2001, found at Internet address *http://www.news.com*, retrieved May 21, 2002.

[43] Poole, written testimony for the House Judiciary Committee, Subcommittee on Courts, the Internet and Intellectual Property, June 5, 2002.

[44] Joel Alarilla, "Using Digital Watermarks to Prevent Music Piracy," *Philippine Daily Inquirer*, Sept. 18, 2000, found at Internet address *http://www.piacipr.com*, retrieved May 15, 2002.

secret pattern of noise, undetectable to the ear, but recorded such that different versions of the file distributed along different channels can be uniquely identified.[45] Unlike encryption, which scrambles a file unless someone has a 'key' to unlock the process, watermarking does not intrinsically prevent use of a file. Instead it requires a player--a DVD machine or MP3 player, for example--to have instructions built in that can read watermarks and accept only correctly marked files."[46]

While watermarks are created by the originator of the content, digital fingerprints are customarily left by the purchaser of the copyrighted work (for example, by the first media player to access the file).[47] Devices can then recognize and authenticate the digital prints, and either grant or deny access as appropriate.[48] However, while in theory the control information cannot be altered or removed without damaging the content, often completely acceptable compression techniques can modify the data in a seemingly harmless way, and various side-stepping methods have evolved, including algorithms that randomize every bit of data.[49] This enables a user to circumvent the protections.

In spite of the above mentioned limitations, some music labels have incorporated strict anti-copying technology into new releases from popular artists.[50] These technologies employ signatures (a technique similar to fingerprinting) that prevent the music from being read by a computer, thus eliminating the risk of "ripping"[51] and illegal distribution.[52] While similar technologies have been around for some time, their use has not been widespread due to the reluctance of music labels to alienate their consumers, who would lose flexibility in where the discs can be played.[53] For example, signature technologies can prevent some portable devices, PCs, and car stereos from playing the discs, limiting playback to standard CD players.

Digital watermarks and fingerprints can also be used to monitor the use of content, rather than prevent its usage outright. With monitoring applications, companies can track the actions of users to see where their content is going on the Internet. Rather than try to prevent the content from being stolen, the company tracks the entity that has illegally distributed copyrighted material, and can then send a "takedown notice" to the owner of the computer server that is hosting the data.[54] While this is challenging for the Internet as a whole, it can be effective in closed systems like corporate intranets. A variation of a digital watermark

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[45] Alan Zeichick, "Digital Watermarks Explained," *Red Herring*, Dec. 1999, found at Internet address *http://www.redherring.com*, retrieved May 21, 2002.

[46] "Electronics Giants Promote Video Security," *CNET.com*, Apr. 26, 2001, found at Internet address *http://news.com*, retrieved June 25, 2002.

[47] Brian Chen and G. W. Wornell, "Digital Watermarking Research," Digital Signal Processing Group, Massachusetts Institute of Technology, found at Internet address *http://web.mit.edu*, retrieved May 22, 2002.

[48] ITI, "Copyright Protection & Technology Mandates," found at Internet address *www.itic.org*, retrieved Oct. 30, 2001.

[49] Zeichick, "Digital Watermarks Explained," Dec. 1999, p. 1.

[50] "Sony Trials Anti-piracy CD," *BBC News*, Sept. 24, 2001, found at Internet address http://www.news.bbc.co.uk, retrieved May 23, 2002; and "Eminem CD May Get Protection," *Reuters*, May 2, 2002, found at Internet address *http://www.news.zdnet.co.uk*, retrieved May 23, 2002.

[51] Ripping is defined as recording a song from a CD to a computer, often to modify its format and/or to record the song onto a blank CD. See "What is 'Ripping'?" Sony Corporation, found at Internet address *http://sony.storagesupport.com*, retrieved May 31, 2002.

[52] "How it Works," *key2Audio*, found at Internet address *http://www.key2audio.com*, retrieved May 23, 2002.

[53] See "Eminem CD May Get Protection."

[54] Brad King, "Pirates Beware: We're Watching," *Wired News*, Jan. 3, 2001, found at Internet address *http://www.wired.com*, retrieved May 2, 2002.

is a "digital envelope," or "wrap," which is embedded into the media while it is still blank. This can be used to control the number of copies made from that disc once data is stored upon it.[55]

Another approach to Internet IPR protection is to send tools out to search the Internet for what may be illegal versions of digital movies and songs.[56] In other circumstances, fake versions of popular songs and movies will be posted online to frustrate those looking for content online, often through peer-to-peer (P2P) sites.[57]

Finally, many online content providing sites will use a technique known as "streaming" to provide access to content while not actually allowing the user to create a complete copy of the digital file. Streaming sends the data over the Internet in tiny "packets," such that only a small portion of the entire file is transmitted and held in computer memory at a time.[58] However, to the user enjoying the content the experience is seamless (provided the Internet connection has sufficient bandwidth to carry the large amounts of data required). Many companies providing online content use the streaming model. In fact, even some sites accused of and subsequently shut down for copyright infringement streamed content to their customers.[59] The implication here is that even "pirates" understand that once a complete digital file is available online there is no limit to the number of copies that can be made and distributed--thus ruining potential business for their own site.

Domestic IPR Legislation

Technical measures have not always been foolproof or sufficient in and of themselves in managing and protecting IPR and, as such, rights holders have often sought legislative means to protect their rights. Examples include the evolution of legal protections for software and the adoption of the Digital Millennium Copyright Act.

Software, which serves as a basis not only for business operating systems and applications but also as a fundamental component of modern media and information technology products, including the Internet, entertainment CDs and DVDs, video games, and other interactive hardware and software, has not always been formally protected by IPR laws. In the United States, a formal protection framework for software, including copyright protection, took shape over the past several decades. As new markets for computers and software began to grow rapidly in the 1970s, increasing pressure was placed on the U.S. Congress to update the Copyright Act of 1909, which had been the key legislation protecting original literary and artistic works. In fact, the Copyright Office had started registering computer programs as early as 1964 but there was a need for further clarifications and specifications of protections. The need to modernize the law for new technologies, including software protection, explicitly led to the adoption of the 1976

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[55] Dan Daley, "Over the Horizon," *TapeDisc Business*, May 2002, pp. 35-40.

[56] Ahrens, "'Ranger' Vs. the Movie Pirates," retrieved Aug. 22, 2002.

[57] David Segal, "A New Tactic in the Download War," *The Washington Post*, Aug. 20, 2002, found at Internet address *www.washingtonpost.com*, retrieved Aug. 21, 2002.

[58] "Streaming Media," *what is.com*, found at Internet address *http://whatis.techtarget.com*, retrieved Aug. 22, 2002.

[59] Stephanie Olsen, "MPA shuts down video site Film88.com," *CNET News.com*, June 6, 2002, found at Internet address *http://www.news.com*, retrieved Aug. 22, 2002.

Copyright Act.[60] In the 1976 Act, Congress authorized the National Commission on New Technological Uses of Copyrighted Works (CONTU) to determine the feasibility of and any need for revisions pertaining to traditional U.S. copyright protection for software and other computer-generated works.

A report issued by CONTU in 1979 recommended the modification of existing copyright laws to identify computer software as explicitly copyrightable material. These modifications were undertaken in the 1980 Computer Software Copyright Act[61] codifying the recommendations of CONTU. The Act explicitly identified computer software as copyrightable subject matter, thereby clearly giving authors of software the same express protection as authors of other literary and artistic works, and added a very limited back-up copying exception for certain software programs. The 1980 Act did not establish an entirely new set of regulatory bodies to protect software; instead, its approach reaffirmed the role of the courts in determining the boundaries of copyright protection for software and computer-generated works.

After the 1980 law was passed, a number of legal determinations were able to adequately address IPR issues of concern to software and related media producers.[62] However, by the mid-1990s, the rapid rise of the Internet and digital media products presented new challenges to copyright protection. These developments pushed the limits of the previous legislation to protect IPR, as the Internet, optical disc, and other digital technologies enabled original software and other media products on CDs and DVDs to be easily replicated, transmitted, and distributed throughout the world via the Internet.[63]

The United States and over 100 other countries responded to the rapid changes by signing two new treaties at the WIPO, the WIPO Copyright Treaty (WCT) and the WIPO Performances and Phonograms Treaty (WPPT), which clarified that copyright is applicable in the digital environment.[64] The United States implemented the WIPO treaties by adopting the Digital Millennium Copyright Act of 1998 (DMCA),[65] which provided new standards for the protection of copyrights in the digital environment.[66] Among other things, the DMCA makes it illegal to circumvent anti-piracy measures built into works, including most commercial software, music and other programs on CDs and content on DVDs.[67] It outlaws the act of circumvention of controls used to prevent unauthorized access to works, and the act as well as the production, sale, or distribution of code-breaking devices used to illegally copy or make other copyright use of protected works.[68] For violators, the DMCA provides for civil, administrative and criminal remedies.

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[60] Pub. L. 94-553, §117, 90 Stat. 2565 (1976).

[61] Pub. L. 95-517, §117, 94 Stat. 3028 (1980), codified at 17 U.S. C. §117 (1988).

[62] Arthur R. Miller, "Copyright Protection for Computer Programs, Databases, and Computer Generated Works: Is Anything New Since CONTU?," *Harvard Law Review*, vol. 106, No. 5, Mar. 1993; and Jack E. Brown, "Softwars," *National Law Journal*, Nov. 1, 1993.

[63] U.S. industry representatives, in-person and telephone interviews by USITC staff, May-Aug. 2002.

[64] These two treaties, known as the WIPO "Internet" treaties will be discussed in more detail in the subsequent section of this paper on trade policy and agreements.

[65] Pub. L. No. 105-304, 112 Stat. 2860 (1998).

[66] Chris Gibson, *WIPO Internet Copyright Treaties Coming Into Force* (London: Steptoe & Johnson, 2002), pp. 1-4.

[67] Library of Congress, "Rulemaking on Exemptions from the Prohibition on Circumvention of Technological Measures that Control Access to Copyrighted Works," pp. 1-3, Apr. 30, 2002, found at Internet address *http://www.loc.gov*; and UCLA Online Institute for Cyberspace Law and Policy, "The Digital Millennium Copyright Act," Feb. 8, 2001, pp. 1-2, found at Internet address *http://www.gseis.ucla.edu*, retrieved July 27, 2002.

[68] However, DMCA allows the circumvention of copyright protection devices to conduct encryption research, assess product interoperability, and test computer security systems. It also provides exemptions from anti-circumvention provisions for nonprofit libraries, archives, and educational institutions under certain circumstances.

While not required by the WIPO treaties, the DMCA also included provisions limiting the remedies available against Internet service providers that unknowingly transmit copyright infringing information over their networks.[69] However, service providers are expected to remove material from users' web sites that they know, are made aware, or should know to constitute copyright infringement.[70] The DMCA also limits the liability of nonprofit institutions of higher education for copyright infringement by faculty members or graduate students serving as online service providers and under certain other circumstances.

Finally, the legislation requires that "webcasters" pay licensing fees to record companies, and that the Register of Copyrights, after consultation with relevant parties, recommend to Congress means for encouraging distance education through digital technologies while "maintaining an appropriate balance between the rights of copyright owners and the requirements of users." The result of the Register's recommendations was passage in 2002 of the TEACH Act, Pub. L. 107-273. The legislation also states explicitly that "[n]othing in this [legislation] shall affect rights, remedies, limitations, or defenses to copyright infringement, including fair use...."[71]

There have been some criticisms of the DMCA by consumer and libertarian groups, which state that its anti-circumvention provisions have not been fairly applied. Instead, critics assert that the DMCA has been used to dampen a wide range of legitimate activities--such as scientific research and the public's fair use rights--rather than to stop copyright piracy.[72]

Trade Policy and Agreements

The United States has signed a number of agreements related to IPR protection, including several international conventions and treaties that are now administered under the auspices of WIPO, and the "WTO Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs)." These agreements have enabled the United States to make significant progress in addressing overseas infringement of IPR, and have led to higher minimum standards of protection in the United States and a number of other countries. However, such standards have not yet been fully adopted in other parts of the world, where some countries lag behind in implementing the enforcement provisions of agreements they have entered into. Therefore, the United States has also relied on trade legislation, policies, and actions to help raise

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[69] UCLA Online Institute for Cyberspace Law and Policy, "The Digital Millennium Copyright Act," Feb. 8, 2001, pp. 1-2, found at Internet address *http://www.gseis.ucla.edu*, retrieved July 27, 2002.

[70] U.S. Copyright Office, *The Digital Millennium Copyright Act of 1998: U.S. Copyright Office Summary*, Dec. 1998, pp. 1-18.

[71] UCLA, "The Digital Millennium Copyright Act," pp. 1-2.

[72] Electronic Frontier Foundation (EFF), Unintended Consequences: Three Years Under the DCMA, v. 1.0 (May 3, 2002), pp. 1-9 found at Internet address *http://www.eff.org*; "The Digital Economy: Why the Anti-Circumvention Regulations Need to be Revised," 14 *Berkeley Technology L.J.* 519, pp. 537-57 (1999) found at Internet address *http://www.sims.berkeley.edu/~pam/papers.html*, retrieved Aug. 22, 2002; and Fred von Lohmann, EEF, "Fair Use and Digital Rights Management: Preliminary Thoughts on the (Irreconcilable?) Tension Between Them," *Computers, Freedom & Privacy 2002*, Apr. 16, 2002, pp. 1-9.

the standards of intellectual property protection in foreign markets for U.S. products dependent on intellectual property.

Early International Efforts to Address IPR Issues

Although interest in IPR infringement problems has especially come to the fore in the United States in recent years, there has been an awareness of the importance of IPR since the founding of the country, when specific provision was made for the protection of intellectual property in the U.S. Constitution.[73] Many European countries have had similar concerns for a longer period of time. The increase in the flow of ideas and inventions between the United States and European countries with the emergence of industrialization in the late 1700s and 1800s, increasingly spurred cooperation with respect to IPR protection.[74] In the latter part of the 19th century, several conventions were entered into which address intellectual property protection internationally, including the Paris Convention, which dealt with patent and trademark protection; the Berne Convention, a copyright treaty; and the Madrid Treaty covering the importation of goods bearing false origin indications (table 2). Treaties covering other intellectual property areas were established afterwards, and the Paris and Berne agreements were revised and updated in 1967 and 1971, respectively. The Paris and Berne conventions provided both national treatment and most favored nation status for foreign countries, enabling inventors and other innovators an opportunity to apply for patents and copyrights in member countries on the same basis as citizens in the country of interest. In 1967, a diplomatic conference among 51 largely industrialized countries established WIPO to administer the treaties.[75]

WIPO joined the United Nations system in 1974. Its mission is to promote the protection of intellectual property throughout the world. Among its responsibilities are to help member countries create multilateral norms, assist developing countries in writing and administering national laws and establishing patent and copyright offices, and serve the member states through administration of the treaties. WIPO also provides a service to patent applicants from member countries under the Patent Cooperation Treaty (PCT), an international clearinghouse in which applicants may submit one patent application that may take effect in some or all (almost 100) PCT member countries.[76]

[73] U.S. Constitution Art. 1, Sec. 8, cl 8.

[74] Maskus, *Intellectual Property Rights in the Global Economy*, p. 2.

[75] For further information on WIPO, see WIPO's website located on the Internet at *http://www.wipo.int/about-wipo/en*.

[76] U.S. multinational companies account for an estimated 40 percent of these services. Ryan, *Knowledge Diplomacy: Global Competition and the Politics of Intellectual Property*, pp. 125-139.

Table 2
Major international conventions, treaties, and other agreements on intellectual property

Agreement	Number of signatories	Objectives	Administrator
Paris Convention (1883, revised in 1967)	129	Protection of patents, trademarks, and service marks, trade names, utility models, industrial designs, indications of sources or appellations of origin and the 'repression of unfair competition' based on principles of non-discrimination and national treatment. Allows for compulsory licensing.	WIPO
Berne Convention (1886, revised in 1971)	111	Basic copyright treaty based on principles of non-discrimination and national treatment.	WIPO
Madrid Agreement (1891)	31	Allows imported goods bearing a false origin indication to be seized on importation.	WIPO
Universal Copyright Convention (1952)	57	Copyright treaty accommodating U.S. statutory requirements and based on principles of non-discrimination and national treatment.	UNESCO
Lisbon Agreement (1958)	17	Protection of appellation of origin.	WIPO
Rome Convention (1961)	47	Protection of neighboring rights (performers, producers of phonograms, broadcasting organizations).	ILO, UNESCO, and WIPO
Geneva Convention (1971)	52	Protection of producers of phonograms against the making of duplicates in another country.	ILO, UNESCO, and WIPO
Treaty on Intellectual Property in Respect of Integrated Circuits (IPIC) Treaty (1989)	8	Provided protection to semiconductor designs.	WIPO

Source: Bernard Hoekman and Michel Kostecki, *The Political Economy of the World Trading System*, 1997; and other sources.

In general, intellectual property intensive companies from industrialized countries have been very satisfied with the PCT and training functions of the WIPO.[77] However, they have often been critical of the level of protection offered by the treaties it administers. Some experts attribute this to the fact that the international intellectual property regime established by the major conventions and WIPO was developed with "loose rules, weak dispute settlement mechanisms, and no ability to enforce the provisions of international treaties."[78] For instance, despite the obligations placed on member countries by the Paris and Berne conventions, the lack of provisions requiring minimum standards of enforcement protection hindered the ability of the WIPO system to enforce strong intellectual property protection, particularly in the industrializing countries.

[77] Ryan, *Knowledge Diplomacy*, p. 131.
[78] Ibid.

U.S. Trade Actions

Intellectual property rights became an increasingly important international trade policy issue for the United States in the 1970s and 1980s as foreign trade became a more important component of the U.S. economy generally (figure 1). U.S. goods and services incorporating patents, copyrights, and other intellectual property enjoyed a competitive advantage and were increasingly demanded in overseas markets. However, as they pursued overseas markets for their products, U.S. firms in the software, entertainment, and pharmaceutical industries in particular became concerned about their goods being replicated and sold without permission by foreign persons and enterprises.[79] As a result, they attempted to devise a strategy for addressing IPR infringement.

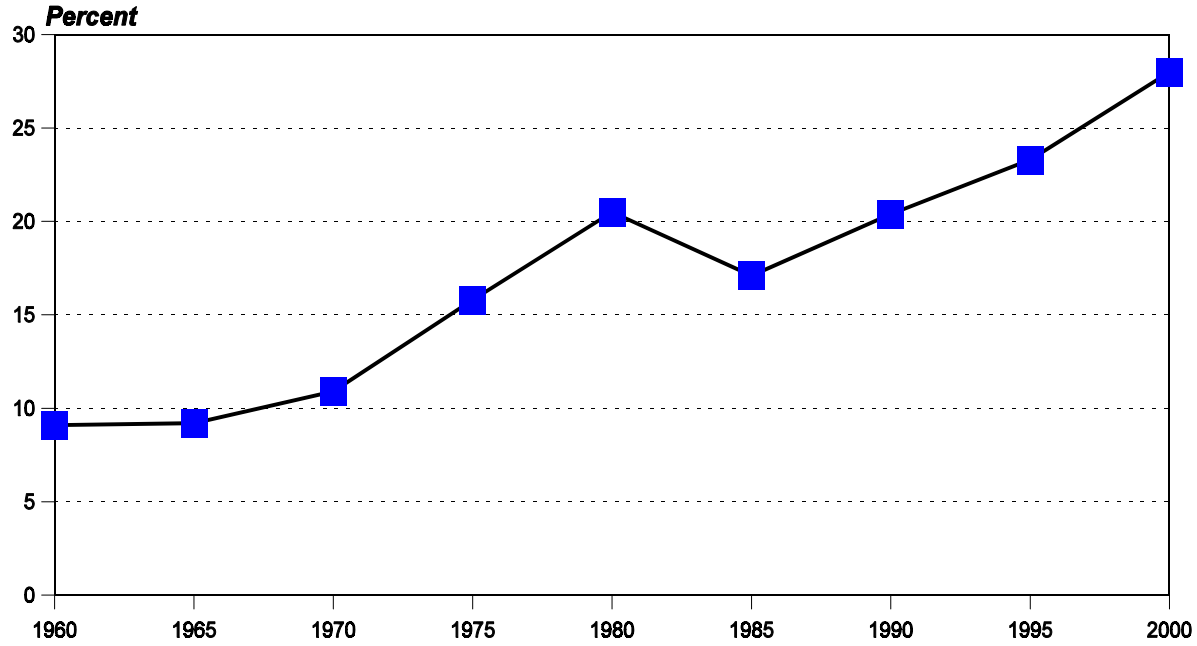
At the time, the most authoritative international trade forum for the industrialized countries, the General Agreement on Tariffs and Trade (GATT), had not yet adequately addressed protection of intellectual property rights. Thus, WIPO and the treaties it oversaw were the only fora available to the United States for attempting to deal with inadequate IPR protection overseas. However, not all countries were signatories to the individual agreements or members of WIPO, particularly rapidly emerging markets in areas such as Asia, which were increasingly being targeted for exports and investment by U.S. firms. Further, while the WIPO-administered agreements promised national treatment and most favored nation treatment and contained minimum standards and enforcement mechanisms (albeit relatively weak when compared now with the dispute settlement mechanism under the World Trade Organization), they could not guarantee protection to copyrighted or patented goods at or near the same level as they received in the United States. If intellectual property laws and enforcement standards in particular countries that were signatory to any of these conventions were low or non-existent, U.S. producers could expect little protection in such markets for their exported goods.

As IPR disputes climbed, U.S. industries dependent on copyright, patent, and trademark protection increasingly expressed deep concerns to the U.S. Government. Because of the lack of institutions or fora that could adequately address the problem of infringement of traded goods, the U.S. Government established a precedent of using unilateral threats of sanctions to deal with alleged intellectual property infringements. The two most important U.S. legal instruments used for addressing foreign IPR infringement are Section 337 of the 1930 U.S. Tariff Act and Section 301 of the 1974 Trade Act.

Section 337.-- Section 337 of the Tariff Act of 1930, as amended, addresses imported products or processes alleged to violate U.S. intellectual property rights. Specifically, the law provides for investigations to be initiated by the U.S. International Trade Commission (ITC) to determine whether

[79] U.S. industry representatives, in-person and telephone interviews by USITC staff, June-Aug. 2002.

Figure 1
U.S. trade as a percentage of Gross Domestic Product, 1960-2000



Source: Compiled by USITC staff based on official data of the U.S. Department of Commerce.

foreign producers of goods imported into the United States are engaging in unfair trade practices.[80] Although the law's provisions could apply to a number of different situations determined to be unfair trade practices, in fact, most of the cases brought under Section 337 increasingly have involved claims of infringement of U.S.-held intellectual property rights such as U.S. patents, copyrights, trademarks, or registered semiconductor designs or mask works. In the case of IPR, a petitioner is only required to show that infringement has occurred to obtain relief under Section 337; the petitioner does not need to prove injury as in other unfair trade practices covered by the law. If a petitioner can show that infringement has occurred under Section 337, the ITC can issue orders that exclude the product from entry into the United States or direct offending parties to cease and desist from certain practices.[81]

Section 301 and Special 301.--During the 1980s, globally competitive high technology and entertainment industries encouraged the U.S. Government to take a more aggressive stance in protecting their intellectual

[80] U.S. International Trade Commission, *Understanding Investigations of Intellectual Property and Other Unfair Trade Practices in Import Trade*, found at Internet address *http://www.usitc.gov*, retrieved May 9, 2002.
[81] Hoekman and Kosteck, "Intellectual Property, pp. 144-158.

property rights in overseas markets. In response, the Trade and Tariff Act of 1984[82] amended Section 301 of the Trade Act of 1974,[83] the principal U.S. statute for addressing foreign trade barriers, to identify inadequate protection of intellectual property as an unreasonable trade practice. The amended law authorized the President to impose sanctions, including removal of tariff preferences, against countries failing to meet their obligations for protecting IPR. USTR has used Section 301 provisions and the threat of sanctions to address copyright, patent, and trademark infringement with a number of countries. Table 3 presents actions taken by the U.S. Government under Section 301, using Korea and Brazil as examples.

Table 3
U.S. Government use of the amended Section 301 authority provided in the 1984 Trade Act to address IPR barriers in Korea and Brazil

Country	Section 301 Actions
Korea	In 1985, USTR used the amended Section 301 authority provided in the 1984 Trade and Tariff Act to threaten Korea with sanctions if it did not provide adequate protection for U.S. producers' copyrights, trademarks, and pharmaceutical and chemical patents. Inadequate Korean copyright and patent laws and enforcement caused the greatest concerns, particularly among U.S. producers of software, audiovisual, and pharmaceutical products. Although U.S.-Korean negotiations on intellectual property rights in those areas had already been taking place prior to the amendment of Section 301, the ability to threaten sanctions provided U.S. negotiators with more leverage in getting their concerns addressed. In 1986, U.S. and Korean officials reached an agreement enabling that country to avoid Section 301 sanctions. The Korean Government agreed to accede to the Universal Copyright Convention and the Geneva Phonogram Convention, providing greater protection to audiovisual and software products, an area of U.S. strength. Korea also promised to amend its copyright and patent laws and provide retroactive protection to certain pharmaceuticals and chemicals patented in the United States after January 1, 1980. Equally important was a commitment by the Korean Government to strictly enforce the new intellectual property rights legislation and impose significant civil and criminal penalties on infringing companies and persons.
Brazil	The United States also initiated Section 301 negotiations in 1985 with Brazil, concerning that country's lack of adequate copyright and patent protection. In response to these concerns, Brazil enacted a copyright bill in 1987 that extended copyright protection to software. However, the United States imposed sanctions on Brazil in 1988 after U.S. producers of software and audiovisual products alleged that Brazil failed to provide effective enforcement of the new copyright legislation, and U.S. pharmaceutical producers complained about inadequate patent protection.

Source: Office of the United States Trade Representative; and Michael P. Ryan, *Knowledge Diplomacy: Global Competition and the Politics of Intellectual Property,* 1998.

[82] P.L. 98573, 98 Stat. 2948.

[83] Section 301 of the 1974 Trade Act, as amended, is the principal U.S. statute for addressing unfair foreign practices affecting U.S. exports of goods or services. As such, the provision may be used to enforce U.S. rights under international trade agreements and respond to unjustifiable or discriminatory foreign practices that restrict U.S. commerce such as inadequate protection of intellectual property rights. United States Trade Representative (USTR), *2002 Trade Policy Agenda and 2001 Annual Report of the President of the United States on the Trade Agreements Program* (Washington, DC: U.S. Government Printing Office, Mar. 2002), pp. 206-207 and 210.

The IPR provisions of the 1984 Trade and Tariff Act were further strengthened by the passage of the 1988 Omnibus Trade And Competitiveness Act, containing a provision known as "Special 301."[84] Special 301 requires USTR to provide an annual report to identify countries that deny adequate and effective protection of intellectual property rights, or deny fair and equitable market access to U.S. persons or firms that rely on intellectual property protection. Countries with laws, policies, or practices that have the greatest adverse effects on relevant U.S. producers or products must be designated as priority foreign countries unless USTR finds that the countries are entering into good faith negotiations or are making significant progress in bilateral or multilateral negotiations to provide adequate and effective IPR protection. Priority foreign countries are subject to investigation and, if necessary, trade sanctions or other actions by USTR under Section 301 provisions.[85]

A number of countries[86] have been named priority foreign countries under Special 301 since that provision was enacted. However, much of the initial Special 301 attention by USTR was paid to China beginning in 1989, after U.S. manufacturers of books, compact discs, video discs, computer software, and other copyright products complained that dozens of Chinese factories illegally reproduced their products.[87] Those U.S. firms claimed that the absence of copyright protection in China resulted in $400 million in lost revenue in 1989.[88] An estimated 25 music and video disc factories in China produced millions of units of pirated products for distribution throughout Asia.[89] Despite modest initial success in U.S.-Chinese negotiations that resulted in raids by Chinese Government authorities to shut down some of these factories, problems with IPR protection continued. China was again named a priority foreign country in 1990 and 1991, when USTR signaled it was ready to become more aggressive about using trade sanctions. As a result, the Chinese Government enacted a new copyright law that took effect in June 1991, which provided copyright protection to computer software (albeit through separate regulations that resulted in worse protection for Chinese domestic software than for U.S. software). The U.S. Government also was able to persuade China to accede to the Berne Convention and the Geneva Phonogram Convention to avoid threatened U.S. sanctions under Special 301 that would have raised U.S. tariffs of $1.5 billion on Chinese-made goods.

In 1992, the United States and China concluded a bilateral agreement that improved that country's legal framework for IPR; however, China's enforcement of those laws was found by the United States to be inadequate. In 1995, a second agreement was reached that focused on enforcement and market access issues. Based on that agreement China developed a basic infrastructure for the protection and enforcement

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[84] Trade Act of 1974, P.L. No. 93-316, as amended by the Omnibus Trade and Competitiveness Act of 1988, P.L. No. 100-418, 102 Stat. 1107. See 19 U.S.C. § 2242(a)(A)(2001).

[85] The range of actions that may be taken under Section 301 is broad and includes any action that is within the power of the President with regard to trade or other pertinent aspects of U.S. foreign relations. For instance, among other things, under such authority, the President, or the USTR as his representative, may (1) suspend trade agreement concessions, (2) impose duties or other import restrictions, or (3) enter into agreements with the subject country to eliminate the offending practice or to provide compensatory benefits for the United States. USTR, *2002 Trade Policy Agenda and 2001 Annual Report*, pp. 206-7.

[86] Other notable countries cited in the 1989 Special 301 report for having IPR problems were Brazil, India, Korea, Mexico, Saudi Arabia, Taiwan, and Thailand. The most recent country named a priority country under the Special 301 process is Ukraine, named in 2001 and 2002, due to its failure to adequately use its existing law enforcement authority to stop optical disc piracy.

[87] Callan, *Pirates on the High Seas*, pp. 11-13, 28-30, and 38-42.

[88] IIPA, *Special 301 Recommendations*, 1989, pp. 57-66.

[89] Ryan, *Knowledge Diplomacy*, pp. 79-85.

of IPR.[90] China's desire to accede to the WTO and negotiations with the United States and other leading WTO members provided further incentives to meet its international IPR obligations. The 1992 and 1995 bilateral IPR agreements (and a subsequent 1996 exchange of letters) provided a sound basis for China's implementation of its WTO IPR obligations upon its accession to that body in 2001.[91]

Despite continued problems, Chinese Government protection of IPR has improved since it was first named a priority foreign country under Special 301 in 1989. Enhancements to China's laws and the training of judges and enforcement personnel have enabled U.S. and Chinese rights holders to seek remedies for infringement of their IPR. The Chinese Government has shut down over 100 illegal CD, DVD, and video cassette production facilities since 1989 and is also improving customs enforcement of IPR. The result has been a major decrease in production of pirated materials in China destined for export. Nonetheless, according to U.S. industry representatives, more needs to be done to improve U.S. sales of computer software, motion pictures, videos, and sound recordings in China.[92] Chinese enforcement of copyrights and trademarks is still uneven, and trademark counterfeiting in China has worsened considerably. However, with its accession to the WTO, China is in the process of modifying its intellectual property laws and regulations. U.S. industry representatives state that they hope that lawmakers in China will recognize the serious commercial nature of copyright piracy, and make criminal enforcement a practical reality in China, without which, there is little hope that serious inroads can be made into what remains a largely pirate domestic market.[93]

A more recent example of the use of Special 301 by the United States involved a March 2001 designation of Ukraine as a priority foreign country, and withdrawal by the United States of Ukraine's preferential duty status under the U.S. Generalized System of Preferences (GSP) program in August of that year. Despite agreeing to a Joint Action Plan signed by Presidents Clinton and Kuchma (in June 2000) and an implementation timetable, the Ukrainian Government had failed to properly regulate optical media products (such as CDs and DVDs), which were being massively produced in and distributed from Ukraine to other markets. The main elements of the Action Plan were that Ukraine would, by November 2000, establish an optical media licensing regime to properly regulate the production and distribution of this media, and then would effectively enforce the law. In a final effort to achieve compliance, the United States extended the deadline based on promises of Ukrainian parliamentary action. After the parliament failed to enact effective legislation cracking down on sound recording and optical media piracy, the United States announced, effective on January 23, 2002, that it was withdrawing concessions resulting in placing prohibitive tariffs on $75 million worth of Ukranian exports.[94]

The Chinese and Ukrainian cases are just two examples of the use of Special 301 by U.S. negotiators to obtain concessions from trading partners with inadequate IPR protections. Numerous other countries have

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[90] USTR, *2002 Trade Policy Agenda and 2001 Annual Report*, pp. 159-161.
[91] Ibid.
[92] U.S. industry representatives, telephone and written communications to USITC staff, Jan. 2003.
[93] Ibid.
[94] The sanctions, which will require the payment of 100-percent duties on imports of Ukrainian metals, footwear, and other products, will offset U.S. Government estimates of the amount of annual damages to the U.S. economy caused by the piracy of optical media. How this case will be resolved remains to be seen. However, the USTR has pointed out that, given Ukraine's aspirations to enhance its economic relationship with the United States and eventually join the WTO, "it is in its interest to move with dispatch to adopt measures that will help curtail the pirating of intellectual property." USTR, "United States Today Imposes $75 Million in Tariffs on Ukraine Due to Continued Failure to Protect American Copyright Holders," *USTR Press Release*, Jan. 23, 2002, pp. 1-2, found at Internet address *http://www.ustr.gov*, retrieved May 22, 2002.

been named "priority foreign countries" under Special 301 and, thus, subject to potential actions by the United States if negotiations failed to provide an acceptable resolution of the IPR problems prompting the designations. Table 4 shows significant positive developments resulting from the implementation of Special 301 in 2001, alone.

There has been much evidence that Section 301, including Special 301, authority has helped the United States in combating overseas infringement of U.S. intellectual property. The U.S. Copyright Office has stated that the Special 301 process has been a significant tool in overcoming inadequate IPR protection abroad because advanced countries avoid investing in "priority [foreign] countries."[95] As such, countries try to avoid that designation. For instance, Hong Kong and Malaysia agreed to do more to enforce IPR because the U.S. Government indicated that failure to do so would impact their designation in the Special 301 process.[96] Other experts concur with this assessment. One scholar states that negotiations and threats by U.S. trade negotiators using Section 301 authority in the 1980s and 1990s "helped usher in stronger IPRs in South Korea, Argentina, Brazil, Thailand, Taiwan, and China."[97]

WTO TRIPs Agreement

As previously discussed, factors that led to more vigorous unilateral U.S. trade policies such as Special 301 to address IPR trade barriers were the relative lack of enforceability of then-existing international agreements in the area of IPR, and the fact that GATT had not yet adequately dealt with IPR protection. After much perseverance, the United States and other industrialized trading partners such as the European Union and Japan were able to achieve their goals in having intellectual property issues seriously considered during the GATT Uruguay Round of trade negotiations. At the conclusion of those negotiations in 1994, IPR were finally included in a separate agreement of the newly established WTO,[98] the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs).

The major achievement of TRIPs is that it sets relatively high minimum levels of intellectual property protection for all members. Previously, the major intellectual property conventions and WIPO were not

[95] Senator Joseph R. Biden, Jr., Chairman, Senate Committee on Foreign Relations, Subcommittee on Crime and Drugs, *Theft of American Intellectual Property: Fighting Crime Abroad and at Home*, Feb. 12, 2002, pp. 40-41.
[96] Ibid.
[97] Maskus, *Intellectual Property Rights in the Global Economy*, p. 4.
[98] The Uruguay Round Trade Agreements entered into force on Jan. 1, 1995, creating the WTO. See *http://www.wto.org*.

Table 4
Special 301 Developments in 2001

Country	IPR developments occurring as a result of Special 301 negotiations
Korea	In January 2001, Korea enacted amendments to strengthen its patent and trademark laws. In February 2001, President Kim of Korea issued public orders to the Ministry of Information and Communications and the Ministry of Justice designed to strengthen their copyright enforcement efforts.
Turkey	In February 2001, Turkey enacted long-awaited amendments to strengthen its patent and trademark laws.
Denmark	In March 2001, the Danish Parliament approved legislation allowing civil ex parte (unannounced) searches of establishments suspected of infringing IPR.
Greece	In March 2001, the United States agreed to settle a WTO dispute it brought against Greece regarding television piracy after Greece passed new legislation providing for the closure of television stations that infringe IPR.
Hong Kong	Hong Kong's amendments to its Copyright Ordinance, clarifying end-user software piracy (as well as three other categories) as a criminal offense, became effective on April 1, 2001.
Canada	Canada amended its Patent Act to extend patent protection from 17 to 20 years to comply with its WTO TRIPs obligations. The law entered into force on July 12, 2001.
Taiwan	In November 2001, Taiwan's legislature passed an optical media management law. The law increased fines and gave the government the authority to seize machinery and products. Taiwan also enacted legislation extending the term of patent protection from 15 to 20 years as required by the WTO TRIPs Agreement.

Source: *USTR 2002 Trade Policy Agenda and 2001 Annual Report*.

able to offer more than national and most favored nation treatment and then only by those countries choosing to become a signatory to any or all of the particular IPR agreements. In addition, TRIPs is the first multilateral intellectual property agreement with a robust dispute resolution mechanism that is enforceable between governments.[99]

The TRIPs agreement covers trademarks, patents, and copyrights (and related rights such as rights of performers, broadcasters, and producers of records, compact discs, and videos) (table 5). It also covers layout-designs of integrated circuits, geographical origin indications, and industrial designs. Generally, TRIPs (1) establishes minimum standards of protection of such rights, (2) prescribes procedures and remedies to be available in member states to enforce rights, (3) makes the WTO dispute-settlement mechanism available to address TRIPs-related disputes, and (4) extends basic WTO principles such as transparency, national treatment, and most favored nation treatment to intellectual property rights.[100] Of these, U.S. industry representatives state that the most significant are the IPR enforcement procedures and remedies made available.

Although TRIPs overcame many of the limitations of the previous international intellectual property agreements, it is built around the main international conventions administered by WIPO. For instance,

[99] *2002 Trade Policy Agenda and 2001 Annual Report*, p. 75.
[100] Hoekman and Kosteck, "Intellectual Property," p. 153-158.

with respect to copyrights, WTO members are required to comply with the provisions of the Berne Convention for copyright protection.[101] Further, as in U.S. law, computer software is to be protected as a literary work under the Berne Convention and the conditions under which databases are to be protected by copyright are clearly specified. WTO members are also required to comply with the most important provisions of the Paris Convention (1967) on patents; at least 20-year patent protection must be provided by members for almost all inventions, including both products and processes.

According to U.S. industry representatives, the accomplishments of TRIPS cannot be understated, since most of the 144 members are currently obligated by the agreement with respect to copyright, trademark, etc.[102] However, one noted weakness, particularly in the area of patents, is the longer transition periods for some lesser developed countries to provide certain patent protections.[103] This means that some U.S. products will not receive full TRIPs protection in some of the poorest countries in the world until that date. Thus, the extended deadlines could result in hundreds of millions of dollars in lost U.S. IPR revenues.[104] Moreover, countries may determine their own designations as developed, developing, or least developed.[105] Developed countries had to implement TRIPs obligations within 1 year of the effective date of the Uruguay Round Agreements, or by January 1, 1996, while developing countries had until January 1, 2000 to comply with TRIPS. The least developed countries have until 2006 to implement their TRIPs obligations.[106]

The WTO has devised several performance standards that can be objectively evaluated regarding the TRIPs enforcement obligations. Among these are standards that require members to provide "adequate" procedures, "effective" remedies that "constitute a deterrent to further infringements," and procedures that are not "unreasonably costly" or that cause "unreasonable delays." Specific remedies that must be available include injunctive relief, damages "adequate to compensate for the injury the right holder has suffered," and preventive remedies, including possible seizure, forfeiture, and destruction of infringing goods in the criminal context. Most importantly, criminal remedies must be available for piracy on a commercial scale.

[101] Ibid.

[102] U.S. industry representatives, telephone and written communications with USITC staff, Jan. 2003.

[103] Callan, *Pirates on the High Seas*, pp. 22-26; and U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

[104] U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

[105] Callan, *Pirates on the High Seas: The United States and Global Intellectual Property Rights* (New York: Council on Foreign Relations, Inc., 1998), pp. 22-26.

[106] Ibid; and U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

Table 5
TRIPs requirements for WTO members

Area	Requirements
Patents	Patents must be granted for 20 years from the date of filing. Obligations are based on the Paris Convention for the Protection of Industrial Property (1967). Pipeline protection will temporarily be granted to pharmaceutical and agricultural products in countries that are allowed to delay implementing full patent protection.
Copyrights	Copyright obligations are based on the Berne Convention for the Protection of Literary and Artistic Works (1971) and the Rome Convention (1961). Computer programs, databases, sound recordings, movies, and performances are protected for 50 years. Broadcasts receive 20 years of protection. Rental rights (the rights to authorize or prohibit commercial renting) are provided for performers, producers, and broadcasting companies.
Trademarks	Trademarks must be to be registered for 7 years initially, and renewed indefinitely thereafter.
Semiconductor Layouts	Semiconductor design obligations are based on the Treaty on Intellectual Property in Respect of Integrated Circuits (1989). Owners of semiconductor layout designs must receive 10-year protection. Compulsory licensing is not allowed.
Geographic Indications	Use of indications that can mislead consumers as to the true origin of a product is prohibited. Further negotiations mandated for a multilateral system of registration and notification.
Industrial Designs	Unauthorized making, selling, or importation of copies of new or original industrial designs is prohibited for 10 years.
Trade Secrets	Company trade secrets including internally derived documents or processes must be protected from misappropriation and unauthorized use as long as reasonable steps are taken to keep information private.

Source: Benedicte Callan, *Pirates on the High Seas: The United States and Global Intellectual Property Rights*.

Notwithstanding these vital enforcement standards, elected representatives and major copyright industry representatives assert that the United States should continue to use bilateral agreements and tools such as Special 301 to ensure that the laws and policies of U.S. trading partners conform to the more stringent standards applied in the United States.[107] That being said, TRIPs, while not sufficient in itself to address all of the problems of intellectual property infringement, has become the bedrock that provides a nonarbitrary basis and justification for use of U.S. trade laws and actions against foreign piracy, including the possibility of dispute settlement actions under the WTO.[108]

U.S. industry representatives recognize that TRIPS was finalized prior to consideration of such issues as technological protection measures, and are also disappointed that genetic technologies are excluded from TRIPs obligations. Since disputed issues concerning copyright protection for electronic commerce were not addressed explicitly in TRIPs, at least one expert has asserted, "dynamic technologies and markets

[107] U.S. industry representatives, in-person and telephone interviews by USITC staff, June 2002-Jan. 2003. Also see Biden, Jr., *Theft of American Intellectual Property*, Feb. 12, 2002.
[108] U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

already render TRIPs coverage incomplete."[109] This precipitated the 1996 diplomatic conference to establish the WIPO WCT and the WIPO WPPT treaties, also referred to as the "Internet Treaties" because they provide new international standards for the protection of copyright and related rights in the digital age.[110]

The two treaties confirmed that copyright applies in the digital environment, significantly clarifying exclusive rights in the distribution of copies of works, as well as in the communication to the public of works, including the "making available" of works so they can be accessed at a place and at a time chosen by the user. In addition, the WIPO treaties codified in an international instrument protections against the unlawful circumvention of TPMs used by right holders to protect their works, as well as protections against illegal tampering or altering of tags or codes that may be used by right holders to facilitate licensing (so-called rights management information).

Future Challenges for Protection of U.S. Intellectual Property Rights

At the behest of and in close consultation with IPR-related industries, the U.S. Government has used various means, including special legislative provisions such as Special 301, and trade agreements such as TRIPs, to export a U.S. model with high intellectual property protection standards to foreign markets where infringement has been a problem. A large part of the success of such trade actions has been due to a consensus built among key U.S. industry players on how IPR issues should be addressed domestically. Such domestic consensus has facilitated the development of coherent U.S. trade policy strategies for ensuring that foreign trading partners' IPR laws and enforcement practices measure up to the same high standards of intellectual property protection existing in the United States.

However, notwithstanding the technical, legislative, and trade policy means developed to help U.S. companies to protect their intellectual property in the past, the nature of digital piracy is likely to challenge the effectiveness of such means for fighting IPR infringement in the future. As we have seen, digital technology greatly facilitates the rapid duplication and distribution of the content of tangible optical media, including CDs and DVDs. Further, copyright-protected data can now be sent throughout the world instantaneously over the Internet, making it difficult for rights holders to maintain control over their intellectual property. Technical protective measures developed to impede digital piracy have had success, but protections against their circumvention must be adopted internationally in order to make them an effective tool to fight digital piracy. However, the question of how digital works will be protected using technical protective measures, whether through legally mandated or voluntary arrangements, remains controversial, even in the United States.[111] U.S. industry representatives state that conflicts

[109] Maskus, *Intellectual Property Rights in the Global Economy*, p. 6.
[110] Gibson, *WIPO Internet Copyright Treaties Coming Into Force* (London: Steptoe & Johnson, 2002), pp. 1-4.
[111] Anna Wilde Mathews, "Tech Firms Rally to Fight Hollywood's Antipiracy Demands," *Wall Street Journal*, p. B1; and U.S. industry representative, email communication with USITC staff, Jan. 28, 2003.

The WIPO Internet Treaties

The WIPO Copyright Treaty (WCT) and the WIPO Performances and Phonograms Treaty (WPPT) are often referred to as the "Internet Treaties" because they provide new international standards for the protection of copyrights and related rights in the digital age. The two treaties entered into force on March 6 and May 20, 2002, respectively, once the required minimum 30 countries had ratified each.[1]

The WCT introduces standards to protect rights holders of literary and artistic works in the digital environment, including art, books, software, movies, and music. The WPPT similarly safeguards the interests of producers of sound recordings, as well as of performers whose performances are fixed in such recordings. Both treaties require member countries to provide a basic framework of rights, allowing creators to control and be compensated for the many ways in which their creative content can be used by others in digital networks.

Among the key points, the WIPO Internet Treaties make clear that the traditional right of reproduction (copying) continues to apply in the digital environment, including the storage of material in digital form in an electronic medium. As to the core right of communication, through the so-called "making available" right, the treaties establish the rightholders' right to control the digital transmission of their works–on demand and interactively–to individual members of the public. This provision describes the act of digital transmission in a neutral, nontechnology-specific way.

The WIPO Internet Treaties also ensure that rights holders can use technology to protect their rights and creative works online. The treaties' "anti-circumvention" provisions address security and piracy risks, such as those posed by "hacking," by requiring member countries to provide adequate legal protection and remedies against the circumvention of technical measures, such as encryption. A new "rights management" provision in the treaties requires member countries to prohibit the deliberate alteration or deletion of electronic rights management information. This is the information that can be embedded into the digital code of a creative work and used to identify the work, its author, performer or owner, the terms and conditions for its use, and any other relevant attributes. The WIPO treaties also make clear that member countries have flexibility in establishing exceptions or limitations to rights in the digital environment, and may either extend existing exceptions and limitations or adopt new ones, as appropriate.

[1] The United States has ratified each treaty and implemented it domestically via the Digital Millennium Copyright Act of 1998, described previously in this paper

Source: Chris Gibson, *WIPO Internet Copyright Treaties Coming Into Force*, 2002; and USTR official, Washington International Trade Association, National Foreign Trade Council, and Global Business Dialogue Program: "TRIPS Implementation: Intellectual Property and the WTO," Washington, DC, July 17, 2002.

among such constituencies could hinder the development of coherent U.S. business and government strategies for addressing digital piracy.[112]

[112] U.S. industry representatives, telephone and written communications with USITC staff, Jan. 2003.

Challenges of Digital Piracy

As discussed previously, digital piracy takes two primary forms.[113] The first is the replication and distribution of illegal copies of tangible media, most frequently of the optical disc variety (CDs and DVDs). Also included in this category is the unauthorized usage of the content on discs across multiple users. This problem occurs around the world (including in the United States) with varying degrees of severity. The second is the transmission of copyright-protected data over the Internet, as information can just as easily be sent across the world as it can be sent across the room. In both cases, digital piracy is an international problem.

The digital world facilitates the making of perfect copies quickly and efficiently, at negligible cost. Companies naturally have taken advantage of these characteristics in order to distribute their content easily (at low cost) and in a format that consumers value. Yet at the same time, the very qualities that make the digital format so attractive are also available to the consumer. Thus, almost anyone can become a distributor if he has the incentive to do so.[114]

To reduce overseas infringement of U.S. intellectual property, the policy of the United States has been to export the high standards contained in its own domestic laws and enforcement practices through various trade agreements, trade actions, and offers of technical assistance to other countries to slow the problem to an acceptable rate.[115] In other words, in countries where illegal replication and sales of such products take place, it has been an important part of U.S. trade policy to make sure that strong intellectual property laws and enforcement mechanisms are in place, civil and criminal penalties are applied, and illegal production facilities are closed down. This basic model, which has worked well in the past for audio and videocassettes, can also be employed to address illegal replication of newer tangible digital media forms such as optical discs, including CDs and DVDs. However, traditional copyright laws alone have been found insufficient to curtail pirate production of CDs and DVDs and other "optical media." Therefore, special optical media regulations, including robust licensing of plants producing such media, tracking mechanisms for the import and export of the raw materials and machinery, and requiring codes to identify the loci of production, have been necessary in countries experiencing severe optical media piracy.

The success of traditional approaches for tangible media products is due to the fact that the physical availability of pirated media can be controlled within national borders with strong IPR laws and enforcement mechanisms for optical disc piracy. Thus, the conventional "export of the model," where copyright infringement is first successfully controlled in one pirate country, then the controls are spread to the country where the pirate phenomenon has migrated, is appropriate. Nevertheless, the much greater ease, speed, and lower relative costs of replication enabled by digital technology will significantly increase the efforts required to control such piracy.

Internet piracy represents an equal if not greater challenge to U.S. firms and policymakers because there are no national borders in Internet piracy.[116] Even though it is possible for a country to control piracy within its own borders if it has the incentive or external pressure on it to do so, it cannot easily control Internet piracy without the cooperation of all countries. For instance, an Internet user may look for

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[113] There are other possible forms of digital piracy in addition to those discussed here. However, they are less common and therefore do not receive our full attention in this paper.

[114] This concept is discussed in detail in *The Digital Dilemma*.

[115] U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

[116] U.S. industry representatives, in-person and telephone interviews by USITC staff, June-Aug. 2002.

copyrighted material online, such as an illegal digital copy of a feature film. Because Internet users can access websites from any country, in order to prevent unauthorized access to copyrighted material, every site providing protected content around the world must be blocked. To accomplish this feat, every economy must not only agree to the same online copyright laws (the goal of the WIPO "Internet Treaties"), but also cooperate fully in enforcing these laws. If even one country dissents, access is available (at least in theory) throughout the world.

The United States has placed pressure on both domestic and international Internet sites to shut down if in violation of U.S. copyright law.[117] For example, in February 2002, Taiwan authorities, with encouragement from the MPA, shut down an Internet site based in Taiwan providing unauthorized video-on-demand that violated U.S. copyright law.[118] But indicative of the troubles encountered by the ubiquitousness of the Internet, the site reappeared in June with a slightly altered name and based in another country. This site was also shut down,[119] and later was sued by the MPA in the hopes it would not reappear yet again.[120] Websites providing illegally copied software, music, and entertainment software are also targeted frequently by the Business Software Alliance and the Software and Information Industry Association (SIIA)'s Internet Anti-Piracy division, the Recording Industry Association of America, and the Interactive Digital Software Association. However, the "cease-and-desist" letters sent to web hosts abroad, for example, for business software piracy, only receive 40- to 50-percent compliance, as opposed to the 90- to 99-percent compliance received in the United States.[121]

Many U.S. industry representatives believe that there must be more consensus on digital IPR issues among interested parties in the United States before effective technical, legislative, and trade policy antipiracy strategies can be pursued overseas.[122] Once a domestic consensus can be attained, the debate can be carried to an international level. This has successfully been done through organizations such as the WTO and WIPO, as well as in many bilateral, multilateral, and other fora around the world. But as evidenced by any number of historical international efforts, it takes time to translate domestic IPR priorities into foreign ones because so many countries and interests are involved. As well, efforts must be comprehensive--all countries must participate--for them to be completely effective.

There are many players in the digital media industries, each with different objectives and business models. In his book *Knowledge Diplomacy*, Michael P. Ryan categorizes the various stakeholders in the intellectual property industries as follows:

> Interests and policy preferences in the United States and internationally have arranged themselves into four groups: producers of copyrighted entertainment, information, and software content; users of copyrighted content, including individuals, libraries, governments, and universities; on-line and communication service providers, the deliverers of content; and makers of hardware, including computers and peripheral

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[117] U.S. industry representatives, in-person and telephone interviews by USITC staff, June-Aug. 2002.
[118] Borland, "Plug pulled on site selling $1 movies," *CNET News*, Feb. 19, 2002, found at Internet address *http://www.news.com*, retrieved July 10, 2002.
[119] Stephanie Olsen, "MPA shuts down video site Film88.com," *CNET News*, June 6, 2002, found at Internet address *http://www.news.com*, retrieved July 10, 2002.
[120] Borland, "Studios sue defunct $1 movie site," *CNET News*, July 10, 2002, found at Internet address *http://www.news.com*, retrieved July 10, 2002.
[121] U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.
[122] U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

equipment, video and audio equipment and other consumer electronics, and broadcast equipment.[123]

Each of these parties has different incentives and goals. For instance, producers of content want to ensure their ownership rights, users want easy and inexpensive access to such content, Internet and other communication service providers want to ensure delivery of such content free of liability for piracy, and hardware makers want to ensure a market for equipment on which entertainment, information, and software can be used.[124]

A closer look suggests that the value chain, or the series of entities required to bring goods or services from its conception to the ultimate user, is extraordinarily complex in each of the digital intellectual property industries. Many parties, from the artists and programmers to the firms whose equipment is used to access the content, have a vested stake in the success of the industry. But not all parts of the chain feel the effects of digital piracy equally.

There is little question that entertainment industries have a great stake in having their content protected stringently in both U.S. and overseas markets. The MPA estimates annual losses from overseas video and optical disc piracy (not including Internet piracy) at $3 billion.[125] Meanwhile, the number of prerecorded CDs shipped in 2001 decreased by 6 percent from 2000 levels, and is expected to fall by another 6 to 10 percent in 2002;[126] however, the number of blank CDs sold (frequently used to "burn" music downloaded from the Internet) has risen dramatically in each of the past 4 years.[127] Showcasing a similar trend, sales of recordable DVD discs,[128] a common format used for both legal and illegal duplication of digital versatile discs, increased by 268 percent between 2000 and 2001, and sales of writable disc drives increased by 225 percent over the same period.[129] While these facts should not be interpreted to say that the producers of recordable DVDs and blank CDs are benefitting at the expense of the U.S. motion picture and recording industries, they do suggest that perhaps certain groups have a greater incentive to stop digital piracy than others.

Further, there have been suggestions that some software and hardware firms may have less incentive in protecting copyright law and online piracy than entertainment companies and other content producers.[130] However, because of their interdependence, it is obvious that all parties involved in digital technology have to work together to establish common positions if they are to maximize domestic and overseas sales. Similar to entertainment firms, software manufacturers themselves are the producers of content, using creative developers to produce "copyrightable expressions"[131] that are in danger of theft and illegal reproduction. Further, because of their own interest in establishing consensus, the Computer Systems Policy Project (CSPP), an advocacy organization representing several high-technology hardware

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[123] Ryan, *Knowledge Diplomacy*, p. 160.

[124] Ibid.

[125] Gwendolyn Mariano, "Using tax dollars to combat piracy," *CNET News.com*, Apr. 24, 2002, found at Internet address *http://www.news.com*, retrieved Aug. 20, 2002.

[126] David Segal, "A New Tactic in the Download War," *The Washington Post*, Aug. 21, 2002, found at Internet address *http://www.washingtonpost.com*, retrieved Aug. 20, 2002.

[127] Ibid.

[128] Also know as writable DVDs.

[129] Dana Parker, "Snapshot: The latest picture of DVD recordable and rewritable formats," *TapeDiscBusiness*, found at Internet address *http://www.tapediscbusiness.com*, retrieved Aug. 20, 2002.

[130] U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

[131] Ryan, *Knowledge Diplomacy*, p. 59.

companies, including Dell, IBM, and Hewlett-Packard, drafted a letter in February 2002 to the CEOs of several media conglomerates, pledging the commitment of its members to finding a solution to the problem of distributing digital content that is optimal for all parties.[132]

This is not to say that all attempts to come to a consensus among intellectual property-intensive industries on domestic and overseas digital piracy issues will be easy, as previous attempts to do so have proven difficult. For instance, in 1998, over 200 companies tied to the digital music industry, from record labels and artist associations to consumer electronics firms and computer manufacturers, came together in an effort to develop a technology standard that would help control the distribution of digital music "both online and in new emerging digital distribution systems."[133] The effort was named the Secure Digital Music Initiative (SDMI).[134] However, despite the enthusiasm behind it, the struggle to unite the goals of so many different parties continuously delayed SDMI's progress, while the market it was trying to control evolved too quickly.

Another attempt to bring market participants together to achieve a common approach to digital piracy occurred several years before, when the motion picture industry debated how and whether DVDs should be technically protected. In 1996, entertainment industry associations, including the Motion Picture Association of America (MPAA) and the Recording Industry Association of America (RIAA), combined with information technology and consumer electronics companies to form the Copy Protection Technical Working Group (CPTWG). The goal was to develop a universal encryption standard to protect DVDs from "casual piracy."[135] The working group, after long negotiations and repeated review of several iterations of technology to ensure the capture of all interests, ultimately rolled out the Content Scrambling System (CSS) in 1997.[136] By some standards, this was considered a success.[137] All interested commercial parties (at least those that participated in the working group) came to agreement and were able to develop a fairly successful and universally accepted product. But industry analysts point out that CPTWG was not a complete success.[138] Its output, CSS, does not prevent the illegal duplication of DVDs; rather it restricts the type of device on which a disc can be played. Furthermore, CSS has since been hacked and the circumvention algorithm (aptly named DeCSS) has been widely distributed on the Internet.[139]

SDMI and CPTWG are only two of many such working groups determined to control digital piracy through market consensus. Others include the Digital Media Device Association's Interoperability Working Group (DMDA-IWG), whose mission is the "quick establishment and acceptance of an interoperability and content protection standard for portable and networked audio devices,"[140] and the

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[132] "High Tech CEOs Pledge Commitment to Resolving Copy Protection Issues," Computer Systems Policy Project, found at Internet address *http://www.cspp.org*, retrieved Aug. 8, 2002.

[133] Secure Digital Music Initiative (SDMI) home page, found at Internet address *http://www.sdmi.org*, retrieved Aug. 8, 2002.

[134] "Where's SDMI? Digital music protection effort flames out," *SiliconValley.com*, Apr. 28, 2002, found at Internet address *http://www.siliconvalley.com*, retrieved Aug. 9, 2002.

[135] "Watermark Standardization for DVD Copy Protection / Galaxy," IBM Tokyo Research Laboratory, found at Internet address *http://www.trl.ibm.com*, retrieved Aug. 9, 2002.

[136] Ibid.

[137] U.S. motion picture industry representative, interview by USITC staff, June 25, 2002.

[138] U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

[139] This is illegal according to the DMCA.

[140] Digital Media Device Association, "DMDA-IWG (Interoperability Working Group)," found at Internet address *http://www.dmda.org*, retrieved Aug. 9, 2002.

Broadcast Protection Discussion Group (BPDG), a subcommittee of the CPTWG developed "to evaluate proposed solutions" for the protection of digital TV broadcasts against unauthorized redistribution.[141]

Recently proposed legislation supported by the motion picture and recording industries mandating certain technical measures has had difficulty gaining the support of other intellectual property industries. The Consumer Broadband and Digital Television Promotion Act[142] (CBDTPA), introduced in Congress in March 2002,[143] calls for mandatory inclusion of security technology in most consumer electronics and PC devices. The proposed law has met with mixed reaction from other digital and copyright dependent industries.[144] Industry associations supporting the bill indicate that the bill represents a "wake-up call to the information technology and consumer electronics industries" to put forth an earnest effort to solving digital piracy.[145] But opposition from other technology industries has argued that the bill imposes inefficient, non-market solutions while hindering innovation.[146] Even the opposition to the bill is split on fundamental issues; some believe that technical protection measures should not be used at all, while others, including the Information Technology Industry Council, simply believe that a market-based solution, rather than one achieved through government intervention as envisioned by the CBDTPA, is best for the economy.[147] No action was taken on CBDTPA before Congress adjourned at the end of 2002.

The development of common positions of industry players dependent on intellectual property rights in the digital era will continue to be a challenge. However, simply recognizing the vast potential that can be realized on an international level if parties work together to come to a general consensus on digital piracy should continue to motivate U.S. computer hardware, software, consumer electronics, entertainment, and other intellectual property industries to reach general consensus. Such consensus should enable U.S. industry and government leaders to develop unified positions for addressing the specific challenges of digital piracy both at home and in overseas markets.

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[141] Robert Perry, et al., "Final Report of the Co-Chairs of the Broadcast Protection Discussion Subgroup to the Copy Protection Technical Working Group," June 3, 2002, p. 4, found at Internet address *http://www.cptwg.org*, retrieved Aug. 9, 2002.

[142] S. 2048.

[143] Declan McCullagh, "Anti-Copy Bill Hits D.C.," *Wired*, Mar. 22, 2002, found at Internet address *www.wired.com*, retrieved Aug. 21, 2002. The CBDTPA was previously known as the Security Systems Standards and Certification Act (SSSCA). See McCullagh, "New Copyright Bill Heading to D.C.," *Wired*, Sept. 7, 2002, found at Internet address *http://www.wired.com*, retrieved Apr. 25, 2002.

[144] Sebastian Rupley, "The Digital Piracy Debate," *PC Magazine*, Apr. 22, 2002, found at Internet address *http://www.pcmag.com*, retrieved Aug. 20, 2002.

[145] Comment of Hillary Rosen, President and CEO, Recording Industry Association of America, On Introduction Of "Consumer Broadband Act," Mar. 21, 2002, found at Internet address *http://www.politechbot.com,* retrieved Aug. 10, 2002; and Hollings Bill Statement on S. 2048 by Jack Valenti, President and Chief Executive Officer, MPA," found at Internet address *http://www.mpaa.org*, retrieved Aug. 10, 2002.

[146] ITI, "Copyright Protection & Technology Mandates," *Issues & Policies*, Nov. 2001, pp. 1-2, found at Internet address *http://www.itic.org*, retrieved Aug. 20, 2002; BSA, "Software Industry is Committed to Fighting Piracy but Opposes Government Mandates," *Policy Brief*, 2000-2002, pp. 1-2; and U.S. industry representatives, interviews by USITC staff, June-Aug. 2002.

[147] Ibid.