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Legal protection of technological measures under copyright law

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ABSTRACT
Digitisation had a profound effect on creation, reproduction and dissemination of works protected by copyright. Works in digital format are vulnerable to infringement, and technological protection measures are accordingly applied as protection. Technological protection measures can, however, easily be circumvented and additional legal protection against circumvention was needed. In response, law makers at both the international and national level have enacted legal provisions aimed at banning the act of circumvention of technological protection measures on the one hand and the production and dissemination of circumvention tools on the other hand. Prominent examples of such legislation, among others, are the WIPO Internet Treaties, the Digital Millennium Copyright Act, and the European Information Society Directive. The recently enacted 2012 Amendments have harmonized the Indian Copyright law with WIPO Internet Treaties with respect to legal protection of technological protection measures. Against this background, this article attempts to critical analyse the existing legal framework for protection of technological measures at national and international levels. It also stresses the need for international harmonisation of copyright law for its efficient enforcement in digital environment.

Introduction

'Digitization' is perhaps the most significant of recent technological developments. It connotes the conversion of works to a format in which they can be read by a machine. Digitization, then, is basically the ability to record works in a binary format (a sequence of ones and zeros) in which they are stored and transmitted. There are different methods of digitizing works but they all have the same result – they create a binary code that can be played back to reproduce the original analogue experience.[1] All tangible works, no matter how complicated, can be recorded in digital format. Digitization thus creates a common form in which all types of subject-matter can be made available to users.[2]

Digitization had an impact not only on the format of works but also on their use and distribution. In the analogue world, works were created and distributed in material forms such as books or paintings. These works were susceptible to the human senses. The copyright works as embedded in material form were protected by law of copyright. It was the expression of the idea in the material form that was protected and not the ideas underlying expression. Accordingly reduction to material form became a requirement for copyright protection in analogue world. Digital works by contrast, have been 'dematerialised' into electronic or digital format. They are not contained in traditional material formats. Although the digital format of works can be read or understood only by technologies such as computers, it can be readily translated into impulses susceptible by the human eye, ear and mind. Any existing analogue work can be converted into a digital data object. It is also very popular to create new works in digital format, as doing so is convenient and inexpensive.

The conversion from analogue to digital not only revolutionized the ways in which works can be created but also the ways in which works can be used. The most significant result of digital technology is perhaps the simplicity and ease of reproduction.[3] Analogue copies degrade in quality with each generation of copying, so it contains an inherent physical limitation on multi-generation copying. This serves an obstacle to large-scale unauthorised copying. Digital copies, however, are perfect, as digital copying involves bit-for-bit replication. This means not only that every digital copy itself is perfect, but also that perfect copies can be made from other copies through endless generations.[4] Although the ease and perfection of digital copying poses a definite threat to authors' reproduction right, it also offers some advantages to authors. Authors can use digital copying to make higher quality copies of works such as sound recordings and films at lower unit cost.

A further feature of digital works is the ease with which they can be manipulated and modified. Works in digital form can be manipulated and modified in almost unlimited ways. Sound recordings originally recorded in analogue format and old film prints are increasingly being digitally re- mastered and re-released. This is made possible by digital editing techniques by

[1] Kramarsky, Stephen M.: Copyright Enforcement in the Internet Age: The Law and Technology of Digital Rights Management, (2001) 11 *De Paul – LCA Journal of Art and Entertainment Law* 1 at 3-4.

[2] Christie, A.: Reconceptualising Copyright in Digital Era, (1995) *European Intellectual Property Review* 522 at 523.

[3] Kumik, P.: Digital Rights Management, (2001) 1 *Legal Information Management* 21.

[4] Fleischmann, E.: The Impact of Digital Technology on Copyright Law, (1988) 70 *Journal of Patent and Trademark Office* 5 at 6-7.

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means of which sounds can be altered, colour added to black-and-white films, and even actors in film changed.[5] The ease with which digital works can be modified and combined lead to a new type of work – multimedia works.[6]

Digital technology has altered the ways in which works are distributed. While analogue works were published in physical form and then distributed by means of air, land, or sea transport, or microwave transmissions, digital works can be delivered by means of digital transmission.[7] Digital transmission offers the potential that every type of work could be made available, in digital form, on an electronic network or series of networks that are accessible worldwide.[8] Copyright traditionally has been concerned with communication or distribution to the public in general. The transmission of works was limited to that which occurred on a one-to-one basis (like telephone communication) or on a one-to-many basis (like broadcasting). Digital transmission involves the transfer of works to individuals. Transmission of a copyright work in digital form can now take place on a one-to-one, many-to-many, or all-to-all basis.[9] Works can be sent from one individual to another, from an individual to a select group, or from individual to public at large.

Digital transmission is interactive, and so is no longer limited to that which occurs on a one-way basis.[10] There is no broadcaster that sends out works to be received by the public at a time of the broadcaster's choice. Instead works are made available on a 'server' to be accessed or used at a time determined by the user. Other than making the works available, the service provider may be a passive participant. The user is the active participant by accessing, using, or copying a particular work. The user can also, in turn, act as a further publisher of the work and so become an unauthorised re-publisher. Digital transmission thus made true communication possible.

The benefits of digitization are endless. For authors, digitization offers not only new paths of creating works but also the wide and efficient dissemination of their works by digital transmission. For the computer, broadcasting, cable, satellite, and telecommunication industries, there is potential for technical innovation and growth. And for virtually every member of the public, digital transmission makes works, information, and services available online in forms much more useful than the traditional analogue formats. However, despite these many advantages of digitization, time proved it to be a double-edged sword – it not only lead to new and exciting ways of creating and enjoying copyright works, but also provided new ways of infringing authors' rights.[11] Digitization threatens authors' economic and moral rights, as well as their enforcement. It also poses the threat of upsetting the existing balance between the rights of authors and those of users. With the emergence of the Internet and increasing use of the worldwide web possibilities of infringement of copyright have become mind boggling free and easy access on the web together with possibilities of down loading has created new issued in copyright infringement. Taking content from one site, modifying it or just reproducing it on another site has been made possible by digital technology and this has posed new challenges for the traditional interpretation of individual rights and protection. Any person with a personal Computer and a modem can become a publisher. Downloading, uploading saving transforming or crating a derivative work is just a mouse click away. So the need arose for some kind of regulation or mechanism that would enable authors to exploit and control their works in the digital format. If authors' rights are not properly protected, the success of the online global information networks can be compromised. In response to the increasing ease of reproduction and disseminating works over the internet, copyright owners and their technology have designed an entirely novel and more effective method – technological protection measures, aimed at regulating copying, distribution, use of and access to digital works. Since users can circumvent these technological protection measures, lawmakers both at the national and international level have enacted provisions that ban the act of circumvention of technological protection measures on the one hand and the production and dissemination of circumvention tools on the other hand.

Technological Protection Measures

With the growth of technological means of disseminating protected material, rightowners have developed, and are still developing, technological measures aimed at protecting their material against unauthorised use. Since digital technology can be used to trace, monitor, and control the reproduction and dissemination of works, it can be successfully employed to protect copyright works. Whilst copyright law can be applied only after infringement has occurred, as it does not work prospectively,[12] technological protection measures work prospectively and can effectively prevent infringement. Also, while copyright law provides authors merely with a right to control the use of their copyright works, technological protection measures enable authors to exercise factual control over what users can and cannot do with their works.[13]

The aim of technological protection measures is to protect or secure works in digital format. It can be integrated in software or built into the hardware. Such technological measures may, for instance, involve the insertion of identification signals in digital recordings, or technical devices which prevent copying of a recording, either at all, or on more than a specified number of occasions. In addition, technological access methods have been developed under which reception of encrypted transmissions requires the use of card or other descrambling device to make

[5] Dixon, Allen N. & Hansen, Martin F.: The Berne Convention Enters the Digital Age, (1996) *European Intellectual Property Review* 604 at 605.

[6] ibid (A multimedia work is basically a work that combines different types of work, or different sensory experiences, and delivers them as one work on a single medium, such as CD-ROM. Digital encyclopedias and educational and entertainment offerings are typical examples of multimedia works.)

[7] Dixon & Hansen, *Supra* note 5 at 606.

[8] Dixon, Allen N. & Self, Laurie C.: Copyright Protection for Information Superhighway, (1994) *European Intellectual Property Review* 465; Dixon & Hansen, *Supra* note 5 at 607.

[9] Christie, *Supra* note 2 at 523.

[10] ibid

[11] Marks, Dean S. & Turnball, Bruce H.: Technical Protection Measures: The Introspection of Technology, Law and Commercial Licences, (2000) *European Intellectual Property Review* 198 at 198.

[12] Casellati, Alvise M.: The Evolution of Article 6.4 of the European Information Society Directive, (2001) 24 *Columbia – VLA Journal of Law & the Arts* 369 at 371.

[13] Koelman, Kamiel J.: A Hard Nut to Crack: The Protection of Technological Measures, (2000) *European Intellectual Property Review* at 272.

the transmitted programme perceptible.[14] Encryption[15] is the key element to distinguish between authorised and unauthorised uses, since no individual or device can decrypt content by accident.[16] Since technological protection measures are used to control access to or use of copyright works, two types of technological protection measures have emerged – access control and copy control.

Access Control

The most basic and important type of technological protection is access-control technology. It prevents someone from viewing, reading, hearing, and/or otherwise perceiving the work without author's consent.[17] It can either prevent access at the online outlet or at the level of the user of the information, or can be used to control or prevent subsequent access to an already acquired copy of a work.[18] An access measure can protect a service as well as the content provided by that service. Measures that control access to an already acquired work differ from those that prevent access at the online outlet or at the receiver end in so far as they control access only to the work itself and not to any service.[19] When used as an access control, encryption effectively locks digital works to ensure that only authorised users have the keys to unlock and use it. Encryption is, however, not the only method used in access control technologies. Access may also be conditional upon passwords or other means of data authentication.

Copy Control

By controlling access one can control use of work generally – if the work cannot be accessed, it cannot be used. However, sometimes an author wants to give access to work while controlling subsequent uses. In order to do so, the author can employ copy or use controls. Copy control enables the author to limit the user's freedom of movement once work has been accessed. It thus allows authorised activities but prevents unauthorised activities by the user who already accessed the work. Copy control limits whether and to what extent a work can be copied, communicated, viewed, or played.[20] Copy protection is the predominant function of this type of technological protection measure. A widely-implemented copy control is the Serial Copyright Management System (SCMS). This system prevents the making of digital copies of a digital copy. In other words, it allows one copy to be made of a work but prevents copies being made of that copy, so that it cannot be used as a digital master. Other methods include planting a 'worm' in computer programs, which detects efforts to copy the program and counterattacks by erasing the copied files. A product may also be designed to prevent the making of print-outs or copies of the product in its entirety, by blocking these functions through software routines.

Access controls and copy controls often overlap. Once a copy control is stripped out, everyone has access to the work without the author's consent – the copy control can accordingly also control access to a work. The Content Scramble System (CSS) is an example of a technology that serves as both an access control and copy control. Motion picture studios use CSS to encrypt DVD contents. Since only licensed devices can decrypt and play CSS-Protected DVDs, it serves as access control, and since it generally also prohibits copies being made of the contents of the DVD, it serves as copy control.

Legal Protection of Technological Measures under the WIPO Internet Treaties 1996

The advent of Internet facilitates the manufacture and trafficking of circumvention devices, and the subsequent dissemination of copies of works whose technological protection measures have been circumvented, at a global scale, posing formidable challenges for the effective protection of copyright owner's interests. Circumvention devices threaten the integrity of technological protection measures, and unauthorised passwords and access codes frustrate access controls. Although technological protection measures can prevent unauthorised copying but are vulnerable to hacking.[21] No technological measure can permanently resist deliberate attacks by hackers and so cannot prevent piracy. Persons who circumvent these measures, or who assist other persons to circumvent them may, in so doing, infringe copyright or related rights, but because of the particular scope of their activities, infringement in the traditional categories may not occur, or may be difficult to prove.[22] Realising the need for statutory regulation of technological protection measures, an ambitious agenda to provide an effective and adequate protection for the technological measures deployed by copyright owners, was adopted at the WIPO Diplomatic Conference 1996. Article 11 of the WIPO Copyright Treaty 1996 provides that:

"Contracting parties shall provide adequate legal protection and effective legal remedies against the circumvention of effective technological measures that are used by authors in connection with the exercise of their rights under this Treaty or the Berne Convention and that restrict acts, in respect of their works, which are not authorized by the authors concerned or permitted by law."

Likewise, the WIPO Performances and Phonograms Treaty 1996 contain a parallel provision for the protection of technological measures employed by performers and phonogram producers.[23]

(a) Illicit Acts to be sanctioned

Under the WIPO Treaties 1996, contracting parties are obligated to provide "adequate and effective" legal protection against the "circumvention" of effective technological measures. Therefore, it is clear that contracting parties are obligated to provide legal protection against the direct circumvention of effective technological measures. At the same time, contracting

[14] Sterling, J.A.L.: *World Copyright Law*, London, Sweet & Maxwell, 2003 at 556.

[15] Encryption entails the digital scrambling of bits that make up the work so that the work cannot be accessed or clearly seen. In order to access or use the work, one needs a 'key' (a magic number that is used to descramble (decrypt) the original work). The key is issued only to authorised users, either for payment or after confirmation that the user is indeed authorised to access or use the work. *See* Marks and Turnball, *Supra* note 11 at 212.

[16] Marks and Turnball, *Supra* note 11 at 212.

[17] Besek, June M.: Anti-circumvention Laws and Copyright: A Report from the Kernochan Centre for Law, Media and the Arts, (2004) 27 *Columbia Journal of Law & the Arts* 385 at 450.

[18] Vinje, T.: Copyright Imperilled? (1999) *European Intellectual Property Review* 192-207 at 196.

[19] ibid

[20] Besek, *Supra* note 17 at 450.

[21] Hanbridge, N.: DRM: Can it Deliver?, (2001) 12 *Entertainment Law Review* 138.

[22] Sterling, *Supra* note 14 at 556.

[23] WIPO Performances and Phonograms Treaty 1996, at Article 18.

parties are still obligated to prohibit circumventor's initial act of manufacturing devices primarily for the purpose of circumventing technological measures, given that such act is in fact an integral part of the illicit act of direct circumvention.

However, it remains disputable as to whether the third party's manufacture and distribution of protection-defeating devices will be subject to the anti-circumvention provisions. Article 13 of the *Basic Proposal* for the draft of the WIPO Copyright Treaty provided affirmative and unequivocal answers to the above controversy, by solely banning the preparatory activities that facilitate direct circumvention.[24] Obviously, the *Basic Proposal* focused on the prohibition of the preparatory activities rather than on the direct circumvention. This proposed approach stemmed from the premise that to cut off the source of circumvention-oriented devices and services was the most effective solution to a multitude of tricky problems brought about by the Internet. Though the final texts of the WIPO Treaties 1996 fundamentally change the proposed articles, the spirit of providing effective and adequate protection against all forms of circumventions remains intact and has been embedded into the adopted anti-circumvention provisions.

Given that the acts of circumvention are not amenable to detection and control in the digital environment[25], the legal protection of technological measures can hardly be enforced in an effective manner if it focuses exclusively on the act of circumvention.26 Absent the effective oversight of the downstream supply of circumvention devices in the market place, it would become increasingly more difficult to deter the acts of circumvention and thus right owners' interests would be seriously prejudiced. Due to the fact that the circumvention can be accomplished relatively easily with the aid of readily available devices, the protection against circumvention will not be adequate and effective, if only the direct circumventor is targeted by law. The absence of the protection against preparatory activities will arguably disturb the balance of copyright protection as proclaimed in the preambles of the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty. In terms of the required effective and adequate protection of the technological measures, contracting parties are therefore obligated to outlaw preparatory activities in the national anti-circumvention regulations.[27]

(b) Eligible Technological Measures for Protection

The WIPO Treaties 1996 mandate that the eligible technological measures for protection should be "effective" in nature, and differentiate the types of such technological measures employed by the right owners. Article 11 of the WIPO Copyright Treaty states that technological measures protected should be effective and used by authors in connection with the exercise of their rights under the WCT or Berne Convention. Article 18 of the WIPO Performances and Phonograms Treaty contains a similar requirement. Moreover, the WIPO Treaties 1996 divide the protectable technological measures into two categories: access-control measures (effective technological measures "that restrict acts, in respect of their works, which are not authorized by the authors concerned or permitted by law") and rights-control measures (effective technological measures "that are used by authors in connection with the exercise of their rights under this Treaty or the Berne Convention").[28]

(c) Knowledge Requirement

Under the WIPO Treaties 1996, there is no explicit knowledge requirement in the anti-circumvention provisions. By contrast, the *Basic Proposal* made it clear that a person would be penalized if he or she knew or had the reasonable grounds to know that the device in question would be used for or in the course of the unauthorized access to and use of works.[29] This knowledge requirement therefore focused on the purpose for which the device would be used.[30] However, it was not incorporated in the final texts of the WIPO Treaties 1996.

(d) Effective Remedies

Finally, contracting parties are required to provide effective remedies against the circumvention of the technological measures. The WIPO Treaties 1996, however, are silent on concrete criteria to evaluate the effectiveness of remedies. According to the *Basic Proposal* contracting parties are free to choose appropriate remedies according to their own legal traditions.[31] National enforcement system, under the WIPO Copyright Treaty and the WIPO Performances and Phonograms Treaty, should be effective and at least include expeditious remedies to prevent infringements and remedies which constitute deterrence to further infringements.[32] Therefore remedies against circumvention should be effective enough to "constitute a deterrent and a sufficient sanction" against illegal acts of circumvention.[33]

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[24] The proposed Article13 provided:

(1) Contracting Parties shall make unlawful the importation, manufacture or distribution of protection-defeating devices, or the offer or performance of any service having the same effect, by any person knowing or having reasonable grounds to know that the device or service will be used for, or in the course of, the exercise of rights provided under this Treaty that is not not authorised by the rightholder or the law.

(2) Contracting Parties shall provide for appropriate and effective remedies against the unlawful acts referred in Paragraph (1).

(3) As used in this Article, "protection-defeating device" means any device, product or component incorporated into a device or product, the primary purpose or primary effect of which is to circumvent any process, treatment, mechanism or system that prevents or inhibits any of the acts covered by the rights under this Treaty.

See WIPO: *Basic Proposal for the Substantive Provisions of the Protection of Literary and Artistic Works to Be Considered by the Diplomatic Conference.* WIPO, Geneva, 1996.

[25] Marks & Turnball, *Supra* note 11 at 198, 201.

[26]. Reinbothe, J. and Lewinski, S.: *The WIPO Treaties 1996: The WIPO Copyright Treaty and The WIPO Performances and Phonograms Treaty: Commentary and Legal Analysis* (London: Butterworths, 2002) at 144.

[27] Ginsberg, J.*:* Achieving Balance in International Copyright Law, (2003) 26 *Columbia Journal of Law & Arts* 201, at 244.

[28] Marks & Turnball, *Supra* note 11 at 201.

[29] WIPO, *Supra* note 24 at Para 13.02.

[30] ibid

[31] ibid at Para 13.04.

[32] WIPO Copyright Treaty, at Article 14; WIPO Performances and Phonograms Treaty, at Article 23

[33] WIPO, ,*Supra* note 24 at Para 13.04.

Legal Protection of Technological Protection Measures under WIPO Implementing Legislations *E. C. Information Society Directive*[34]

Under the E.C. Information Society Directive, a legal protection is provided to technological measures that effectively inhibit and/or prevent the infringement of any copyright, rights related to copyright or *sui generis* rights provided by law, without, however, preventing the normal operation of electronic equipment and its technological development.[35] In implementation of Article 11 of the WIPO Copyright Treaty and Article 18 of the WIPO Performances and Phonograms Treaty, Article 6(1)(2) of the Directive requires Member States to provide adequate legal protection against the circumvention of any technological measures. While the Treaties refer generally to effective technological measures that are used by right owners to restrict acts which are unauthorized by them or by law, the Directive enters into more detail by referring to adequate legal protection against manufacture, import, distribution, sale, etc., of devices, etc., or the provision of services which facilitate circumvention. Furthermore, a wide ranging and specific definition of "technological measures" is given in the Directive.[36]

A problem in the application of technical protection measures concerns the position of persons who, under the law, are, by virtue of an exception, entitled to reproduce or otherwise use protected material for certain purposes, without the necessity of permission from respective rightowner, yet are frustrated in the attempt to benefit from the exception by the presence of a technical protection measure. Article 6(4) of the Directive provides solution to this problem. Expressed in simple and broad terms, an entitled beneficiary can get access to or copy material covered by the relevant exception, either under an agreement with the respective rightholder, or if there is no such agreement, by the use of a means or procedure provide by the state. These means or procedures are left to the discretion of Member States, and it remains to be seen what legislation is adopted in this connection and how it will operate.[37]

***Digital Millennium Copyright Act* 1998**

In the United States, the WIPO Internet Treaties have been implemented through Title I of the Digital Millennium Copyright Act (DMCA). In essence, the DMCA prohibits three circumvention-related activities:[38]

- Sec. 1201(a)(1) DMCA prohibits the *acts of circumvention* of "a technological measure that effectively controls *access* to a work protected under this title" (Emphasis added). Notably, the scope of the provision is very broad, because acts of access control circumvention are even outlawed if undertaken for purposes that are entirely lawful (e.g. fair use) and authorized by the Copyright Act. In this respect (and others), the DMCA significantly exceeds the minimal protection level as set forth by the WIPO Internet Treaties.
- Sec. 1201(a)(2) DMCA prohibits a person from manufacturing, importing, offering to the public, providing or otherwise trafficking "in any technology, product, service, device, component, or part thereof, that ... is primarily designed or produced for the purpose of circumventing a technological measure that effectively *controls access* to a work …; has only limited commercially significant purpose or use other than to circumvent a technological measure that effectively controls access to a work …; or is marketed by that person … for use in circumventing a technological protection measure that effectively controls access …." Thus, the DMCA prohibits tools that can be used for circumvention purposes based on their primary design or production, regardless of whether they can or will be used for non-infringing uses. However, uncertainty remains as to the exact meaning of the criterion "primarily designed or produced."
- Sec. 1201(b)(1) DMCA, finally, prohibits the trafficking in tools that circumvent technologies that effectively protect *a right of a copyright owner* in a work or portion thereof. Similarly to circumvention devices intended for cracking access controls, the threshold for violation of the Act is that the device is primarily designed for circumvention purposes, or has only a limited commercially significant purpose apart from circumvention, or is marketed for use in circumventing a relevant technology.

The term "technological measure" is not defined by the DMCA. However, sec. 1201(a)(3)(B) essentially defines a technological measure that controls access to a work as effective "if the measure, in the ordinary course of its operation, requires the application of information, or a process or a treatment, with the authority of the copyright owner, to gain access to the work." Similarly, sec. 1201(b)(2)(B) states that a technology measure "effectively protects a right of a copyright owner under this title' if the measure, in the ordinary course of its operation, prevents, restricts, or otherwise limits the exercise of a right of a copyright owner under this title."

With regard to the exceptions under the DMCA, one has to distinguish between statutory exceptions on the one hand and exceptions to the prohibition of circumventing access control technologies concerning particular classes of works stipulated by the Librarian of Congress on the other hand. Sec. 1201 contains

[34] European Council Directive on the Harmonisation of Certain Aspects of Copyright and Related Rights in the Information Society 200/29/EC, 2001 O.J.(L 167) 10(EU).

[35] The Information Society Directive is based upon the understanding that there is a need to provide for harmonised legal protection against any activity enabling or facilitating the circumvention without authority. (Ed.) Heath Christopher and Sanders Anselm Kamperman: *Intellectual Property in the Digital Age,* (Hague,Kluwer Law International, 2001) at 75.

[36] For the purposes of the Directive the expression 'technological measures' means any technology, device or component that, in the normal course of its operation, is designed to prevent or inhibit the infringement of any copyright or any right related to copyright as provided by law or the *sui generis* right provided for in Chapter III of Directive on Databases (Directive 96/9/EC). Moreover, those technological measures shall be deemed "effective" where the access to or use of a protected work or other subject matter is controlled through application of an access code or any other type of protected process which achieves the protection objective in an operational and reliable manner with the authority of the rightholders. Such measure may include decryption, descrambling or other transformation of the work or other subject matter. *See* Information Society Directive, *Supra* note 34 at Article 6(3).

[37] Sterling, J. A. L.: *World Copyright Law*, (London, Sweet & Maxwell), 2003 at 558.

[38] Ginsburg, Jane C.: Copyright Legislation for the Digital Millennium, (1999) 23 *Columbia Journal of Law & Arts* at 137.

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seven specific and narrow statutory exemptions that apply to the act of circumvention of access controls. Five of them also apply to provisions that prohibit the trafficking in circumvention technologies. These seven exceptions to the prohibition against circumvention may be enumerated as follows:

1. Nonprofit Libraries, archives and educational institutions, under certain conditions, may circumvent TPM solely for the purpose of gaining access to the work in order to determine whether the relevant institution wishes to purchase it.[39]
2. Law enforcement, intelligence and other government agencies, where authorized, are not subject to either the ban on acts of circumvention nor the prohibition of trafficking in circumvention technologies set out in sec. 1201(a) and 1201)(b).[40]
3. Reverse engineering of a computer program by a person who has lawfully obtained a copy of that program is permitted under a series of restrictive conditions.[41]
4. Encryption research is permitted if the researcher has lawfully obtained a copy, the act is necessary for research and does not constitute a copyright infringement, and the researcher made a good faith effort to obtain authorization.[42]
5. Protection of minors can justify an exception to the prohibition on circumvention for a technology that has the sole purpose of preventing minors from accessing material on the Internet.[43]
6. The act of circumvention is permitted where the TPM collects or disseminates personally identifying information gathered in the course of online activities if certain criteria are met.[44]
7. Security testing of a computer, computer system or network is permitted with the authorization of the owner. This exception, if other conditions are met, allows both the act of circumvention as well as the development, distribution, and use of technological means for the respective testing purpose.[45]

Free Trade Agreements

The recent proliferation of Free Trade Agreements (FTAs) concluded between the US and her trading partners, including Singapore[46], Chile[47], Australia[48], Central American countries[49], and Morocco[50], have set the far-reaching and stringent standards for IP protection and enforcement. Unlike the WIPO Treaties 1996, a host of detailed and far-reaching anti-circumvention provisions are set out in the recent FTAs, prohibiting both the direct circumvention of technological measures, and the manufacture and trafficking of protection-defeating devices. These DMCA-based provisions set out higher standards for the protection of technological measures than those set forth in the WIPO Treaties 1996. The WIPO Treaties 1996 are silent on the knowledge requirement concerning the anti-circumvention measures. Under the recent FTAs, it is prescribed that those who "knowingly, or having reasonable grounds to know" circumvent the access-control measures employed by rightholders, will be subject to penalization.[51] Though the WIPO Treaties 1996 make the preparatory acts illegal, there are no specific requirements concerning the extent to which adequate protection and effective remedies against such illicit acts should be afforded by domestic laws. Based upon the DMCA, recent FTAs broadly outlaw the manufacture and trafficking of devices that:

---- are promoted, advertised, or marketed for the purpose of circumvention of any effective technological measure; or

---- have only a limited commercially significant purpose or use other than to circumvent any effective technological measure; or

---- are primarily designed, produced, or performed for the purpose of enabling or

---- facilitating the circumvention of any effective technological measure.[52]

Additionally, contracting states are obligated to prohibit the manufacture and trafficking of devices that are "primarily of assistance in decoding an encrypted program-carrying satellite signal" without authorisation, and the wilful receipt or further distribution of a decoded encrypted program-carrying satellite signal.[53]

The WIPO Treaties 1996 leave the effective technological measures eligible for protection open to definition. According to the recent FTAs, the protected effective technological measures refer to "any technology, device, or component that, in normal course of its operation, controls access to a protected work, performance, phonogram, or other subject matter, or protects

[39] Sec. 1201(d) DMCA.
[40] See sec. 1201(e) DMCA.
[41] Sec. 1201(f) DMCA.
[42] Sec. 1201(g) DMCA.
[43] Sec. 1201(h) DMCA.
[44] Sec. 1201(i) DMCA.
[45] Sec. 1201(j) DMCA.
[46] U.S.—Singapore Free Trade Agreement (hereinafter "Singapore FTA"), concluded on Jan. 15, 2003, available at: http://www.ustr.gov/Trade_Agreements/Bilateral/Singapore_FTA/Final/Final_Texts/Section_Index.html
[47] U.S.—Chile Free Trade Agreement (hereinafter "Chile FTA"), concluded on June 6, 2003, available at http://www.ustr.gov/Trade_Agreements/Bilateral/Chile_FTA/Final/Final_Texts/Section_Index.html
[48] U.S.— Australia Free Trade Agreement (hereinafter "Australia FTA"), concluded on May 18, 2004, available at: http://www.ustr.gov/Trade_Agreements/Bilateral/Australia_FTA/Final/Final_Texts/Section_Index.html .
[49] U.S.—D.R.-Central American Free Trade Agreement (hereinafter "D.R.-Central American FTA"), concluded on August 5, 2004, available at: http://www.ustr.gov/Trade_Agreements/Bilateral/DR_CAFTA/Final/Final_Texts/Section_Index.html .
[50] U.S.—Morocco Free Trade Agreement (hereinafter "Morocco FTA"), concluded on June 15, 2004, available at: http://www.ustr.gov/Trade_Agreements/Bilateral/Morocco_FTA/Final/Final_Texts/Section_Index.html .
[51] Singapore FTA, Art. 16.7(a)(i); Australia FTA, Art. 17.4.7(a)(ii); The Chile FTA only requires that the person who knowingly circumvents the access-control technological measures without authorization should be penalized. *See* Chile FTA, Art.15.7.5(a). The Morocco FTA and D.R.-Central American FTA are silent on the knowledge requirement. *See* Morocco FTA, Art.15.5. 8(a)(i), D.R.-Central American FTA, Art.15.5.8(a).
[52] Singapore FTA, Art.16.4.7(a)(ii); Chile FTA, Art.15.7.5(b); Australia FTA, Art.17.4.7(a)(iii); D.R.-Central American FTA, Art.15.5.7(b); Morocco FTA, Art.15.5.8(a)(i).
[53] Singapore FTA, Art.16.6; Chile FTA, Art.17.8; Australia FTA, Art.17.7; D.R.-Central American FTA, Art.15.8; Morocco FTA, Art.15.8.

any copyright or any rights related to copyright".[54] However, recent FTAs, unlike the WIPO Treaties 1996, undercut contracting states' freedom to accommodate public to redress the adverse side effects resulting from the adoption of the stringent anti-circumvention measures.

Legal Protection of Technological Measures under Indian Copyright Law

The Indian Copyright Law mainly consists of the Copyright Act 1957.[55] The Act has been amended five times, prior to 2012, once each in the years 1983, 1984, 1993, 1994 and 1999 to meet with the national and international requirements. The amendments in 1994 were a response to technological changes in the means of communication like broadcasting and telecasting and the emergence of new technology like computer software[56]. The Amendments introduced by the Copyright Amendment Act, 2012 are significant in terms of range as they address the challenges posed by the Internet and go beyond these challenges in their scope. The latest Amendment harmonizes the Copyright Act, 1957 with WCT and WPPT. With these amendments, the Indian Copyright Law has become a forward-looking piece of legislation and the general opinion is that, barring a few aspects, the amended Act is capable of facing copyright challenges of digital technologies including those of Internet.

By 2012 Amendment a new Section 65A has been introduced to provide for protection of technological measures used by copyright owner to protect his rights on the work. Any person who circumvents an effective technological measure applied for the protecting any of the rights, with the intention of infringing such rights, shall be punishable with imprisonment which may extend to two years and shall also be liable to fine. Sub-section (2) of Section 65A provides for some exceptions. The prohibition shall not prevent doing anything for a purpose not expressly prohibited by the Act (thus enabling enjoyment of fair use provisions). However, any person facilitating circumvention by another person of a technological measure for such a purpose shall maintain a complete record of such other person including his name, address and all relevant particulars necessary to identify him and the purpose for which he has been facilitated. Exception is available for doing anything necessary to conduct encryption research or conducting any lawful investigation; or doing anything necessary for the purpose of testing the security of a computer system or a computer network with the authorization of its owner or operator; or doing anything necessary to circumvent technological measures intended for identification or surveillance of a user; or taking measures necessary in the interest of national security.

The above provision emanates from Article 11 of WIPO Copyright Treaty and Article 18 of the WIPO Performances and Phonograms Treaty. The rationale is to prevent the possibility of high rate of infringement in the digital environment. The use of technological measures had a significant impact on users since the freedom to use the work (fair use of works) permitted by law was considerably regulated through these measures. In the absence of the owner of the works providing the key to enjoy fair use, the only option was to circumvent the technology to enjoy fair use of works. The major problem of use of law in preventing circumvention was the impact on public interest on access to work facilitated by the copyright laws. This is the logic of sub-section (2) permitting circumvention for the specific uses. The Standing Committee of the Parliament which examined the legislation in its report stated that many terms in this section have been consciously left undefined, given the complexities faced in defining these terms in laws of developing countries. It also stated that the approach enshrined in Section 65A is to give limited legislative guidelines and allow the judiciary to evolve the law based on practical situations, keeping in mind the larger public interest of facilitating access to work by the public.

Need for International Harmonization

Given the borderless nature of the Internet and its ability of transmitting works almost at a lightning speed, copyright protection has become increasingly difficult.[57] The problems created by recent technological developments cannot be solved by the decisions of individual countries. With the Internet, copyrighted works remain vulnerable to outside piracy even if protected in the home country. Therefore, it is necessary to balance between easy infringement and expensive enforcement; it is also important to address the uncertainties involved in international litigation. No doubt, to some extent these uncertainties are common to all law suits, but in most other contexts there is, at least, a greater amount of precedent for successful results. The more uncertainty there is about the procedures of enforcement, applicable laws, or the likely results, the more unwilling copyright holders will be to try to enforce their rights abroad. The problem for a copyright holder is not only the potential loss of earnings due to infringement, but also the additional costs spent in unsuccessful litigation. Enforcing judgments would be easy if all the defendants were residents of the country of the court that rendered the judgment. In the case of foreign defendants, it would also be straightforward if they had assets within that country.[58] However, foreign defendants with no assets in the forum country create a problem. It can be difficult to have national judgments enforced in the foreign country where the defendant resides or has assets, and it is also difficult, costly, and time consuming to need to pursue additional copyright litigation abroad.

The ubiquitous nature of online delivery systems necessitates the consideration of multinational enforcement[59], which will to some degree require the harmonization of domestic laws concerning enforcement measures and facilitate the cross-border protection of copyright in the digital age. Clear rules about the enforcement of preliminary injunctions and monetary judgments will diminish the inconvenience of dealing with the unknowns of how foreign judges apply their own

[54] Singapore FTA, Art.16.4.7(b); Chile FTA, Art.17.7.5(f); Australia FTA, Art. 17.4.7(b); D.R.-Central American FTA, Art. 17.5.7(g); Morocco FTA, Art. 15.5.8(f).

[55] The latest amendment being, Act 27 of 2012 that came into force on 21 June, 2012.

[56] The 1999 amendments have made the copyright fully compatible with Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement.

[57] WIPO: *Intellectual Property Reading Material*, (Geneva 1998) at 319 (noting that enforcement has become increasingly important in that the formidable expansion of technologies have made possible infringing uses of protected rights to an extent which was unthinkable some decades ago).

[58] Symposium: Copyright's Long Arm: Enforcing US Copyrights Abroad, (2004) *Loyola of Los Angeles Entertainment Law Review*, 24 (1), 36-55.

[59] Ginsburg, J.: Putting Cars on the 'Information Superhighway': Authors, Exploiters, and Copyright in Cyberspace, (1995) 95 *Columbia Law Review* at 1485.

substantive and procedural laws. Even if the cost of international litigation would only be marginally reduced, the increased certainty and probability of success would improve the balance between unfettered infringement and expensive enforcement.

Conclusion

Digitization in tandem with the emergence of the Internet has changed the ways in which we create, distribute, access, and use information. In response to the disruptive power of the new information and communication technology, rightholders have developed and, on a large scale, applied new technological protection measures. In addition, the rightsholders—exposed to an arm's race between copyright and copyleft—have successfully lobbied both at the international as well as the national level for a third layer of protection, i.e., anti-circumvention legislation, which in important respects has changed the traditional balance between the interests of rightholders on the one hand and users as well as the public at large on the other hand. This paper looked at digitization and its impact on copyright law, technological protection measures used by authors to protect their works, the framework provisions of the WIPO Internet Treaties 1996, and the legislations in United States of America, the European Union and India to give effect to the WIPO Treaties. The above discussion indicates that many of these legislative provisions, while mindful of the authors' interests, at the same time pose a considerable threat to users of copyright works, especially to their ability to make lawful use of copyright works without needing to obtain authors' permission. Emerging technologies to protect digital copyright works may actually mean that author's rights will be better protected in cyberspace that they have ever been in the analogue world. Considering this, the real difficulty when applying copyright in digital media is to maintain the balance between incentives for creating and investing in works and the provision of adequate public access to works. Copyright in cyberspace has to be enforced in such a way as to protect the rights of users and to ensure the existence of healthy public domain.

In India the latest amendments in copyright law are significant in terms of range as they address the challenges posed by the Internet. The 2012 Amendment harmonizes the copyright law with WCT and WPPT. The introduction of new Section 65A, which extends legal protection to the technological protection measures used by authors, is a welcome step. The provision is sure to contain, if not to put an end to, the menace of digital piracy. Since the pirate is using new technologies in the digital environment to infringe on the copyright and related rights, so in the same vein, the holders of these rights should use the very means to counter such actions of infringer. With these amendments, the Indian Copyright Law has become a forward-looking piece of legislation and the general opinion is that, barring a few aspects, the amended Act is capable of facing copyright challenges of digital technologies including those of Internet. Indeed, it seems inevitable that the digital networked environment will eventually necessitate more radical changes to the copyright system not only to insure adequate protection to right holders, but also to protect the legitimate interests of users of protected works.

The ubiquitous nature of Internet necessitates the consideration of multinational enforcement, which will to some degree require the harmonization of domestic laws concerning enforcement measures and facilitate the cross-border protection of copyright in the digital age. Diversities in basic theories and in the practice of national systems protecting copyright and related rights create obstacles to effective international and national implementation of protection of authors and other right owners. The experience and achievements of the harmonization programme of the European Community demonstrate the possibilities of bringing together important provisions of diverse national systems. The unity of legislative approach will, it is submitted, be the only effective way of dealing with the problems posed for the exercise of copyright and related rights in the borderless environment created by the Internet and other international communication systems.