Digital Copyright Management: Need for Managerial Aspects

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Abstract

This paper discusses the digital copyright management in the context of digital libraries. The digital right management prevents the unauthorized use of authors' original work. With the current technological developments in Information Technology, information can be accessed easily. Current copyright law does not discuss about the digitization aspect – particularly its storage, use in the network environment and fair use in the digital environment. It also discuss that about the computer software, piracy etc.. The main objectives of copyright management in digital aspects arc promoting the access and the use of information and protecting the works from the infringement for encouraging the authors in pursuit of knowledge. The technological developments, the increasing number of electronic publications and digital libraries pose challenges to the right holders as well as law enforcing agencies. The nature of electronic information including computer software is also discussed. Intellectual Property Rights 'Intellectual property rights' (IPR) is a general term which covers copyright, patents.

Keywords: Digital Rights Management, Copyright, WIPO, Digital Environment, DOI, Encryption, Watermarks, License

1. Introduction

Information is the primary 'commodity' for any R&D activity. The ever changing technological developments and the ever-growing number of publications in a multitude of subject fields led to a paradigm shift in the library management. The developments in the information technologies have brought in new products formats for storage, retrieval and dissemination. The digital information has greatly enhanced the quality and range of services provided in a library. The growing electronic publications including e-books, e-journals and the billions of web pages and Peta bytes of information on Internet have had a profound impact on the knowledge society. The CD-ROM technology becomes a popular storage and retrieval mechanism. These led to a number of licensing agreements.

Digital rights management (DRM) is a commonly used term in a number of professional areas such as, libraries and archives, publishing, media creation and production, information technology etc. Rights provide the legal and moral context for providing managed access to copyright-protected resources in ways that protect the creator's exploitation of his/her work and the privacy of the resource user. A critical issue for effecting DRM, particularly in a digital environment where resources can be readily duplicated and altered, is to identify and support the authentic resource. Affective DRM involves establishing a framework of policy and practice that supports the rights of the creator, the user and the resource. Libraries can address each entity

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in turn to develop a comprehensive yet manageable digital rights strategy.

Although technical controls on the reproduction and use of software have been intermittently used since the 1970s, the term 'DRM' has come to primarily mean the use of these measures to control artistic or literary content. DRM technologies have enabled publishers to enforce access policies that not only disallow copyright infringements, but also prevent lawful fair use of copyrighted works, or even implement use constraints on non-copyrighted works that they distribute.

2. What is Copyright?

According to World Intellectual Property Organization (WIPO), copyright is defined as a legal term describing 'rights given to creators for their literary and artistic works'. Copyright is a form of protection provided by the laws of any country to the authors of "original works of authorship," including literary, dramatic, musical, artistic, and certain other intellectual works. This protection is available to both published and unpublished works. Copyright is a statutory term, defined in dictionary as "the exclusive legal right to the publication, sale etc. of a literary or artistic work".

2.1. What Works are Protected?

Copyright protects "original works of authorship" that are fixed in a tangible form of expression. Copyrightable works include the following categories:

1. Original literary works
2. musical works, including any accompanying works
3. dramatic works, including any accompanying music
4. pantomimes and choreographic works
5. pictorial, graphic, and sculptural works
6. motion pictures and other audiovisual works
7. sound recordings
8. architectural works

These categories should be viewed broadly. For example, computer programs and most "compilations" may be registered as "literary works"; maps and architectural plans may be registered as "pictorial, graphic, and sculptural works."

2.2. Copyright in Digital / Electronic Environment

Copyright relates in books, sound recordings, audiovisual/musical works, films, radio and TV broadcasts, artistic works and computer software. Due to swift change in technological developments, countries like USA (Digital Millennium Copyright Act), Australia (Digital Agenda Act), India (Information Technology Act and Communications Convergence Act), Japan, European Union, Malaysia, Singapore etc have taken steps to strengthen the existing copyright legislations to protect intellectual property rights (IPRs). The IPR Acts aim a three-level protection, viz. legal—through legislations like copyright laws; technological—through digital rights management systems (DRMS); and legal protection to help technological protection—through prohibition of acts of circumvention of copyright laws. Technologies have been developed to protect the content through watermarking, finger printing and tamper proof hardware and software; access control by user ID and password; content use through disabling printing and downloading, copying specified number of times only and restricting copying through originals (masters) only.

3. What is Digital Rights Management (DRM)?

Digital Rights Management - also known by its initials, DRM. Digital Rights Management is a technology that creates certain conditions about how some digital products can be used and shared. It was set up as a system for the protection of digital works. Then, Digital Rights Management (DRM) is a system created or designed to protect the unauthorized duplication and illegal distribution of copyrighted digital product. Once the Internet becoming widely used, it was easy for pirates to copy and illegally sell a variety of marketed digital information and products. Therefore, this type of technology and system prevents users from doing things with content that the content providers do not wish them to do.

Digital Rights Management (DRM), also sometimes called ECMS, or electronic copyright management systems, are technologies designed to automatically manage rights in relation to information. This can include preventing copyright works and other information from being accessed or copied without authorization and establishing and enforcing license terms with individuals. DRM is a form of continual protection that protects works and manages rights at all times, no matter where the works are located or who has possession of them. DRM attempts to promote authorized use of a copyright work, in part by precluding the possibility of copyright infringement. DRM systems comprise a number of technological components, which can include encryption, a surveillance mechanism, databases of works, owners and users, license management functionality and Technological Protection Measures (TPMs).

4. Technology Related to DRM

DRM works by allowing distributors of electronic information to control viewing access to content. Some form of encryption is needed to control access to content. Rights management solutions are based on a wrapper or container placed around a data file, which offers protection, sets the data life cycle and defines usage rules, payment and redistribution constraints. A license must be acquired to unlock the wrapper and get access to the content. Individual "keys" for viewing or listening to the content are provided to the end user who has purchased the rights, which generally include limitations on copying, printing and redistribution. Content access can be configured in a number of ways.

Keys are the main way to grant access and are commonly given to the computer instead of the end user. People are allowed to buy the product and download it to their computer. While that is happening, a small file is also downloaded which contains the key to open the product such as an e-book or a song. The key is tied to the identity of the computers hardware. The key takes a unique identifier from the computer and gives it back to the owner. The unique identifier can be something the users CPU, serial number and something that cannot be easily changed by the user. Whenever the file is opened the unique key is looked for and if found, the file will open up. If the end user tries to give it to someone else then an error message is displayed and states that the valid license cannot be found and the program will not open.

All of the systems for DRM are based on the identification and recording of information about the copyright owners and about the copyright associated with the content. The use of metadata and rights management information (RMI) or Digital Object Identifiers (DOI) is used to manage this. Metadata is information that is held about a

particular piece of content. They are commonly structured around a set of keywords and data categories. Metadata keywords are created when they are needed and names that actually make sense like. The most common protection given by DRM is through encryption and digital watermarking.

5. Basic Tools and Components

DRM systems usually comprise a suite of several technologies that enable a transaction or digital communication. Many core technology are involved in each part of the DRM, which includes packaging content, authenticating and authorizing the user, making the protected content available to the authorized user and controlling any further use of the content.

5.1. Encryption

Encryption is the process of scrambling information embedded within a digital object so that it can't be used without a password or a unique key. This could include encoding the terms and conditions for which the material can be used. Two possible encryption schemes are private key (Symmetric) cryptography and public key (Asymmetric) cryptography. Symmetric encryption is the most secure and requires both parties to know a private key in order to engage in a secured message exchange. Public key cryptography involves the use of a pair of keys-a public key and a private key. The public key may be widely distributed, even to unknown users, but the private key is known only to its owner.

5.2. Watermarking

Digital watermarking is a communication method in which the author information known as watermark (author name, date, time, logo, fingerprint etc.) is embedded directly or imperceptibly into the digital data (called original data or host data may be images, videos, graphics and audio) to make the watermarked data. Watermarks can be used for different purposes that may include:

- for recording the copyright owner
- for recording the distributor
- for recording the distribution chain
- for identifying the purchaser of the music

Watermark information to be embedded and modulation of the repeated bit sequence with a pseudo-noise signal. Digital watermarking embeds the information into data. Watermarks can either be visible or invisible. It helps to reduce the likelihood that someone will pass it on or try to make illegal copies. An effective watermark will have the following characteristics:

- Imperceptible
- Robust
- Reversible
- Secure

Watermarks can be successfully attacked through collusion, where multiple copies of the original signal are combined and analyzed for small noise variations, to develop a composite copy that most resembles the original, unmarked, data.

6. DRM System

DRM systems are designed to ensure the harmony of the object, so that the object is not intercepted before delivery, and to ensure the security of the whole distribution chain, so that the objects are transferred only to authorized consumers and devices. DRM systems make use of the technology and tools to create an end-to end secured packaging and distribution system for

protected content. These systems generally include at a minimum:

Identification of the content. Watermarks and identifiers are used to identify the content uniquely. This identification can also be used for downstream tracing of the content to ensure an authorized use of the content.

Encryption of all part of the content, to ensure that only consumers with appropriate keys can access the content and to ensure that the content is unchanged throughout the process.

Key(s) and key management to manage the encryption and decryption of the content by authorized entities in the content value chain

License containing usage rules to decide what conditions must be met for access and how the consumer can use the resource.

A license may be combined with the content into a single package or distributed separately from the content, with key pairs used to bind content to license. The core DRM process is shown in Fig.1.

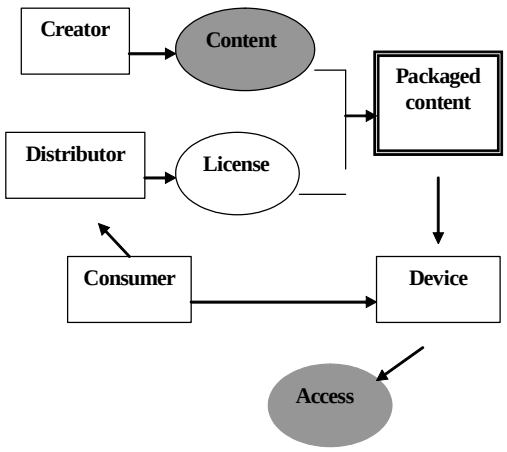

Figure 1 - DRM System Enabling Access to Content

DRM systems have also reached a stage of maturity and flexibility where libraries can actually consider their adoption in order to provide integrated access to all digital information – open source and copyright-protected.

7. Conclusion

In digital environment, the librarians should have the same kind of fair dealing arrangement printed books. They should be able to read or browse electronic information without having to pay for it; preserve in digital format, copyright material held in their collections; and fulfill inter-library document requests electronically.

The major problem in a digital library environment is the difficulty of providing rights violations when they occur. The regularity steps like cryptographic techniques, authentication of users and limits to their access. Watermarks are not complete DRM mechanisms in their own right.

DRM technologies are continually evolving, but the critical role of libraries in leveraging copyright-protected resources to support the public good remains the same. Libraries have an important role to play in the DRM landscape, not just as reluctant consumers but also as the designers and implementers of the next generation of DRM that embraces the important concepts of privacy, user judgment and responsibility of commercial and open source resources to truly realize the concept of the 'one-stop-shop' for information. DRM model, libraries can also bring balance back to copyright, particularly with regard to the competing but equally important needs of the rights holder and the user.

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