# Digital Rights Management

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***Abstract***

Digital rights management (DRM) is a generic term for *access control* technologies that can be used by hardware manufacturers, publishers, *copyright* holders and individuals to impose limitations on the usage of digital content and devices. The term is used to describe any technology that inhibits uses of digital content not desired or intended by the content provider. The term does not generally refer to other forms of *copy protection* which can be circumvented without modifying the file or device, such as *serial numbers or key files*. It can also refer to restrictions associated with specific instances of digital works or devices. Digital rights management is used by companies such as *Sony*, *Amazon*, *Apple Inc.*, *Microsoft*, *AOL* and the *BBC*. The use of digital rights management is controversial. Proponents argue it is needed by copyright holders to prevent unauthorized duplication of their work, either to maintain artistic integrity or to ensure continued revenue streams.

***Key words:***
*DRM.*

## Introduction

DRM technologies attempt to control use of digital media by preventing access, copying or conversion to other formats by end users. Long before the arrival of digital or even electronic media, copyright holders, Content producers or other financially or artistically interested parties had business and legal objections to copying technologies. Examples include: player piano rolls early in the 20th century, audio tape recording, and video tape recording .Copying technology thus exemplifies a disruptive technology.

## Statement of Problem

The advent of digital media and analog/digital conversion technologies, especially those that are usable on mass-market general-purpose personal computers, has vastly increased the concerns of copyright-dependent individuals and organizations, especially within the music and movie industries, because these individuals and organizations are partly or wholly dependent on the revenue generated from such works. While analog media inevitably loses quality with each copy generation, and in some cases even during normal use, digital media files may be duplicated an unlimited number of times with no degradation in the quality of subsequent copies. The advent of personal computers as household appliances has made it convenient for consumers to convert media originally in a physical/analog form or a broadcast form into a universal, digital form for location- or time shifting. This, combined with the Internet and popular file sharing tools, has made unauthorized distribution of copies of copyrighted digital media much easier.

## Objective of the Study

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; examples include the placement of DRM on certain public-domain or open-licensed e-books, or DRM included in consumer electronic devices that time-shift both copyrighted and non-copyrighted works.

Enterprise digital rights management (E-DRM or ERM) is the application of DRM technology to the control of access to corporate documents such as Microsoft Word, PDF, and AutoCAD files, emails, and intranet web pages rather than to the control of consumer media. E-DRM, now more commonly referenced as IRM (Information Rights Management), is generally intended to prevent the unauthorized use of proprietary documents. IRM typically integrates with content management system software.

DRM has been used by organizations such as the British Library in its secure electronic delivery service to permit worldwide access to substantial numbers of rare documents which, for legal reasons, were previously only available to authorized individuals actually visiting the Library's document centre at Boston Spa in England.
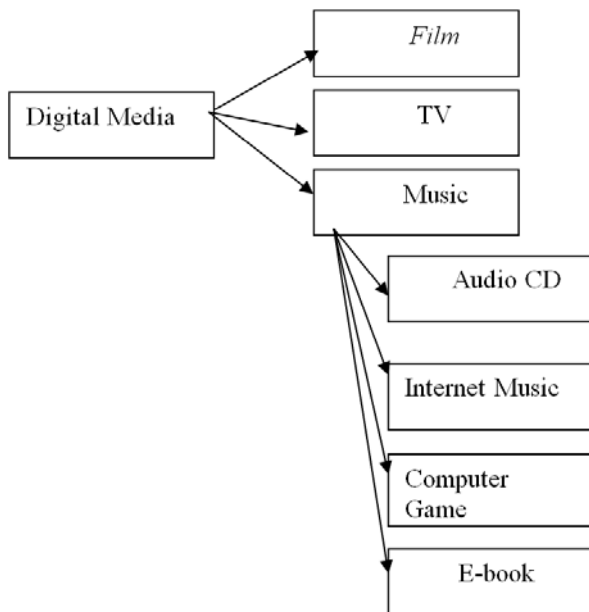
## Literature Review and Methodology



*Figure-1: Digital Media*

## DRM and film

An early example of a DRM system was the Content Scrambling System (CSS) employed by the DVD Forum on film DVDs since ca. 1996. CSS used a simple encryption algorithm, and required device manufacturers to sign license agreements that restricted the inclusion of features, such as digital outputs that could be used to extract high-quality digital copies of the film, in their players. Thus, the only consumer hardware capable of decoding DVD films was controlled, albeit indirectly, by the DVD Forum, restricting the use of DVD media on other systems until the release of DeCSS by Jon Lech Johansen in 1999, which allowed a CSS-encrypted DVD to play properly on a computer using Linux, for which the Alliance had not arranged a licensed version of the CSS playing software.

Microsoft's Windows Vista contains a DRM system called the Protected Media Path, which contains the Protected Video Path (PVP). PVP tries to stop DRM-restricted content from playing while unsigned software is running in order to prevent the unsigned software from accessing the content. Additionally, PVP can encrypt information during transmission to the monitor or the graphics card, which makes it more difficult to make unauthorized recordings.

Advanced Access Content System (AACS) is a DRM system for HD DVD and Blu-ray Discs developed by the AACS Licensing Administrator, LLC (AACS LA), a consortium that includes Disney, Intel, Microsoft, Matsushita (Panasonic), Warner Brothers, IBM, Toshiba and Sony. In December 2006 a process key was published on the internet by hackers, enabling unrestricted access to AACS-restricted HD DVD content. After the cracked keys were revoked, further cracked keys were released.

## DRM and television

The Cable Card standard is used by cable television providers in the United States to restrict content to services to which the customer has subscribed.

An updated variant of the broadcast flag has been developed in the Content Protection and Copy Management (DVB-CPCM). It was developed in private, and the technical specification was submitted to European governments in March 2007. As with much DRM, the CPCM system is intended to control use of copyrighted material by the end-user, at the direction of the copyright holder. According to Re1n Bucholz of the EFF, which paid to be a member of the consortium, "You won't even know ahead of time whether and how you will be able to record and make use of particular programs or devices". The DVB supports the system as it will harmonize copyright holders' control across different technologies and so make things easier for end users. The CPCM system is expected to be submitted to the European Telecommunications Standards Institute in 2008.

## DRM and music

### Audio CDs

Discs with digital rights management schemes are not legitimately standards-compliant Compact Discs (CDs) but are rather CD-ROM media. Therefore they all lack the CD logotype found on discs which follow the standard. Therefore these CDs could not be played on all CD players. Many consumers could also no longer play purchased CDs on their computers. Personal computers running Microsoft Windows would sometimes even crash when attempting to play the CDs.

Sony's DRM software actually had only a limited ability to prevent copying, as it affected only playback on Windows computers, not on other equipment. Even on the Windows platform, users regularly bypassed the restrictions. And, while the Sony DRM technology created fundamental vulnerabilities in customers' computers, parts of it could be trivially bypassed by holding down the "shift" key while inserting the CD, or by disabling the auto run feature. In addition, audio tracks could simply be played and re-recorded, thus completely bypassing all of the DRM (this is known as the analog

hole). Sony's first two attempts at releasing a patch which would remove the DRM software from users' computers failed.

In January 2007, EMI stopped publishing audio CDs with DRM, stating that "the costs of DRM do not measure up to the results." Following EMI, Sony BMG was the last publisher to abolish DRM completely, and audio CDs containing DRM are no longer released by the four record labels.

### Internet music

Many online music stores employ DRM to restrict usage of music purchased and downloaded online. There are many options for consumers wishing to purchase digital music over the internet.

### Computer games

Computer games sometimes use DRM technologies to limit the number of systems the game can be installed on by requiring authentication with an online server. Most games with this restriction allow three or five installs, although some allow an installation to be 'recovered' when the game is uninstalled. This not only limits users who have more than three or five computers in their homes but can also prove to be a problem if the user has to unexpectedly perform certain tasks like upgrading operating systems or reformatting the computer's hard drive, tasks which, depending on how the DRM is implemented, count a game's subsequent reinstall as a new installation, making the game potentially unusable after a certain period even if it is only used on a single computer.

Many mainstream publishers continued to rely on online-based DRM throughout the later half of 2008 and early 2009, including Electronic Arts, Ubisoft and Atari. Ubisoft broke with the tendency to use online DRM in late 2008 with the release of Prince of Persia as an experiment to "see how truthful people really are regarding the claim that DRM was inciting people to use pirated copies. Although Ubisoft has not commented on the results of the 'experiment', the majority of their subsequent titles in 2009 contained no online-based DRM since the release of Prince of Persia - notable examples being Anno 1404 and James Cameron's Avatar: The Game making use of the online version of the TAGES copy protection system. An official patch has since been released stripping Anno 1404 of the DRM. Electronic Arts followed suit in June 2009 with The Sims 3, with subsequent EA and EA Sports titles also being devoid of online DRM.

Ubisoft formally announced a return to on-line authentication on 9 February 2010 through its Uplay™ on-line gaming platform, starting with Silent Hunter 5, The Settlers 7 and Assassin's Creed 2. Silent Hunter V was first reported to have been compromised within 24 hours of release, but users of the cracked version soon found out that only early parts of the game were playable. The Uplay system works by having the installed game on the local PCs incomplete and then continuously downloading parts of the game-code from Ubisoft's servers as the game progresses, making cracking games using the system a daunting task. It was only more than a month after the PC release in the first week of April that software was released that could bypass Ubisoft's DRM in Assassin's Creed 2, demonstrating its strength. The software did this by emulating a Ubisoft server for the game. Later that month, a real crack was released that was able to remove the connection requirement altogether. No fully working crack for Silent Hunter V has been confirmed.

In early March, 2010, Uplay servers suffered a period of inaccessibility due to a large scale DoS attack, causing around 5% of game owners to become locked out of playing their game. The company later credited owners of the affected games with a free download, and there has been no further downtime.

Some most prominent cases making use of online DRM technology SecuROM include Spore, BioShock, Mass Effect and Gears Of War.

### E-books

Electronic books read on a personal computer or an e-book reader typically use DRM restrictions to limit copying, printing, and sharing of e-books. E-books are usually limited to a certain number of reading devices and some e-publishers prevent any copying or printing. Some commentators believe that DRM is something that makes E-book publishing complex.

Two software programs to view e-books are Adobe Reader and Microsoft Reader. Each program uses a slightly different approach to DRM. The first version of Adobe Acrobat e-book Reader to have encryption technologies was version 5.05. In the later version 6.0, the technologies of the PDF reader and the e-book reader were combined, allowing it to read both DRM-restricted and unrestricted files. After opening the file, the user is able to view the rights statement, which outlines actions available for the specific document. For example, for a freely transferred PDF, printing, copying to the clipboard, and other basic functions are available to the user. However, when viewing a more highly restricted e-book, the user is unable to print the book, copy or paste selections. The level of restriction is specified by the publisher or distribution agency.

Microsoft Reader, which exclusively reads e-books in a .lit format, contains its own DRM software. In Microsoft

Reader there are three different levels of access control depending on the e-book: sealed e-books, inscribed e-books and owner exclusive e-books. Sealed e-books have the least amount of restriction and only prevent the document from being modified. Therefore, the reader cannot alter the content of the book to change the ending, for instance. Inscribed e-books are the next level of restriction. After purchasing and downloading the e-book, Microsoft Reader puts a digital ID tag to identify the owner of the e-book. Therefore, this discourages distribution of the e-book because it is inscribed with the owner's name making it possible to trace it back to the original copy that was distributed. Other e-book software uses similar DRM schemes. For example, Palm Digital Media, now known as Ereader, links the credit card information of the purchaser to the e-book copy in order to discourage distribution of the books.

The most stringent form of security that Microsoft Reader offers is called owner exclusive e-books, which uses traditional DRM technologies. To buy the e-book the consumer must first open Microsoft Reader, which ensures that when the book is downloaded it becomes linked to the computer's Microsoft Passport account. Thus the e-book can only be opened with the computer with which it was downloaded, preventing copying and distribution of the text.

Amazon.com has remotely deleted purchased copies of George Orwell's 1984 and Animal Farm from customer's Amazon Kindles. Commenters have widely described these actions as Orwellian, and have alluded to Big Brother from Orwell's 1984. After an apology from Amazon CEO Jeff Bezos, the Free Software Foundation has written that this is just one more example of the excessive power Amazon has to remotely censor what people read through its software, and called upon Amazon to free its e-book reader and drop DRM

## Findings and Analysis

Following are the finding of different technology to enforce Digital Right over the time:

| Name | Used In | Date of Use | Description |
|---|---|---|---|
| **DRM Schemes Currently in Use** | | | |
| **Personal computer DRM** | | | |
| Windows Media DRM | Many Online Video Distribution Networks | 1999+ | WMV DRM is designed to provide secure delivery of audio and/or video content over an IP network to a PC or other playback |
| | | | device in such a way that the distributor can control how that content is used. |
| FairPlay | The iTunes Store, iPod | 2003+ | Purchased music files were encoded as AAC, then encrypted with an additional format that renders the file exclusively compatible with iTunes and the iPod. On January 6, 2009, Apple announced that the iTunes Store would begin offering all songs DRM-free. |
| Helix & Harmony | Real Networks services | 2003+ | A DRM system from Real Networks intended to be interoperable with other DRM schemes, particularly FairPlay. Ultimately used only by Real Networks. |
| Excel Software | Business, educational, government and consumer applications | 2006+ | Protection for Mac and Windows applications, plugins, DLLs, multimedia and documents with manual and automated activation, trial and perpetual licenses, software subscriptions, floating and dynamic licenses, network floating licenses and user friendly license release, restore, |

| Name | Device/Platform | Year | Description |
|---|---|---|---|
| | | | suspend and automated feature delivery. |
| Adobe Protected Streaming | Flash Video/Audio Streaming | 2006+ | The Media-Streams are encrypted "on the fly" by the Flash Media Server (the protocol used is rtmpe or rtmps). In addition the client player can be verified via "SWF-Verification", to make sure that only the official client can be used. |
| PlayReady | Computers, Mobile and Portable Devices | 2007+ | PlayReady is designed to encrypt WMA, WMV, AAC, AAC+, enhanced AAC+, and H.263 and H.264 codecs files. PlayReady is actually a new version of Windows Media DRM for Silverlight. Silverlight 2-based online content can be restricted using PlayReady and played back via the Silverlight plug-in. PlayReady is promoted by Microsoft |
| DRM-X | Computers, Audio/Video Streaming | 2007+ | A DRM system from Haihaisoft is designed to encrypt both audio/video, swf, and PDF documents. The viewer is based-on Haihaisoft Universal |

| Name | Device/Platform | Year | Description |
|---|---|---|---|
| | | | Player and PDF Reader. It restricts play count, expires date, and with Watermarks technology. |
| **Portable device DRM** | | | |
| Janus WMA DRM | All PlaysForSure Devices | 2004+ | Janus is the codename for a portable version of Windows Media DRM intended portable devices. |
| OMA DRM | Implemented in over 550 phone models. | 2004+ | A DRM system invented by the Open Mobile Alliance to control copying of cell phone ring tones. Also used to control access to media files, such as video. |
| **Storage media DRM** | | | |
| VHS Macrovision | Almost all VHS Video through the end of the 20th Century | 1984+ | When dubbing a Macrovision-encoded tape, a video stream which has passed through the recording VCR will become dark and then normal again periodically, degrading quality. The picture may also become unstable when darkest. |
| Content-scrambling system (CSS) | Some DVD Discs | 1996+ | CSS utilizes a weak, 40-bit stream cipher to actively encrypt DVD-Video. |
| DVD Region Code | Some DVD Discs | 1996+ | Many DVD-Video discs contain one or more region codes, marking those area[s] of the world in which playback |

| | | | is permitted. This restriction enforces artificial market segmentation. |
|---|---|---|---|
| ARccOS Protection | Some DVD Discs | 1997? | Adds corrupt data sectors to the DVD, preventing computer software implementing computer standards from successfully reading the media. DVD players execute the on-disk program which skips the (corrupt) ARccOS sectors. |
| OpenMG | ATRAC audio devices (e.g., MiniDisc players), Memory Stick based audio players, AnyMusic distribution service | 1999+ | A proprietary DRM system invented and promoted by Sony. |
| BD+ | Blu-ray Discs | 2005+ | A virtual machine embedded in authorized Blu-ray players that runs a security check on the playback environment to ensure that it has not been compromised. It also performs necessary descrambling of the audio/video stream on discs, allowing the content to be rendered. |
| **DRM Schemes no Longer in Use** | | | |
| Extended Copy Protection | Sony and BMG CDs | 2005 | Also known as the 'Sony Rootkit'. Although not classified as a virus by many anti-virus software producers, it bore many virus-like and trojan-like characteristics, rendering it illegal in some places and dangerous to infected computers in all. After it became publicly known, protests and litigation resulted in withdrawal by Sony. The US litigation was settled by payment by Sony. |
| **DRM Schemes Proposed** | | | |
| Marlin (DRM) | Marlin Developer Community (MDC) | | |

## Limitation

Bruce Schneider has written about the futility of digital copy prevention and says it's an impossible task. He says "What the entertainment industry is trying to do is to use technology to contradict that natural law. They want a practical way to make copying hard enough to save their existing business. But they are doomed to fail." He has also described trying to make digital files uncopyable as being like "trying to make water not wet".

Both the Association for Computing Machinery and the Institute of Electrical and Electronics Engineers have historically opposed DRM, even going so far as to name AACS as a technology "most likely to fail" in an issue of IEEE Spectrum.

## Solution and alternatives

In Europe, there are several ongoing dialog activities that are characterized by their consensus-building intention:

● Workshop on Digital Rights Management of the World Wide Web Consortium (W3C), January 2001.
● Participative preparation of the European Committee for Standardization/Information Society Standardization System (CEN/ISSS) DRM Report, 2003 (finished).
● DRM Workshops of Directorate-General for Information Society and Media (European Commission) (finished), and the work of the DRM working groups (finished), as well as the work of the High Level Group on DRM (ongoing).
● Consultation process of the European Commission, DG Internal Market, on the Communication COM (2004)261 by the European Commission on "Management of Copyright and Related Rights" (closed).
● The INDICARE project is an ongoing dialogue on consumer acceptability of DRM solutions in Europe. It is an open and neutral platform for exchange of facts and opinions, mainly based on articles by authors from science and practice.
● The AXMEDIS project is a European Commission Integrated Project of the FP6. The main goal of AXMEDIS is automating the content production, copy protection and distribution, reducing the related costs and supporting DRM at both B2B and B2C areas harmonizing them.
● The Gowers Review of Intellectual Property is the result of a commission by the British Government from Andrew Gowers, undertaken in December 2005 and published in 2006, with recommendations regarding copyright term, exceptions, orphaned works, and copyright enforcement.

## DRM-Free

Due to the strong opposition that exists to DRM, many companies and artists have begun advertising their products as "DRM-Free" Most notably, Apple began selling "DRM-Free" music through their iTunes store in April 2007. It was later revealed that the DRM-Free iTunes files were still embedded with each user's account information, a technique called Digital watermarking generally not regarded as DRM. In January 2009, iTunes began marketing all of their songs as "DRM-Free", however iTunes continues to use DRM on movies, TV shows, ringtones, and audio books.

## Conclusion:

Piracy is always tries to cover our creativity. So to protect this and flash out the creativity to all over the human being beside such type of defending wall, Digital rights management system is always require in the IT section for all the sector.

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