

Digital Rights Management in eBooks



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What is Digital Rights Management?

- DRM involves rights embedding, identification, and rights validation of digital content among digital publishing, distribution, and consumption.
- It protects digital content against illegal uses and piracy copies over the Internet in digital industry.
- A well-designed DRM system can assist the enforcement of DRM for digital content as well.
- DRM is one of the content access control mechanisms also functioning as a method to monetise the use of digital content.
- The management of secure exchange of digital content, or in more specific terms intellectual property, such as music, video or text and even medical or financial records across different digital channels.

Genesis to DRM is Piracy

- eBooks suffers greatly from piracy.
- This burden of piracy is passed on to *paying* consumer: inflated prices and restricted rights through the use DRM.
- So publishers tried to find a more active method of cutting piracy through DRM.
- DRM gives publishers more control over what users are able to do with eBooks.
- Current standard formats did not include the DRM, forcing the publishers to rely on proprietary eBook formats.
- None of the formats works on all devices and Oss..
- Publishers are forced to incur higher cost to publish in multiple format or risk losing potential customers.
- In addition, consumers often have to to read their eBooks on multiple eBook readers.
- Such a system is causing much confusion for consumers.
- OpenReader Consortium is working on a non-proprietary, well-developed, open-source standard that will work on all platforms.
- Single standard eBook format is not yet a reality.
- DRM itself seem to presents a problem with consumers.
- So what needs to be in place is a secure, but somewhat open system that would protect the publisher copyright and investment yet give consumers more rights to their purchased eBook to help drop the price of eBooks and to gather more consumers into the market.

DRM Goals

- The DRM systems must have goals in order to give a trusted platform for users.
- These goals should be advantageous to content providers, who have to trust the system and get assurances that they will be properly compensated if they release content into the market.
- DRM systems should also assure the authenticity of every content they provide the customers with. DRM will enable a robust digital content e-commerce by accomplishing the following goals:
 1. DRM should provide protection of digital content.
 2. DRM should enable secure distribution
 3. DRM should ensure content authenticity
 4. DRM should provide for transaction non-repudiation.
 5. DRM should support participant identification

Multiple DRM Perspectives

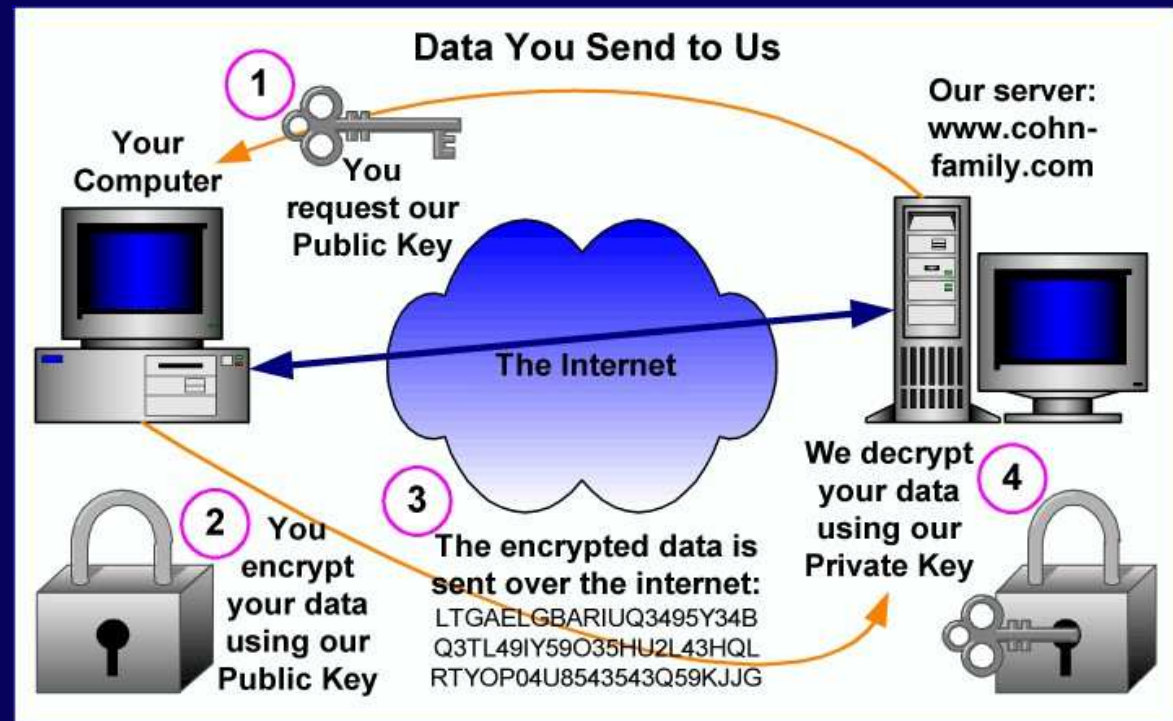
- Authors and publishers should not expect DRM technology, or DRM technical standards, to secure ebook content absolutely.
- To optimize protection, publishers should look at DRM from a perspective broader than just technology.
- **The Open eBook Forum**, a leading ebook standards organization, suggests three perspectives: technical, social and legal.
 1. **The technical perspective** involves rights specification language, electronic package controls and trust infrastructure.
 2. **The social perspective** involves expectations, mores and education.
 3. **The legal perspective** involves legislation, compliance, investigation and enforcement.

1. Technical DRM Perspective

- It includes hardware and software used to protect digital content.
- It involves a number of elements used in combination to secure content.
- Most are based on the mathematics of cryptography. These include:
- Encryption
- Public / private keys
 - Digital certificates
 - Watermarks
 - Access control
- Authentication
- Secure communications protocols
 - Secure content storage
 - Rights specification language
 - Trust infrastructure

Cryptography

- Practice and study of techniques for secure communication
- Protects from third parties secretly listening to private conversations (eavesdropper)
- Information is Encrypted and then Decrypted once securely transmitted



Purpose of Cryptography

- Securely transmit a message/data from one party to another
- Authentication
 - The receiver must identify themselves correctly in order to start receiving the message or data
- Privacy/Confidentiality
 - The original data is only ever seen by the sender or the receiver
- Integrity
 - Received Message = Sent Message
 - Capability to check who sent the data

Types of Cryptography

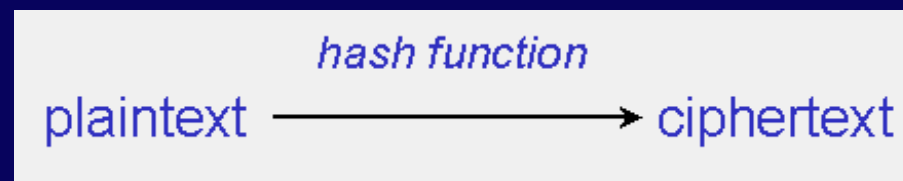
1. Secret Key (Symmetric) - single key for both encryption and decryption



2. Public Key (Asymmetric) - one key for encryption and another for decryption



3. Hash Function (One Way) - no key



Digital Rights Management (DRM)

- An access control technology using cryptography
- Allows copyright holders to limit
 - Expiration time of data
 - Number of devices data can be used on -
 - Usage access

DRM & Cryptography

- Simply a way of applying cryptography to media for usage rights and protection
- Works mainly using the **public key** cryptography technique discussed earlier
- The algorithms used for the encryption must be fast and responsive for the consumers

2. Legal DRM Perspective

- It is about managing “rights” refer to a legal aspects.
- The legal perspective includes:
 1. Legislation
 2. Compliance
 3. Investigation
 4. Enforcement
- One of the technologies promise from the legal perspective is digital watermarking.
 - Digital watermarks are invisible stream of digital bits buried in a document or image.
 - It contains identifying information such as the original publisher, or even the name or credit card number of the purchaser.
 - It may not be visible to humans, but can easily be read by special software.
 - Web crawlers can also scour the web to locate illegal content.

2. Legal DRM Perspective

- It enables the detection of illegal copies, enable compliance, investigation and enforcement of current legislation.
- DRM encryption and digital watermarking can't guarantee completely secure digital content.
- The best DRM can do is help keep honest people honest.
- What can be done to create more honest people?
 - Develop users TRUST on publishers
 - Support users /their requirements and WIN their confidence
 - Educate users about copyright and discourage piracy
 - By all means get the support of users to implement copyright

3. Social DRM Perspective

- It is technically possible for consumers to acquire high-quality copies of copyrighted works without compensating the **right of the copyright holders** which is legal.
- Downloading is not freeloading; many ebook consumers fail in distinction.
- Some don't understand that a distinction exists, and others choose to ignore it.

Solution:

- Publishers, trade organizations and technology companies should work together to educate consumers regarding the issues related to piracy.
- e.g. a joint effort of AAP and Microsoft Corporation
- Consumers who understand the risks associated with pirated electronic content are more likely to acquire content from legitimate sources.

Toward Success in the Ebook Market

- Publishers should consider DRM from the three perspectives outlined above.
- A balanced effort that incorporates technical, legal and social initiatives is most likely to optimize the protection DRM affords.
- Take lessons learned from software industry eg. software-locking scheme .

Strategy: software companies discourage piracy by providing superior support to legal users (for example, warranty support, problem resolution, access to specialists, copies of documentation, announcements of updates, etc.), and by aggressively enforcing copyright when transgressors are identified.

Result is: consumers realize more value from licensed software than unauthorized copies.

- DRM strategy, publishers should aim to supplement content with added value so that legitimately acquired ebooks remain more valuable to consumers than illegal copies.

Toward Success in the Ebook Market

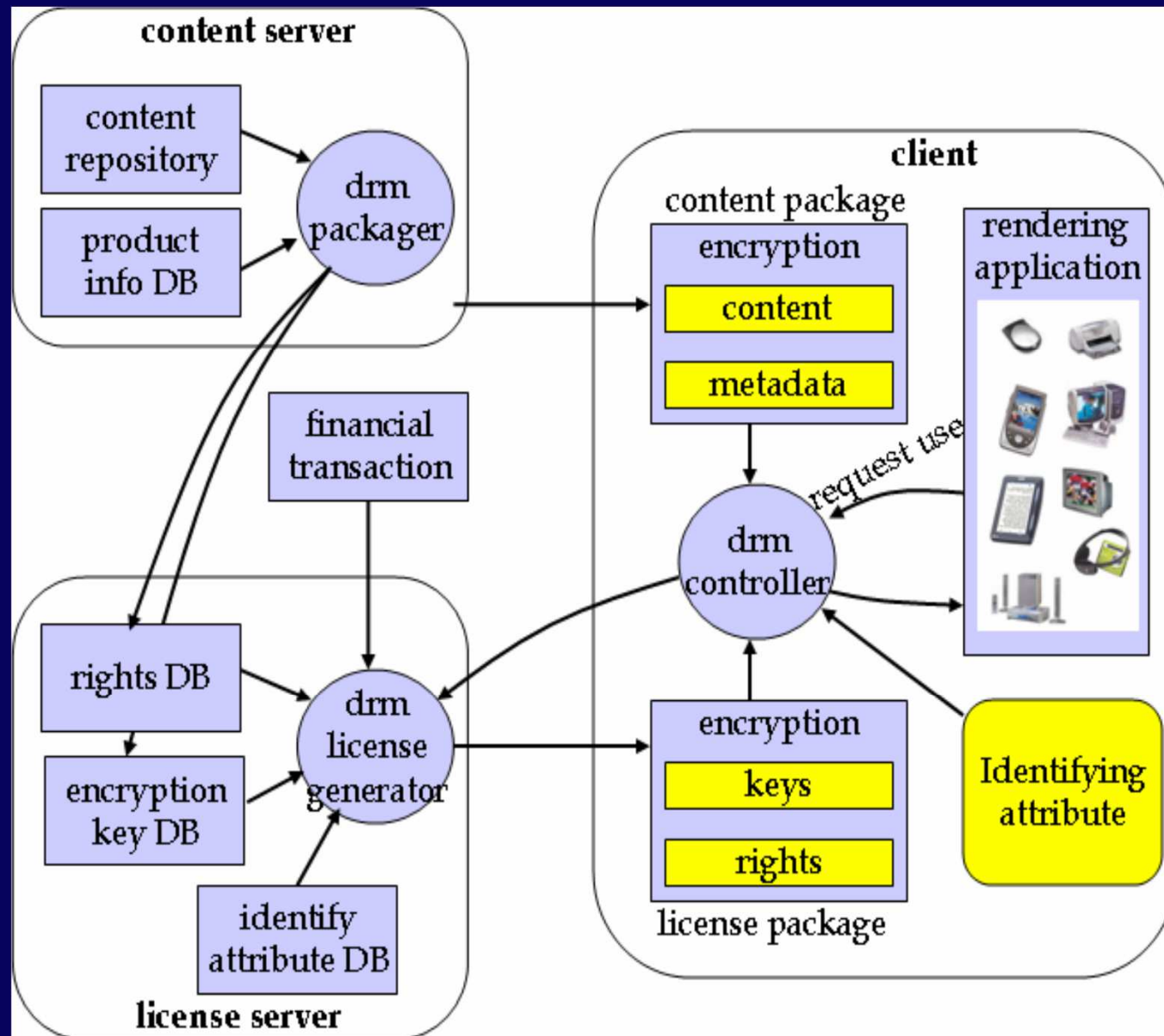
Some possibilities are:

- Offer consumers a subscription service that presents customized streams of ebook content based on educational or entertainment goals.
- Provide high-function virtual bookshelves offering everywhere content that automatically follows the consumer from office laptop PC to car-based audio device to home PC.
- Create interactive author/consumer online communities that involve readers in the creation of enriched content.
- Sponsor loyalty programs based on direct purchases and indirect sales
- Enrich basic ebook content with multimedia enhancements.
- Package reading devices with content to offer “turnkey” libraries tailored to consumers’ specific interest profiles.

A Representative DRM Application Architecture

- DRM architecture can be discussed at either a macro-scale or a micro-scale.
- **Macro scale DRM** enables **commerce** within the ebook market by supporting activities in each of the publishing phases.
- **Micro scale DRM** provides the **technical infrastructure** required for moving an electronic ebook package from the publisher to the consumer.

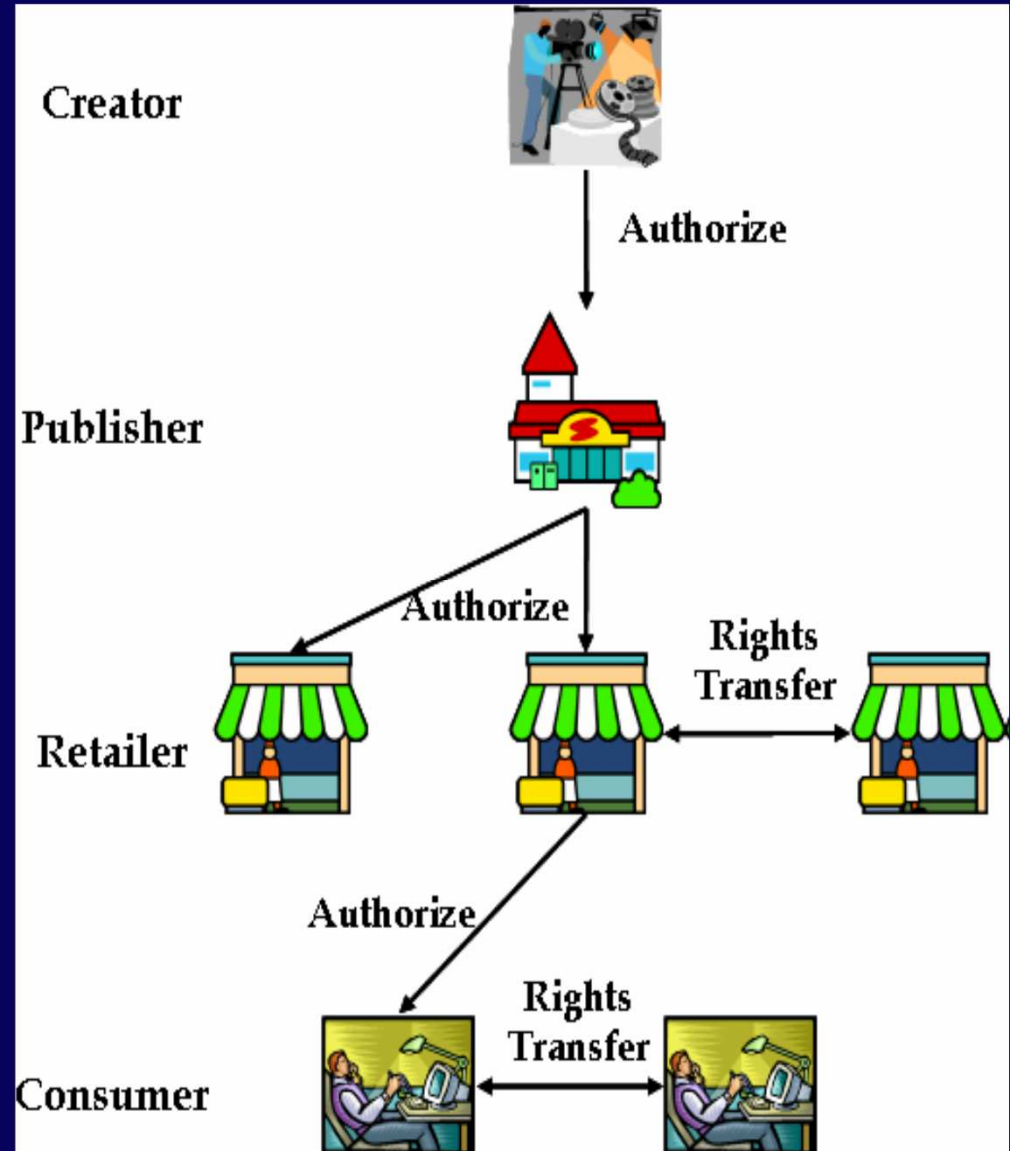
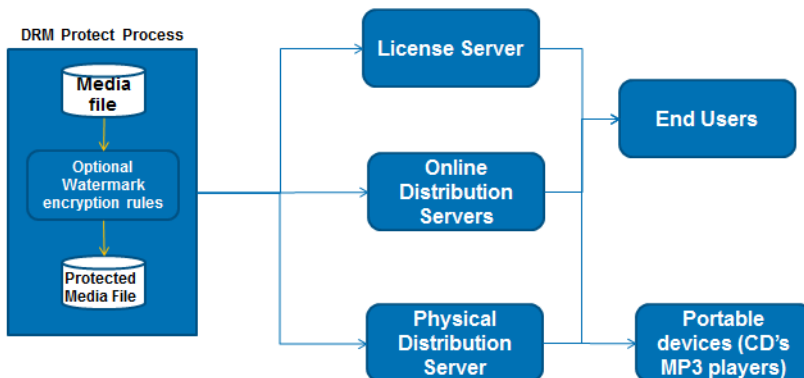
Architecture of Generic DRM System (Erickson, 2002)



Operational flow of Publishing ...

Operational flows of publishing, authorization and rights transfer of digital contents among different roles

DRM Process Flow



Macro-Scale View

- **DRM and the Ebook Market Model**
- To understand how DRM enables ebook publishing, it is helpful to look at DRM using a simplified model of the market.
- The **Ebook Market Model** is a simplified model, the very dynamic, complex workings of the real world.
- DRM operates across the ebook market model, consists of five process steps:
 1. **Create and publish,**
 2. **Market and distribute,**
 3. **Sell to consumer,**
 4. **Consume content, and**
 5. **Support consumer.**

1. Create & Publish

- This step consists of contracting, writing and editing content.
- DRM supports this step by:
- Providing a rights specification language that is used to express the terms of the contract between author and publisher.
- Providing encryption to keep digital content secure as it moves back and forth between author and publisher.
- In general most publishers will initiate DRM protection after the product is created.
- Under some business models, authors will set basic digital rights during the creation phases of development.
- Encryption technologies should be used:
- to protect sensitive content on author computers and publisher servers.
- to protect digital content while moving back and forth from the author to the publisher.

2. Market and Distribute

- This step consists of packaging, storing, translating and shipping ebook content.
- The activities associated with creating a marketing plan for the ebook are also included in this step.
- DRM supports this step by:
 - Providing a secure electronic package for the ebook content and related items.
 - Providing technical mechanisms for digitally signing the book as authentic.
 - Providing encryption technologies for keeping ebook packages secure before, during and after distribution.
 - Providing the ability to describe the unique aspects of the business model in the rights specification language.
- DRM is heavily involved during this step.
- Elements of the business model including pricing options, distribution options, marketing payments, etc., will be expressed in the DRM system.
- The DRM system must be able to support the business models that are contemplated

3. Sell to Consumer

- This step consists of selling, fulfilling and processing payments.
- There is no single model that prescribes where selling and fulfillment take place.
- DRM supports this step by:
- Specifying the **allowed terms** of sale through the rights specification language.
- Providing the technical mechanisms to **authenticate parties** to the transaction.
- Providing the technical mechanisms to **authorize** the transaction.
- Providing the technical mechanisms to **certify that a transaction** has been completed.
- Providing the technical interfaces to the financial clearing system.
- Providing the technical interfaces to the consumer information clearing system

4. Consume Content

- This step includes accessing, reading, storing and disposing of ebooks.
- DRM provides support for accessing the content, and for consumer support that can lead to additional sales.
- DRM supports this step by:
 - Providing a technical mechanism **for accessing** and processing keys to unlock the content.
 - Providing a **trusted environment** for accessing and using the content.
 - Providing technical **mechanisms** for printing, lending, giving, super distributing and otherwise disposing of ebooks.
 - Protecting the content while it is on the **consumer's reading device**.

5. Support Consumer

- This step consists of returning, replacing, and troubleshooting ebooks.
- DRM supports this step by:
 - Providing the **technical mechanisms** that support returning and replacing.
 - Providing a **technical environment** that is easy for publishers and other industry participants to support.
 - Creating opportunities for publishers and/or other ebook market participants to create virtual libraries, backup/restore, archival, etc.

DRM Interoperability Issues

What is Interoperability?

- Ability of a system or a product to work with other systems or products without special effort on the part of the customer. Interoperability is made possible by the implementation of standards.” — IEEE Standards Glossary (www.ieee.org)
- Interoperability is a major issue affecting ebook market growth.
- Insufficient DRM interoperability is inability to exchange information
- Non-interoperable ebook formats cause problems for consumers
- reading and using this ebook is tightly connected to this platform
 - transfer of ebooks from one ebook platform to another is not possible
 - buying books on different platforms and reading them using the same reader (application) is not possible
 - This hampers cultural diversity, a free choice between online booksellers for customers, and the opportunities for “bricks and mortar” bookstores
- To achieve interoperability, the technical DRM measures used by the retailers must also be interoperable.
- To reach true interoperability in the ebook market, interoperable ebook formats and interoperable DRM schemes are necessary.

Software-based DRM Schemes for Ebooks

1. Amazon DRM

- ebooks sold through Kindle Store can only be read using Kindle readers
- Kindle readers can display only Amazon books

2. Apple Fair Play

- ebooks sold through iBookStore can only be read using iBooks
- Reading app (eBooks) allows customers to import non-protected EPUB books
- Reading app (eBooks) allows customers to import non-protected EPUB books

3. Adobe Digital Experience Protection Technology (ADEPT)

- e.g. Barnes & Noble
- works with pdf and EPUB

4. Marlin DRM

- open DRM standard
- emphasizes the interoperability between various ecosystems
- not widely used

DRM Rights Expression Languages

The Open Digital Rights Language (ODRL) is a proposed language for the DRM community for the standardisation of expressing rights information over content.

- The ODRL is intended to provide flexible and interoperable mechanisms to support transparent and innovative use of digital resources in publishing, distributing and consuming of electronic publications, digital images, audio and movies, learning objects, computer software and other creations in digital form.

XrML – eXtensible Rights Markup Language

- XrML is developed based on research at the Xerox PARC, and is currently governed by ContentGuard. The eXtensible rights Markup Language provides a universal method for securely specifying and managing rights and conditions associated with all kinds of resource, including digital content as well as services.

ODRL Standards Group

- It an international initiative to define the open standard for expressing policy information over digital content residing on the Open Web Platform (OWP).
- ODRL was initially created in 2000 to address the growing needs of DRM sector
- Open Mobile Alliance DRM Enabler
- OMA started In 2001 as Mobile DRM initiative and the first version of the DRM enabler published in 2002.

DRM Systems

- Marlin DRM is an open-standard content protection system for consumer devices and services.
- It offers sophisticated rights management for content distributed over Mobile, Broadband, Broadcast, and all other popular channels.
- Intertrust, Panasonic, Philips, Samsung and Sony — jointly developed the Marlin DRM specifications in 2005.
- YouView (UK), Tivù (Italy) and the IPTV Forum (Japan) currently adopted Marlin.

Mechanisms to protect copyrighted material

- Types of mechanisms used by ebook publishers and distributors to protect copyrighted material:
 1. honor system
 2. closed ecosystem
 3. digital watermarking, and
 4. software-based protection using encryption.

Six Ways DRM Works for Publishers

1. Prevent Piracy
2. Proof of Reading
3. Keeping out Competition
4. Subscriptions and Member Benefits
5. Information Gathering
6. Limits Over-Sharing

Content owners DRM Requirements

- Content owners want to protect their legal rights, maximize their profits and protect their businesses.

What Consumer wants?

- Printing of the work in whole or part.
- Creating copies of the work.
- Reading of the same e-book on multiple devices and platforms including mobile devices
- Lending of content including library lending functionality
- Accessibility for blind and print disabled persons.
- Donating eBooks.
- Backup copies
- Highlighting text and making all types of annotations
- Exploring of text (e.g. for placing a passage of book into their class work/research paper.
- Importing text
- Ability of consumers to setup user-friendly personal libraries of digital content
- User control over size, location and orientation of graphics.
- Flexible font type, font size, interline spacing etc.

Impact of DRM on Adoption of EBooks in Academic Libraries

- DRM restricts the flexibility and accessibility of e-books and frustrates users.
- DRM restrictions impacting adoption rates in academic libraries.
- Research shows that students want to use ebooks which they can download and interact with the content.
- The lack of flexibility in academic e-books led to frustration in students.
- DRM restrictions play a major role in user perceptions of e-books.
- Tenopir's (2003) findings related that "both faculty and students use and like electronic resources and most readily adopt them if the sources are perceived as convenient, relevant, and time saving to their natural workflow."
- The restrictions imposed by DRM and proprietary delivery systems may be key factors in user adoption of e-books.

Opposition to DRM is growing...

- Macmillan & Tor/Forge dropping DRM because its customers, authors have been asking for DRM-free titles.
- Free Software Foundation campaigns against DRM and asking to donate \$25 to stop DRM from locking down the Web in 2014?
- "Mozilla has committed to not implement DRM in Firefox for WebM HTML5
- DRM in HTML5 is a victory for the open Web, not a defeat
- Law firm fires clerk for personal opposition to DRM Cory Doctorow
at 11:28 pm Tue, Jan 31, 2006.

What libraries should do about DRM?

- Libraries oppose uses of DRM that lock readers to specific ebook formats.
- Libraries and readers who lawfully acquire content should be able to read that content on any device.
- Libraries oppose DRM that is used to track specific individual reader behavior - what they read, when they read, and where they choose to read it.
- Libraries and readers need new technology that protects and expands access to ebooks and other digital content.
- Libraries and readers need consistent standards and formats that enable, rather than restrict, reading across devices and technology platforms.

eBook DRM Removal Tools

1. **Adobe EPUB DRM Removal 7.3.9**
 - Removes DRM from Adobe EPUB books, Remove drm from Adobe PDF books
2. **Epubsoft Ultimate DRM Removal 8.4.6**
 - Removes Kindle AZW, Adobe PDF, Adobe ePub, Nook ePub DRM with just 1 click.
3. **Kindle AZW DRM Removal 7.6.9**
 - The best Kindle AZW DRM Removal tool.
4. **eBook Any DRM Removal 1.0.10.7**
 - Remo Removes ve Nook,Kindle,Adobe DRM from EPUB,PDF,Mobi,AZW,PRC eBooks protected by DRM to read them on all readers.
5. **DRMBuster 4.2.7**
 - Convert DRM protected files to be played on portable devices....removes the digital restrictions management
6. **Epubsoft Adobe PDF ePub DRM Removal 7.6.3**
 - Removes PDF & ePub DRM protections from adobe digital editions.
7. **Epubor Kindle DRM Removal 3.0.10.4**
 - Removes or decrypt Kindle Mobi, Kindle AZW DRM protection from any Kindle books with no quality lost.
8. **Adobe PDF DRM Removal 7.2.9**
 - Removes DRM from Adobe PDF books.
9. **Adobe EPUB PDF DRM Removal 2.0.7.5**
 - Removes EPUB DRM, PDF DRM from eBooks protected by Adobe DRM.
10. **Lavasoft ARIES Rootkit Remover 1.0**
 - Removes the ARIES rootkit installed by Sony, BMG's DRM protection software.

Readers Bill of Rights

- **The Readers Bill of Rights currently makes the following demands for readers:**
 1. Ability to retain, archive and transfer purchased materials
 2. Ability to create a paper copy of the item in its entirety
 3. Digital Books should be in an open format (i.e. you could read on a computer, not just a book reader device)
 4. Choice of hardware to access books (i.e. in 3 years when your device has broken, you can still read your book on other hardware)
 5. Reader information will remain private (what, when and how we read will not be stored, sold or marketed)

DRM free eBook Publishers

1. **Baen Ebooks** sells DRM-free ebooks - science fiction and fantasy publishers, including Baen Books, Del Rey, and Tor. They also offer a number of no-cost downloads in their “Free Library”.
2. **BookCyclone** sells new releases, self-published books, and the works of the biggest-name authors. The classics, and other works in the public domain, are also easily available online.
3. **Carina Press** is a digital-first imprint from Harlequin covering many genres.
4. **Flat World Knowledge** is the world’s largest publisher of free and open college textbooks.
5. **Momentum Books** — Australian publisher
6. **O’Reilly** sells DRM-free computer and technical books in a variety of formats
7. **Packt Publishing** has DRM-free books for IT professionals.
8. **Polzer Media Group** is a small book publisher offering ebooks via KAGI and BEAM.
9. **The Pragmatic Bookshelf** has DRM-free books by and for programmers in a variety of formats.
10. **SIGNAL 8 PRESS** is a publishing company focusing on East Asia and the Pacific Rim -novels, short story collections, and nonfiction written in English.
11. **Springer Science+Business Media** is an international publisher of books on science, technology, and medicine.
12. **Tor/Forge** — Science fiction and fantasy publisher of Macmillan

Result is DRM Free e-books!

1. Project Gutenberg

- The first and largest single collection of free e-books

2. Projekt Runeberg

- Free electronic editions of classic Nordic (Scandinavian) literature.

3. Bookboon.com

- Free e-books with advertisements

4. Flat World Knowledge

- The world's largest publisher of free open access textbooks

5. Google Books

- Free e-books and more

Conclusions

- DRM in an academic environment should be an *enabler* not a *preventer*.
- The Producers, publishers, manufacturers and distributors are managing their IPRs through DRM on the property they continue to control, even after we have purchased it.
- DRM is effectively “Digital Restrictions Management” and is being used to manage us.
- There is a need to educate consumers about DRM, and also understand what consumers' concerns and expectations are with regard to the use of digital content.
- There is need for improving consumer friendliness and responsiveness of technical and business solutions involving DRM.
- Further experimentation and discussions are needed as to how the potential of consumer-responsive technical and business solutions can be realised best.
- DRM is a significant inconvenience to users. Because of the DRM, users will revert back to archiving via the paper medium; hence the whole “digital revolution” is defeated.
- The MIT Libraries have not purchased any technical papers or journals that are subject to DRM and opposed to access with DRM restrictions.
- DRM an unattractive option for the publisher.
- Libraries should make it a policy not to subscribe to any publication with DRM.

"It's a bad idea to build your business model on the idea that you can make bits of information hard to copy." --- Cory Doctorow

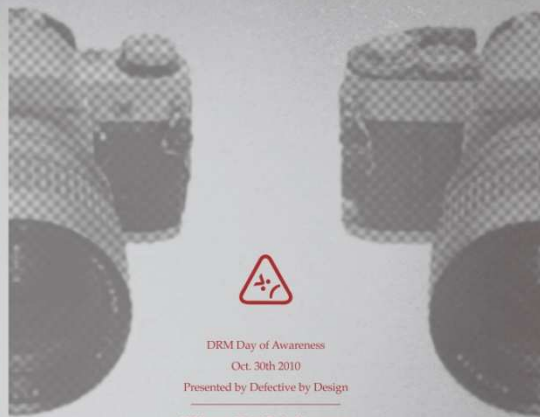
Thank you!!!

**Imagine There's No DRM... I Wonder if You
Can – IEEE Spectrumspectrum.ieee.org**



Opposition to DRM

**DO YOU
EVER FEEL
LIKE YOU
ARE BEING
WATCHED**



DRM Day of Awareness

Oct. 30th 2010

Presented by Defective by Design

DRM means Digital Rights Management access control technologies that can be used by hardware manufacturers, publishers, copyright holders and individuals to limit the usage of digital content and devices. Digital rights management is used by companies such as Sony, Amazon, Apple Inc., Microsoft, AOL, and the BBC.

PROTECT INTERNET FREEDOM

Tell Google, Apple, Microsoft, & Netflix
NO DIGITAL RESTRICTIONS FOR THE WEB

DEFECTIVE BY DESIGN .org

DR.M - LOCKED AWAY

**DRM IS
KILLING MUSIC**

LIFE - WITHOUT MUSIC

AND IT'S A RIP OFF!

**PLEDGE TO
TAKE ACTION**

**DAY AGAINST DRM
MAY 4th, 2012**

DEFECTIVE
BY DESIGN .org

Opposition to DRM

- Macmillan & Tor/Forge dropping DRM because its customers, authors have been asking for DRM-free titles.



Opposition to DRM

