Security(Copyright) Issues for Multimedia Content



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Multimedia Content

- **Digital technology**
  - Computer & Networks
- **Digital Multimedia**
  - Intangible
  - Duplicable without degradation
  - Transferable with cost zero and location free



Intel Core i7 4790 8GB 1TB DVDRW WiFi USB3 HDMI Windows 7 PC Desktop Computer

$674.99

Was: ~~$749.99~~

Buy It Now

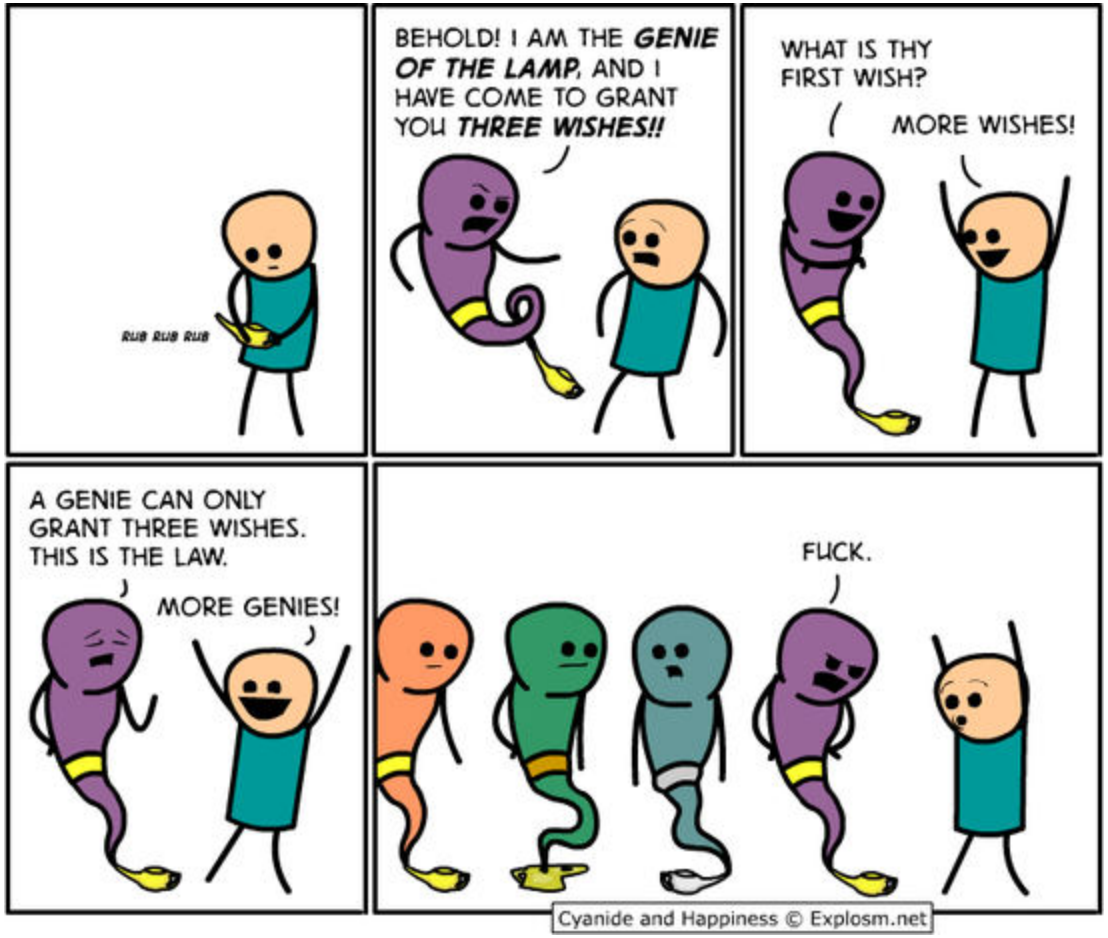
15 watching

10% off

From United States

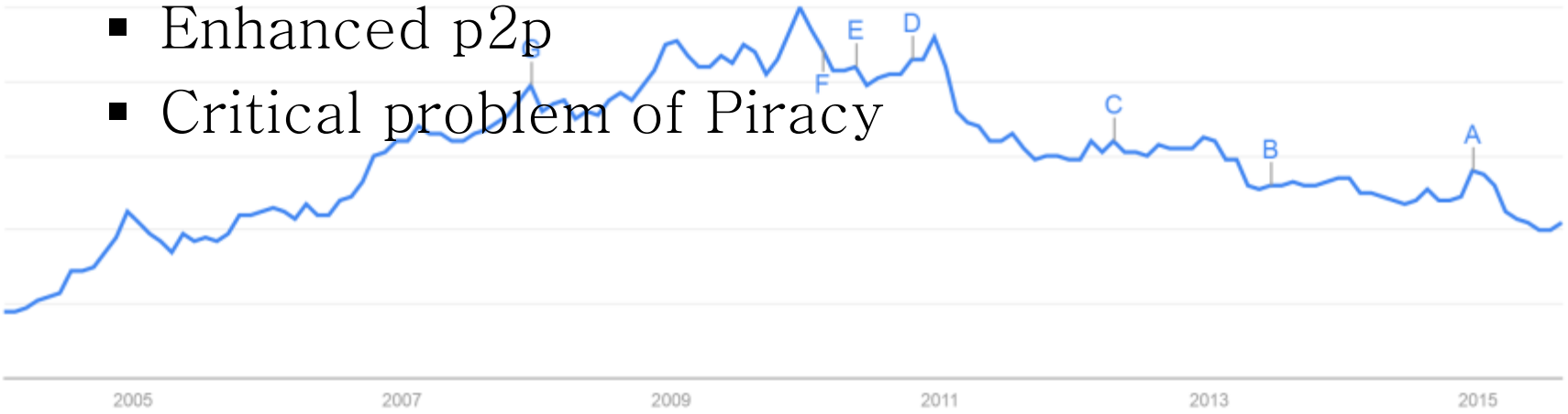
Customs services and international tracking provided

Duplication

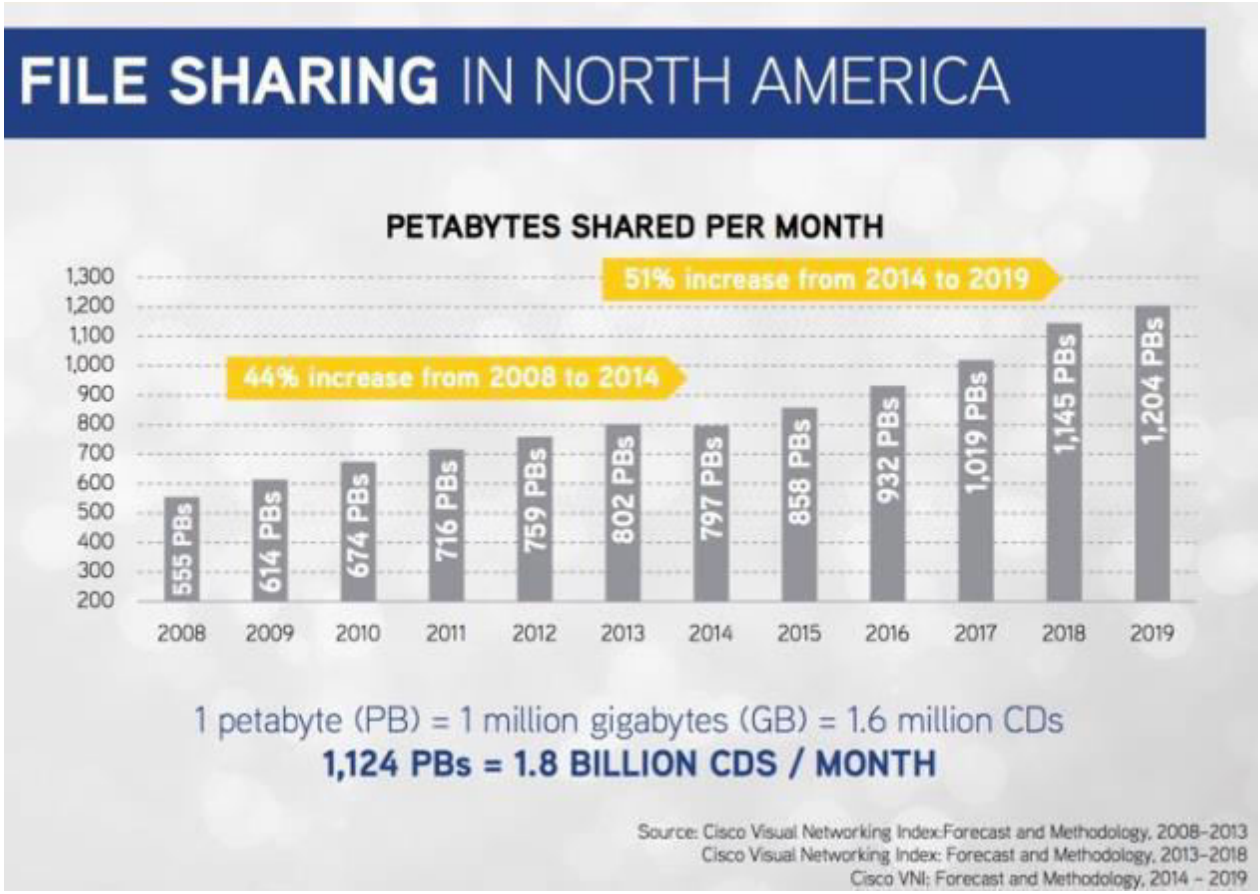


Piracy issues

- Napster
  - Established in 1999
  - Music file sharing via p2p
  - RIAA sued
- Bittorrent
  - Bram Cohen made in 2001
  - Enhanced p2p
  - Critical problem of Piracy



File sharing



http://www.digitalmusicnews.com/permalink/2015/07/16/if-you-think-piracy-is-decreasing-you-havent-looked-at-the-data-2

Copyright

- Rights for creative works
  - Bundle of rights
- automatically protects those works from the moment they are written down (or painted, or filmed – the technical term is “fixed in a tangible medium”)
- In most cases, copyright protection lasts for the life of the author plus 70 years after death.

Copyright vs. Patent

Copyright	Patent
Covers artistic, creative works	Covers useful articles
Automatically protects a work upon fixation	Must be applied for
Work does not have to be new to society	Work must be new to society
Lasts for the life of the author plus 70 years after death	Lasts for 20 years
Law assumes damages for infringment	Must prove damages from infringment

Figure 1: Characteristics of Copyright and Patent Protection

A Tragedy of Copyright in Korea



Copyleft

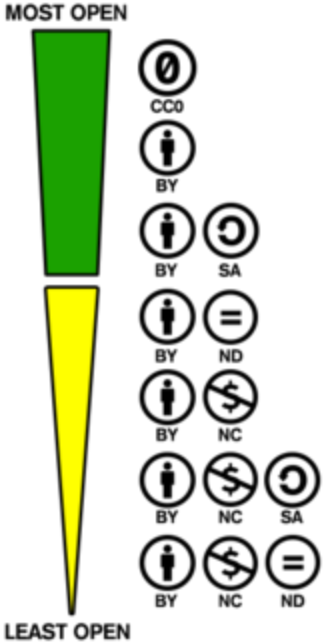
- The concept of copyleft was described in Richard Stallman's GNU Manifesto in 1985
- Solomon: Bible
  - There is nothing new under the sun - Ecclesiastes 1:9
- Bernard de Chartres
  - Standing on the shoulder of giant



- Isaac Newton
  - If I have seen further it is by standing on the shoulders of giants.

Compromising

- Creative Commons License – Lawrence Lessig



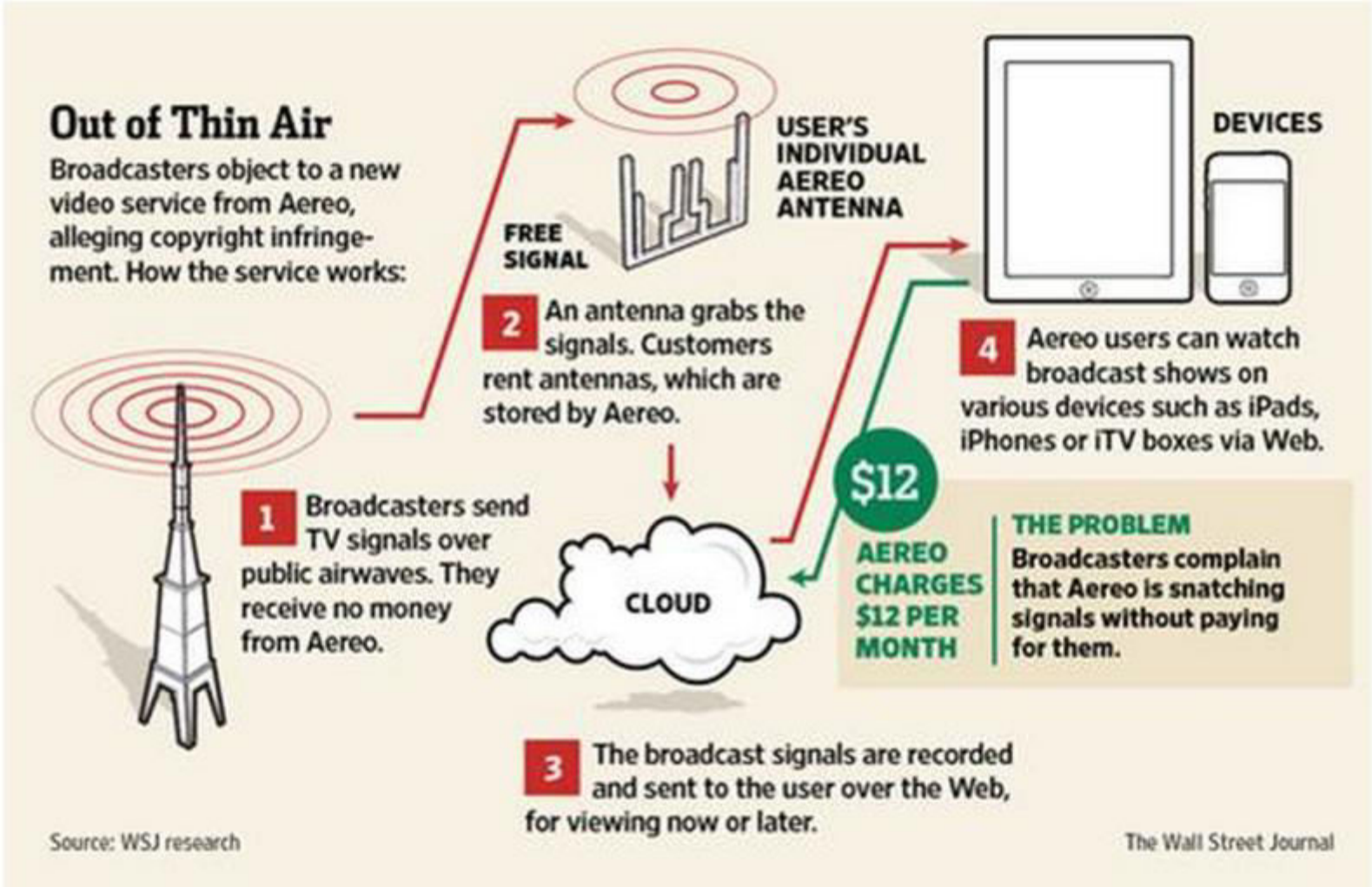
Icon	Description	Acronym	Free/Libre
	Attribution alone	BY	Yes
	Attribution + Noncommercial	BY-NC	No
	Attribution + ShareAlike	BY-SA	Yes
	Attribution + NoDerivatives	BY-ND	No
	Attribution + Noncommercial + ShareAlike	BY-NC-SA	No
	Attribution + Noncommercial + NoDerivatives	BY-NC-ND	No



New Technology – Aereo

- New Technology Platform Allows Consumers Access to Live TV Over the Internet – Feb. 14, 2012
- Aereo loses to broadcasters in Supreme Court fight for its life – June 25, 2014
- Aereo suspends the service at 11:30 EST today – June 28, 2014
- Aereo Files For Chapter 11 Bankruptcy – Nov. 21, 2014
- TiVo Receives Approval To Acquire Aereo Assets – March 13, 2015

Aereo Service



New Technology – Sling Box

- Your Slingbox connects to your home network (via WiFi or Ethernet) and sits between your cable or satellite services set-top box and your TV.
- The TV signal comes from your set-top box and your Slingbox slings it to any of your devices, anywhere in the world. You can even watch or control your DVR.
- You can even use a streamer to watch your TV on a second television.



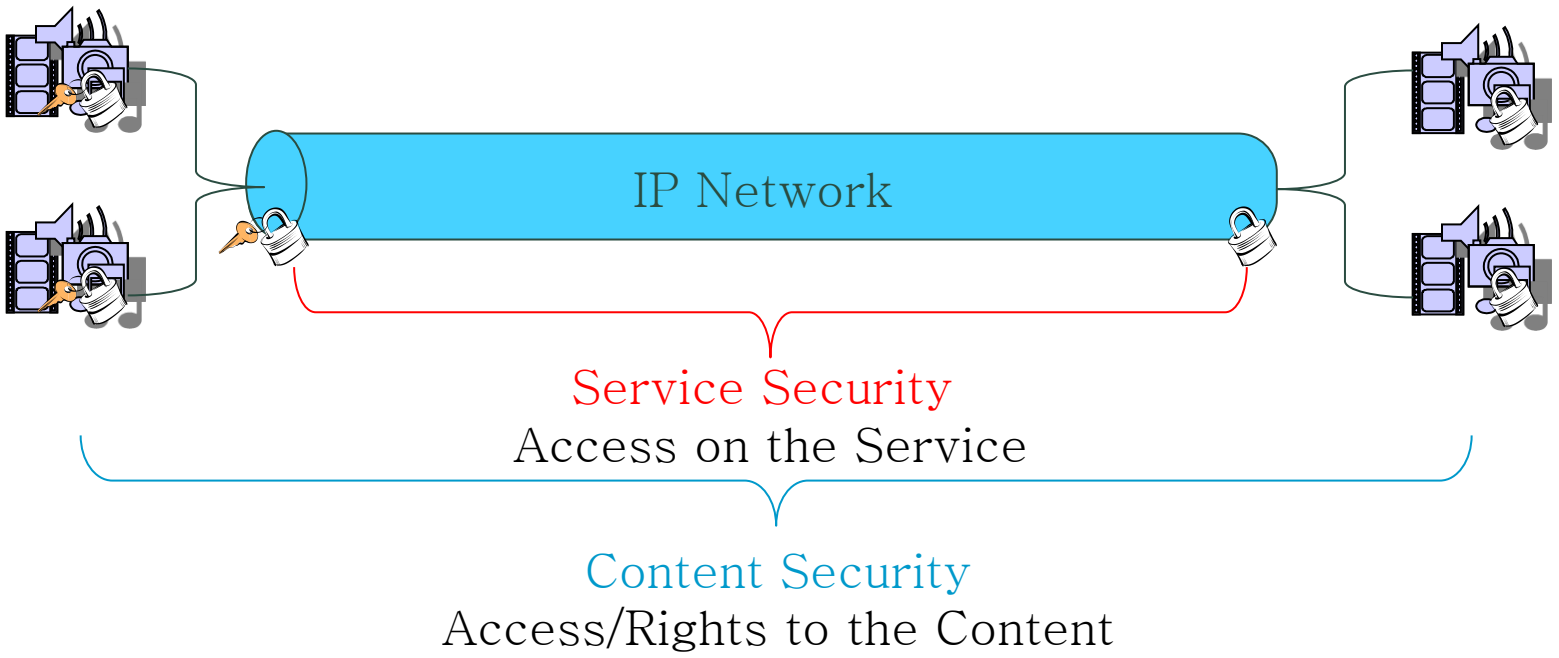
Global Cooperation

- TPP – Trans-Pacific Partnership
- America, Japan, Singapore, New Zealand, Vietnam, Canada, Mexico, Australia, Chile, Brunei, Peru, Malaysia
- Strengthen Copyright
  - Strong demand of USA

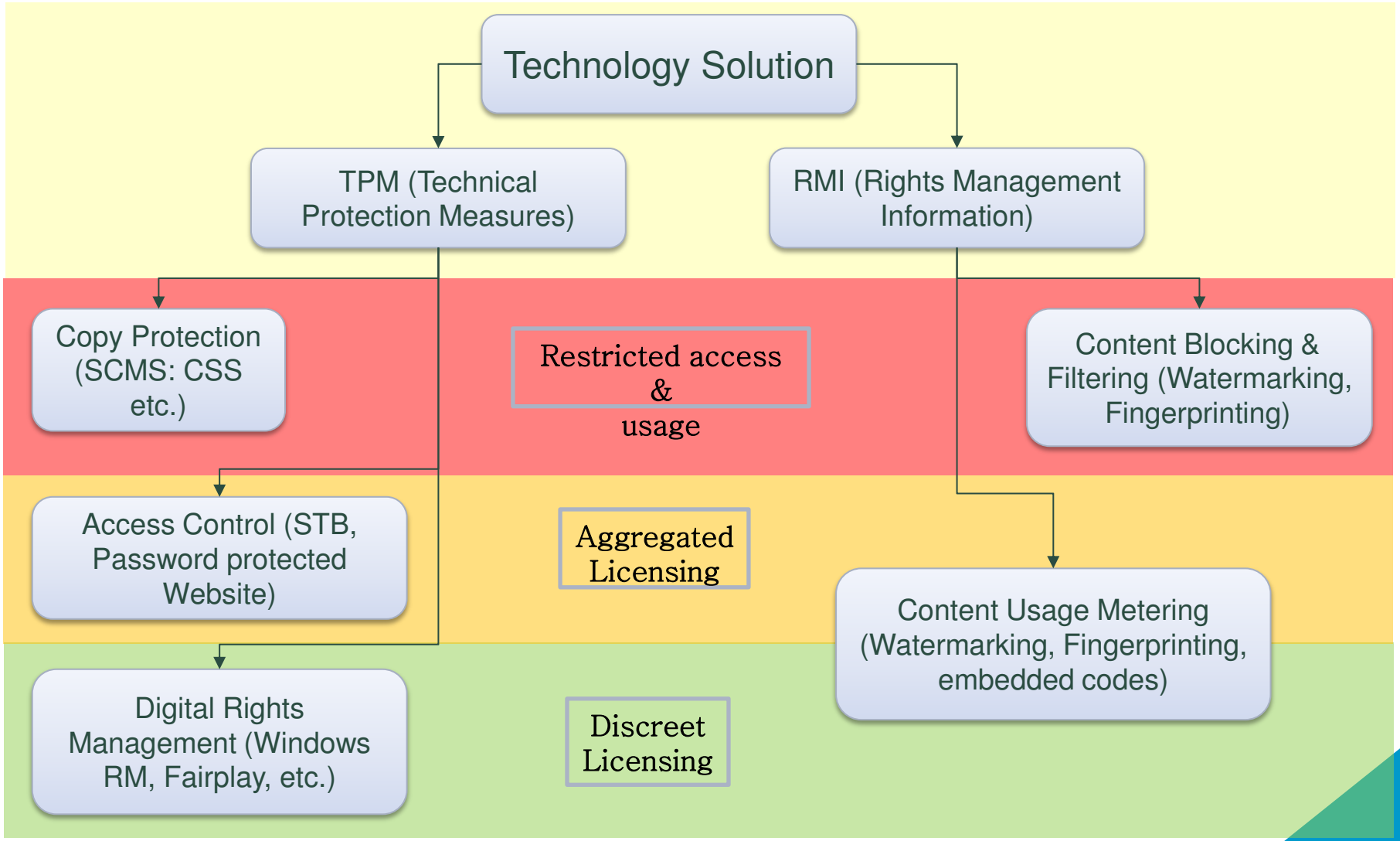
Technical Measure

❖ Service Security vs. Content Security

- FG-IPTV defined



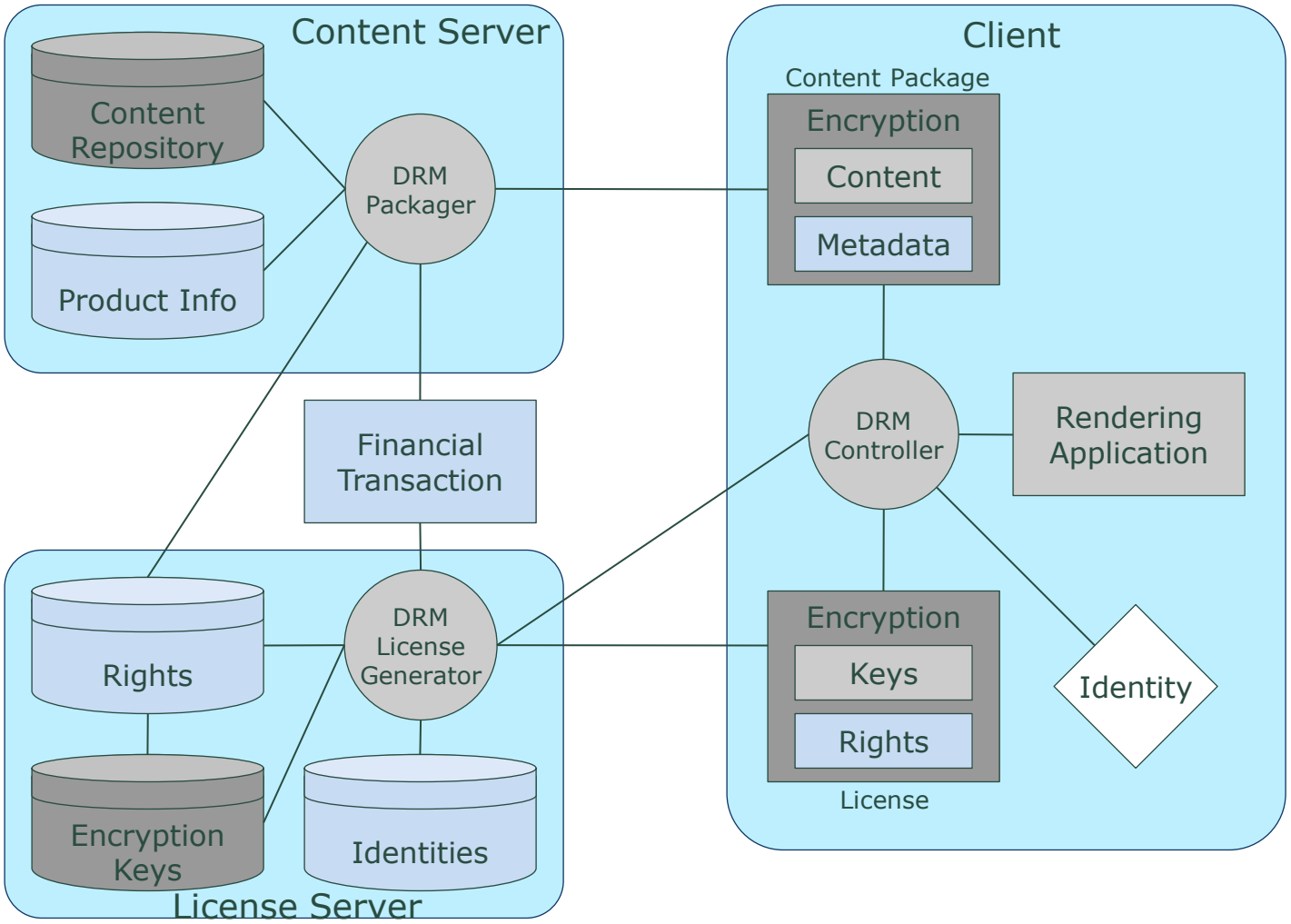
Category


Technology Solution
TPM (Technical Protection Measures)
RMI (Rights Management Information)
Copy Protection (SCMS: CSS etc.)
Restricted access & usage
Content Blocking & Filtering (Watermarking, Fingerprinting)
Access Control (STB, Password protected Website)
Aggregated Licensing
Content Usage Metering (Watermarking, Fingerprinting, embedded codes)
Digital Rights Management (Windows RM, Fairplay, etc.)
Discreet Licensing

Digital Rights Management

- Based on cryptography
- Rights control according to licenses
- Rights model
  - Permission
  - Constraints
- DRM free
  - Feb. 2007, Steve Jobs
  - Thoughts on Music

DRM Reference Architecture



Digital Watermarking

- Imperceptible mark into contents
- Information hiding
  - Copyright holders
  - Buyers
- Advantages
  - Imperceptible
  - Inseparable

Who is the rightsholder?





Lena in 1972

Digital Fingerprinting

- Features of multimedia content
  - Like a fingerprint or a DNA
- Content Identification by Google
- Grace note, Audible magic, etc.
- Illegal transmission control of Contents

Limitation of Technical Measures

- Professor Ed Felton at Princeton University said.
- The legal definition of fair use is, by computer scientists' standards, maddeningly vague. No enumeration of fair uses is provided. There is not even a precise algorithm for deciding whether a particular use is fair. Instead, the law says that judges should make case-by-case decisions based on four factors: the nature of the use; the nature of the original work; the portion of the original work used; and the effect of the use on the market. The law does not say exactly how these factors should be evaluated or even how the factors should be weighted against one another.
- To a computer scientist, such imprecision is a bug.

Technical Challenge for Copyright

- Awareness by Deep Learning and big data will be helpful to identify fair use case
- Nonlinear watermarking
  - embed the mark in the compressed domain and extract the mark in the uncompressed domain. Is it possible ?
- Self-destructive content – smart content
  - Destroy content by itself if there is illegal intended usage.

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THANK YOU !