

CS 523: Social, Economic, and Legal Aspects of Security

Intellectual Property

Copyright law

- Protects an author's work from being used by others without permission
- The owner of a copyrighted work has the exclusive right to
 - reproduce it
 - prepare derivative works based upon it
 - distribute copies by sale or transfer of ownership
 - perform and display it publicly, and authorize others to do so

Copyright law (cont'd)

- Protects original works of authorship
 - Some creativity is required, but the work does not have to be the first of its kind (it just has to be the independent product of the author, not copied)
- Does not protect against independent creation of similar works
- If a group creates a work, the copyright may be held jointly
- A contractor may hold the copyright in a work made for someone else
 - unless there is explicit agreement to the contrary

Copyright law (cont'd)

- Employer is the owner of a work created by an employee within the scope of employment
 - Example: University owns copyright to all course materials developed by a professor
- Include copyright notice (optional but advised)
 - © 1995 John Doe, all rights reserved
- Many benefits to registering the work with the Copyright Office
 - Must be done within 3 months of publication

Copyright infringement: Direct

- Direct infringement
 - Violates one of the exclusive rights of the owner
- Plaintiff must prove: (i) ownership; and (ii) defendant's copying
 - No need to prove defendant's intent to infringe (defendant cannot escape liability on the grounds of unconscious copying from an infringer)
 - It does not matter whether the defendant derived a direct profit from the infringing works

Copyright infringement: Contributory

- Contributory infringement
 - Defendant is not directly engaged in the infringing activity, but is held accountable for the actions of another who does infringe
- Defendant substantially contributes to another's infringing conduct
 - With knowledge of the infringing activity
- Greater penalties if defendant benefited

Infringement risk sources

- The persons creating your system may include unauthorized copies of other peoples' works
- The people operating and maintaining your system may add unauthorized copies
- Your subscribers may upload to your system infringing copies of works
- Infringing copies may be transmitted through your system

Minimizing infringement risk

- Ask contractors to warrant that no infringing works will be used in your new system
- Ask contractors to indemnify and hold harmless your system from any infringement claim or liability resulting from what they did
- Ask subscribers to agree with terms and conditions of service that prohibit the uploading of infringing works
- Ask subscribers to agree with terms and conditions of service that hold your online system harmless for acts or omissions that result from their actions
- Educate and train your system operators on what acts may result in liability under copyright law

Copyrights: Liability Limits

- DMCA law contains “safe harbor” provisions that limit the liability of certain organizations
- Some special condition must hold, e.g.,
 - “Mere conduit”
 - Caching
 - Hosting
- Examples
 - An ISP
 - A university

Fair use

- Privilege to use copyrighted material in a reasonable manner, without owner's consent
 - There are societal benefits in allowing this, e.g., for news reporters, teachers, researchers, critics
- Factors that determine whether fair use or not
 - Purpose & character of use (profit? Educational?)
 - Nature of the copyrighted work
 - Amount of portion used in relation to the whole
 - Effect of the use on the work's value or market

Trademarks

- Purpose: to identify source of product/service
 - Avoid confusion that would result from conflicting use of similar words or symbols
- Protected marks need to be distinctive
 - Distinctiveness can be achieved with words, symbols, slogans, designs, characters, packaging, sounds, smells, colors, product configurations
 - Highly distinctive marks are the easiest ones to register with the U.S. Patent and Trademark Office

Trademarks: Registration

- Benefits from federal registration include
 - Nationwide protection
 - Ability to use the federal registration symbol, ®
 - In civil infringement, ability to recover a defendant's profits, in addition to damages, costs, attorneys' fees
- As evidence of distinctiveness applicant can show substantially exclusive and continuous use in commerce for at least five years
- Applicant can alternatively register a mark based on intent to use it in commerce

Trademarks

- Registration is valuable but not essential
 - Owner can maintain an enforceable trademark simply by using it in commerce
- A trademark can be licensed by its owner to other parties
- Whether violation occurred is based on the likelihood of confusion
 - For a violation to occur, it is not necessary for the defendant to have bad faith or the intent to deceive

Trademark violation examples

- Hasbro v. Internet Entertainment Group
 - Over use of “candyland” and candyland.com
- Planned Parenthood lawsuit over the use of plannedparenthood.com
- Porsche lawsuit over the use of porsch.com, porsche.net, ...
- Better Business Bureau (BBB) lawsuit against person who acquired "bbb.org", "bbb.com"

Trademark violation examples (cont'd)

- PaineWebber lawsuit over the use of www.painewebber.com (note missing “.”)
 - Also asked for injunction against NSI
- Mattel lawsuit against Clue Computing Inc. over the use of clue.com
- Etoys lawsuit over the use of etoy.com
- Too many: [mcdonalds](http://mcdonalds.com), [mikerowesoft](http://mikerowesoft.com), ...etc
- But what if many contenders are legitimate ?
 - E.g., United Airlines, United Van Lines, United Health Care, ..., can all plausibly claim united.com

Why so many domain name battles?

- In early days, getting a name was “first come, first served, no questions asked”
 - Caused much legal trouble (including to NSI)
- Later: First come, first served, preference given to owner of a registered trademark
 - Required statement that no trademark would be infringed, promise to indemnify NSI if it got sued
- Contained loophole, had to be changed again
 - Loophole was that the registration could be “U.S. or foreign” (which obviously spells legal trouble)

Anti-cybersquatting law

- Cybersquatting = acquiring a domain name in bad faith
 - Intent to profit from someone else's trademark
 - Often the intent is to later sell it to the owner of the legitimate trademark
- Typo-squatting = acquiring a domain name that is not same but close (e.g., mis-spelled)
 - For ad revenue, malware/adware install, phishing

Patents

- Patent = Exclusive legal rights to invention
 - Granted to inventor or assignee
 - Granted by a specific country
 - Limited in time (expiration date)
 - Requires public disclosure of the invention
 - Solution to a specific technological problem (can be a product or a process) defined by claims
 - Solution must be novel, useful, and non-obvious
 - Can be difficult to enforce (even to detect)

Patents (cont'd)

- Defensive publication
 - Detailed public disclosure of invention for the purpose of preventing others from patenting it
 - Establishes “prior art”
 - Can be anonymous
- An alternative to patent: Trade secret
 - Invention is kept confidential (no time limit)
 - Use nondisclosure and employment agreements
 - Can be vulnerable to reverse engineering

Reverse-Engineering

- OK if for certain purposes (e.g., interoperability)
- Lexmark v.s. Static Control
 - Static Control had reverse-engineered Lexmark chips for the purpose of making and selling cartridges that are compatible with Lexmark printers
 - Court upheld the right of Static Control to make parts that interoperate with goods of another manufacturer
 - Static Control could afford the legal fight, an individual researcher (professor or grad student) typically cannot
- Anti-competitive practices are rife (not only in printers)
 - Cell phone batteries, automobile parts, ...

Reverse-Engineering (cont'd)

- HP OfficeJet episode
 - On 9/13/2016, a firmware update from HP deliberately caused all HP OfficeJet printers to reject non-HP ink cartridges
 - On 9/12/2016 a customer had a working printer, one day later it no longer worked
 - The non-HP ink cartridge makers will (try to) produce cartridges that work with the new firmware
- Some auto manufacturers now claim to own parts of a vehicle you bought and fully paid for

Clean room design technique

- X reverse-engineer a product to be copied, writes a specification for it
- Lawyer reviews that specification, to make sure it doesn't contain copyrighted material
- A team with no connection to X implements the specification (i.e., re-invents the product)
- What if product contains patented technology?
 - independent invention is no defense against patent

Clean room design technique (cont'd)

- It is often possible to find implementations that make no use of patented technologies yet achieve the desired functionality/performance
- Clean room design helped manufacturers of inexpensive clones survive legal challenges
 - PC clones
 - Apple II ROM clone
 - NEC v. Intel lawsuit (microcode similarities, that were deemed unavoidable hence free of a creative element)

DMCA and Reverse Engineering

- Section 1201 of DMCA forbids “circumvention of copyright protection systems”
 - Provides both criminal and civil penalties
 - Not just for music and movies: Applies to software and hardware (even multi-purpose, as long as a purpose pertains to copyright protection)
- Has been used to prevent reverse engineering
 - Even when done by responsible researchers whose purpose is to analyze the security of deployed systems, inform their manufacturers of the flaws discovered, and help them fix those flaws

DMCA & Reverse Engineering (cont'd)

- When honest, responsible researcher informs manufacturer of discovered flaws, the typical reaction is a threat of a lawsuit under DMCA
 - Manufacturer's do not want their products' internals investigated, use DMCA to prevent it
- Manufacturers' motivations include:
 - Embarrassment caused by disclosure of the flaws
 - The costs they'd have to incur to fix the flaws
 - The "flaws" might be deliberate (and illegal)

DMCA Lawsuits

- Such lawsuits work against honest researchers
 - They cannot afford the legal costs of fighting them
- But criminals don't care about DMCA lawsuits
 - They quietly exploit the flaws they discover (and they too don't want anyone else finding the flaws)
 - Many criminals, highly motivated: They find flaws
- Result: Many flaws in systems remain unfixed
 - Known to criminals, but not to the public

DMCA's (Un)intended Consequences

- DMCA prevented access to the VW emissions-cheating software
 - The software caused vehicles to “pass” emissions tests even though they’d fail in normal use conditions
 - Access to the software would have revealed the code fragments responsible for the cheating
- Researchers routinely refrain from disclosing serious vulnerabilities they find
 - For fear of being jailed under DMCA
 - Foreigners who do disclose, avoid travel to the U.S.

DMCA and the U.S. Constitution

- It is in the public interest to allow honest researchers to find, responsibly disclosure, discuss, and help fix flaws in deployed systems
 - To prevents this threatens U.S. national security
- Such discussions are legitimate free speech
 - Protected by the U.S. Constitution
- First Amendment to the U.S. Constitution
 - “prohibits the making of any law ... abridging the freedom of speech, infringing on the freedom of the press, ...”

More Examples of DMCA Lawsuits

- Viacom v. *YouTube and Google
 - Filed 2007 sought \$1B in damages
 - 2010: Judgement in favor of YouTube (“mere conduit” defense), Viacom appealed
 - 2012: The 2010 judgement is vacated
 - 2013: The 2010 judgement is reaffirmed
- *Lenz v. Universal Music Corp
 - Lenz had posted home-made video on YouTube whose removal was forced by Universal under DMCA