

Peer-to-Peer Commercial Content Distribution

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Abstract:

There has been much hand ringing by media conglomerates about how the Internet will kill creativity unless they are able to impose draconian usage restrictions in a vain attempt to control piracy. While unauthorized copying is a fact of life, the proposed controls are unworkable and represent a significant diminution of the traditional notion of fair use.

The Internet represents the most drastic change in communication since invention of the printing press. Rather than trying to thwart this incredible opportunity, enterprising businesses ought to embrace it. Disruptive technology creates new opportunities even while threatening the status quo.

This paper presents a proposal to utilize, rather than stifle, the power of peer-to-peer file sharing to distribute electronic books, music, and movies while creating incentives to encourage customers to play by the rules, resulting in greater economic rewards for creators and dramatically lower prices for customers.

Content Owners in a Panic

The music and movie industries are in a panic due to unauthorized content sharing on the Internet. They seek technical and legal remedies to restrict how information is used. Book publishers are at risk from the same technology. So far, e-books do not have the same allure as downloading music and videos.

From a technical perspective restrictive controls are unlikely to be successful since a single compromise makes the work available to everyone: **Crack-Once-Share-Everywhere**. Proposed anti-piracy controls limit customer use of electronic works, decreasing convenience, and almost guaranteeing patrons be drawn to unauthorized distribution. This presents the same specter as 1930s Prohibition and current anti drug campaign. If demand exists and products are not available legally, a criminal underground will rise to service demand. There is no reason to believe electronic entertainment will be any different.

Short History Lesson

Until about 100 years ago performing artists interacted directly with patrons in the form of live performance. Middlemen played only a minor role. With the advent of recording, the function of middlemen expanded, and artists no longer required direct contact with patrons. Middlemen owned the recording and film studios, manufacturing facilities, and in some cases, even the means of performance. During this time middlemen delivered a valuable service by connecting performer to patron. They allowed artists to concentrate on creative endeavors and relieved them from the burden of distribution and manufacturing. Over time, middlemen rose to a dominant position controlling all aspects of artistic creation. Today, artists are little more than workers for hire.

Technological change always threatens the status quo. Book publishers balked at the emergence of libraries that allowed people to read books without paying for them. The availability of cheap books encouraged more people to read, thus expanding the market for books. Distribution is not a zero-sum game.

Similar attempts to restrict technology occurred with the introduction of the player piano, radio, cassette, DAT, VCR, Digital TV, and now the Internet. Time and time again, incumbents panic and attempt to suppress new technology. Below is the infamous, and now rather embarrassing, quote by Jack Valenti, MPAA president, when he testified before Congress in April 1982:

"I say to you that the VCR is to the American film producer and the American public as the Boston strangler is to the woman home alone."

The technology he wanted to ban now represents the majority of film industry revenue. Incumbents always attempt to thwart challenges to established practice, being comfortable with the status quo, and fearing change.

From Robert Heinlein's *Life-Line*:

"There has grown up in the minds of certain groups in this country the notion that because a man or corporation has made a profit out of the public for a number of years, the government and the courts are charged with the duty of guaranteeing such profit in the future, even in the face of changing circumstances and contrary to public interest. This strange doctrine is not supported by statute or common law. Neither individuals nor corporations have any right to come into court and ask that the clock of history be stopped, or turned back."

Incumbents wield incredible power with a reach that extends to government. Their concerns and fears receive a receptive ear in the halls of power. Unless alternatives exploiting new technology are demonstrated, incumbents will likely prevail, gaining legal sanctions enshrining their business model in perpetuity.

21st Century Information Distribution

For the first time in human history, ordinary people publish what they want, when they want, without seeking cooperation or permission from others. Setting up a web site is child's play, making one's work available to anyone with Internet access. The cost of publishing is now within the means of just about anyone in the industrialized world. Not only are authors and artists able to connect directly to patrons, but patrons interact directly with them. Middlemen are no longer in control.

Once a work is in digital form it can be endlessly duplicated. Copies are indistinguishable from originals. Data compression and broadband networks reduce the time it takes to exchange material. This trend will continue until access becomes virtually instantaneous. The promise of the Internet: anyone, anything, anywhere, anytime!

The peer-to-peer nature of the Internet makes it virtually impossible to control how works are distributed. Authentication and encryption schemes being proposed for mass-market content distribution are easily circumvented and, once broken, the work is available without restriction. Antipiracy mechanisms make these works less convenient to use creating an incentive to utilize non-crippled unofficial versions.

Digital distribution has almost no incremental cost. Bandwidth is a perishable commodity. If not utilized it cannot be saved and used later. The same thing happens with CPU cycles and storage - one either has enough and incremental use is free, or one needs to acquire another chunk of resource.

One needs to ask if maintaining the old scarcity-based distribution model best serves the needs of the 21st Century? Shouldn't improvements in technology allow us to create a better distribution system other than the one used for the past hundred years? Should a few powerful corporations have virtual monopoly control over artistic expression?

Criteria for Internet Distribution

1. Media consolidation is a fact of life. Mature markets tend to be "winner takes all." The Internet is a bright spot on the otherwise rather desolate media horizon. The Internet has the potential to act as a vehicle for nondiscriminatory peer-to-peer information exchange, allowing new or fringe voices to be heard, thus bypassing traditional gatekeepers.
2. Conventional wisdom says high-speed Internet service drives economic expansion. The broadband industry remains caught in a typical chicken and egg conundrum. Broadband service, already perceived as too expensive, causes customers to avoid faster service, or worse, remain on dialup. Low demand inhibits investment in faster service and market expansion.

Real time MP3 music requires a 150 kbps connection. The slowest broadband service available today downloads MP3 in real time. NTSC TV requires 10 times the speed, or about 1.5 Mbps, and High Definition TV (HDTV) ten times more, 20 Mbps. The need for speed severely taxes current broadband offerings.

Availability of online line entertainment will drive demand for faster Internet service creating more business opportunities.

3. Electronic distribution reduces inventory cost almost to zero. Old works no longer need purging from inventory. This helps artists and society by keeping works available virtually forever.
4. Media conglomerates believe it impossible to compete with free distribution. Restaurants compete with soup kitchens; bottle water industry competes with “free” tap water. Massive libraries, convenience and low cost, coupled with better treatment of artists, ought to compete handily with unauthorized free alternatives.
5. Distribution cost depends on peak computer and network demand making these resources perishable commodities - if not consumed they cannot be saved and used later. Peer-to-peer distribution spreads demand over a large population reducing peak load.

For example: when a new work is introduced, each purchaser distributes the work to two others, and each work takes about an hour to transfer. In 24 hours, 64 million copies of the work exist even though no user had to upload more than two copies. Six hours later a copy exists for every human being on the planet. In little over a day, a peer-to-peer network delivers an artistic creation to everyone on the planet at an average “cost” of one download and one upload per person.

Involving customers in distribution pays huge dividends by relieving content owners of the burden of large server farms and high-speed communication facilities. This graphically demonstrates the revolutionary power of the Internet when used creatively.

6. Given the impossibility of perfect technical and legal control of artistic work, the system must provide incentives so most people play by the rules. Actively involving customers in distribution and rewarding them for doing so minimizes unauthorized behavior. Having an economic stake in the system creates a disincentive to act unilaterally.

Upload royalty must be high enough to create incentives and low enough to keep prices down. Assuming a 20% customer honorarium per upload, 10% fee to retailers and 5% fee for electronic funds transfer, copyright owner receives 65% of retail price.

The creative portion of music of a CD (artist, producer, songwriter) is about 10% of retail price; the other 90% is overhead. Assuming creative talent receives \$1.50 for a \$15 CD containing 14 songs, peer-to-peer distribution generates the same return if each song sells for \$.17 (17 cents) rather than \$1.07. Either way, creative talent receives \$.11 (11 cents) per song. Elementary economics says reducing price 85% dramatically increase sales, resulting in greater artistic compensation. Similar price reductions are possible for movies and books.

On average each customer participates in one upload per purchase reducing price by 20%. However, early purchasers participate in more uploads than late purchasers, thus creating incentive to purchase early.

7. Cooperative peer-to-peer distribution drastically reduces barriers to entry. This opens the market to new and fringe voices not heard today
8. Most residential Internet access is asymmetric: upload speed is significantly slower than download. This impacts peer-to-peer schemes because transfer speed becomes gated by low upload capability. The solution spreads upload among multiple participants so aggregate speed becomes about the same as the buyers' download capability. As an example, a purchase split among 10 upload servers, each supplying 1/10 of the work and receiving 1/10 honorarium, transfers 10 times faster than downloading from a single server.
9. There must be a mechanism to determine if works on the participant's server have been legally purchased. Only these works are eligible for participation in commercial distribution. Each purchased work includes a Digital Certificate, signed by both copyright holder (or agent) and purchaser, identifying the work as legally purchased. Presence or absence of the certificate has no effect on private use, only participation in commercial distribution.

This sidesteps the huge problem of managing encryption keys among multiple systems, preventing data leaks, and recovering from key loss. In the event of key loss the customer retains full use of material but loses the ability to participate in commercial distribution. If needed, a recovery process notifies content owners of key loss that allows customer certificate regeneration by using a new key, a process similar to recovering from credit card loss.

Cryptographically it is relatively easy to prove ownership but impossible to prevent all unauthorized use.

10. Declining storage costs allows individuals to amass gigabyte or terabyte libraries.

Proposal

This proposal turns the current distribution model on its head. Rather than a centralized and concentrated business function linking artists to patrons, the new distribution model enables patrons to play a critical role in the distribution process.

Electronic distribution has four components: artistic creation, distribution, sales/marketing, and payment. Creation is outside the scope of this proposal other than assuming availability of artistic works in electronic form. Using the peer-to-peer system books, music, movies, photographs or software become available electronically.

Each customer acts as a data warehouse storing works and making them available to others. “New” customers obtain their copy from an “existing” customer. When a “new” customer purchases a work, funds transfer from “new” customer to e-retailer. The e-retailer pays a royalty to copyright holder and compensates the “existing” customer for participating in transfer.

Multiple e-retailers performing as brokers connect buyers to sellers. They provide storefront facilities allowing customers to browse available works and backend processes to supervise copying material from “existing” to “new” customers. E-retailers vie for the ability to link artist to patron. Artists freely strike deals with any e-retailer they desire, breaking the strangle hold of existing distribution.

The transaction looks something like this: “New” customer goes to Friendly Web Music store, browses selections, and places selections in shopping cart. Cart is totaled and funds electronically transfer to e-retailer. E-retailer determines optimum download source for each item and creates tokens authorizing “New” customer to download from “Existing” customer. “New” customer goes to designated server and downloads the work. A Digital Certificate verifies authenticity of the work. The “New” customer and copyright holder mutually sign another Digital Certificate indicating lawfully acquisition and place the Certificate on the “New” customer’s server. Certificate creation provides notification to copyright holder of royalty due from E-retailer. E-retailer transfers royalty amount to copyright holder and calculates honorarium due “Existing” customer for participating in transfer.

Potential Problems

1. Digital Certificates become proof of purchase. Unauthorized transactions may occur but lack of authentic certificate makes large-scale fraud easy to detect.
2. A significant proportion of people interested in a particular artist or author must willingly play by the rules, thereby reducing size of bootleg market.
3. Participants need reasonable network speed. Customers will not tolerate slow or unreliable downloads. The server selection process must match upload

speed to “New” customer download speed. Upload and download speed throttles prevent overloading network connection.

4. System must automatically recover from crashed or disconnected servers, corrupt files, and communication faults. Except for lengthened download time these problems are hidden from customers.
5. System is mindful of ISP transfer cap. Exceeding transfer cap may cost “Existing” customer more than honorarium compensation.
6. Residential Internet access is not an “always-on” service and often uses dynamic IP addressing. Participating servers need to register availability.
7. There is nothing stopping someone from bypassing the system and making works available for free. Low price and incentives to play by the rules constitute keys to success.
8. This proposal represents a dramatic change from the current situation, shifting power to artists and retailers. Convincing incumbents to make existing libraries available presents a challenge.

Conclusion

Peer-to-peer distribution represents a bright alternative to draconian restriction of fair use being proposed by media giants. People willingly to pay for convenience and service. A winning combination consists of on demand access to an extensive library at a reasonable price, fair treatment of artists, and rewarding customers for active participation.

Time for a new distribution model!