

Unclogging the Legitimate P2P.

Abstract:

Peer-to-peer systems have recently gained a lot of attention in social, academic, and commercial communities. Peer-to-peer systems have become synonymous with file-sharing as systems like Napster, Gnutella, Kazaa and BitTorrent have enjoyed explosive popularity over the last few years. The awareness of P2P networking grew from the illicit 'sharing' of music files, much to the chagrin of content holders.

It has been long believed that the sole purpose of P2P is to facilitate users in indulging in non legitimate content piracy. P2P service providers have had to deal with numerous law suits with accusations of Copyright Infringement against them. In this paper We take the position that P2P has more on offer than just an easy way of 'pirating' digital content on the Web. We provide an argument that despite the prevailing perceptions of P2P as synonymous with content piracy, P2P is emerging as viable means of distributing legitimate content.

1. Introduction:

A peer-to-peer (P2P) distributed system is one in which participants rely on one another for service, rather than solely relying on dedicated and often centralized infrastructure. Instead of strictly decomposing the system into clients (which consume services) and servers (which provide them), peers in the system can elect to provide services as well as consume them. The membership of a P2P system is relatively unpredictable: service is provided by the peers that happen to be participating at any given time. In some cases, peer-to-peer communications is implemented by giving each communication node both server and client capabilities. In recent usage, peer-to-peer has come to describe applications in which users can use the Internet to exchange files with each other directly or through a mediating server. One of the early driving forces behind the peer-to-peer

concept is that there are many PCs in homes and offices that lie idle for large chunks of time. Why not leverage these idle resources to do something useful, like share computation or share content?

Peer-to-peer systems, beginning with Napster, Gnutella, and several other related systems, became immensely popular in the past few years, primarily because they offered a way for people to get music without paying for it. However, under the hood, these systems represent a paradigm shift from the usual web client/server model, where there are no "servers;" every system acts as a peer, and by virtue of the huge number of peers, objects can be widely replicated, providing the opportunity for high availability and scalability, despite the lack of centralized infrastructure.

Peer-to-Peer offers an easy hassle free form of communication between two hosts without the need of a centralized server. P2P data currently contributes to 44% of all consumer traffic moved across the Internet, and a total of 33.6% in North America alone. With content owners continually looking to P2P as a cost effective tool to distribute their content, that figure is only going to grow, the market researchers believe. Of the P2P material distributed, over 70% consists of audio and video files, with the number of audio files transferred far outweighing the amount of video and other files.

Napster was the pioneer in introducing the P2P networks to share music files on the internet in 1999. Napster's winning idea was in giving P2P, for free, to the masses. At the same time as Napster was released three factors greatly increased its mass popularity - higher bandwidth, more powerful desktop processors and cheaper storage. Add to this the fact that for many American homes, Internet access is flat rate, which led to people leaving their computers on 24/7 downloading music.

However the huge growth of Napster was a great concern for record companies around the world, and on April 13th 2000, nearly one year after its release, Rock Band Metallica sued Napster for copyright infringement following which Napster had to pay 26 million to songwriters and publishers. This was just the beginning of a long series of lawsuits against P2P service providers for copyright infringement which included the lawsuit against Grokster by MGM Inc in which Grokster was held liable for copyright violation by the Supreme Court.

2. Argument:

The nature of digital file-sharing technology inevitably implicates copyright law. First, since every digital file is "fixed" for purposes of copyright law (whether on a hard drive, CD, or merely in RAM), the files being shared generally qualify as copyrighted works. Second, the transmission of a file from one person to another results in a reproduction, a distribution, and possibly a public performance (in the world of copyright law, "public performance" includes the act of transmitting a copyrighted work to the public). To a copyright lawyer, every unauthorized reproduction, distribution, and public performance requires an explanation, and thus file-sharing systems seem suspicious from the outset

The Widespread notion of P2P is that it does not serve any purpose more than just providing illegal digital content on the web. P2P have been often referred to as the 'Bad Boys of Content'. The fundamental reason for this notion is the number of copyright infringement cases against P2P service providers. The effects of this were that P2P have been synonymous with piracy of digital content leading to the widely held perceptions that P2P has little legitimate use.

We, though agree that much of the earlier use of P2P was taken in providing this type of content on the Web, it has moved on from that state in which numerous legitimate P2P uses have been identified and efforts are going to exploit the decentralized, fault tolerant architecture of P2P to provide more legal services in P2P. In

Section 3 we will identify the primary arguments identifying P2P as content provider's folly by providing illegal content and in the following sections describe the legitimate uses of P2P which are on an ascent.

3. Counterclaims:

It is claimed that P2P have little to zero legitimate use and hence came the inferences that P2P equals piracy. The concepts of P2P and Copyrights have been closely related with content providers expressing their concern over illegal distribution of their content on the Web. The lawsuits filed against some major P2P service providers stand a testimony to this fact.

The infamous ***A&M Records Inc v Napster Inc*** lawsuit exposed the primary short comings of a P2P service in failing to provide legal content much to the annoyance of content providers. Napster provided a platform for users to upload and download music files in a compressed digital format. The plaintiffs were major record companies who saw the potential for this technology to impact their sales, and quickly filed suit against Napster as a "contributory and vicarious copyright infringer." The United States District Court found that Napster had contributed to the infringement of copyrights owned by the plaintiffs. Napster tried to invoke the *betamax* defense which had helped Sony Corp prove its innocence against Universal Studios but this did not help as Napster was held responsible for the violation.

The Second landmark case was that of ***MGM Studios, Inc. v. Grokster, Ltd.*** in which the Supreme Court unanimously held that defendant P2P file sharing companies Grokster and Streamcast (maker of Morpheus) could be sued for inducing copyright infringement for acts taken in the course of marketing file sharing software. The plaintiffs were a consortium of 28 of the largest entertainment companies (led by Metro-Goldwyn-Mayer studios). The case has been called the most important copyright infringement case in decades. Following this, Grokster announced that it would no longer be providing peer-to-peer service to its users.

For a long time now, P2P service providers have been on the edge treading a fine line between legitimacy and piracy. A study conducted by the Multimedia Intelligence group state that among all of the internet traffic 44% is P2P and almost all of it is illegal. Even in North America P2P traffic, which is mostly illegal constitutes 33% of the total internet traffic. These are astounding figures which indicate that P2P technology has been flourishing despite the numerous copyright infringement cases that P2P have had to deal with.

A new study conducted by MCPS-PRS Alliance and Big Champagne, an online media measurement company, claims that downloading through P2P is 'entrenched'. Researchers analyzed the downloading of Radiohead's new album InRainbows – which was made freely available through an official website. Some 2.3 million people downloaded Radiohead's latest album from BitTorrent sources - during the two months it was *legally* available for *free*. Not only did many more fans illegally download the album than those who bought it in shops, they downloaded it from illegal P2P and torrent sites like Pirate Bay than from the official Radiohead site. The authors of the study concluded that legal free will be trumped by illegal free. It further goes on to say that *illegal* is now entrenched, it's habitual and the business faces an uphill struggle to change that.

The future of peer-to-peer file-sharing and related technologies is entwined, for better or worse, with copyright law. If the early legal skirmishes yield any lesson for P2P developers, it is that an appreciation of the legal environment should be part of any development effort from the beginning, rather than bolted on at the end. The question to ask is whether P2P file sharing illegal? The answer would be that it is not illegal. It is the illegal use of the technology which is the problem. So, efforts have been going on in order to exploit the legal uses of P2P. With the increasing number of P2P applications that have caught the attention of the users in legitimate uses, the situation is changing with the legal applications of the technology becoming more prominent. Legitimate Peer-to-Peer is on the

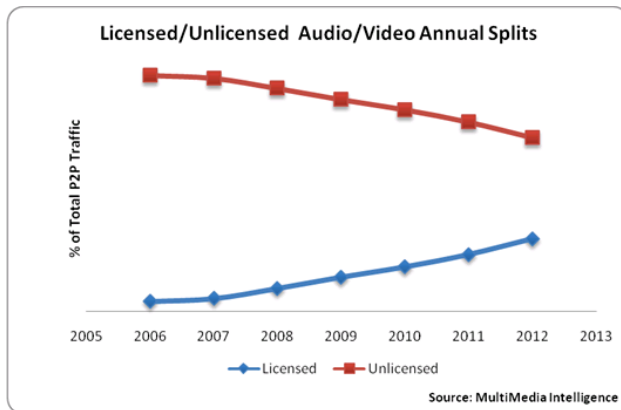
rise. This forms the basis for us not to support the view that Peer-to-Peer has no legitimate use.

4. Legitimate P2P, Current Scenario:

The purpose and drive towards building legal P2P has been on a rise. With more content providers realizing the importance of P2P in providing content at a low price, an increasing number of legitimate uses of P2P have come forward. P2P is "starting to see a lot more legitimate uses," says Frank Dickson of MultiMedia Intelligence. The Company's new report on P2P growth projects an astounding 400 percent increase in such Internet traffic over the next five years. But more surprising than the growth rate, which has been in decline now for some time, is the fact that it's P2P's lawful uses that are seeing the biggest growth.

For small content providers, especially companies involved in video, paying for a content delivery network can eat up a significant chunk of revenue. Done right, P2P distribution can save valuable cash for these providers, which is why the study predicts that Legal P2P will grow 10 times faster than the illicit ones. It can be argued that of this is due to the "law of small numbers"; P2P's legal uses (transferring Linux ISO files, etc.) have always been dwarfed by its usefulness as a distribution mechanism for music and now video content. Thus, when legal applications begin to boom, it's much easier for them to rack up big percentage numbers. But there is definitely a trend emerging which might someday see Legal P2P just eclipse its Illegal cousin. Figure 1 is the graphical representation comparing the amount of Legal and Illegal P2P traffic. This shows a decrease in Illegal P2P applications and an increase in the legal peer-to-peer based on which arguments have been made that Legal P2P will drive the growth of the internet in the next five years.

Figure 1: Comparison of Legal v Illegal P2P



P2P systems have a number of good properties that make them very attractive. These include:

- Scalability
- Low server requirements
- Fast deliveries from nearby nodes
- Cost effectiveness
- Enables Push Video-on-Demand

One interesting characteristic of P2P networks is their adaptability, e.g. they dynamically absorb load as demand rises. As an example, P2P provides an ideal distribution platform for the growing number of independent artists seeking a cost-effective channel for delivery.

Researchers have defined structured peer-to-peer (p2p) overlays such as CAN [1], Chord [2], Pastry [3] and Tapestry [4] provide a self-organizing substrate for large-scale p2p applications. Unlike earlier systems, these have been subject to more extensive analysis and more careful design to guarantee scalability and efficiency. Also, rather than being designed specifically for the purpose of sharing unlawful music, these systems provide a powerful platform for the construction of a variety of decentralized services, including network storage, content distribution, web caching, searching and indexing, and application-level multicast. Structured overlays allow applications to locate any object in a probabilistically bounded, small number of network hops, while requiring per-node routing tables with only a small number of entries. Moreover, the systems are scalable, fault-tolerant and provide effective load balancing.

Corporations are looking at the advantages of using P2P as a way for employees to share files without the expense involved in maintaining a

centralized server and as a way for businesses to exchange information with each other directly.

5. Efforts to unclog Legitimate P2P:

Example 1: Velocix

Velocix is described by vendor CacheLogic as a multiprotocol P2P-based media delivery platform that could revolutionize legitimate peer-to-peer traffic. Velocix is a system of local caching, whereby popular high-volume files are stored at various locations relatively close to where they are needed.

The idea is that agreements could be signed with content distributors, such as movie studios or software vendors, and Internet service providers, enabling large files to be stored with Velocix and distributed locally when requested. For very large files, this could cut transmission costs for the ISPs significantly. This could also encourage customers to download copyright-protected content rather than unlicensed versions.

Example 2: BitTorrent acquires the studio distribution deal

Warner Bros. Entertainment Group agreed to use BitTorrent's peer-to-peer system to distribute movies and television shows, including "Dukes of Hazzard" and "Babylon 5," beginning 2006. Warner Bros. is the first major entertainment company to embrace BitTorrent's distribution system, which has been widely used to illegally swap copies of copyright movies.

The agreement is also believed to be the first Hollywood distribution deal for any of the file-sharing technology companies, which include eDonkey or Kazaa. Financial terms were not disclosed. "In the past, San Francisco-based BitTorrent was falsely perceived to be the video equivalent of Napster", said Ashwin Navin, the company's president. "BitTorrent never maintained a network to help people exchange copyright material and has gone to lengths to

separate the company from law breakers”, he said.

Example 3: Snocap deal with Warner Bros.

Snocap, the company founded by the creator of the original Napster services that incited the explosion of free music on P2P networks, signed a licensing deal with Warner Music Group in 2005. The deal gives the fledgling company access to the catalogs of all four major music labels, as it had already inked deals with Sony BMG, Universal Music and EMI Group.

Snocap created a music registry system based on fingerprinting technology to identify and track music within a P2P network. That system was designed to make sure that copyright holders--labels, publishers, and artists--get paid. Snocap did not determine how much everyone gets paid and how much a consumer pays to use the service--that falls to the services and copyright holders themselves.

Example 4: Qtrax launch

Qtrax, a service launched in January 2008, is the world's first free and legal peer-to-peer (P2P) digital music site. Music lovers can discover new music and legally download full-length, high-quality versions of their favorite songs while compensating both the artists and the record labels through non-intrusive and relevant advertising. Qtrax has the unparalleled support of the major record labels like EMI and SonyBMG, and all of their respective publishing divisions. LTDnetwork Inc, a division of Brilliant Technologies Corporation, developed Qtrax and its components.

Example 5: P4P

P4P, or Proactive network Provider Participation for P2P, is a method for internet service providers (ISPs) and peer-to-peer (P2P) software to optimize peer-to-peer connections. P4P proponents say that it can save ISP significant costs, and that using local connections also speeds up download times for P2P downloaders by 45%.The P4P working group has participants from the ISP,

Movie/Content, & P2P industries. It is focused on helping ISPs handle the demands of large media files and enabling legal distribution.

5. Legitimate uses of P2P:

A significant number of Legal P2P uses have been identified in the efforts which use the underlying simple decentralized architecture of peer-to-peer. The examples of Peer-to-Peer technology being put to legal use are as follows:

1. Bibster: A project that aims to assist researchers in managing, searching, and sharing bibliographic metadata (e.g., from BibTeX files) in a peer-to-peer network. The advantage of the system is it provides the possibility to search on a distributed peer-to-peer network using Semantic Web technologies. It provides an easy way to share data with other researchers. The Bibster client on its own (e.g. disconnected from the P2P network) will already provide added value to its users as it will give researchers an overview and search facilities of his/her own bibliography data.

2. Blizzard Entertainment: Distributes World of Warcraft game updates using Blizzard Downloader (a combination BitTorrent/HTTP client). The Blizzard Downloader allows users to download large files using a peer-to-peer protocol. Each person downloading the file will offer a portion of their upload bandwidth to allow other users to download the same file.

3. bt.etree.org: This site is provided by the etree.org community for sharing the live concert recordings of trade friendly artists using the BitTorrent Client. Downloaders get pieces of the fileset from the original server, and from anyone else who is downloading. The more people there are downloading the same thing, the lower the burden on the central server, and the faster everyone's downloads get, due to sharing with each other.

4. Gutenberg: The CD and DVD Project: Uses BitTorrent to distribute CD and DVD image files

(ISO files). Project Gutenberg encourages the use of P2P for sharing its eBooks. All Project Gutenberg eBooks may be freely shared, printed, and modified, within the limitations of the "small print" trademark license in each eBook.

5. Ibiblio: An online library and archive that provides BitTorrent access to its content. Osprey is a peer-to-peer enabled content distribution system. A metadata management system for software and document collections enables local and distributed searching of materials. Items are available for download directly via URL or indirectly via the BitTorrent peer-to-peer protocol.

6. Joost: A P2P Internet TV client which uses Peer-to-peer to provide content to its users.

7. Librivox: Distributes audio recordings of books that are in the public domain via BitTorrent.

8. LinuxTracker: A free linux download resource using BitTorrent.

9. NASA's Visible Earth Project: A catalog of NASA images and animations of our home planet using BitTorrent to facilitate file transfer.

10. Skype: Uses a P2P telephony network.

11. VMware's Virtual Appliance Marketplace: Offers a catalog of pre-built VMs that can be freely shared, made by members of the VM community.

12. Music Industry: The music industry which has long been at locked horns with the peer-to-peer service providers, actually uses those same file sharing networks to research about the most popular bands around, and are even using that data to convince record stations to push certain bands. A company called BigChampagne monitors the various file sharing services, to include quite a few major labels

6. Guidelines for the legitimate P2P Developers:

The future of peer-to-peer file-sharing and related technologies is entwined, for better or worse, with copyright law. An appreciation of the legal environment should be a part of the development process of P2P. In this section we provide some guidelines that could help the P2P developers in to realize the potential threats and ways to prevent them.

1. The developers should take care that they don't make and store any copies. The strength of Peer-to-Peer architecture is that actual resources shared need not pass through a central server. Care should be taken where caching or similar activities are concerned.

2. Total control or total anarchy:

In the wake of recent decisions on indirect copyright liability, it appears that copyright law has foisted a binary choice on P2P developers: either build a system that allows for thorough monitoring and control over user activities, or build one that makes such monitoring and control completely impossible.

3. Identifying the substantial non-infringing uses: Almost all peer-to-peer systems can be used for many different purposes, some of which the creators themselves fail to appreciate. So create a platform that lends itself to many uses. Actively, sincerely, and enthusiastically promote the non-infringing uses of your product.

4. Do not promote infringing uses:

Do not promote any infringing uses. Be particularly careful with marketing materials and screenshot illustrations

5. Disaggregate functions:

Separate different functions and concentrate your efforts on a discrete area. In order to be successful, peer-to-peer networks will require products to address numerous functional needs—search, namespace management, security, dynamic file redistribution—to take a few examples. There's no reason why one entity should try to do all of these things. In fact, the creation of an open set of protocols, combined

with a competitive mix of interoperable, but distinct, applications is probably a good idea from a product-engineering point of view.

7. Conclusions:

In this paper We have put forth two contrasting views of P2P technology in which one identifies P2P with only illegal music and digital theft on the Web and the other identifies it as the one with huge potential if properly tapped in legal scenario. Early P2P had been synonymous with online piracy which had its origin from P2P technology like Napster. These views claim P2P as just a proxy for online theft much to the chagrin of content providers. There have been huge debates which will probably never end regarding the legal relevance of P2P given its rampant use in illegal file sharing.

We, though agreeing that most of the early P2P were utilized for such illegitimate uses, we argue that it is perhaps about time that the fault tolerant, decentralized, scalable infrastructure be used in driving tomorrow's legal technologies on the internet. An appreciation of legal framework while developing the P2P applications can help a great deal in identifying the legal uses of this powerful technology. Our claims are strengthened by a number of instances that we have provided in which P2P technology has been put to legitimate use.

The study conducted by multimedia intelligence group has predicted that P2P traffic will increase by more than 400% in the next five years in which legal P2P will increase 10 times as much as illegal P2P. Legal P2P looks set to drive the internet in a near future. With content providers looking to P2P in providing their content low of cost without them having to maintain a centralized server, the P2P technologies are being appreciated even by perhaps their strongest deterrents. Corporations are looking at the advantages of using P2P as a way for employees to share files without the expense involved in maintaining a centralized server and as a way for businesses to exchange information with each other directly. Taking all these points into consideration we might just see legal P2P be able to dwarf the illegal P2P in near future.

References:

1. Ratnasamy, S., Francis, P., Handley, M., Karp, R., Shenker, S.: A scalable content addressable network. In: Proc. ACM SIGCOMM'01, San Diego, California (2001)
2. Stoica, I., Morris, R., Karger, D., Kaashoek, M.F., Balakrishnan, H.: Chord: A scalable peer-to-peer lookup service for Internet applications. In: Proc. ACM SIGCOMM'01, San Diego, California (2001)
3. Rowstron, A., Druschel, P.: Pastry: Scalable, distributed object location and routing for large scale peer-to-peer systems. In: Proc. IFIP/ACM Middleware 2001, Heidelberg, Germany (2001)
4. Zhao, B.Y., Kubiawicz, J.D., Joseph, A.D.: Tapestry: An infrastructure for fault-resilient wide-area location and routing. Technical Report UCB//CSD-01-1141, U. C. Berkeley (2001)
5. Fred von Lohmann Peer-to-Peer File Sharing and Copyright Law: A Primer for Developers ,Senior Intellectual Property Attorney Electronic Frontier Foundation
6. *A&M Records, Inc. v. Napster, Inc.*, 239 F.3d 1004 (9th Cir. 2001).
7. *A&M Records, Inc. v. Napster, Inc.*, 2000 WL 573136 (N.D. Cal. May 12, 2000) (ruling on DMCA 512 safe harbor).
8. *MGM v. Grokster* (Kazaa/Morpheus/Grokster) summary judgment briefs:
http://www.eff.org/IP/P2P/MGM_v_Grokster/
9. Mema Roussopoulos, Mary Baker, David S. H. Rosenthal, TJ Giuli, Petros Maniatis, Jeff Mogul: 2 P2P or Not 2 P2P.
10. <http://en.wikipedia.org/wiki/Peer-to-peer>
11. http://connect.educause.edu/term_view/Legitimate%2BP2P
12. http://news.cnet.com/2100-1026_3-6070004.html
13. <http://guardian.co.uk>
14. http://en.wikipedia.org/wiki/MGM_Studios,_Inc.v._Grokster,_Ltd
15. http://en.wikipedia.org/wiki/Proactive_network_Provider_Participation_for_P2P