**Recommendations to the MPAA Regarding Popcorn Time**

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Tyler Seymour

Law and Business Aspects of the Entertainment Industry

Prof. Shaeffer

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Abstract

The purpose of this project is to propose recommendations to the Motion Picture Association of America (‘MPAA’) regarding Popcorn Time, the so-called “Netflix for Pirates.”[[1]](#footnote-1) First, I describe how Popcorn Time works as compared to other peer-to-peer file sharing software. After identifying certain differences, I determine whether these differences affect the enforceability and infringement analysis of copyright claims by content owners. In turn, I make recommendations about what, if anything can be done to protect copyright owners.

Background

Popcorn Time is an open source software project that allows users to stream movies over a peer-to-peer network. The apparent use for the software is to unlawfully view copyrighted material. The project’s founders pulled the plug on March 14, 2014. The homepage explains, “Our experiment has put us at the doors of endless debates about piracy and copyright, legal threats and the shady machinery that makes us feel in danger for doing what we love. And that’s not a battle we want a place in.”[[2]](#footnote-2) A search of the “Sony Hack” emails revealed that the source of this pressure was the MPAA. [[3]](#footnote-3)

The MPAA stated in an email to its member studios, “The Content Protection team scored a major victory in shutting down key developers of ‘Popcorn Time,’ a BitTorrent-based desktop application that allowed users to stream high quality movie and TV content.  The investigative and enforcement effort required real-time, cross-border collaboration on three continents – and may have prevented Popcorn from becoming a major piracy threat before it could become popular.”[[4]](#footnote-4) Despite this seeming success, Popcorn Time lives on to torment Hollywood.

One of the salient features of open source software is that it is freely available for use for any purpose, so long as the subsequent user releases his or her source code under the same license. Github, a popular source code repository, facilitates this licensing arrangement by allowing users to “fork” the software with the click of a button. A fork is an independent copy of the source code, wholly distinct from the parent project. Inevitably, the source code of Popcorn Time was forked at least once before the founders took the project down, so several iterations of the software remain in the wild. Indeed, the source code remains freely available for use and modification under the GNU General Public License v3.[[5]](#footnote-5)

Several forks have popped up that are of particular concern for copyright owners. After the original desktop client, the development community has produced Android and iOS versions of the app. Notably, the PopcornExpress fork runs within the web browser.

Undeterred, the MPAA has issued DMCA takedown notices to Github, asking them to remove the software. In at least three instances, Github has removed the code and repositories without a counter-notification by the owner of a particular fork.[[6]](#footnote-6) Other forks, however, remain in active development on Github.

How it Works

A bad actor seeking to view copyrighted material must first select a movie. Popcorn Time facilitates this selection by providing an easy-to-use interface populated with movies and TV shows, in much the same way that Netflix and HBOGo recommend content to their users.[[7]](#footnote-7) Virtually all of the content available within the app is copyrighted material, however, neither Popcorn Time’s users nor its development community explicitly add infringing works to the queue. Instead, the app’s listings are curated via RSS feeds created by popular torrent search engines such as The Pirate Bay,[[8]](#footnote-8) KickassTorrents,[[9]](#footnote-9) or YTS.[[10]](#footnote-10) For example, <https://yts.to/rss/0/1080p/western/0> links to an RSS feed for 1080p Westerns from the release group YIFY[[11]](#footnote-11). The BOZX feed[[12]](#footnote-12) contains an almost endless collection of Blu-Ray quality. Both streams can be incorporated into Popcorn Time’s queue. After a user makes a selection, the movie starts streaming from within the app.

In the background, Popcorn Time is a custom BitTorrent client. To start streaming, the Popcorn Time application must be supplied with the “info hash” of the targeted file – the unique identifier of the particular torrent used to locate peers hosting the content.[[13]](#footnote-13) The RSS feed contains a list of magnet links containing this info hash. For example, a magnet link in the RSS feed for “most popular” movies might be: “magnet:?xt=urn:btih:**ff368b75c326ad29232504edb33e56a2cb19a860**&dn=Fast.and.Furious.7.2015.HC.HDRip.XViD.AC3ETRG&tr=udp%3A%2F%2Ftracker.openbittorrent.com%3A80&tr=udp%3A%2F%2Fopen.demonii.com%3A1337&tr=udp%3A%2F%2Ftracker.coppersurfer.tk%3A6969&tr=udp%3A%2F%2Fexodus.desync.com%3A6969” [emphasis added]. This string of text contains the info hash of *Fast and Furious 7* in bold typeface*.* Popcorn Time then extracts the info hashes from the RSS.

The app also extracts the storage location of the cover art image from the RSS feed. For example, the 1080p Western RSS contains the location of the cover art for the film *Blazing Saddles*:

“img src=<https://s.ynet.io/assets/images/movies/Blazing_Saddles_1974/medium-cover.jpg>”[[14]](#footnote-14) Using in-line linking, the application displays the cover art for each movie within the app without hosting any of the content. In effect, the user can find movies without ever having to visit a torrent search engine such as The Pirate Bay. In this respect, Popcorn Time differs from other torrenting clients, such as uTorrent or BitTorrent, by providing a feed reliable feed of copyrighted content out-of-the-box. Combined with the extracted info hashes, Popcorn Time creates a playlist for the user.

Nor Popcorn Time does not host any of the copyrighted movie content. The application is built on BitTorrent’s peer-to-peer protocol, so Popcorn Time’s users stream directly from the seeding peers hosting the file. Popcorn Time simply provides the instructions necessary to facilitate the connection and streaming between these parties – the seeders and leechers. It is worth noting that Popcorn Time can run on the local machine of a leecher or within the browser, as in the PopcornExpress fork,[[15]](#footnote-15) or the closed-source, now-defunct Cinefi.[[16]](#footnote-16) Iterations that run within the browser create particularized problems for copyright owners, as will be examined, in turn. Even there, where the Popcorn Time app is hosted on a webserver accessible via web browser, no copy of the copyrighted content is stored on the server. Instead, only the seeder and local machine of the leecher ever has a copy.

Popcorn Time’s connection process is substantially the same as any other peer-to-peer file sharing system. After a user selects a movie, the initial peer connection begins with Popcorn Time sending a request to the “distributed hash table” (‘DHT’). Querying the DHT with an info hash returns the IP addresses of any peers seeding the file.[[17]](#footnote-17) If Popcorn Time finds any seeding peers, it initiates a “handshake” - essentially asking the seeding peer at a given IP address, “Do you have the file associated with this info hash?”[[18]](#footnote-18) Popcorn Time attempts to handshake with each seeding peer that the DHT returns – in some instances, hundreds of peers. If the seeder does have the file, it responds affirmatively with a “bitfield message,” letting the leecher know which parts of the file are available for download from the individual peer. Put another way, the application connects to many peers at once, downloading only a small fragment of the file from each peer.

Each fragment, known as a “block,” contains 16kB of the total file.[[19]](#footnote-19) Most torrenting clients select these blocks in random order, or in “rarest first” order to increase redundancy of blocks with fewer peers than other blocks in the file. In this important respect, Popcorn Time is different. Popcorn Time uses a different piece-picking algorithm such that blocks are downloaded sequentially. This allows leechers to stream the content.

In summary, Popcorn Time differs from other torrenting clients in two ways. First, the software provides a feed of reliable copyrighted content. Second, the app uses a sequential downloading algorithm that allows users to stream torrents.

Implications

*1. Infringement by Seeders*

The traditional infringement analysis for violation of the §106(1) reproduction right on a peer-to-peer network, as applied to seeders, is not affected. Indeed, copyright owners have a rich history of bringing infringement actions against seeders for violations of the copyright owner’s reproduction right.[[20]](#footnote-20) To prove infringement, a forensic team connects to the seeder (in much the same way as described above) and downloads the file from them under the observation of a network protocol analyzer or packet-capture application.[[21]](#footnote-21) Such tools record the transfer of packets between the seeder and the forensic team’s server in such a way that the transaction is preserved for evidentiary purposes. Having proven that an unauthorized copy of the copyrighted work resides on the seeder’s computer, an infringement action for violation of the reproduction right can be commenced. On the other hand, actions alleging violation of the distribution right typically do not succeed because forensic teams can only gather circumstantial evidence that the seeder is distributing copies to other peers on the network. That is, peers other than the forensic team. Nonetheless, it seems plain that seeders are distributing unauthorized copies of copyrighted works.

With the invention of Popcorn Time, seeders may further be liable for violations of the copyright owner’s §106(4) public performance right for streaming the copyrighted work. Under §101, to perform a work “publicly” means, “(1) to perform or display it at a place open to the public or at any place where a substantial number of persons outside of a normal circle of a family and its social acquaintances is gathered; or (2)to transmit or otherwise communicate a performance or display of the work to a place specified by clause (1) or to the public, by means of any device or process, whether the members of the public capable of receiving the performance or display receive it in the same place or in separate places and at the same time or at different times.” The BitTorrent network qualifies as a place open to the public because the files are not access restricted in any way, and there are a substantial number of persons – often hundreds of thousands in the case of popular works – seeding or leeching the file. These users typically do not know each other at all, let alone well enough to qualify as family or social acquaintances. Furthermore, transmitting the work over the BitTorrent network qualifies as a transmission because the definition in Clause 2 permissively states, “by means of any device or process.” Moreover, the fact that the leechers are in different places and view the work at different times is not dispositive under this definition.

However, proving a violation of the public performance right on a peer-to-peer network suffers the same evidentiary pitfalls as distribution: that is to say, the forensic team could only stream a copy of the work it requests from the seeder, but it cannot capture traffic that proves the seeder is seeding to other peers.

*2. Infringement by Leechers*

There are several difficulties bringing an infringement action against someone leeching using a Popcorn Time fork. First, to prove that a leecher violated any of the exclusive rights of copyright, in particular, reproduction, distribution, or public performance, the forensic team would have to either analyze the confiscated machine of a seeder (unlikely), or directly seed to the leecher in order to perform the packet capture. However, this latter option may be considered an authorized use of the work and therefore not infringement. Moreover, recent cases such as *Prenda* counsel that this sort of behavior is unethical and likely illegal.

Second, violations of the reproduction and distribution right require either that *copies* are reproduced or *copies* are distributed. Under §101, copies are the material objects in which a work is fixed. However, a work is not “fixed” unless it is “sufficiently permanent or stable to permit it to be perceived, reproduced, or otherwise communicated for a period of more than transitory duration.” Popcorn Time utilizes its sequential downloading algorithm in order to stream the file, and in doing so, only stores a small amount of the file for a short amount of time, i.e. as much as required to stream. The court in Cartoon Network v. CSC Holdings, Inc. held that a buffer of 1.2 seconds stored in the electrostatic memory of a computer is not fixed.[[22]](#footnote-22) Indeed, Popcorn time stores a buffer in the random access memory of a computer to facilitate streaming. It is ambiguous whether this buffer exceeds 1.2 second (although that would not necessarily be dispositive). However, it would be trivial to adjust the buffer to conform to the fixation requirement. Assuming that leechers do not fix the copyrighted work on their hard drive, they do not possess copies for the purposes of violating §106(1) reproduction and §106(3) distribution. Therefore, the only recourse a copyright owner has against a leecher is by demonstrating a violation of §106(4) public performance. Again, however, the evidentiary burden is insurmountable: a forensic team could not prove that the leecher was streaming the copyrighted work without seeding it to the leecher themselves.

*3. Contributory Liability*

As a preliminary matter, Popcorn Time may qualify under the safe harbor of §512(d) as an information location tool for “referring or linking users to an online location containing infringing material or infringing activity, by using information location tools, including a directory, index, reference, pointer, or hypertext link.”[[23]](#footnote-23) However, the development community has not implemented a DMCA policy or system, whatsoever. Therefore, whoever operates an implementation of Popcorn Time in its current form (without a DMCA system) is vulnerable to suit.

Pleading a contributory infringement action against the operators of a Popcorn Time implementation requires that a plaintiff allege direct infringement by a third-party, knowledge by the operators that the third-party was infringing, and that the operator materially contributed to the infringement. The circumstances present in Popcorn Time are informed by the canon of peer-to-peer filing sharing cases: Napster and Grokster*.*

For the purposes of this analysis, I will presume direct infringement by either a seeder or leecher. The second element requires that the operator “know or have reason to know” of a third party’s direct infringement.[[24]](#footnote-24) This is a difficult obstacle to overcome considering that the operator must have knowledge of *specific* acts or *specific* materials that are infringing. Popcorn Time curates its content with various RSS feeds maintained by various torrent search engines. Notably, most forks incorporate the YIFY feed into their project out-of-the-box. YIFY is a notorious pirate release group. While knowledge of this fact is hardly innocent, it does not give rise to knowledge of a seeder or leecher’s direct infringement.

However, under the Groksterstandard, the operators of a Popcorn Time implementation will be liable if the active inducement of infringement can substitute for this specific knowledge requirement. There, the court held that “one who distributes a device with the object of promoting its use to infringe copyright, as shown by clear expression or other affirmative steps taken to foster infringement, is liable for the resulting acts of infringement by third parties.”[[25]](#footnote-25) Specifically, a copyright owner only needs to prove that the operators “acted with a purpose to cause copyright violations by use of software suitable for illegal use.”[[26]](#footnote-26) The incorporation of notorious pirate feeds is probably enough to satisfy this standard. Moreover, Popcorn Time’s development community has not implemented any “filtering tools or other mechanisms to diminish the infringing activity,” a fact the court relied upon in Grokster*.* [[27]](#footnote-27)

Although any claim of secondary infringement will depend on the specific circumstances of each Popcorn Time implementation, it is likely that copyright owners will prevail on their claims of contributory liability.

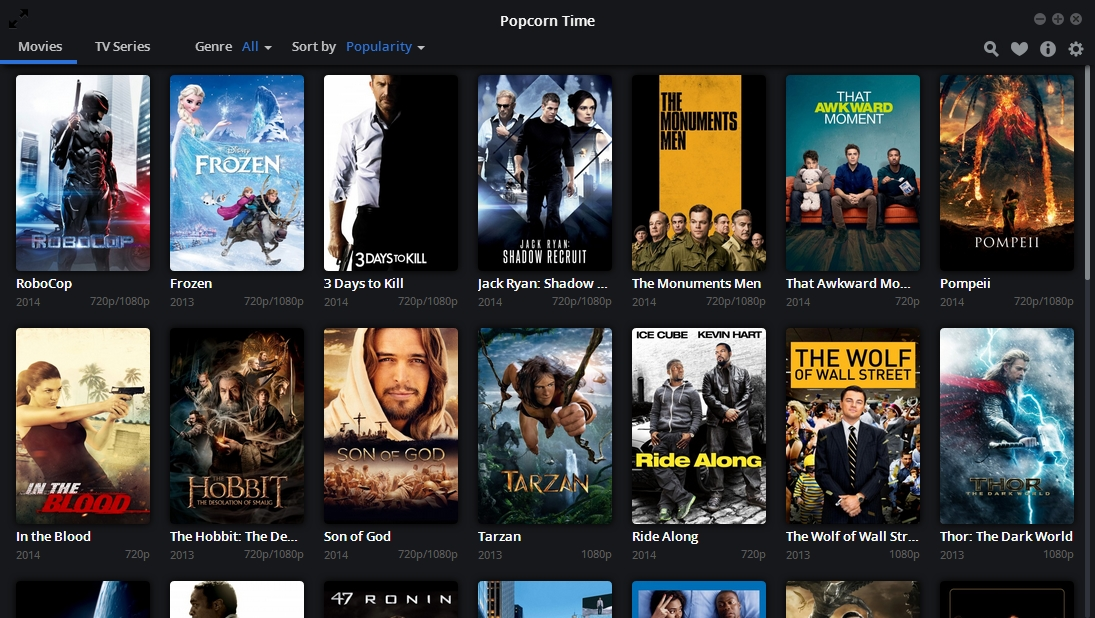
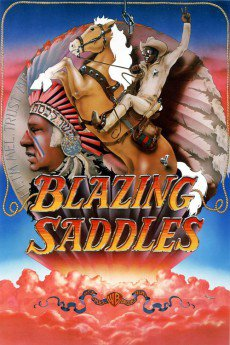
Recommendations

Considering the effect of Popcorn Time’s technical features on the legal analysis, I recommend that the MPAA take the following steps to curb the infringement of copyrighted works on Popcorn Time:

1. **Prioritize removing links from torrent search engines.** Ultimately, these search engines populate Popcorn Time’s movie queue across every implementation of the software; therefore, removing specific links will have a widespread effect.
2. **Create a honeypot.** Popcorn Time creates a unique bottleneck where leechers can be found. Without Popcorn Time, leechers would have to visit a torrent search engine to find a link, and the direct their torrent client to download the file. While seeders can be located, leechers (who do not subsequently seed) are more difficult to track down. A Popcorn Time devoid of any “inducing” feeds, although capable of substantial non-infringing activity, i.e. watching public domain films, would still likely be abused be users who scavenge torrent search engines themselves. Creating a “honeypot” that logs these infringing uses would serve four potential purposes:
   1. Create “first alert” system for infringing info hashes so they can be promptly removed by the Content Protection team;
   2. Provide a body of evidence for infringement suits and contract claims arising from violations of the site’s terms of service;
   3. Serve as the basis of a scare-campaign to discourage the use of other Popcorn Time implementations if they honeypot is every found out.
3. **Create a DMCA compliant implementation of Popcorn Time.** If the MPAA were to quietly partner with a team of developers to implement a compliant Popcorn Time, sanctioned-version could serve four purposes:
   1. Create a “first alert” system, as in above;
   2. Detract from traffic non-compliant implementations receive;
   3. Provide for easy enforcement of infringement;
   4. Provide an expeditious DMCA system for the platform to reduce infringement.
4. **Send Github more takedown notices.** As referenced, the MPAA has had limited success securing takedown notices for publication of the source code. It is easy to identify whether the source code contains a “pirate feed” that would subject it to analysis under Grokster. If it does, these take down notices are, at least, in “good faith” so as to avoid liability under §512(f).
5. **Subpoena Google Analytics.** Almost every Github implementation contains a Google Analytics tracking code. For example, the Popcorn Time repository with the most forks – 2,215 separate forks – all contain the following javascript file: <https://github.com/popcorn-time/popcorn-app/blob/master/js/tracking.js> The Google Property ID, i.e. UA-xxx-xxxxx, can be derived from any live implementation. In turn, this can be used to subpoena any data Google Analytics has collected about the users of the site. It is ambiguous whether this will reveal the IP addresses of the users, however, the Analytics dashboard does provide geolocation data (which implies that Google knows the IP address). Moreover, it would reveal the amount of time spent on every page by every user – an indication of whether they watched a film, or not.

Conclusion

Popcorn Time represents a significant improvement on the user experience of torrenting. One study shows that the service is slowly catching up to the most popular torrent client, uTorrent.[[28]](#footnote-28) Undoubtedly, this is due to the usability of the software. Of particular concern are the Android, iOS, and browser-ready forks that have recently presented themselves. One worry is that as traffic on Popcorn Time increases, this will detract from the revenue copyright owners might otherwise receive from “home theater” purchases on iTunes (esp. for iPad and AppleTV), or Android devices (including Chromecast). Copyright owners and the MPAA should proceed cautiously when enforcing actions against an open source software project: taking one implementation off the internet will assuredly spawn several other forks in a never-ending game of whack-a-mole. For that reason, the MPAA must make a strategic decision to act either act surreptitiously and create distrust in the software (while establishing trust in their own honeypot implementation), or instill fear in the hearts of would-be-leechers by commencing a flagrant, hell-bent campaign to eradicate this software.

1. https://torrentfreak.com/netflix-sees-popcorn-time-as-a-serious-competitor-150121/ [↑](#footnote-ref-1)
2. <http://getpopcornti.me/> [↑](#footnote-ref-2)
3. Wikileaks 4/17/15 (<https://wikileaks.org/sony/emails/emailid/101424>) [↑](#footnote-ref-3)
4. Wikileaks 4/17/15 (<https://wikileaks.org/sony/emails/emailid/101424>) [↑](#footnote-ref-4)
5. <https://github.com/popcorn-official/popcorn-android> [↑](#footnote-ref-5)
6. <https://github.com/github/dmca/blob/master/2014-07-11-MPAA.md> [↑](#footnote-ref-6)
7. Popcorn Time’s user interface:  [↑](#footnote-ref-7)
8. https://thepiratebay.se/ [↑](#footnote-ref-8)
9. http://kickasstorrents.to/ [↑](#footnote-ref-9)
10. http://yts.to/ [↑](#footnote-ref-10)
11. YIFY is a prolific “release group,” a group of people dedicated to disseminating copyrighted content on the internet. [↑](#footnote-ref-11)
12. https://thepiratebay.se/user/BOZX/ [↑](#footnote-ref-12)
13. BitTorrent Protocol Specification[?] [↑](#footnote-ref-13)
14.  [↑](#footnote-ref-14)
15. http://www.popcornexpress.me/ [↑](#footnote-ref-15)
16. https://torrentfreak.com/cinefi-streams-movie-and-tv-torrents-straight-to-your-browser-140414/ [↑](#footnote-ref-16)
17. http://www.bittorrent.org/beps/bep\_0005.html [↑](#footnote-ref-17)
18. https://wiki.theory.org/BitTorrentSpecification#Handshake [↑](#footnote-ref-18)
19. https://wiki.vuze.com/w/Torrent\_Piece\_Size [↑](#footnote-ref-19)
20. Dallas Buyer’s Club [↑](#footnote-ref-20)
21. https://www.wireshark.org/about.html [↑](#footnote-ref-21)
22. 536 F.3d 121(2d Cir. 2008) [↑](#footnote-ref-22)
23. Perfect 10, Inc. v. Amazon.com, Inc., 508 F.3d 1146, 1175 (9th Cir. 2007) [↑](#footnote-ref-23)
24. A&M Records, Inc. v. Napster, Inc. 239 F.3d 1004, 1020 (9th Cir. 2001) [↑](#footnote-ref-24)
25. Metro-Goldwyn-Mayer Studios, Inc. v. Grokster, Ltd., 545 U.S. 913, 933 (2005). [↑](#footnote-ref-25)
26. Id. At 938. [↑](#footnote-ref-26)
27. Id. At 939. [↑](#footnote-ref-27)
28. http://www.proceranetworks.com/blog/its-popcorn-time-or-is-it [↑](#footnote-ref-28)