

BitTorrent

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This article is about the protocol. For the client, see BitTorrent client.

BitTorrent is the name of a peer-to-peer (P2P) file distribution protocol, and is the name of a free software implementation of that protocol. The protocol was originally designed and created by programmer Bram Cohen, and is now maintained by BitTorrent Inc. BitTorrent is designed to distribute large amounts of data widely without incurring the corresponding consumption in costly server and bandwidth resources. CacheLogic suggests that BitTorrent traffic accounts for ~35% of all traffic on the Internet,^[1] while other sources are skeptical.^[2]

The original BitTorrent client was written in Python. Its source code, as of version 4.0, has been released under the BitTorrent Open Source License, which is a modified version of the Jabber Open Source License. There are numerous compatible clients, written in a variety of programming languages, and running on a variety of computing platforms.

BitTorrent clients are programs which implement the BitTorrent protocol. Each BitTorrent client is capable of preparing, requesting, and transmitting any type of computer file over a network using the BitTorrent protocol.

Internet protocol suite

Layer	Protocols
Application	DNS, TLS/SSL, TFTP, FTP, HTTP, IMAP, IRC, NNTP, POP3, SIP, SMTP, SNMP, SSH, TELNET, BitTorrent , RTP, rlogin, ...
Transport	TCP, UDP, DCCP, SCTP, IL, RUDP, ...
Network	IP (IPv4, IPv6), ICMP, IGMP, ARP, RARP, ...
Data link	Ethernet, Wi-Fi, Token ring, PPP, SLIP, FDDI, ATM, DTM, Frame Relay, SMDS, ...



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Torrents

Creating and publishing torrents

To share a file or group of files through BitTorrent, clients first create a “torrent”. This is a small file which contains metadata about the files to be shared, and about the host computer that coordinates the file distribution. The exact information contained in the torrent file depends on the version of the BitTorrent protocol. However, a torrent file always has the suffix `.torrent`. Torrent files contain an “announce” section, which specifies the URL of the tracker, and an “info” section which contains (suggested) names for the files, their lengths, the piece length used, and a SHA-1 hash code for each piece, which clients should use to verify the integrity of the data they receive. Clients who have finished downloading the file may also choose to act as seeders, providing a complete copy of the file. After the torrent file is created, a link to it is placed on a website or elsewhere, and it is registered with a tracker. BitTorrent trackers maintain lists of the clients currently participating in the torrent.^[3] The computer with the initial copy of the file is referred to as the initial seeder.

Downloading torrents and sharing files

Using a web browser, users navigate to the site listing the torrent, download it, and open it in a BitTorrent client. After opening the torrent, the BitTorrent client connects to the tracker, which provides it with a list of clients currently downloading the file or files. A group of peers on a BitTorrent or P2P connected with each other to share a particular torrent is generally referred to as a swarm.

Initially, there may be no other peers in the swarm, in which case the client connects directly to the initial seeder and begins to request pieces. The BitTorrent protocol breaks down files into a number of much smaller pieces, typically a quarter of a megabyte (256 kB) in size. Larger file sizes typically have larger pieces. For example, a 4.37-GB file may have a piece size of 4 MB (4096 kB). Pieces are checked as they are received using a hash algorithm to ensure that they are error-free.^[3]

As peers enter the swarm, they begin sharing pieces with one another, instead of downloading directly from the seeder. Clients incorporate mechanisms to optimize their download and upload rates, for example using a tit for tat scheme. Peers download pieces in a random order, to increase the opportunity to exchange data, which is only possible if two peers have a different subset of the file.

The effectiveness of the peer-to-peer data exchange depends largely on the policies used by clients to determine whom to send data to. Clients will prefer to send data to peers that send data back to them, which encourages fair sharing, but strict policies often result in suboptimal situations, where newly joined peers are unable to receive any data (because they don't have any pieces yet to share themselves) and two peers with a good connection between them do not exchange data simply because neither of them wants to take the initiative. To counter these effects, the official BitTorrent client uses a mechanism called “optimistic unchoking”, where the client will reserve a portion of its available bandwidth for sending pieces to random peers (not necessarily known-good partners, so called preferred peers), in hopes of discovering even better partners and to ensure newcomers get a chance to join the swarm.^[4]

A visual presentation of how the BitTorrent protocol works can be found here (<http://aphid.org/btsim/>) .

Terminology

availability

(also *distributed copies*) The number of full copies of the file available to the client. Each *seed* adds 1.0 to this number, as they have one complete copy of the file. A connected peer with a fraction of the file available adds that fraction to the availability, if no other peer has this part of the file. (ie. a peer with 65.3% of the file downloaded increases the availability by 0.653. However, if two peers both have **the same** portion of the file downloaded - say 50% - and there is only one seeder, the availability is 1.5).

choked

Describes a peer to whom the client refuses to send file pieces. A client *chokes* another client in several situations:

- The second client is a *seed*, in which case it does not want any pieces (ie. it is completely *uninterested*)
- The client is already uploading at its full capacity (ie. the value for `max_uploads` has been reached)

interested

Describes a downloader who wishes to obtain pieces of a file the client has. For example, the uploading client would flag a downloading client as 'interested' if that client did not possess a piece that it did, and wished to obtain it.

leech

A *leech* is usually a *peer* who has a negative effect on the swarm by having a very poor share ratio - in other words, downloading much more than they upload. Most leeches are users on asymmetric internet connections and do not leave their BitTorrent client open to seed the file after their download has completed. However, some leeches intentionally avoid uploading by using modified clients or excessively limiting their upload speed. The term *leech*, however, can be used simply to describe a *peer* - or any client that does not have 100% of the data.

peer

A *peer* is one instance of a BitTorrent client running on a computer on the Internet to which other clients connect and transfer data. Usually a *peer* does not have the complete file, but only parts of it. However, in the colloquial definition, "peer" can be used to refer to any participant in the swarm (in this case, it's synonymous with "client").

scrape

This is when a client sends a request to the tracking server for information about the statistics of the torrent, such as with whom to share the file and how well those other users are sharing.

seeder

A *seeder* is a *peer* that has a complete copy of the torrent and still offers it for upload. The more *seeders* there are, the better the chances are for completion of the file.

snubbed

An uploading client is flagged as *snubbed* if the downloading client has not received any data from it in over 60 seconds.

superseed

When a file is new, much time can be wasted because the seeding client might send the same file piece to many different peers, while other pieces have not yet been downloaded at all. Some clients, like ABC, Azureus, BitTornado, TorrentStorm, and µTorrent have a "superseed" mode, where they try to only send out pieces that have never been sent out before, making the initial propagation of the file much faster. This is generally used only for a new torrent, or one which must be re-seeded because no other seeds are available.

swarm

Together, all *peers* (including *seeders*) sharing a *torrent* are called a *swarm*. For example, six ordinary *peers* and two *seeders* make a *swarm* of eight.

torrent

A *torrent* can mean either a `.torrent` metadata file or all files described by it, depending on context. The *torrent file* contains metadata about all the files it makes downloadable, including their names and sizes and checksums of all pieces in the *torrent*. It also contains the address of a *tracker* that coordinates communication between the peers in the swarm.

tracker

A *tracker* is a server that keeps track of which seeds and peers are in the swarm. Clients report information to the tracker periodically and in exchange receive information about other clients to which they can connect. The tracker is not directly involved in the data transfer and does not have a copy of the file.

Comparison to other file sharing systems

The method used by BitTorrent to distribute files parallels the one used by the eDonkey2000 network, but nodes in eDonkey's file sharing network usually share and download a much larger number of files, making the bandwidth available to each transfer much

smaller. Also eDonkey has queue-based system wherein there might be 200 people sharing the file but only one or two have queue free. Hence a user ends up getting files from only a few and rising up in rank in other users' queue list (while getting no download from them). BitTorrent transfers are typically very fast, because all nodes in a group concentrate on transferring a single file or collection of files. While the original eDonkey2000 client provided little "leech resistance", most new clients have some sort of system to encourage uploaders. eMule, for example, has a credits system whereby a client rewards other clients that upload to it by increasing their priority in its queue. However, the nature of the eDonkey2000 concept means download speeds tend to be much more variable, although the number of available files is far greater.

BitTorrent 4.0.4 running under Windows XP

BitTorrent 4.0.4 running under Windows XP

A similar method to BitTorrent was the Participation Level introduced in Kazaa in 2002. A user's Participation Level would increase when they uploaded and decrease when they downloaded. Then when a user uploaded a file, the person with the highest Participation Level would get it first, then the next highest, and so on. This can be visualised as a pyramid, with the clients who have the most upload bandwidth available at the top and those with less bandwidth on progressively lower levels. This is the most efficient way to distribute a file to a large number of users: it is probable that even the people at the bottom of the pyramid will get the file faster than if the file was served by a non-P2P method. Unfortunately, the implementation adopted by Kazaa is considered by some to be flawed as it relies on the client accurately reporting their Participation Level and therefore it is easy to cheat using one of the many unofficial clients.

Authorized use of BitTorrent

A growing number of individuals and organizations are using BitTorrent to distribute their own material. Many adopters report that only by using BitTorrent technology, with its dramatically reduced demands on networking hardware and bandwidth, could they afford to distribute their files.

Software

Many major open source and free software projects encourage BitTorrent as well as conventional downloads of their products to increase availability and reduce load on their own servers. Examples include OpenOffice.org^[5] and most major Linux distributions, including SUSE^[6] and Ubuntu.^[7] BitTorrent is also used to distribute updates to the BitTorrent client itself, as well as to other clients such as Azureus and BitComet.

Games

Various sites on the Internet like gameupdates.org (<http://www.gameupdates.org/>) offer authorized game files via BitTorrent; the demo of the flight sim *X-Plane* is offered via BitTorrent, as are the *World of Warcraft* ingame patches. Another such example is *PlaneShift*, a free open-source MMORPG, which uses BitTorrent for its primary method of distribution. For the first time, the demo of *Football Manager 2007* is offered for download through BitTorrent.

Films

The film studio Warner Brothers Entertainment plans to distribute its films and TV shows using Bittorrent.^[8] The fan-film *Star Wars: Revelations* is distributing two DVD images as well as the film by itself via BitTorrent, while *Star Wreck: In the Pirkinning* and *Cactuses*, both feature-length films, were provided for download via BitTorrent. The fan-films *Star Trek: New Voyages* are distributed via BitTorrent among other methods.

Music

The SXSW (South by South West) music festival in Austin, Texas has released two packages of mp3 music files—nearly a thousand tracks—from their 2006 festival by BitTorrent download, along with trailers to two DVD films that can be purchased.^[9] Babyshambles, Pete Doherty's band, distributes two collections of music, *Shaking and Withdrawn Megamix* and *Untitled* by Bittorrent from their official website.^[10] In 2005, the rock group Harvey Danger began distributing their third full-length album, *Little by Little...*, using BitTorrent. Discipline Global Mobile (<http://www.dgmlive.com/>) (the record label/website begun by Robert Fripp) uses BitTorrent technology to distribute. Folk punk band Defiance Ohio distributes their music from their website using mp3's, ogg's and torrents. The free music portal Jamendo also uses BitTorrent to distribute its 1000+ albums.

Conferences

Some Free and Open Source Software conferences have made their video recordings available, such as DrupalCon 2005 (<http://drupal.org/drupalcon-2005-media>) , International Free Software Forum - fisl6.0 and fisl7.0 (<http://torrents.softwarelivre.org/>) , HITBSecConf 2003, 2004 and 2005 (<http://video.hitb.org/>) , YAPC::NA::2005 (<http://torrent.ibiblio.org/doc.php?docid=64>) , GPLv3 European Conference (<http://fsfeurope.org/projects/gplv3/europe-gplv3-conference.en.html>) , Triangle Bloggers Conference (<http://torrent.ibiblio.org/doc.php?docid=9>) Chaos Communication Congress 22C3 (<http://events.ccc.de/2006/04/21/gentlemen-fire-up-your-clients/>) just to name a few.

Other material

Peter Jackson's production diaries for King Kong have been posted for download using BitTorrent technology. Universal Studios also released footage of its film, "Fast and Furious: Tokyo Drift" with BitTorrent (http://www.bittorrent.com/tokyo_drift.html). Several anime companies have also used BitTorrent technology to release teaser episodes and trailers online for promotional purposes, as a sign of embracing technology that is often seen as a direct competitor. Furthermore, the NASA space agency recently included BitTorrent as a means to download some of their larger space image files.

Legal issues

BitTorrent, like any other file transfer protocol, can be used to distribute files without the permission of the copyright holder, the same as photocopiers can be used to duplicate books. BitTorrent has received some criticism for this ability.

Copyright enforcement

BitTorrent trackers have been frequent targets of raids and shutdowns due to claims of copyright infringement. BitTorrent metafiles do not actually store copyrighted data *per se*, and thus it is often claimed that BitTorrent trackers, which only store and track the metafiles and usually do not share any potentially copyrighted data, must therefore be legal. Despite this claim, there has been tremendous legal pressure, usually on behalf of the MPAA and RIAA, to shut down numerous BitTorrent trackers.

In December 2004, the Finnish police raided a major BitTorrent site, Finreactor.^{[11][12]}

The case is before the courts, and 32 people, in September 2006, mostly administrators and moderators, are facing charges. Software and media companies are seeking damages worth 3.5 million euros in total. Two defendants were acquitted by reason of being underage at the time but they are being held liable for legal fees and compensation for illegal distribution ranging up to 60,000 euros. The court set their fine at 10% of the retail price of products distributed.^[13]

Suprnova.org, one of the most popular early BitTorrent sites, closed in December 2004, supposedly due to the pressure felt by Sloncek, the founder and administrator of the site. In December 2004, Sloncek revealed that the Suprnova computer servers had in fact been confiscated by Slovenian authorities. LokiTorrent, arguably the biggest torrent source after the demise of Suprnova, closed down soon after Suprnova. Allegedly, after threats from the

MPAA, Edward Webber (known as 'lowkee'), webmaster of the site, was ordered by the court to pay a fine and supply the MPAA with logs (the IP addresses of visitors).^[14]

Webber, in the weeks following his receipt of the subpoena, had begun a fundraising campaign to pay lawyers fees in a legal battle against the MPAA. Webber raised approximately US\$45,000 through a PayPal-based donation system. It is unclear how much of that money went to the MPAA, but taking into account the amount of damages he most likely had to pay, probably much of it. Following the agreement, the MPAA changed the LokiTorrent website to display a message intended to intimidate filesharers.^[15] Webber did not comment on this change.

On May 25, 2005, the popular BitTorrent website EliteTorrents.org was shut down by the United States Federal Bureau of Investigation and Immigration and Customs Enforcement. At first it was thought that a malicious hacker had gained control of the website, but it was soon discovered that the website had been taken over by the US government. Ten search warrants relating to members of the website were executed. - Newspaper, Butler Eagle, PA

On October 24, 2005, a 38-year-old Hong Kong BitTorrent user Chan Nai-ming (???, using the handle ????) Lit. *The master of cunning*, while the magistrate referred to him as *Big Crook*) allegedly distributed the three movies *Daredevil*, *Red Planet* and *Miss Congeniality* in violation of copyright, subsequently uploading the torrent file to a newsgroup (See HKSAR v Chan Nai Ming). He was convicted of breaching the copyright ordinance, Chapter 528 of Hong Kong law. The magistrate remarked that Chan's act caused significant damage to the interest of copyright holders. He was released on bail for HK\$5,000, awaiting a sentencing hearing, though the magistrate himself admitted the difficulty of determining how he should be sentenced due to the lack of precedent for such a case. On November 7, 2005, he was sentenced to jail for three months but was immediately granted parole pending an appeal to the High Court.

On November 23, 2005, the movie industry and Bram Cohen, the creator of BitTorrent, signed a deal they hoped would reduce the number of unlicensed copies shared on the downloading network. The deal covered films found via the bittorrent.com website run by BitTorrent, Inc. It meant BitTorrent.com had to remove any links to unlicensed copies of films made by seven Hollywood movie studios. As it covered only the BitTorrent.com website, it is unclear what overall effect this has had on copyright infringement on the network.^[16]

In June 2006, the popular website Newnova.org, an exact replicant of Suprnova, was also subject to closure.

The Pirate Bay is another popular BitTorrent website which was formed out of a Swedish anti-copyright group. The site also contains torrents which point to copies of copyright-protected material. The Pirate Bay is notorious for its "legal" section^[17] in which letters and replies on the subject of alleged copyright infringements are publicly displayed. The replies are written in a humorous manner and a hard copy of one was even sold on eBay for USD \$255. On May 31, 2006, however, The Pirate Bay's servers, which are based in Sweden, were raided by Swedish police; the site owners might be facing charges for copyright infringement or facilitating it according to the accusations on the search warrant. No charges have been made so far. However, after securing new servers in The Netherlands and using a recent backup, The Pirate Bay was back online in less than 72 hours. Recently, The Pirate Bay has returned to Sweden. The return has been facilitated by the public and media backlash against the Swedish Government's actions. The Pirate Bay is now, supposedly, going to counter-sue the Swedish government for millions of Swedish kronor (SEK) lost from having their website shut down.

HBO, in an effort to combat the distribution of its programming on BitTorrent networks, has been sending out cease and desist letters to the Internet Service Providers of BitTorrent users. Many users have reported receiving letters from their ISP's that threatened to cut off their internet service if the alleged infringement continues. HBO, unlike the RIAA, has so far declined to sue anyone for sharing the files.^[18]

Legal defenses

There are two major differences between BitTorrent and many other peer-to-peer file-trading systems, which advocates suggest make it less useful to those sharing copyrighted material without authorization. First, BitTorrent itself does not offer a search facility to find files by name. A user must find the initial torrent file by other means, such as a web search. Second, BitTorrent makes no attempt to conceal the host ultimately responsible for facilitating the sharing: a person who wishes to make a file available must run a tracker on a specific host or hosts and distribute the tracker address(es) in the .torrent file. While it is possible to simply operate a tracker on a server that is located where the copyright holder cannot take legal action, this feature of the protocol does imply *some* degree of

vulnerability that other protocols lack. It is far easier to request that the server's ISP shut the site down than it is to find and identify every user sharing a file on a traditional peer-to-peer network. However, with the use of a distributed hash table (DHT), a tracker is no longer required, although they are often still used so that clients that do not support DHT can still connect to the swarm.

Etiquette

Because BitTorrent relies on the upstream bandwidth of its users — and the more users, the more aggregate bandwidth is available for sharing the files — it is considered good etiquette to leave one's BitTorrent client open after downloading has completed so that others may continue to gain from the file that has been distributed.

It is not clear, however, how long one should leave their client open after downloading has finished. Many trackers/sites ask their users to seed at least 72 hours and/or until a share ratio of 1.0 is reached. Members-only trackers and sites enforce this rule, thus files on these websites have a higher traffic than others, and the torrents on these websites remain active longer than other free torrent sites/trackers. Many clients report the byte traffic upstream as well as down, so the user can see how much they have contributed back to the network. Some clients also report the "share ratio", a number relating the amount of data uploaded to the amount downloaded. A share ratio of 1.0 means that a user has uploaded as much data as they have downloaded. A share ratio greater than 1 means that a user has uploaded more than they have downloaded. It is generally considered good form to at least share back the equivalent amount of traffic as the original file size.

Share ratios are more important on BitTorrent than they are on other peer-to-peer file sharing networks, because many BitTorrent trackers require users to maintain a minimum global share ratio. On some trackers that require users to register, the minimum global share ratio may start at around 0.5 and increase over time, so that the user has adequate time to upload and share their files. Users with a share ratio below the minimum may be put into a restricted "upload-only" mode, where they may not download until their share ratio reaches the minimum.

While it is impossible for all users who download a given torrent to achieve a 1.0 ratio on it (because the net ratio of all users is 1.0 and the original source doesn't download anything), it is more of a guideline to encourage the average upstream of a given network. Some networks, for example, prevent access to new torrents for the first 24-48 hours that the torrent is active to people with overall ratios of less than 1.0 and a certain amount of data uploaded.^[19]

The amount of time the client is left open may be more important than the amount of traffic contributed, since new users attempting to download a file will first need to find peers hosting the file.

Many advanced trackers now track statistics such as how many seeders and downloaders were on a torrent at the time of a user's disconnect as many consider this information more important than just the user's ratio of data downloaded/uploaded.

Limitations and security vulnerabilities

BitTorrent does not offer its users anonymity. It is possible to obtain the IP addresses of all current, and possibly previous, participants in a swarm from the tracker. This may expose users with insecure systems to attacks.^[4]

Another drawback is that BitTorrent file sharers, compared to users of client/server technology, often have little incentive to become seeders after they finish downloading. The result of this is that torrent swarms gradually die out, meaning a lower possibility of obtaining older torrents. Some BitTorrent websites have attempted to address this by recording each user's download and upload ratio for all or just the user to see, as well as the provision of access to older torrent files to people with better ratios. Also, users who have low upload ratios may see slower download speeds until they upload more. This prevents users from leeching, since after a while they become unable to download much faster than 1-10 kB/s on a high-speed connection. Some trackers exempt dial-up users from this policy, because they cannot upload faster than 1-5 kB/s.

BitTorrent is best suited to continuously connected broadband environments, since dial-up users find it less efficient due to frequent disconnects and slow download rates.

New developments

The BitTorrent protocol is still under development and therefore may still acquire new features and other enhancements such as improved efficiency.

In May 2005, Bram Cohen released a new beta version of BitTorrent that eliminated the need for web site hosting of centralized servers known as "trackers". It is now possible to have a torrent up in minutes, with a file, a website, and no understanding of how it works. In addition, Cohen launched a new search service on BitTorrent's website, similar to those found on other popular sites such as The Pirate Bay.

Cohen explained that the tracker removal feature is part of his ongoing effort to make publishing files online "painless and disruptively cheap". The move is only one of several designed to remove BitTorrent's dependence on centralized trackers.

This change is said to cause some trouble in the legal efforts to shut down illegal file sharing. However, Tarun Sawney, BSA Asia antipiracy director, said BitTorrent files could still be identified, since with or without the tracker sites, actual users still host the infringing files.^{[20][21]}

Alternative approaches

The BitTorrent protocol provides no way to index torrent files. As a result, a comparatively small number of websites have hosted the large majority of torrents linking to copyright material, rendering those sites especially vulnerable to lawsuits. In response, some developers have sought ways to make publishing of files more anonymous while still retaining BitTorrent's speed advantage. The Shareaza client, for example, provides three alternatives to BitTorrent: eDonkey2000, Gnutella, and Shareaza's native network, Gnutella2. If the tracker is down, it can finish the file over the other protocols, and/or find new (Shareaza) peers over G2. The use of distributed trackers is also one of the goals for Azureus 2.3.0.2 and BitTorrent 4.1.2. Another interesting idea that has surfaced recently in Azureus is virtual torrent. This idea is based on the distributed tracker approach and is used to describe some web resource. Right now, it is used for instant messaging. It is implemented using a special messaging protocol and requires an appropriate plugin. Anatomic P2P is another approach, which uses a decentralized network of nodes that route traffic to dynamic trackers.

BitTorrent search / Trackerless torrents

Recently, Bram Cohen released his own BitTorrent search engine [1] (<http://search.bittorrent.com/>) , which searches popular BitTorrent trackers for torrents, although it does not host nor track torrents itself.^[22] From software version 4.2.0, BitTorrent also supports "trackerless" torrents, featuring a DHT implementation that allows the client to download torrents that have been created without using a BitTorrent tracker.

Web seeding (unofficial feature)

One recently implemented feature of BitTorrent is web seeding. The advantage of this feature is that a site may distribute a torrent for a particular file or batch of files and make those files available for download from that same web server application; this can simplify seeding and load balancing greatly once support for this feature is implemented in the various BitTorrent clients. In theory, this would make using BitTorrent almost as easy for a web publisher as simply creating a direct download while allowing some of the upload bandwidth demands to be placed upon the downloaders (who normally use only a very small portion of their upload bandwidth capacity). This feature is an unofficial one, created by TheSHADOW, who created BitTornado.^[23] The latest version of the popular download manager, GetRight supports downloading a file from both HTTP/FTP protocols and using BitTorrent.

Broadcatching

Another proposed feature combines RSS and BitTorrent to create a content delivery system dubbed broadcatching. Since a Steve Gillmor column for Ziff-Davis in December 2003, the discussion has spread quickly among many bloggers (Techdirt, Ernest Miller, and former TechTV host Chris Pirillo, for example). As Scott Raymond explained:

"I want RSS feeds of BitTorrent files. A script would periodically check the feed for new items, and use them to start the download. Then, I could find a trusted publisher of an Alias RSS feed, and 'subscribe' to all new episodes of the show, which would then start downloading automatically — like the 'season pass' feature of the TiVo."^[24]

While potential illegal uses abound as is the case with any new distribution method, this idea lends itself to a great number of ideas that could turn traditional distribution models on their heads, giving smaller operations a new opportunity for content distribution. The system leans on the cost-saving benefit of BitTorrent, where expenses are virtually non-existent; each downloader of a file participates in a portion of the distribution. One early adoption of this concept is IPTV show mariposaHD, which uses BitTorrent to distribute large (1-2 GB) WMVHD files of high-definition video.

RSS feeds layered on top keep track of the content, and because BitTorrent does cryptographic hashing of all data, subscribers to the feed can be sure they're getting what they think they're getting, whether that winds up being the latest *Sopranos* episode, or the latest Sveasoft firmware upgrade. (Naturally, however, ensuring that the same data reaches all nodes neglects the possibility that the original, source file may be corrupted or incorrectly labeled.)

One of the first open source attempts to create a client specifically for this was Democracy Player. The idea is already gaining momentum however, with other Free Software clients such as PenguinTV and KatchTV also now supporting broadcatching.

APIs

The BitTorrent web-service MoveDigital has made available an ability to any web application capable of parsing XML through its standard Representational State Transfer (REST) based interface.^[25] Additionally, Torrenthut is developing a similar torrent API which will provide the same features, as well as further intuition to help bring the torrent community to Web 2.0 standards. Alongside this release is a first PHP application built using the API called PEP which will parse any Really Simple Syndication (RSS 2.0) feed and automatically create and seed a torrent for each enclosure found in that feed.^[26]

Encryption

Protocol header encrypt (PHE), Message stream encryption (MSE), or Protocol encryption (PE) are features of some BitTorrent clients that attempt to make BitTorrent hard to throttle. MSE and PE are two names for the same protocol. At the moment Azureus, Bitcomet and μ Torrent, the three biggest BitTorrent clients, support MSE/PE encryption.

Some ISPs throttle BitTorrent traffic because it makes up a large proportion of total traffic and the ISPs don't want to spend money purchasing extra capacity.^[27] Encryption makes BitTorrent traffic harder to detect and therefore harder to throttle. Recently, ISPs have announced possible future hardware upgrades in order to minimize BitTorrent traffic. Several universities have already taken these steps, including the University of Maryland, College Park, Emory University, Brigham Young University, ASU, UTC, and WPI. ISPs sometimes use products such as Allot Inc.'s NetEnforcer to try to throttle encrypted BitTorrent traffic.

Peer exchange

Peer exchange (PEX) is another method to gather peers for BitTorrent in addition to trackers and DHT. Peer exchange checks with known peers to see if they know of any other peers.

Multitracker

Another unofficial feature is an extension to the BitTorrent metadata format proposed by John Hoffman.^[28] It allows the use of multiple trackers per file, so if one tracker fails, others can continue supporting file transfer. It is implemented in several clients, such as BitTornado, KTorrent and μ Torrent. Trackers are placed in groups, or tiers, with a tracker randomly chosen from the top tier and tried, moving to the next tier if all the trackers in the top tier fail.

BitTorrent-related applications

Because of the open nature of the protocol, many clients have been developed that support numerous platforms and written using various programming languages.

Clients

Applications

- Anime fansub communities often use BitTorrent for their releases, and the most popular announce sites like Animesuki and downloadanime.org have RSS feeds.
- Blog Torrent offers a simplified BitTorrent tracker to enable bloggers and non-technical users to run a tracker off their site with the added functionality of letting visitors download a file even if they do not have a BitTorrent client installed by automatically installing a client to download the desired file.^[29]
- GunZ The Duel is a game with built-in torrent client (for in game use).
- Blizzard Entertainment uses a version of BitTorrent in World of Warcraft to distribute patches.
- Popular Linux distributions, such as Ubuntu and Fedora, offer BitTorrent as one of the download methods for installation CDs
- Podcasting is starting to integrate BitTorrent to help podcasters deal with the download demands of their MP3 "radio" programs. Specifically, Juice supports BitTorrent for the RSS 2.0 enclosures that power podcasting.

See also

- Comparison of file sharing applications
- Comparison of BitTorrent software
- Magnet link
- Super-seeding
- BitTorrent tracker
- TBSource and TBDev provide information and help on the TorrentBits sourcecode, a PHP based BitTorrent Tracker.

References

- ↑ Pasick, Adam (November 4, 2004). LIVEWIRE - File-sharing network thrives beneath the radar (<http://in.tech.yahoo.com/041103/137/2ho4i.html>) . Yahoo! News. Retrieved on 2006-05-09.
- ↑ Sevcik, Peter (November 01, 2005). Peer-to-Peer Traffic: Another Internet Myth Is Born (http://www.bcr.com/opinion/next_generation_networks/peer-to-peer_traffic_internet_myth_born_20051101647.htm) . Business Communication Review. Retrieved on 2006-05-09.
- ↑ ^{*a*} ^{*b*} BitTorrent Protocol 1.0 (<http://www.bittorrent.org/protocol.html>) . Retrieved on 2006-05-06.
- ↑ ^{*a*} ^{*b*} Tamilmani, Karthik. Studying and enhancing the BitTorrent protocol (http://mml.cs.stonybrook.edu/home/karthik/BitTorrent/Robustness_of_BT.doc) . Retrieved on 2006-05-06.
- ↑ OpenOffice.org P2P Downloads (<http://distribution.openoffice.org/p2p/index.html>) . Retrieved on 2006-05-09.
- ↑ OpenSUSE Released Version (http://en.opensuse.org/Released_Version) . Retrieved on 2006-05-09.
- ↑ Ubuntu download page (<http://www.ubuntu.com/download>) . Retrieved on 2006-05-21.
- ↑ Warner Bros. to sell films via BitTorrent (<http://www.msnbc.msn.com/id/12694081/>) . MSNBC.com (May 9, 2006). Retrieved on 2006-05-09.
- ↑ SXSW 2006 Clickguide for iPod (<http://2006.sxsw.com/toolbox/schedules/ipod>) . Retrieved on 2006-05-09.
- ↑ Baby shambles official website (<http://www.babyshambles.net/mp3s.asp>) . Retrieved on 2006-05-09.
- ↑ Cullen, Drew (14 December 2004). Finnish police raid BitTorrent site (http://www.theregister.co.uk/2004/12/14/finnish_police_raid_bittorrent_site/) . The Register. Retrieved on 2006-05-09.
- ↑ Police swoop closes down Finland's largest file download site (<http://www.hs.fi/english/article/1101978018778>) . HELSINGIN SANOMAT (16.12.2004). Retrieved on 2006-05-09.
- ↑ First hearings in Finland's largest P2P case (<http://www.afterdawn.com/news/archive/7820.cfm>) . Afterdawn (11.08.2006). Retrieved on 2006-08-14.
- ↑ Court: Hollywood gets P2P giant's server logs (http://news.com.com/Court%20Hollywood%20gets%20P2P%20giants%20server%20logs/2100-1025_3-5571782.html) .
- ↑ LokiTorrent Shut Down (<http://yro.slashdot.org/article.pl?sid=05/02/11/1345253>) .
- ↑ BBC News
- ↑ Legal threats (<http://thepiratebay.org/legal.php>) . The Pirate Bay. Retrieved on 2006-05-09.
- ↑ Letter (<http://tallin.wordpress.com/files/2006/04/Charter%20Letter%20-%20Part%202.jpg>)
- ↑ FAQ (<http://www.torrentbytes.net/faq.php#dl8>) . TorrentBytes. Retrieved on 2006-06-02.
- ↑ LeMay, Renai (May 20, 2005). BitTorrent enemies face new hurdle (http://news.com.com/BitTorrent+enemies+face+new+hurdle/2100-1032_3-5715093.html) . CNET News.com. Retrieved on 2006-05-09.
- ↑ Norton, Quinn (June 2, 2005). May the source be with you (<http://www.guardian.co.uk/online/story/0,3605,1496722,00.html>) . Guardian Unlimited. Retrieved on 2006-05-09.
- ↑ Worthington, David; Nate Mook (May 25, 2005). BitTorrent Creator Opens Online Search





- (http://www.betanews.com/article/BitTorrent_Creator_Opens_Online_Search/1117065427) . BetaNews. Retrieved on 2006-05-09.
23. ^ HTTP-Based Seeding Specification (<http://bittornado.com/docs/webseed-spec.txt>) (TXT). Retrieved on 2006-05-09.
 24. ^ Raymond, Scott: Broadcatching with BitTorrent (<http://scottraymond.net/archive/4745>) . *scottraymondnet*: (Dec 16, 2003).
 25. ^ Main Page (http://torrentocracy.com/mediawiki/index.php/Main_Page) . Torrentocracy wiki. Retrieved on 2006-05-09.
 26. ^ pep.txt (<http://prodigem.com/code/pep/pep.txt>) (TXT). Prodigem.com. Retrieved on 2006-05-09.
 27. ^ Encrypting Bittorrent to take out traffic shapers (<http://torrentfreak.com/encrypting-bittorrent-to-take-out-traffic-shapers/>) . Torrentfreak.com (02.05.06). Retrieved on 2006-05-09.
 28. ^ MULTITRACKER METADATA ENTRY SPECIFICATION (<http://www.bittornado.com/docs/multitracker-spec.txt>) (TXT). Bittornado.com. Retrieved on 2006-05-09.
 29. ^ Blog Torrent and Participatory Culture (<http://grep.law.harvard.edu/article.pl?sid=04/08/26/0236209>) . Retrieved on 2006-05-09.

Bibliography

- Schiesel, Seth (February 12, 2004). "File Sharing's New Face." *New York Times*, link (<http://www.nytimes.com/2004/02/12/technology/circuits/12shar.html?ex=1391922000&en=da75cefbee224928&>)
- Thompson, Clive (January, 2005). "The BitTorrent Effect." *Wired Magazine*, link (<http://www.wired.com/wired/archive/13.01/bittorrent.html>) .
- BBC News (May 13, 2005). "TV download sites hit by lawsuits" *BBC News*, link (<http://news.bbc.co.uk/1/hi/technology/4545519.stm>) .
- BBC News (October 25, 2005). "BitTorrent user guilty of piracy." *BBC News*, link (<http://news.bbc.co.uk/1/hi/technology/4374222.stm>) .
- BBC News (April 13, 2006). "BitTorrent battles over bandwidth." *BBC News*, link (<http://news.bbc.co.uk/1/hi/technology/4905660.stm>) .
- Rietjens, Bob (2005) "Give and Ye Shall Receive! The Copyright Implications of BitTorrent", 2:3 *SCRIPT-ed* 364. link (<http://www.law.ed.ac.uk/ahrb/script-ed/vol2-3/torrent.asp>)
- Roth, Daniel (November 14, 2005). "Torrential Reign." *Fortune*, p. 91–96.
- Pouwelse, Johan (December 18, 2004). "A detailed study of the BitTorrent network." *The Register*, link (http://www.theregister.co.uk/2004/12/18/bittorrent_measurements_analysis/) .

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- Official BitTorrent Inc Website (<http://www.bittorrent.com/>)
- BitTorrent Specification (<http://www.bittorrent.org/protocol.html>)
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