

BitTorrent

From Wikipedia, the free encyclopedia
(Redirected from Bittorrent)

BitTorrent is the name of a peer-to-peer (P2P) file distribution client application and also of a file sharing protocol, both of which were created by programmer Bram Cohen. 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 application was written in Python. Its source code, as of version 4.0, has been released under the BitTorrent Open Source License (a modified version of the Jabber Open Source License). There are numerous compatible clients, written in a variety of languages and running on a variety of computing platforms.



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, ...
Link	Ethernet, Wi-Fi, Token ring, PPP, SLIP, FDDI, ATM, DTM, Frame Relay, SMDS, ...

Contents

- 1 How BitTorrent works
 - 1.1 Creating and publishing torrents
 - 1.2 Downloading torrents and sharing files
 - 1.3 Limitations
- 2 Terminology
- 3 Comparison to other file sharing systems
- 4 Authorized use of BitTorrent
 - 4.1 Software
 - 4.2 Games
 - 4.3 Films
 - 4.4 Music
 - 4.5 Other material
- 5 Legal issues
 - 5.1 Copyright enforcement
 - 5.2 Legal defenses
- 6 Etiquette
- 7 New developments
 - 7.1 Alternative approaches
 - 7.2 BitTorrent search / Trackerless torrents
 - 7.3 Web seeding (unofficial feature)
 - 7.4 Broadcatching
 - 7.5 APIs
 - 7.6 Encryption
 - 7.7 Peer exchange
 - 7.8 Multitracker
- 8 BitTorrent-related applications
 - 8.1 Clients
 - 8.2 Torrent search engines
 - 8.3 Applications
- 9 See also

- 10 References
- 11 External links

How BitTorrent works

The BitTorrent protocol defines a method for advertising and sharing files over a network. BitTorrent is a variation of earlier Peer-to-Peer or P2P protocols which allowed groups of computers to share files with one another, instead of having to access a central repository. BitTorrent incorporates mechanisms to provide greater scalability and reliability than previous P2P protocols such as Gnutella, at the cost of requiring a central list of clients. BitTorrent typically works in conjunction with the TCP/IP stack, meaning it can operate over normal Internet channels.

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. This includes text, audio, video, encrypted content, and other types of digital information.

Creating and publishing torrents

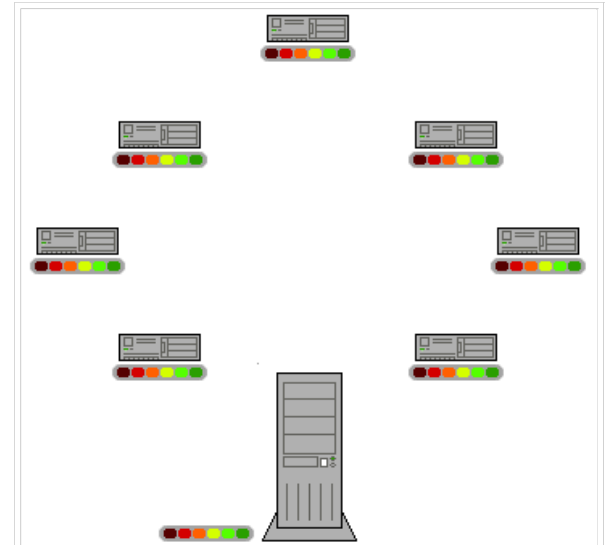
To share a file or group of files through BitTorrent, clients first create a “torrent”. Each torrent contains meta information about the file to be shared, and about the host computer that provides the initial copy of the file. The exact information contained in the tracker file depends on the version of the BitTorrent protocol, however a torrent file always has the extension `.torrent`. Torrent files contain an “announce” section, which specifies the URL of the tracker, and an “info” section which contains a suggested name for the file, fragment size, a key length, file length, and a pass. A single torrent can contain information on one or more files. 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, and it is registered with a tracker. BitTorrent trackers maintain lists of the clients currently downloading the file.^[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 fragments. The BitTorrent protocol breaks down files into a number of small fragments, typically a quarter of a megabyte (256 KB) in size. Larger file sizes typically have larger fragments. For example, a 4.37 GB file will often have a fragment size of up to 4 MB (4096 KB). File fragments are checked as they are received using a hash algorithm to ensure that they are error free.^[4]

As peers enter the swarm, they begin sharing fragments with one another. Because clients share fragments with one another, instead of directly from the seeder, BitTorrent networks easily scale to large numbers of clients. The protocol



BitTorrent greatly reduces network load because it encourages peers, or client computers, to download fragments of files from each other, instead of from a central repository. In this animation, the colored bars beneath each peer represent file fragments. File fragments are initially requested from the original publisher of the file, or the seeder. As peers receive fragments from the seeder, they begin to share them with each other over the peer-network, until every peer has a complete copy of the file.

incorporates mechanisms so that clients choose peers with the best network connections for the fragment they are requesting. One major innovation that adds to the scalability of BitTorrent is the concept of “rare fragments.” The BitTorrent protocol specifies that clients should always request fragments that are the rarest, meaning they are held by the fewest number of clients in the swarm. By requesting the rarest fragments, the BitTorrent protocol ensures that one machine will not be swamped with requests, eliminating potential network bottlenecks.^[5]

BitTorrent also uses a mechanism called “optimistic unchoking” to create a group of “preferred peers.” Preferred peers are a subset of peers in a swarm who are known to offer the most bandwidth. Optimistic unchoking allows BitTorrent to determine which peers should be preferred by periodically testing peers. Peers outside the group are offered a file fragment. If the peer downloads the fragment faster than a peer in the preferred peer group, the new peer displaces the old. This ensures that clients are always downloading from a group of the fastest available peers.^[6]

Limitations

BitTorrent does not offer its users anonymity. Because trackers maintain lists of file sharers, it is possible to obtain the IP address of all current, and possibly previous, file sharers. It is also possible to ascertain the address of peers in the current swarm, meaning peers are open to attack from fellow file sharers.^[7]

Hackers wishing to gain access to another user's system will typically choose the most popular file download of the time (new film release, top ten hit etc) as bait, and will try to pick up on any vulnerable IP addresses open to attack. Not all firewalls may offer protection against this sort of attack.

Another drawback to the BitTorrent model is that file sharers have little incentive to become seeders after they finish downloading. The result of this is that seeds gradually die out as the swarm surrounding them dies out, meaning a lower possibility of obtaining older torrents. BitTorrent excels in continuously connected, broadband environments. Dial-up users find it less efficient however, due to frequent disconnects and slow download rates.

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, when two peers who both have **the same** 50% of the file downloaded and there is one seeder the availability is 1.5).

choked

Describes an uploader to whom the client does not wish to upload. An uploading 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 uploading 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 who 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 that you connect to and transfer

data. Usually a *peer* does not have the complete file, but only parts of it, however, 'peer' can be used to refer to any participant in the swarm (in this case, also known as a 'client'). Note that the "colloquial" definition of peer is anybody, leech or seed, involved in a torrent.

scrape

This is when a client sends a request to the tracking server for information about the statistics of the torrent, like who to share the file with 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*. 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.

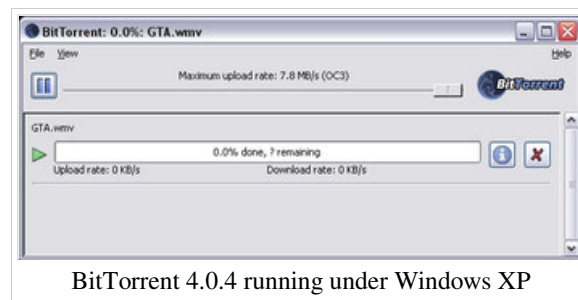
tracker

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 that they can connect to. 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. 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.

A similar method to BitTorrent was the Participation Level introduced in Kazaa in 2002. The Participation Level would increase when you upload and decrease when you download. Then when you upload a file to someone else the person with the highest Participation Level gets it first, then they upload it on to the person with the next highest Participation Level, 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 organisations 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. This has led to a rapid upswing in both the size and quality of material distributed freely online.

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^[8] and most major Linux distributions, including SUSE^[9] and (K)ubuntu ^[10] ^[11]

BitTorrent is also used to distribute updates to the BitTorrent client itself, as well as to other clients such as Azureus and BitComet.

Games

For example, the site <http://www.gameupdates.org> offers 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.

Bram Cohen, the creator of the protocol, was hired in 2004 by Valve Software to develop a means of distributing patches and other content for online video games.

Films

The film studio Warner Brothers Records plans to distribute its films and TV shows using Bittorrent.^[12] 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 besides a centralized server.

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.^[13] Babyshambles, Pete Doherty's band, distributes two collections of music, *Shaking and Withdrawn Megamix* and *Untitled* by Bittorrent from their official website.^[14] In 2005, the rock group Harvey Danger began distributing their third full-length album, *Little by Little...*, using BitTorrent.

Other material

Peter Jackson's production diaries for King Kong have been posted for download using BitTorrent technology. Democracy Now! now distributes its daily television and radio broadcast using BitTorrent technology as well as by podcasting in addition to its traditional cable and satellite distribution. 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. BitTorrent has received some criticism for its ability to distribute copyrighted files illegally.

Copyright enforcement

There have been many cases of BitTorrent sites distributing copyrighted content without authorization being shut down by organizations. Some of these shutdowns are performed by industry associations, such as the MPAA, and some are performed by government organizations.

In December 2004, the Finnish police raided a major BitTorrent site, Finreactor^{[15][16]} The charges have been dropped. 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, 2005, 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).^[17]

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. In news reports, Webber said he would stand up to protect the rights of file sharers, which he did not. 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 files sharers.^[18] 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.

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 pirated movies *Daredevil*, *Red Planet* and *Miss Congeniality*, 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 pirated films 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 pirated 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 net piracy.^[19]

ThePirateBay.org is another popular BitTorrent website which was formed out of a Swedish anti-copyright group. The site contains many torrents which point to copyright protected material. The Pirate Bay is notorious for its "legal" section^[20] in which letters and replies on the subject of alleged copyright infringements are publically displayed. The replies are written in a humorous manner and a hardcopy of one was even sold on eBay for USD \$255. As of May 31, 2006, however, ThePirateBay.org's servers have been raided by Swedish police and the site owners might be facing charges for copyright infringement. (No charges have been made so far) However, after securing new servers and using a recent backup, ThePirateBay.org was back online in less than 72 hours. Some online tech-journals report that ThePirateBay.org is moving its site to Holland.

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.

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 asks their users to seed at least 72 hours and/or until a share ratio of 1.0 is reached. Members only trackers and sites enforces 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 share ratio. On some trackers that require users to register, the minimum 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.

The suggested requirement of a "1.0" share ratio (to upload as much data as you have downloaded - often referred to as "100%" or "1:1") is rather hotly contested given its relative impossibility to achieve for every person. On any given torrent, the best possible outcome is the original seeder with an infinite ratio (having only uploaded data and never downloaded any data), a number of peers with 1.00 ratios (having downloaded the file, uploaded just as much data, and then promptly logged off), and two users with a .50 ratio (the last two having each downloaded a separate half of the file and then shared their half with the other). This is highly unlikely to be achieved due to the very small chance of the last two peers downloading completely opposite halves and finishing just as the last seeder logged off and the fact that not all people will upload the same amount of data they downloaded as some will upload less and others will upload more. Ultimately, a perfect torrent would leave two end users with only a .50 ratio for the torrent, which means every user would have to provide new content at least equal to the portion of data they did not get to upload in the last torrent to maintain an overall ratio of 1.00.

While it is highly unlikely that all users who download a given torrent will achieve a 1.0 ratio on it (because the net ratio of all users is 1.0, if any user uploads past 1.0 some other user will have to sustain a lower ratio), 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.^[21]

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.

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.^{[22][23]}

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 decentralised 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.^[24] From software version 4.2.0, BitTorrent also support "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 TheSHAD0W, who created BitTornado.^[25]

Broadcatching

Another proposed feature combines RSS and BitTorrent to create a content delivery system dubbed broadcastching. 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). In an interview, 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."

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. Also, with a block of bytes that is the same length as a piece in the torrent and has the same digest as that piece, one could irreparably "poison" a torrent. Though the chance of collision is designed to be incredibly miniscule, this possibility could keep some from using BitTorrent for critical files.)

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 broadcastching.

APIs

The BitTorrent web-service Prodigem has made available an ability to any web application capable of parsing XML through its standard Representational State Transfer (REST) based interface.^[26] 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.^[27]

Encryption

Main article: BitTorrent protocol 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 µTorrent, the three biggest BitTorrent clients, support PE/MSE 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.^[28] Instead, ISPs spend money purchasing hardware designed to look for and throttle BitTorrent traffic. 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 Brigham Young University, ASU, and UTC.

Peer exchange

Main article: 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.^[29] 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 and µTorrent. 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

Main article: Comparison of BitTorrent software

Main article: Category:BitTorrent clients

Torrent search engines

- Comparison of BitTorrent sites

Applications

- Comparison of BitTorrent software
- 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 and the desired file.^[30]
- 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.
- 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.
- TBSource and TBDev provide information and help on the TorrentBits sourcecode, a PHP based BitTorrent Tracker.
- Thinkingest is providing
- Magnet link
- Super-seeding
- BitTorrent tracker
- BitTorrent search engine
- BitTornado

See also

- Comparison of file sharing applications
- Comparison of BitTorrent sites
- Research on BitTorrent performance from a client's perspective

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External links

- Bittorrent tutorial (http://wiki.theppn.org/index.php/BitTorrent_Tutorial)
- Official BitTorrent Website (<http://www.bittorrent.com/>)
- BitTorrent Research And Definitions (<http://www.bit-torrent.us/>)
- BitTorrent Specification (<http://wiki.theory.org/BitTorrentSpecification>)
- BitTorrent (http://dmoz.org/Computers/Software/Internet/Clients/File_Sharing/BitTorrent/) in the Open Directory Project
- Interview with chief executive Ashwin Navin (http://streaming.scmp.com/podcasting/upload/News_BitTorrent_june18.mp3)

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