

Brief Introduction to the P2P (peer to peer) BitTorrent System

Informal Note :

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BitTorrent cuts out files in small "pieces".

BitTorrent operates using various software, sites and temporary gatherings.

The set of people, who are trying to get the same file, are called peers, they exchange between themselves pieces which they need respectively, in a participatory fashion.

People who do not wish to, or are unable to give to others, are downloading only with a very low priority.

Those who do possess a complete copy are called "seeds". Those who do not have a complete copy are called "leechers" (slang). The ethics are calling to leave a certain time, as a seed, a file whose download has just been completed. If not, one may be punished. The "swarm" is the set of peers that tries to download the same file.

One may create a "torrent" file (metafile) of a content (video, music or else) file which one has the wish to put at the disposal of other people, without committing oneself in hosting it for a long time time, and having enough bandwidth.

One may use the "torrent" creation utility software, which quite simply calculates a key (a mathematical function which take in entry all the contents) which make it possible to identify in a single way all the pieces of the file. One indicates a plain text name for the file, understandable enough.

One also indicates in the torrent file, the "tracker" site that will oversee the traffic between the various members of the swarm. The traffic is regulated using a rather sophisticated schedule algorithm.

Generally, trackers sites, are using, by default, the port 6969, but one can set up another port.

Tracker sites do not host necessarily torrents metafiles.

To make his/her torrent metafile be known, there are several possibilities: either one submits the metafile to a repository of torrents file, or one posts the metafile on a

mailing list, or still, one may include the metafile in a RSS feed (blog). There are specialized search engines that search for torrents metafiles on sites and blogs all over the Internet. There are also integrated sites for example : LegalTorrents, ThePirateBay, Mininova which combine together the functions of torrents repository as well as tracker by offering a simple submission interface. These integrated sites make it possible to give further useful information on contents and often give also the status of the swarm (numbers of seeds and leechers). Some trackers require registration before being allowed into the swarm.

Before the torrent is announced to the public, one must connect to the swarm with his/her own BitTorrent client, with a complete copy which is a "seed". The torrent is "seeded". Of course, one is all alone at the beginning on his/her own swarm !.

Once that the torrent metafile is known, some peers who read the content title, and who are interested by the content, are going to connect with their BitTorrent client to on the tracker site indicated in the Torrent metafile and then to the swarm identified thanks to the key.

At the very beginning, the first peers are going to mainly download from the first seed. However as soon as some peers have a few pieces, instead of downloading from the first seed, they are going to start to download also from all those concurrently downloading. Therefore, there is a communication between peers, which allows peers to download from one another what they miss respectively. The algorithm is clever enough to maximize transfer and to avoid congestions.

The peers communicate by default on ports 6881 up to 6999. It is thus necessary that your firewall authorizes in/outs for those ports, because if you are a bad leech in the swarm, then other leeches, as expected, shall give you only crumbs !.

Once that the content file is available within several seeds in the swarm, the first seed can even withdraw from the swarm, being honorably discharged from duty. If the content file is sufficiently interesting, the swarm shall continue to live.

If the swarm does not feature any more seeds, it may disappear, but it can reappear if some leechers that have missing complementary parts connect again to the swarm, or if one seed connects again.

Of course, in the case that concerns us, for P2P Television, it will be necessary to keep a few complete seeds, the crucial point is that BitTorrent makes it possible to ensure a world wide network broadcasting without having a very high bandwidth or expensive commercial mirror sites (like Akamai <http://www.akamai.com>).

Links are available in the web page <http://www.p2pscience.org/soft1.html#bittorrent>

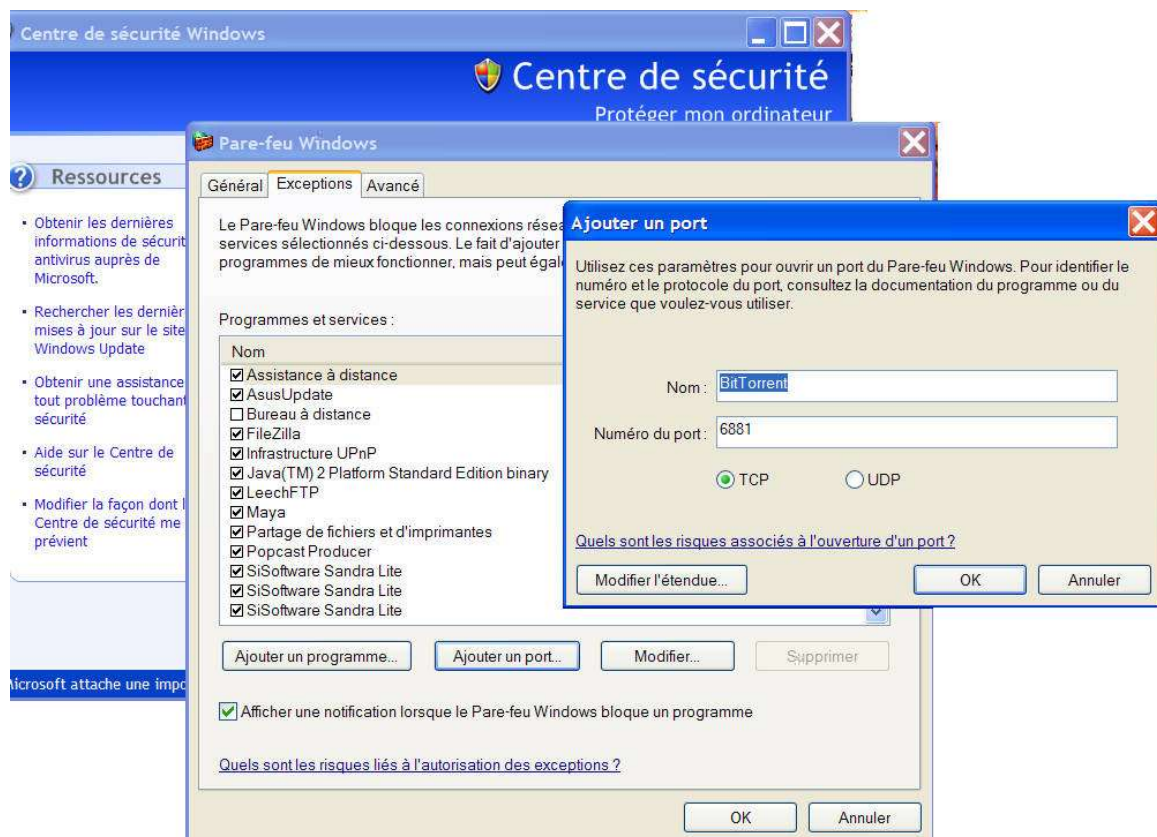
With BitTorrent, the sharing process is really occurring on a worldwide scale, it is quite fascinating. Please find below two screenshots of detailed swarm information provided by the Azureus client, with the geo-localization plugin of IPs addresses. IPs of the swarm members who are known to all the members of the swarm were removed from the picture for privacy reasons.

T	Pieces	%	Down Sp	Up Speed	State	CC	Flag
L		0.0%	0 B/s	0 B/s	Fully established	tt	
L		0.0%	0 B/s	0 B/s	Fully established	pl	
L		0.0%	0 B/s	0 B/s	Fully established	us	
L		0.0%	0 B/s	0 B/s	Fully established	br	
L		1.1%	0 B/s	0 B/s	Fully established	fi	
L		1.3%	0 B/s	0 B/s	Fully established	us	
L		2.4%	70 B/s	0 B/s	Fully established	cl	
L		2.8%	0 B/s	0 B/s	Fully established	dk	
L		4.7%	0 B/s	0 B/s	Fully established	us	
L		4.6%	0 B/s	0 B/s	Fully established	us	
L		6.4%	0 B/s	0 B/s	Fully established	my	
L		6.7%	0 B/s	0 B/s	Fully established	de	
L		7.3%	0 B/s	0 B/s	Fully established	gb	
L		7.8%	0 B/s	0 B/s	Fully established	ca	
L		7.8%	0 B/s	0 B/s	Fully established	gb	
L		11.5%	0 B/s	0 B/s	Fully established	us	
L		16.2%	0 B/s	0 B/s	Fully established	tw	
L		16.6%	0 B/s	0 B/s	Fully established	be	
L		18.9%	0 B/s	0 B/s	Fully established	tw	
L		20.5%	0 B/s	0 B/s	Fully established	us	
L		21.6%	0 B/s	0 B/s	Fully established	pl	
L		22.0%	0 B/s	0 B/s	Fully established	jp	

Unknown 0[-----	L		55.0%	0 B/s	0 B/s	Fully established	ca	
Azureus 2.3.0.	L		55.7%	0 B/s	0 B/s	Fully established	us	
Azureus 2.3.0.	L		57.6%	7.6 kB/s	19.7 kB/s	Fully established	ca	
Unknown 1[-B5	L		64.4%	5.7 kB/s	6.4 kB/s	Fully established	cz	
Azureus 2.3.0.	L		67.3%	0 B/s	0 B/s	Fully established	gb	
Azureus 2.3.0.	L		67.5%	6.2 kB/s	9.6 kB/s	Fully established	gb	
BitComet 0.59	L		69.5%	0 B/s	0 B/s	Fully established	br	
Azureus 2.3.0.	L		74.6%	9 B/s	0 B/s	Fully established	ca	
Azureus 2.3.0.	L		78.9%	15 B/s	0 B/s	Fully established	ca	
Azureus 2.3.0.	L		82.7%	12 B/s	0 B/s	Fully established	se	
Azureus 2.3.0.	L		83.8%	0 B/s	0 B/s	Fully established	us	
Azureus 2.3.0.	L		84.7%	0 B/s	0 B/s	Fully established	fi	
BitLord 1.1	L		88.5%	0 B/s	0 B/s	Fully established	se	
Shad0w 5.8.7	L		88.9%	0 B/s	0 B/s	Fully established	us	
Azureus 2.3.0.	L		94.0%	0 B/s	0 B/s	Fully established	pl	
Azureus 2.3.0.	L		100.0%	2 B/s	0 B/s	Fully established	fr	
Azureus 2.3.0.	L		100.0%	0 B/s	0 B/s	Fully established	dk	
Azureus 2.3.0.	L		100.0%	0 B/s	0 B/s	Fully established	us	
Azureus 2.3.0.	L		100.0%	0 B/s	0 B/s	Fully established	se	
BitComet 0.59	L		100.0%	0 B/s	0 B/s	Fully established	si	
Azureus 2.3.0.	L		100.0%	0 B/s	0 B/s	Fully established	us	
BitComet 0.58	L		100.0%	0 B/s	0 B/s	Fully established	fi	

Unknown 0[---- L	55.0%	0 B/s	0 B/s	Fully established	ca	
Azureus 2.3.0. L	55.7%	0 B/s	0 B/s	Fully established	us	
Azureus 2.3.0. L	57.6%	7.6 kB/s	19.7 kB/s	Fully established	ca	
Unknown 1[-B&L	64.4%	5.7 kB/s	6.4 kB/s	Fully established	cz	
Azureus 2.3.0. L	67.3%	0 B/s	0 B/s	Fully established	gb	
Azureus 2.3.0. L	67.5%	6.2 kB/s	9.6 kB/s	Fully established	gb	
BitComet 0.59 L	69.5%	0 B/s	0 B/s	Fully established	br	
Azureus 2.3.0. L	74.6%	9 B/s	0 B/s	Fully established	ca	
Azureus 2.3.0. L	78.9%	15 B/s	0 B/s	Fully established	ca	
Azureus 2.3.0. L	82.7%	12 B/s	0 B/s	Fully established	se	
Azureus 2.3.0. L	83.8%	0 B/s	0 B/s	Fully established	us	
Azureus 2.3.0. L	84.7%	0 B/s	0 B/s	Fully established	fi	
BitLord 1.1 L	88.5%	0 B/s	0 B/s	Fully established	se	
Shad0w 5.8.7 L	88.9%	0 B/s	0 B/s	Fully established	us	
Azureus 2.3.0. L	94.0%	0 B/s	0 B/s	Fully established	pl	
Azureus 2.3.0. L	100.0%	2 B/s	0 B/s	Fully established	fr	
Azureus 2.3.0. L	100.0%	0 B/s	0 B/s	Fully established	dk	
Azureus 2.3.0. L	100.0%	0 B/s	0 B/s	Fully established	us	
Azureus 2.3.0. L	100.0%	0 B/s	0 B/s	Fully established	se	
BitComet 0.59 L	100.0%	0 B/s	0 B/s	Fully established	si	
Azureus 2.3.0. L	100.0%	0 B/s	0 B/s	Fully established	us	
BitComet 0.58 L	100.0%	0 B/s	0 B/s	Fully established	fi	

Under Windows XP, SP2, for all practical purposes, in order to the ports that are required for BitTorrent, one must first get to the *SECURITY CENTER* after being through *Programs* -> *Accessories* -> *System Tools* , then to the *FIREWALL* at the item *Exceptions*. On must select the button *ADD A PORT*, as illustrated below.



The procedure is similar for other firewalls and Operating Systems. Under GNU/Linux Mandriva, the procedure is a child's play, if one has installed beforehand the official BitTorrent client which is included in the distribution. It suffices to go the *Control Center* > *Security* - > *Firewall*.

Automatically, the firewall is aware that BitTorrent has been installed. It suffices to click a box, as illustrated below :

