Comcast Blockage of BitTorrent 101

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According to an Oct. 19 article by the *Associated Press*, Comcast has been actively degrading and blocking BitTorrent traffic, amounting to "the most drastic example yet of data discrimination by a U.S. Internet service provider."[1] This is the latest and most clear cut incident illustrating the need for "network neutrality" principles for the Internet. This factsheet provides a technological backgrounder on what Comcast is blocking and how the company does it.

The BitTorrent Protocol

BitTorrent is a Peer-to-Peer (P2P) protocol that allows users to quickly download a high volume of data. A user first downloads a program to access these files known as a BitTorrent client. The user then finds a "torrent," which is a miniscule file that serves to point a user's computer in the direction of that file's location. The torrent contains data that identify the file or files to be downloaded and a tracker notifying the computer coordinating such file distribution (many also utilize a trackerless system in which each connected computer acts as a tracker) that another user is interested in obtaining the file. All the rest of the BitTorrent users currently downloading or possessing the file (through keeping their application open, known as "seeding") help transmit small portions of the overall file to the requesting user. As the user begins to acquire portions of the overall file, their computer redistributes the content to other users also requesting the file. The BitTorrent protocol differs from traditional P2P networks where a central server distributes the information to each user, thereby putting all the strain on a single source.

The BitTorrent protocol allows the original content creator to not incur the entire costs of hardware, hosting and bandwidth.[2] The protocol was originally used by system administrators for open source software such Linux Operating system files, which were gigabits in size. While the initial public use of the protocol had been for illegal file sharing of copyrighted materials, many legitimate uses for the BitTorrent protocol arose over time.[3] The reduction in hosting costs and the ability to distribute high quality files at fast speeds is now seen by many in Hollywood as the most efficient way of distributing movies and television shows online. Recent articles in the *Wall Street Journal*[4] and *Forbes*[5] have highlighted this newfound legal application of BitTorrent in the video realm and Wall Street has taken an interest.[6]

Legal Usage of the BitTorrent Protocol

Any Web site offering downloads can utilize the BitTorrent technology to increase service and decrease hosting costs. More and more Web sites are adopting this technology. For example, Amazon.com offers BitTorrent with their Web site management service.[7] Content creators are also able to use this technology to distribute television- and HD-quality video, high-quality music and podcasts.[8]

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[1] http://www.msnbc.msn.com/id/21376597/

[2] http://www.torrentocracy.com/blog/archives/2005/02/getting_to_99_b.shtml In a real world scenario, this means that if a user create an hour long movie and want to distribute it to anyone willing to watch it, she would need to pay a hosting company at a significant cost to store her content and pay it for the upload bandwidth in order for others to download the move. BitTorrent allows the user to pay significantly less and provides as many people as are interested access to it at a faster speed. The more popular a file becomes, the faster the download becomes.

[3] See legal content listed below

[4] ; http://online.wsj.com/article/SB119189097794952908.html.

[5] http://www.forbes.com/home/technology/2007/10/08/brightcove-fox-paramount-tech-cx_ag_1009bittorrent.html

[6] http://money.cnn.com/2007/03/28/commentary/mediabiz/index.htm

[7] http://www.amazon.com/gp/browse.html?node=16427261

Overall, BitTorrent is emerging as the future of online video.[9] Some of the legal applications of the technology include:

Software: Linux Operating systems and patches[10]; World of Warcraft Updates[11], OpenOffice

Legal Music: Sub Pop Records (Postal Service, Iron & Wine); the Libertines; the Babyshambles [12]

Legal Video: Vuze (including agreements with Showtime, BBC, A&E, History Channel, Biography Channel, National Geographic Channel and Starz)[13]; BitTorrent.com (including agreements with 20th Century Fox, Lionsgate, MTV, Paramount, Spike, and WB), Brightcove (Dow Jones, About.com, BET, CBS Corp, Discovery Channel, Buena Vista Int'l), GM, Haagen-Daz, Hearst Corp., New York Times, People, Reuters, Rodale, Showtime Networks, Sony-BMG, TMZ.com, Time, Wall Street Journal), and Joost (Viacom, Hasbro, NHL, Sports Illustrated, Sony Pictures Television, Reuters, MLB)

Podcast: clients include Juice[14] and Miro[15]

How Comcast Blocks BitTorrent

In filings with the FCC this summer, Comcast explicitly stated that it does not block access to video or P2P services.[16] But as reported by Reuters[17], Comcast is using a type of network management service provided by a company called Sandvine to block BitTorrent uploading by its customers.[18] Sandvine's network management technique uses "deep-packet inspection" to limit the actions of Comcast customers. It contains a "redirecting agent" that monitors traffic and limits the number of P2P connection made to external users. Known as "session management," it controls how many (if any) uploads this network operator's users are allowed to have. According to Sandvine, "session management allows service providers to save anywhere from 0 percent up to 100 percent of all upstream traffic". The method for doing this is by sending an exact replica of the requested packet back to both parties that includes a reset command (RST), which then drops the connection. In doing so, Comcast masquerades as one of the end users to send the false reset command. By cutting off uploads with other users, the session management tool also cuts off all potential connections with that user, including downloads. This service essentially tells a Comcast customer that they are not allowed to distribute any information[19] and limits the speed at which they can gain access to information from others.[20] This is particularly damaging to BitTorrent users. BitTorrent encourages users to upload files through a rating system that rewards those users willing to both upload and download files with faster speeds. Users that are blocked by Comcast from uploading are thus inhibited from realizing the full benefits of BitTorrent.

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[8] http://www.vuze.com/Publish.html
[9] http://online.wsj.com/article/SB119189097794952908.html
[10] http://linuxtracker.org; http://software.opensuse.org/
[11] http://www.blizzard.com/press/070111.shtml; http://www.blizzard.com/press/070724.shtml
[12] http://www.bittorrent.com/users/subpoprecords
[13] http://azureus-zudeo.en.softonic.com/
[14] http://juicereceiver.sourceforge.net/overview/index.php
[15] http://www.getmiro.com/create/broadcast/
[16] *See* Comments of the National Cable & Telecommunications Association, WC Docket No. 07-52 (filed June 15, 2007) at 31.
[17] Reuters, "Easing network debate may aid Allot/Sandvine-paper," April 8, 2007, Available at
        http://www.reuters.com/article/companyNewsAndPR/idUSN0826692320070408.
[18] http://www.dslreports.com/forum/r18323368-Comcast-is-using-Sandvine-to-manage-P2P-Connections;
        http://www.dslreports.com/forum/r18972606-UPDATE-Re-Comcast-is-using-Sandvine-to-manage-P2P-Connection
[19] The only potential exception to this is the slim chance that a Comcast customer within your community requests the file.
[20] As described below, your download speed is negatively affected when you do not upload.