

File Sharing's New Face

By Seth Schiesel

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AFTER working for a parade of doomed dot-com startups, a young programmer named Bram Cohen finally got tired of failure.

"I decided I finally wanted to work on a project that people would actually use, would actually work and would actually be fun," he recalled.

Three years later, Mr. Cohen, 28, has emerged as the face of the next wave of Internet file sharing. If Napster started the first generation of file-sharing, and services like Kazaa represented the second, then the system developed by Mr. Cohen, known as BitTorrent, may well be leading the third. Firm numbers are difficult to come by, but it appears that the BitTorrent software has been downloaded more than 10 million times.

And just as earlier forms of file-sharing seem to be waning in popularity under legal pressure from the music industry, new technologies like BitTorrent are making it easier than ever to share and distribute the huge files used for video. One site alone, suprnova.org, routinely offers hundreds of television programs, recent movies and copyrighted software programs. The movie industry, among others, has taken notice.

What Mr. Cohen has created, however, seems beyond his control. And when he was developing the system, he said, widespread copyright infringement was not what he had in mind.

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Rather, he was intrigued by a problem familiar to many Internet users and felt acutely by friends who were trading music online legally: the excruciating wait while files were being downloaded.

"Obviously their problem was not enough bandwidth to meet demand," Mr. Cohen said in an interview at a Mexican restaurant near his home in Seattle. "It seemed pretty clear to me that there is a lot of bandwidth out there, but it's not being used properly. There's all of this upload capacity that people aren't using."

That was the essential insight behind BitTorrent. Under older file-sharing systems like Napster and Kazaa, only a small subset of users actually share files with the world. Most users simply download, or leech, in cyberspace parlance.

BitTorrent, however, uses what could be called a Golden Rule principle: the faster you upload, the faster you are allowed to download. BitTorrent cuts up files into many little pieces, and as soon as a user has a piece, they immediately start uploading that piece to other users. So almost all of the people who are sharing a given file are simultaneously uploading and downloading pieces of the same file (unless their downloading is complete).

The practical implication is that the BitTorrent system makes it easy to distribute very large files to large numbers of people while placing minimal bandwidth requirements on the original "seeder." That is because everyone who wants the file is sharing with one another, rather than downloading from a central source. A separate file-sharing network known as eDonkey uses a similar system.

For Mr. Cohen, BitTorrent was always about exercising his brain rather than trying to fatten his wallet. Unlike many other file-sharing programs, BitTorrent is both free and open-source, which means that those with enough technical know-how can incorporate Mr. Cohen's code into their own programs.

While writing the software, "I lived on savings for a while and then I lived off credit cards, you know, using those zero percent introductory rates to use one credit card to pay off the previous card," Mr. Cohen said.

The first usable version of BitTorrent appeared in October 2002, but the system needed a lot of fine-tuning. Luckily for Mr. Cohen, he was living in the Bay Area at the time and his project had attracted the attention of John Gilmore, the free-

software entrepreneur, who had also been one of the first employees at Sun Microsystems. Mr. Gilmore ended up helping Mr. Cohen with some of his living expenses while he finished the system.

"Part of what matters to me about this is that it makes it possible for people with limited bandwidth to supply very popular files," Mr. Gilmore said in a telephone interview. "It means that if you are a small software developer you can put up a package, and if it turns out that millions of people want it, they can get it from each other in an automated way."

BitTorrent really started to take off in early 2003 when it was used to distribute a new version of Linux and fans of Japanese anime started relying on it to share cartoons.

It is difficult to measure BitTorrent's overall use. But Steven C. Corbato, director of backbone network infrastructure for Internet2, the high-speed network consortium, said he took notice in May. "We started seeing BitTorrent traffic increase right around May 15, 2003, and by October it was above 10 percent of the traffic," he said.

Data for the week of Jan. 26, which Mr. Corbato said was the latest reliable information, showed that BitTorrent generated 9.3 percent of the total data traffic on Internet2's so-called Abilene backbone, which connects more than 200 of the nation's biggest research universities, in addition to laboratories and state education networks. By contrast, no other file sharing system registered more than 1 percent of the traffic, though Mr. Corbato said his network might be underreporting the use of those other services.

Just a few months ago, however, that success still had not translated into dollars for Mr. Cohen.

"This past September I had, like, no money," he recalled. "I was just scraping along and doing the credit card thing again."

But unknown to Mr. Cohen, BitTorrent was serving as a job application. Out of the blue, he heard from Gabe Newell, the managing director of Valve Software, based in nearby Bellevue, Wash. Valve is developing what gaming experts anticipate will be a blockbuster video game, Half-Life 2, but it is also creating an online distribution network that it calls Steam. Because of Mr. Cohen's expertise in just that area, Valve offered him a job. He moved to Seattle and started work in October.

"When we looked around to see who was doing the most interesting work in this space, Bram's progress on BitTorrent really stood out," Mr. Newell said. "The distributed publishing model embedded in BitTorrent is exactly the kind of thing media companies need to build on for their own systems."

All along, Mr. Cohen had accepted donations from BitTorrent users at his Web site, bitconjurer.org, but the sum had been minimal. In October, however, Mr. Cohen's father prevailed on him to ask a bit more directly. Now, Mr. Cohen said, he is receiving a few hundred dollars a day.

"It's been a pretty dramatic turnaround in lifestyle in just a few months, with the job and the donations coming in," Mr. Cohen said. "It's nice."

According to survey data from the Pew Internet and American Life Project, file sharing is on the wane, apparently as a result of the music industry's legal offensive. Last May, 29 percent of adult Internet users in the United States reported that they had engaged in file sharing; that figure dropped to 14 percent in a survey conducted in November and December. Nonetheless, the ranks of the BitTorrent faithful -- whether anime fanatics, Linux users, Deadheads or movie pirates -- appear to be growing. And some are quite thankful to Mr. Cohen.

"I think Bram is going to be like Shawn Fanning in terms of the impact this is going to have," said Steve Hormell, a co-founder of etree.org, a music-trading site that predates the file-sharing phenomenon, referring to the inventor of the original Napster service. "It is a bit of paradigm shift and I can't stress the community aspect of it enough. You have to give back in order to get. Going back 15 years, that's what the Internet was all about until the suits came along."

Not surprisingly, the movie industry is not amused. "BitTorrent is definitely on our radar screen," Tom Temple, the director for Internet enforcement for the Motion Picture Association of America, said in a telephone interview. While the association first became aware of the technology about a year ago, BitTorrent's surging popularity prompted the group to start sending infringement notices to BitTorrent site operators in November.

"We do have investigations open into various BitTorrent link sites that could lead to either civil or criminal prosecution in the near future," Mr. Temple said.

For his part, Mr. Cohen pointed out that BitTorrent users are not anonymous and that their numeric Internet addresses are easily viewable by anyone who cares. "It amazes me that sites like Suprnova continue to stay up, because it would be so easy to sue them," he said. Using BitTorrent for illegal trading, he added, is "patently stupid because it's not anonymous, and it can't be made anonymous because it's fundamentally antithetical to the architecture."

That said, Mr. Cohen is not in the nanny business.

"I'm not going to get up on my high horse and tell others not to do it because it's not my place to berate people," he said. "I just sort of watch it with some amusement."

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