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BITTORRENT: THE GREAT DISRUPTER
Torrential Reign
Bram Cohen's BitTorrent software made it a cinch to pirate
films on the Internet. So why is Hollywood on his side?
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By Daniel Roth

For two years after the dot-com crash, Bram Cohen could almost
always be found at his small dining-room table, first in San
Francisco's Nob Hill and later in Oakland. His long brown hair
would flop in front of his eyes, and he'd curl it back over his
ears as he stared at the screen of his Dell laptop, writing line
after line after line of code. Occasionally Cohen would take
breaks—there was a club to visit some nights, a conference on
coding to help organize, a trip to Amsterdam—but then he'd
return to his wooden chair, his keyboard on his lap, his laptop
propped up on some books, his back perfectly straight (thanks to
posture classes he was taking), and he'd program some more.
First he lived off savings from the handful of jobs he'd worked
during the bubble. When that ran out, he lived off credit cards,
following a rigid system for applying for and transferring debt to
0% introductory-rate cards. Friends would ask what he was
doing. Why wouldn't he just get a job? Cohen shooed them
away. He was determined to solve a puzzle that was consuming
him.

Since the birth of the Net, programmers had been stumped by
how to transfer massive files—movies, TV shows, games,
software, whatever—without incurring astronomical bills or
risking frequent failure. Cohen knew he could find a solution; all
it would take was time, good code, and brute intellect. He had
all three. The money would take care of itself. "I didn't have any
clear plans when I first started," he says. "I wasn't worried,
partially because what I was doing was really cool, and partially
because I'm broken and can't feel anxiety."

Cohen is not being self-deprecating. He never is. The
30-year-old speaks in a disarmingly literal way about almost
everything, including—and because of—his Asperger's
syndrome. Often tagged as the "little-professor syndrome," the
mild form of autism tends to give its sufferers superhuman
abilities to concentrate on certain things but leaves them
confused by very human social cues. "Even those individuals
who have coped well with their handicap will strike one as
strange," wrote one researcher. Cohen's condition is just bad
enough that he has had to train himself to look people in the eye
when they talk to him. But it has worked to his advantage,

enabling him to obsessively turn over the downloading problem in his head.

What he came up with was BitTorrent, a deceptively simple program that has grown into the hottest way to download anything bigger than a music file—from the legal (like militaryvideos.net's amateur videos of the war in Iraq) to the infringing. It makes pirating a copy of the latest movie out of Hollywood a snap. All it takes is a free download of the BitTorrent software—something 45 million people have done—and anywhere from a few minutes to a few days. TorrentSpy, a site unrelated to Cohen that helps people find content available for download, averages more than 600 new BitTorrent files a day. A sampling: Microsoft Office 2003, Alfred Hitchcock's *Rear Window*, episode two of CBS's *Ghost Whisperer* (in high definition, for serious Jennifer Love Hewittians), plus a file containing over 400 *Amazing Spider-Man* scanned-in comics. Those huge files have made BitTorrent one of the biggest forces on the Internet, accounting for more than 20% of its traffic at any one time. That's double the volume generated by the most common Internet activities combined: clicking on web pages, sending and receiving mail and spam, even streaming videoclips.

With great power, of course, comes great enemies, so you can probably guess how it ought to play out. When music-sharing networks Napster and Kazaa rose up earlier this decade, the record labels sued them into submission. Surely BitTorrent will be next—especially now that Hollywood is beginning to feel the pinch as well. Today there are roughly 1.7 million copies of Hollywood movies—typically the most popular ones—being downloaded at any one time using BitTorrent, a 12% jump from last year, according to online media measurement firm BigChampagne. Analyst Informa Telecoms & Media estimates that in 2004, the downloads cost Hollywood roughly $860 million, or 4% of box office receipts. In the same period the number of TV shows downloaded grew by 150%—about 70% of them snagged using BitTorrent. "In the David and Goliath scenario, there really is a David," says Big Champagne CEO Eric Garland. "There's a kid at a keyboard who writes this incredibly disruptive technology."

Yet this time the plot has a twist: the entertainment industry seems to have found a disrupter it might be able to live with. In mid-September the recording industry issued cease-and-desist letters to seven popular downloading-technology companies, including BearShare, LimeWire, and eDonkey (prompting eDonkey's CEO to announce to a Senate subcommittee that he was "throwing in the towel"). BitTorrent was noticeably absent from the assault. It was also MIA last winter when the movie industry went after sites hosting copyright-busting BitTorrent content. Instead of fighting the entertainment establishment, Cohen is courting it. Last July, he met Dan Glickman, president of the Motion Picture Association of America, for drinks at the Peninsula Hotel in Beverly Hills and left him wowed. "He's

obviously a very brilliant guy," says Glickman, who notes that Hollywood understands that it's time to embrace these new technologies. "The opportunities are going to be there to get our content to millions more people."

To understand how Cohen is managing to avoid Hollywood's wrath, you need to get inside his head. More inventor than entrepreneur, he has never claimed to be sticking it to the Man; nor, he insists, has he ever downloaded an infringing file. Napster's Shawn Fanning dreamed of changing the music industry. Cohen couldn't care less. True, in 1999 (pre-BitTorrent) Cohen noted on his website that he "build[s] systems to disseminate information, commit digital piracy, synthesize drugs, maintain untrusted contacts …" He insists it was a parody of dot-commers' revolutionary thinking; the fact that BitTorrent operates without encryption or any attempt to hide its users' activity—downloaders beware!—back him up. Cohen says he created the program simply to … well, he's not sure why. "I wanted to work on something rewarding," he says. And once he was done, he was ready to move on to something new; his father had to twist his arm to build a company out of his work.

Last month venture firm DCM-Doll Capital Management bet that Cohen could indeed make BitTorrent a business, investing $8.75 million in the startup. Now Cohen has to prove himself again, showing that he can thrive not just in the programming world—a place where logic rules and theories can be proved true or false—but in the fuzzy corporate world too, where compromise reigns and intellect doesn't always trump idiocy. "He just has to view the problem of how to be a CEO as yet another thing you can analyze and come to conclusions about," says his father, Barry Cohen, a computing sciences professor at the New Jersey Institute of Technology. "I don't think it's instinctive at all."

On a recent September day, Cohen is sitting in the lobby of the Marriott Wardman Park in Washington, D.C. His Merrell shoes are off, and his Gold Toed feet are digging into the couch as he completes puzzles in *The Book of Sudoku #2* with a big, orange ABC Family channel pen. Hours earlier he keynoted a conference for the companies that control the backbone of the Net. On stage Cohen sat with his legs crossed Indian-style—his shoes again placed neatly in front of him—as he explained the impact of BitTorrent. Now, instead of schmoozing with the attendees, he's happily digging into sudoku: "It's very well balanced at a human level," he explains. "There is a decent-length list of tricks, where if you can do those reliably, you'll solve any sudoku puzzle you come up against."

Cohen often delivers well-thought-out soliloquies on things that come to mind: Over breakfast one morning he weighed in on the difference between home fries and hash browns, why the telecom companies are nearly insolvent, and how the gas pedal of a car has evolved. (He's now trying to get his driver's license

so that he can help with family chores; his wife is pregnant with his third child.) Each is an elegant summary of something that he's clearly picked over in his mind. The insights make his LiveJournal blog a must-read and are often followed by his staccato laugh, which arises from his thin frame without budging it at all. "Each topic you engage with him, he likes to go deep," says David Chao, co-founder of the DCM venture firm. "That's a classic sign of a great mind and a great engineer."

As Cohen was growing up on Manhattan's Upper West Side, his parents saw a great mind but knew that something was off. At 6 months, he entertained himself for hours by simply staring at a wooden block and turning it over in his hands. The first words he learned to read—"goto," "run," and "print"—came from his family's Timex Sinclair computer, which he learned to program when he was 5. It was clear that he excelled in certain areas, but the gap between Cohen and his peers kept growing. "He was always different—socially it wasn't quite as easy for him to make friends," says younger brother Ross, who is BitTorrent's chief technical officer and who is still not convinced that Bram has Asperger's. In fact, that diagnosis is relatively recent. The syndrome wasn't even detailed in the clinician's bible, *The Diagnostic and Statistical Manual of Mental Disorders,* until 1994, a year after Cohen graduated from the elite public Stuyvesant High School.

"I knew I was weird," says Cohen now. "I was pretty frustrated trying to interact with other people. I can really remember lots of stories in my life—things that it's really obvious to me now what was going on, but I didn't realize it back then because I didn't understand people very well." His confusion in social settings made people think he was a rebel or a slacker or both. He almost failed freshman math after he completed the first answer on a test and then refused to do the next 49, declaring that they were simply variations on the first. When I called his school to find out about Cohen's time as co-captain of the math team, the administrator who answered the phone blurted out about Cohen, "What a space cadet!"

Not everyone reached such conclusions. In 1992, Cohen showed up uninvited at a New York University lecture given by Bart Selman, then a researcher at Bell Labs, on an arcane area of computer sciences. Cohen hung around afterward and grilled Selman with dead-on questions; Selman offered Cohen a summer internship typically reserved for college students and had him look at a new class of algorithm employed in software for heavy-duty problems like protein folding or complicated logistics. "We put him on it, and he just went away, and a few weeks later he said, 'Okay, I've got a way to do this 100 times faster,' " says Selman, now a professor at Cornell. "Many scientists—world-renowned people—had thought about it. Bram came in and did something new."

Unfortunately, MIT and other math and science schools cared less about Cohen's wizardry and more about his dismal grades.

He enrolled at the University of Buffalo and dropped out two years later. Selman says he heard from Cohen only once, when the prodigy called to see whether Selman would write a recommendation for Cohen to work at RadioShack. Then the dot-com boom started, and Cohen, recently fired from a job at Kinko's for insubordination, found his way into one web company after another. During that time he would solve one of his biggest puzzles—why he acted the way he did—when he realized after much reading that he had Asperger's. By understanding why he did certain things, and why others did what they did, Cohen could figure out how to get along better in the world. His wife, a former systems administrator whom he married in 2004, has even found an upside to his syndrome: "She actually finds my candor quite charming," he says. The next puzzle, the one that compelled Cohen to sequester himself, is the one that would finally make the world think of him not as a space cadet but as a star.

Before BitTorrent, large file transfers basically operated like the world's slowest Blockbuster. You found someone with, say, a movie or show you wanted by going on Kazaa or searching the Net. Then you waited … and waited … and waited … as bit by orderly bit assembled itself on your PC, if it ever did. Cohen's brainstorm was to break the file into pieces—typically about 1,000—and share the pain of the transfer among many downloaders. The BitTorrent software runs on a user's machine and "talks" to other users who are trying to download the same file, automatically bartering for the pieces they each need (see diagram). The more users, the faster the download. Cohen also filled the program with canny details: For example, when a file first goes up, machines can download chunks only as fast as they upload them, deterring freeloaders who want to receive but not give. The program also always tries to snag the rarest piece of the file first. The idea? The more machines that have that rare piece, the less rare it becomes.

The first real world test of whether the principles would work on any large scale came in 2003, when open-source software company Red Hat released its Red Hat Linux 9 operating system. Demand for the product was so strong that downloaders crippled Red Hat's servers. Eike Frost, a computer science student at Germany's University of Oldenburg, however, had managed to get a copy. He ran it through BitTorrent, then posted a link to popular tech site Slashdot, inviting folks to come and get it. The swarm was immediate. Within three days the Red Hatters traded 21.15 terabytes of data—equivalent to more than all the books in the Library of Congress. At the peak, nearly 4,500 computers were swapping pieces of the file at any one time, uploading and downloading at a rate of 1.4 gigabits each second. Frost estimates that if he had leased a line to handle that much traffic, it would have cost him $20,000 to $60,000. Instead he paid his usual $99 server hosting bill.

Pirates quickly saw the benefit, but so too did some legitimate enterprises. Gamemaker Blizzard Entertainment uses BitTorrent

to distribute the two-gigabyte World of Warcraft game (nearly three CDs' worth of info) and all the patches that go with it. "We have hundreds of thousands, if not millions, getting our game," says Blizzard COO Paul Sams. Sun Microsystems is using BitTorrent to make available its entire Open Solaris operating system to tens of thousands of users and is planning to boost its BitTorrent use as it open-sources all its software over the next few years. Others, like anime film giant ADV Films, have tapped BitTorrent as the best way to spread trailers of films to multitudes of fans at once.

Those are all fantastic votes of confidence, except for one thing: None of the companies has to pay BitTorrent a penny. Cohen created his program under an open-source license, leaving anyone free to tinker with it, distribute it, or use it. "The only payments that BitTorrent accepts are completely optional donations," the BitTorrent site cheerfully notes. The capital infusion from DCM will pay the salaries of the company's 13 employees for now, but it won't ensure the company's long-term survival. Cohen and COO Ashwin Navin, however, have a plan they think will build on the founder's brainstorm.

Navin runs through a verbal sketch of the media industry as he sees it. He's sitting in BitTorrent's office, which for now is a room in a converted warehouse near the old Port of San Francisco. BitTorrent, explains the 28-year-old Navin, has commoditized the most expensive part of the media equation: distribution. Now it has the chance to cash in on the content itself. The company plans to establish a marketplace—part iTunes, part eBay—for bandwidth-intensive content. BitTorrent will host and index any content its creators want to sell (or give away, for that matter). It will generate revenue either by charging sellers a small commission or through related advertising. Until it has built the marketplace, BitTorrent is employing the ubiquitous business model of the Web 2.0 age: In partnership with AskJeeves, it's selling ads against a BitTorrent content search engine that it maintains on its homepage.

Search ads? Online marketplace? The only thing missing is a podcast. BitTorrent was born of programming genius, but its business model seems secondhand. Plus it's late. Google this spring launched Google Video, which allows users to post streams (not downloads, as the BitTorrent site would permit) and, if they wish, sell their content. Even scarier, Google doesn't set size limits on the files it'll host, making BitTorrent's cheap and simple handling of large files more academic than vital. In mid-October, Apple unveiled its long-rumored video iPod and started making some TV downloads and Pixar shorts available through its popular iTunes service. Navin says that the Google and Apple moves are both competition, but that BitTorrent's market will offer much more than just movies and TV shows. Plus, he speculates that Apple is paying "an astronomical price for bandwidth."

Faced with such fearsome competition, the challenge for

BitTorrent isn't one of engineering but of business: It needs to set its service apart. So this summer it retained Fred Davis, the son of recording industry legend Clive Davis and a high-profile entertainment lawyer, to handle discussions with the music industry about securing licenses that would allow BitTorrent to sell everything from albums to videos to high-fidelity tracks that would be too big to simply stick on a CD. "Everybody knows BitTorrent," says Davis. "When I call up and say, 'Let's meet—they want to be legitimate,' we are welcomed at the front door of every company." Navin hints that similar discussions are in the works with Hollywood.

Cohen realizes that it's going to take someone like Navin to keep the company running—Navin's personable to a fault, while Cohen has to work at it—but he doesn't want to have too loose a grip. "Right now I'm the CEO because I don't trust anyone else to be the CEO," he says. To keep things interesting, he focuses on trying to predict the future and on approaching the whole affair as one more puzzle to master. "I really hope to make it possible for a whole lot of content creators to take their stuff online and to make money off it," says Cohen, listing both Google and eBay as corporate role models. Creating such a market would be good for both the creators and for his company, he notes. "But I'm really more proud of making money for other people than for myself. Making money for oneself is not widely considered a high moral goal, though it's an acceptable one."

Almost no one in media or entertainment doubts that the world will move toward digital distribution. And as bandwidth costs drop and the media powerhouses get more tech savvy, the desire to control the pipe to their consumers—middleman be damned—is just too tempting. In one of his last speeches as a Hollywood don, Michael Eisner in late September told his peers: "Don't panic over the latest techno jargon, such as peer-to-peer, Wi-Max, 802.11, BitTorrent. Rather, embrace them." So will BitTorrent walk into the promised land with the moviemakers? Well, that's another matter.

So far, Hollywood has only given BitTorrent a deferred sentence. That's enough for some. Certainly the company's investors are crossing their fingers for something Skype-like to happen: The infant Net-based phone company was recently purchased by eBay for up to $4.1 billion. "I'm a big believer that when the majority of Internet traffic is governed by BitTorrent and they have 45 million users, you're going to be able to monetize that," says DCM's Chao.

But it's far from sure that Cohen's going to stick around to guide the process. Henry Kautz, who worked closely with Cohen at Bell Labs and is now a professor at the University of Washington, isn't convinced that Cohen would mind all that much if BitTorrent doesn't pay off. Last fall the former intern dropped by Kautz's office unannounced to quiz him on an area of computer science called satisfiability testing. The two also got a chance catch up on life since Bell Labs. Cohen talked about

BitTorrent, but he didn't dwell on it, leaving Kautz with a strange feeling. "If BitTorrent was outlawed and went away, I don't think it would hurt him emotionally at all," he says. "He looks at it as a fascinating puzzle that he's figured out."

I told Cohen what Kautz had said, and he paused to think about it, resting his sudoku book on his lap. "It wouldn't leave me emotionally scarred," he says. "I mean, I'm certainly going to try to keep that from happening. But if for some reason the shit hits the fan, you just deal with it. That's the way I've always been." There are, after all, plenty more puzzles out there to be solved.

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