

Peer-to-peer, the Scourge of the
Internet
v2.0, updated edition
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Additions and/or corrections are very welcome

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Introduction

Peer-to-peer software systems are in 2005 thriving on the Internet. This despite public and business concerns over their use. Yet, a sheen of mystique still surrounds these packages. This report seeks to demystify p2p, while providing some firsthand observational data on its use over a period of time.

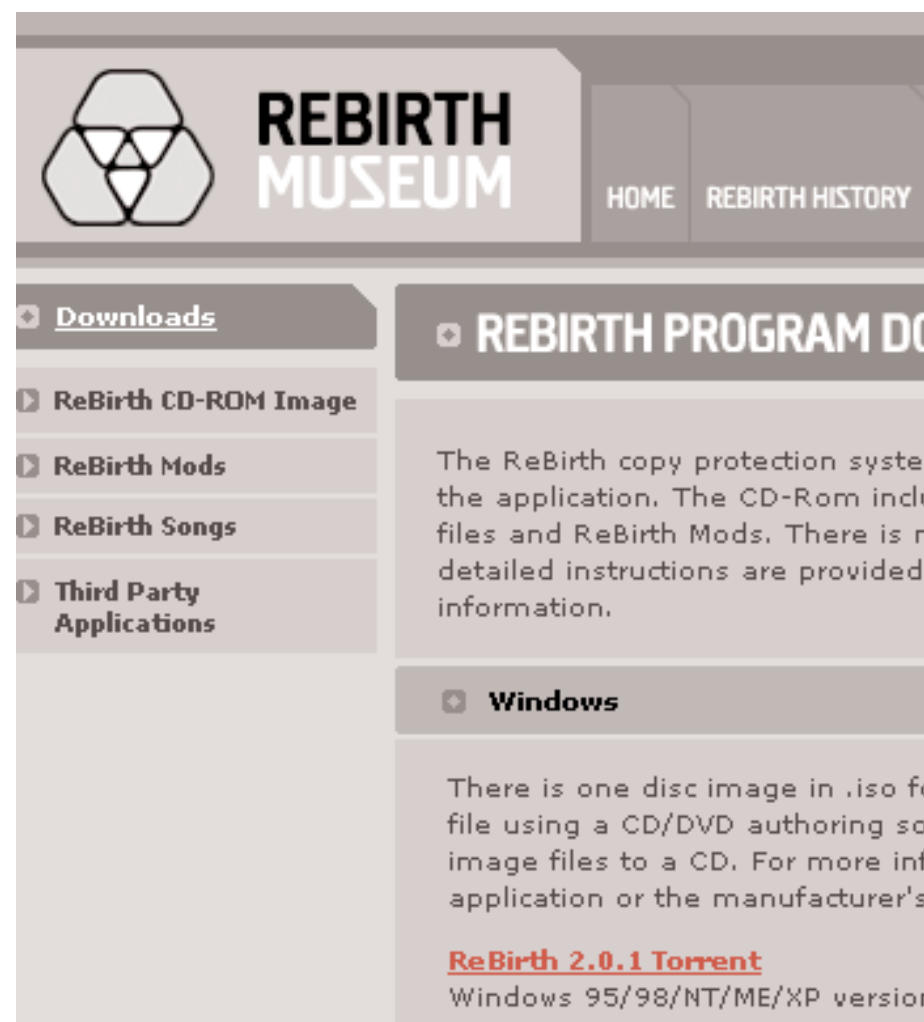
A peer-to-peer system allows computer users across the world to exchange data files without ever having physical contact or exchanging traditional data storage media, such as floppy disks or CDs. The music exchange system Napster is still the best known example of this, although it in its present state hardly exists. There is at present a lot of different implementations of the p2p idea available for users. Common ones are WinMX, Kazaa and e-donkey.

Most p2p clients (the software a user needs to run on his or her own computer in order to connect to the network) are either free or so-called "shareware", software you are supposed to pay for after you have tried it out. This means that getting started with peer-to-peer is in most cases cost-free, and thus available for all users. The user bottleneck is connecti-

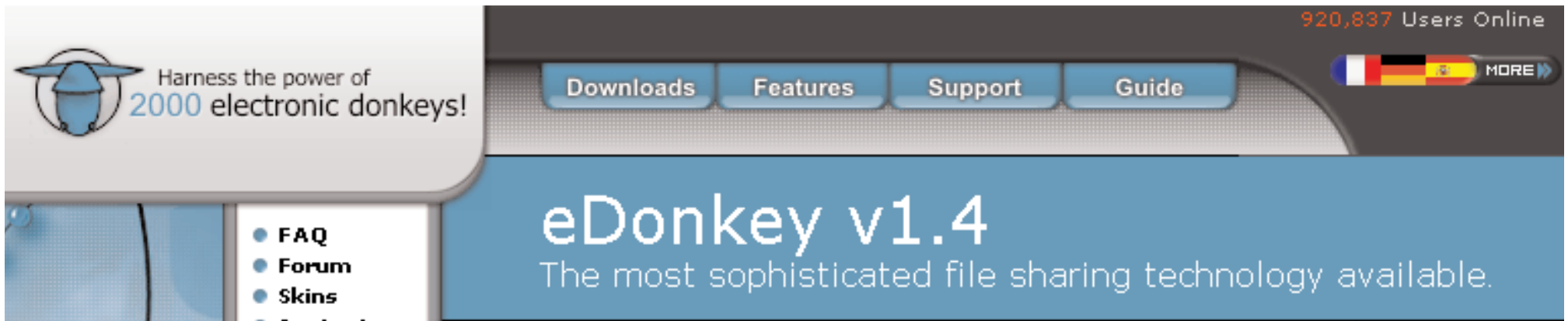
on bandwidth, both in regard to transfer speeds and to cost of connection and speed. Using p2p on a paid dial-up (56k/sec or lower) connection is to all intents and purposes close to useless. This effectively excludes a large portion of current European home users. But this is a minor point, since more and more users throughout Europe and the rest of the world are getting broadband or free dial-up connections. Therefore, the use of peer-to-peer networks is assumed to increase.

In 2005, there has been a shift in p2p usage. So-called Bittorrent systems have close to replaced the more traditional networks for the sharing "enthusiast". BT is very good at distributing popular files to a lot of people in a short period of time. It is not, however, particularly suited to "file archeology", the sharing and distribution of rare/unpopular files.

Example: When software developer Propellerheads (see www.propellerheads.se) decided to give away their old music box software ReBirth338, it was in the form of a approx 250 mb download. After just a few hours, the Propellerheads download site (see www.rebirthmuseum.com) had crashed due to an overwhelming demand for the file. Instead, the company released it through BT, thus spreading the download requests among all the users. This resulted in all users getting the file quickly, while preserving the web site integrity.



The screenshot shows the ReBirth Museum website. At the top left is a logo consisting of three overlapping triangles forming a larger triangle. To its right, the text "REBIRTH MUSEUM" is displayed in a large, bold, sans-serif font. Further right are two navigation links: "HOME" and "REBIRTH HISTORY". Below the header is a main content area. On the left side, there is a vertical menu with a "Downloads" section containing four items: "ReBirth CD-ROM Image", "ReBirth Mods", "ReBirth Songs", and "Third Party Applications". On the right side, there is a section titled "REBIRTH PROGRAM DOCUMENTATION". Below this title, there is a paragraph of text: "The ReBirth copy protection system is a copy of the application. The CD-Rom includes the application files and ReBirth Mods. There is no detailed instructions are provided information." Below this text is a section titled "Windows" with a paragraph: "There is one disc image in .iso format for each file using a CD/DVD authoring software to create image files to a CD. For more information see the application or the manufacturer's website." At the bottom of the "Windows" section, there is a link: "[ReBirth 2.0.1 Torrent](#)" followed by the text "Windows 95/98/NT/ME/XP version".



Description of the project

The project has been running several p2p packages for a six month+ period. It has not tried to initiate or participate in more closed filesharing groups, such as the ones known from the so-called "warez" scene, this to get a picture of what is available and possible for the semi-casual user. The core purpose of the project has been to gather observational data on typical use of peer-to-peer.

The project has not had a statistical focus, this because of its scope. This means that the data gathered consists of realtime user experiences during the project period. The result is an overview of the peer-to-peer universe. This can then be used to tailor-make further investigational and/or statistical studies.

In addition, during 2005 the project has run "traditional" p2p (edonkey/-mule) alongside Bittorrent (BT). BT is a newer file sharing technology that has received a lot of press the last year. It was therefore felt that a closer inspection and inclusion into the report was in order.

Technical information

Peer-to-peer networks work on a de-centralised principle.

This applies to all p2p "dialects", but some are more specialised in this respect. This is an overview of the development of the technology:

File index/catalog	Files	Example
Central server	Central server	ftp
Central server(s)	On user computers	Kazaa
On user computers/ download of indexes from web servers	On user computers	Overnet/Bittorrent

With ftp systems, both the file catalog (file names) and the files themselves reside on the same computer, which must be uniquely identifiable in the network. With the advent of peer-to-peer networks, the file catalog was moved to a distributed system, first to a sub-network of "Supernodes" which enabled a fast search for available files. The files themselves are totally distributed, throughout the network. With the latest generation of p2p, the index is also spread across the whole network.



With the latest invention, Bittorrent, this is yet again a layered situation. The file indexes are distributed, but every downloader needs a short description ("metadata") of the file(s) in question. Most of the time these can be found on dedicated web pages, but they can be shared by any means available, by traditional p2p, USENET, e-mail, or even RSS feeds, something that fits BT very well, given its fresh-file nature. The above can also be viewed as a historical timeline.

This has implications for the potential of the p2p networks, and the possibility/difficulty to control these networks.

Technically speaking, p2p works by operating on pieces of files ("chunks"), not whole files, in turn analogous to the way the Internet itself sends data around. When downloading a file, one doesn't need to start at the beginning, nor get the data in the final file sequence. The whole file is reconstructed only when all the pieces are stored locally on the user computer. A side implication of this is that the sharing possibilities are enhanced; if user A needs piece 8 of a file, and user B might need piece 23, the two users can send the respective pieces to each other (through the p2p network) and both end up with a complete file.

Some p2p systems allow the user to completely shut off outwards sharing, while others require a certain amount of "uploads" to get any "downloads". This is a throwback to the old-school "warez" sharing ftps, where users shared files on ftp servers on a upload/download ratio basis - upload a megabyte, get to download five, for example. Users not uploading ("leechers") are usually shunned and barred from access if possible. Similarly, all the peer-to-peer systems operate on a rating regime, "good uploaders" (= those that have a lot of files in their shared data folders) get a better rating, and are put forward in the downloading queues.

The project has had a constant 100kb net connection. This has enabled substantial up- and downloading. While the uploading has been heavily restricted, for reasons outlined below (See "What are they looking for?"), downloads have been tested at full speed. In order to move forward in the download queue, for testing and simulating a real p2p existence, the uploading has had to be opened up for periods of time. These bursts of file sharing have generally generated more downloads, but also - ironically - strong concerns from the project's system provider, whose alarm bells went off with the increased outwards data stream.

The project has resided behind a firewall, thus preventing most, if not all of the potential dangers to the client computer system itself. This means that such threats will not be dealt with in this document.

What can be found?

In short, any form of digital content can be found on a p2p network. A core finding is that some networks have more of one type of content than others. This means that users searching for several types of content will eventually have to run and operate within more than one network. For example, Kazaa users seem to have specialized in music files (mostly in the MP3 format), while e-mule contains a lot of CD images of movies and software, games and business applications. This of course changes quite rapidly, but underlines the fact that if one uses one p2p system, the chances that one also uses several others is quite high. If you do not find the latest version of the Windows operating system on WinMX, you might search for it on e-donkey2000.

Some content is more prevailing than others. Computer software is of course abundant, but the number one type of content is music, most of the time in the popular MP3 for-



mat. The third type of content that is most easily found, is pornography. For example, when searching for an e-book by Ernest Hemingway, not many results appear, while looking for videos with the Norwegian porn star Tanya Hansen quickly fills up the search window.

During the project, no traces of child pornography/documentation of sexual abuse of children has been found. The project has made no attempts to actively search for material of this kind, but has neither encountered it attached to or hidden within other types of content. This

contradicts reports on this type of material ending up with unsuspecting users. This report makes no statement as to whether this at all happens, but can state that during the six months of extensive use, no such imagery or video has been downloaded by accident.

Other types of sexual material are abundant on the peer-to-peer networks, plainly in sight or even more or less camouflaged. Finding ordinary pornography in picture or video form is very easy, as is similar material on every form of human sexual persuasion, including sexual relations with animals. The project did encounter one example of animal pornography disguised as something else. It should, however, be noted that this one example might be viewed as a strange joke, as it materialized while doing a search for the "Paris Hilton Sex Video", one of the most searched for net items in december 2003. Instead of showing the american hotel heiress' sexual activities, the video did depict humans and animals copulating. The users of e-mule quickly issued a warning, tagging the file with comments like "Fake! Digusting animal porn!", to warn off potential downloaders.

The above observation can be extended to BT systems as well. The project has still not searched actively for content of this type, but can report that no such content has been found, by accident or masquerading as

something else. The BT .torrent web sites (where one usually goes to find content metadata), also function as message boards, where users comment on the content at hand. Example, taken from the file "Drunk sleeping Korean chick gets taken advantage of" (in reverse chronological order, poster names removed):

```
Comments
:
the real question here is: how can you not wake
up when someone fucks you in the ass???
correction, hope you die.
:
You sick fuck. Hope you dies.
:
what fuckin crap this is
:
redmags22, LOL and you do have a point
:
Is there any reason you needed to post this shit
twice on the same page? Idiot.
:
worst crap ever
:
How can a DRUNK and SLEEPING "chick" who is being
taken advantage of be defined as a slut?? I pity
the women in your family!
:
is it worth the downlaod?
:
Rape can never be any fun. Please don't download.
:
Rape can never be any fun. Please don't download.
```

Thus, the message boards do contain an element of self-policing, although at a definitely ad-hoc level.

:: About TorrentPortal

Torrent Portal is a BitTorrent metafile index tracking:

89,122 Torrents with 1,535,229 Peers across 2,579 trackers. We also have 180,235 registered members.

Know your local laws and be sure you are following them.

P2P file sharing technology is completely legal. However, many of the files traded via P2P are copyrighted. Unless you live in Canada, downloading copyrighted material via P2P may put you at risk for a lawsuit. Canadian users are currently shielded from P2P lawsuits. Recently there has been class-action suits filed against users who copy and distribute copyrighted material without regard for the law. The MPAA, RIAA and the governments of both England and Australia have taken several thousand users to court demanding thousands of dollars. Your ISP may, on their own judgment, give their logs of your downloading activity to those who request it. The more you download, the more risk you put yourself at.
Please keep all this in mind before you use any portion of TorrentPortal.

To sum up, one can state that anything can be found on peer-to-peer, but huge amounts of patience and user bandwidth may be required. Finding and downloading one song by Britney Spears might be within the ordinary user's reach, but getting a whole CD needs a fast, cheap and permanent connection. The same applies to software and full length movies, peer-to-peer is not instant. In addition, one needs to keep in mind that even though a file is shown in a file search, it isn't necessarily available. When doing a search - slightly depending on the search structure of each system/client - one is given the availability of at least one part of a file somewhere in the network. It is not even sure that this one piece can be downloaded. When queuing for downloads, one is in constant contact with the network, waiting for the missing pieces. The result is that downloads are not immediate, downloading large files of course more so. Getting a full CD with one of the latest games might take a week or two on a fast connection, all depending on the other users in the network.

What are they interested in?

The project has tried to actively limit the outwards sharing of data. This for a multitude of reasons, including practical, moral and technical. However, to get any information on what all the others are searching for, the project has had to, for limited periods of time, open up for outwards file sharing. This has provided the project with valuable data on the general state of the p2p global network. In addition, as explained in the technical section, some p2p clients require some outwards data sharing to get any incoming files at all.



The United States Supreme Court unanimously confirmed that using this service to trade copyrighted material is illegal. Copying copyrighted motion picture and music files using unauthorized peer-to-peer services is illegal and is prosecuted by copyright owners.

There are legal services for downloading music and movies. This service is not one of them.

Grokster hopes to have a safe and legal service available soon.

As in the previous section, one can quite blankly state that a collected body of users is interested in all sorts of material. If you have an open connection there is always a user out there somewhere that is interested in what is in your Outbox, even if it might be a song by an obscure electronic artist. But a general trend is quite clear. An experiment with putting material from Madonna, Britney Spears, Microsoft, Adobe and generic pornography with file names like "xxx" and "fetish", shows that the porn wins the upload race by a 9 out of 10 margin. Yes, the world wide user base does want to download the latest version of Photoshop or Office package, but ten times as many want to watch pornography.

This can unquestionably be extended to BT networks, with the exception that new releases of popular software packages such as the above mentioned Microsoft Office or Adobe Photoshop will, during the first few days, be the most popular items, alongside worldwide music releases from artists such as U2 and Madonna.

Potential problems

There are three categories of content that is of concern to the society:

- Material that it is illegal to possess, view or display; for example depictions of the sexual abuse of children
- Potentially harmful material; for example sexual or xenophobic imagery
- Material that is protected by copyright laws; for example photographic images or computer software

The project has shown that at least the two latter categories are abundant on peer-to-peer networks.

Can they be stopped?

Whether peer-to-peer systems should be stopped or not, is not a matter for this report. Since there is some concern over these networks, from government, business and public entities, this chapter will outline the possibilities. Peer-to-peer can, as is the case with all other forms of online communication, be controlled through at least four channels:

Legislative

- Can cover all arenas, home, business, national and international
- Can aid the public opinion
- Difficult to enforce, thus eroding the public's respect for the law on a general level

Technical

- Can work in a closed environment, by for example monitoring the data stream to and from a corporation, as in the example above (see "Technical Information")

The WinMX software is no longer available.

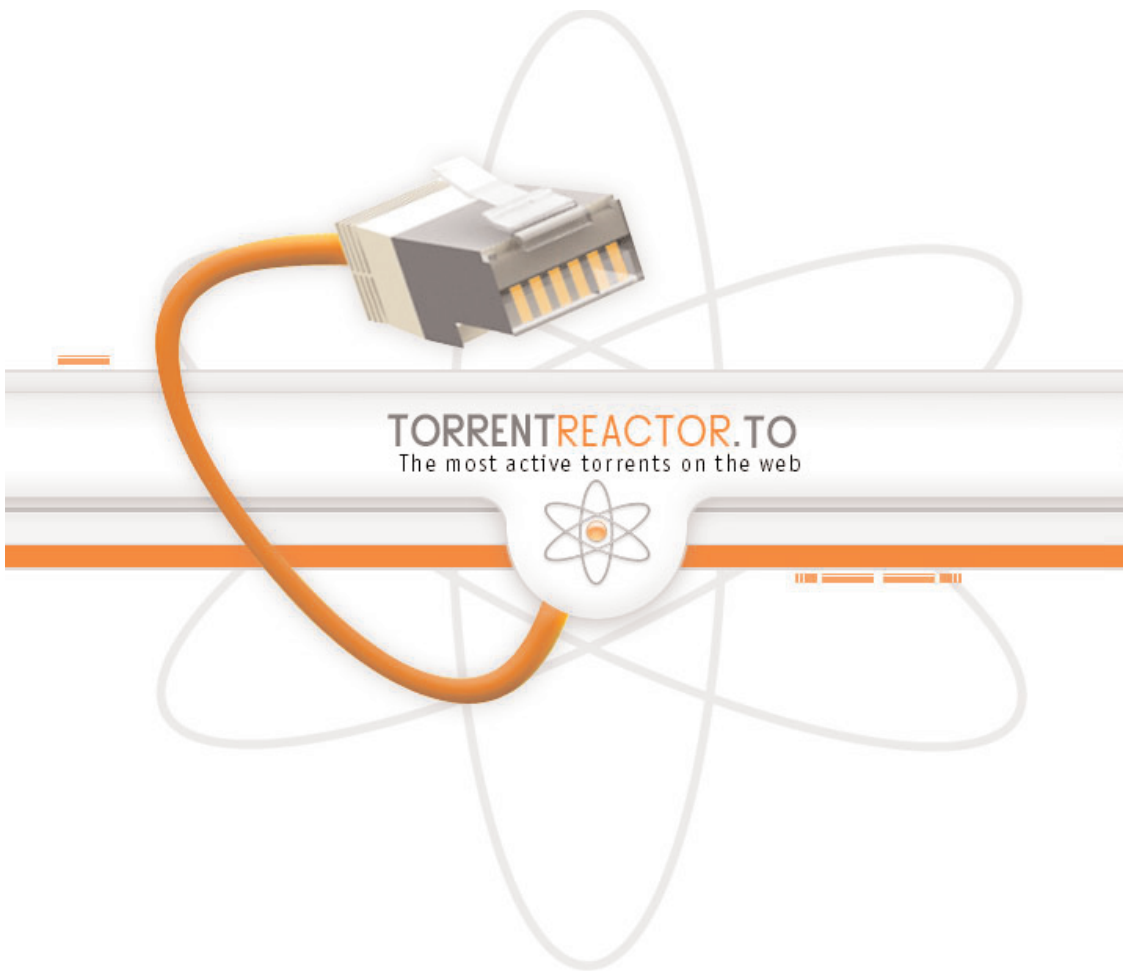
- Very difficult to implement globally, without interfering with user rights

User action

- Peer-to-peer networks can be sabotaged, by for example renaming files or inserting invalid data into the streams
- Sharing users can switch networks
- There might be technical answers to this
- Could be illegal. Data destruction is a felony in several countries, and is the equivalent to the spreading of virii and intrusion hacking

Public/user attitude

- Users can be informed of the legal and moral rights of content producers, thus curbing the sharing of content one does not have the right to share
- Does not require new legislation or technical frameworks
- Even in a best-case scenario, huge amounts of content will still be shared



Conclusions

Peer-2-peer networks are in principle hybrid free-enterprise-communist systems. Participants are all supposed to share, and those sharing a lot also get more back. The core problem is of course the issues concerning the ownership of

and right to actually share the data. This report has no desire to dive into the legal issues surrounding file sharing, them being legally difficult, somewhat unclear and not at all internationally coordinated - regardless of whether this is desirable or not. What this project shows is that:

- Peer-to-peer systems are easy to parttake in
- With a fast connection, most types of digital material is available to the patient user
- The global p2p community is more interested in pornography than anything else
- Those wanting to shut down the p2p networks face both logistical and legal problems

To sum up; p2p systems are here to stay for the foreseeable future, partly because of their inherent simplicity of use, partly because of the mass of content they provide the end user with. There are severe problems connected with them, problems that are not easily solved, neither by law nor technology. Recent events indicate that middle-ground deals between

makers of p2p software and the content industry to some degree might have an impact. It will, however, be quite naive to expect this to solve all problems. Data has a tendency to find its own way, regardless of corporate or governmental agreements. The fork needs to have several prongs.

DIN SIDE
trafikk
sa/teknologi
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PORT.no
TBALL
JLTUR
DIN SIDE
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AGASINET
EBLOGG
ENINGER
.LOGGING.no
trafikk
e/samliv
ratur
kk
stips

BitTorrent-skaperen bøyer seg for Hollywood

Inngikk avtale med filmselskapene i går.

LES OGSÅ:

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- [Her er Norges beste blogger](#)
- [FBI-viruset spres i rekordfart](#)

DIANA BADI

Onsdag 23.11.2005, 11:02

oppdatert 11:58

(Dagbladet.no): Fra nå av slutter [BitTorrent.com](#), den offisielle nettsiden til den populære fildelingsteknologien, å lenke til andre nettsteder som gir mulighet for å laste ned ulovlig filmer.

Ønsker sameksistens

Den 30 år gamle programmereren og opphavsmannen bak BitTorrent, Bram Cohen, inngikk i går en avtale med [Motion](#)



FORHANDLER MED BRANSJEN: Bram Cohen er her avbildet sammen med direktøren i MPAA, Dan Glickman. Begge med den nylig inngåtte