Death by DMCA

By: Fred von Lohmann and Wendy Seltzer

In 1998, U.S. entertainment companies persuaded Congress to make dramatic changes in its copyright code by passing the Digital Millennium Copyright Act. The DMCA gave copyright holders new rights to control the way people use copyrighted material and new protection for technologies designed to restrict access or copying. The movie and record companies argued they needed these new restrictions to fight increased piracy threats in the digital era.

In the eight years since the DMCA's passage, however, piracy has not decreased, and hurdles to lawful uses of media have risen. The Motion Picture Association (MPA), the international arm of the Motion Picture Association of America (MPAA), estimated worldwide losses because of piracy to be US $2.2 billion in 1997 and $3.5 billion annually in 2002, 2003, and 2004.

Meanwhile, entire consumer electronics categories have been wiped from retail shelves. If three or four years ago you didn't buy a digital video recorder that automatically skips commercials, you're out of luck; that feature is not in such products today. Television executives brought litigation that bankrupted the company offering DVRs with these user-friendly features, because skipping commercials potentially undermine their ability to sell commercial time.

You're likewise out of luck if you're looking to buy software that lets you copy a DVD onto your laptop's hard drive; it's no longer for sale, at least not in the United States. Even if you want to put the movie you bought onto a pocket-size video and game console, such as Sony's PlayStation Portable, which allows users to watch video stored on flash memory or a miniature hard drive, you can't legally do so, because you'd have to "rip," or decode, it to make the transfer—and the studios claim that this action violates the DMCA. When you rip a CD, be it to a audiotape or an MP3 file, you're not breaking any laws. But to rip a DVD you need to somehow get around the encryption technology built into a standard disc, and since such circumvention is forbidden by the DMCA, if you rip a DVD, you are breaking a law. Under the DMCA, legality doesn't depend on how the copy will be used but rather on the means by which the digital content is copied.

Now, in an even more vexing situation, U.S. entertainment companies are successfully spreading the copyright code changes established by the DMCA around the world. Laws similar to the DMCA now exist in Japan, Australia, and much of Europe. At least nine additional countries, including Chile, Guatemala, and Singapore have also been pressured to enact DMCA-like laws as part of a devil's bargain with U.S. trade negotiators, who say the copyright change is necessary to secure free trade pacts with the United States that would govern all sorts of commerce. And in Europe, the body charged with defining the European digital television standards is mixing in content-protection obligations, responding yet again to pressure from major U.S. movie studios.

Emboldened by their successes, U.S. entertainment companies are pushing for another wave of even more restrictive legislation. “Broadcast flag” legislation could require that all consumer electronics devices recognize protected television broadcasts and potentially refuse to copy them; a so-called "radio flag" bill would prevent or restrict the manufacture of hard disk recorders for digital radio; and an "analog hole" closure would restrict the connections new digital devices can make with analog devices.

As the entertainment industry expands copyright law, the rising tide threatens to completely wash away many types of innovative gadgets.

Before the passage of the DMCA, entertainment and technology had, for the most part, peacefully coexisted. Laws addressing the use and misuse of copyrighted content targeted "bad actors" rather than complete classes of technology. For example, when songwriters in the 1920s sued radio stations for broadcasting live music performances without paying the songwriters, the lawyers did nothing to the companies that designed and built the broadcast transmitter towers. And in the early 1980s, when videocassette recorders (VCRs)
made it possible for consumers to record television broadcasts, the U.S. Supreme Court, in its landmark Betamax case, ruled that the manufacturers of home video-recording devices were not liable for copyright infringement.

By the 1990s, U.S. entertainment companies wanted not just compensation but control. They went abroad to fight for international treaties that went beyond punishing copyright infringement. These new treaties endorsed copyright-protection technologies and prohibited the circumvention of these technological barriers. Then the companies brought the treaties back home to demand an update of the U.S. Copyright Act. And that brought about the DMCA.

The most controversial of the DMCA’s additions to copyright made it a crime to circumvent “technological protection measures” deployed on copyrighted works. Under the DMCA, these measures mean any technology used to restrict or prevent copying of or access to a copyrighted work. Thus, the DMCA makes it illegal to bypass a password-control system and also prevents working around an encryption scheme that might stop someone from copying a song to an MP3 player. Other DMCA provisions outlaw the distribution of devices that bypass these digital locks.

Copyright is being turned from a limited-term incentive designed to encourage creative artists to a broadly scoped transfer of wealth from the public to the private realm. As the industries that generate copyrighted materials seek control over not only their works but also the devices on which we watch, listen to, and remix them, copyright law is turning into technology regulation.

ReplayTV 4000, an advanced digital video recorder introduced in 2001 by ReplayTV Network Inc., of Cupertino, Calif., was an early victim of the rising legislative tide. Like its competitor TiVo, from TiVo Inc., Alviso, Calif., the ReplayTV recorded television programs to a hard drive and allowed the viewer to watch the show at a later time—the kind of time shifting the Supreme Court approved as a fair use of the Betamax. The ReplayTV had two additional unique features: it could automatically skip commercials, and it could also relay a recorded program to another ReplayTV unit in the home or elsewhere on the Internet.

These new capabilities did not please Hollywood. Jamie Kellner, then CEO of Turner Broadcasting System Inc., called skipping commercials “theft” and, along with 28 entertainment companies including major movie studios and television networks—such as Disney, Paramount, Time Warner, Fox, Columbia, ABC, NBC, and CBS—sued ReplayTV for contributing to copyright infringement. Though the company might have prevailed in the end based on the Betamax precedent, ReplayTV ultimately ended up in bankruptcy before it could have its day in court. The company that rescued ReplayTV from bankruptcy, D&M Holdings Inc., Tokyo, settled the case in 2005 by pledging not to include the commercial-skipping and the show-forwarding features in its future models.

None of the DVRs on the market today, from TiVo, ReplayTV’s successors, or elsewhere, such as from cable companies, offer these features. Although nothing currently stops a technically savvy hobbyist from turning a personal computer with a TV tuner card into a ReplayTV 4000–like video recorder, the legislative tide may soon threaten these tinkerers as well, as we’ll explain.

The DVD, introduced in 1996, quickly became one of the most successful consumer products of all time. It revolutionized the market for home movie viewing and enabled new, portable devices to be created; it also gave rise to new distribution schemes like the Netflix subscription service and its many imitators.

But for consumers, the DVD format left room for improvement. Copy-protection schemes implemented in the DVD format at Hollywood’s insistence made it difficult to reproduce movies, in whole or in part. So DVD owners who wanted to copy a few movies onto a laptop computer for a long trip—and to leave the drive and discs themselves at home—couldn’t. Furthermore, region codes locked discs to specific areas of the world, blocking travelers from picking up new discs or trying foreign selections.

In 1999, a team that included Jon Lech Johansen, a young Norwegian programmer, cracked the DVD copy-protection technology. Johansen explained how to do it on his Web site, and programs soon developed to enable direct copying of a DVD. A group of movie studios complained to legal authorities in Norway, and the Norwegian prosecutor charged Johansen with a crime. The court cleared him after years of legal battles. However, Johansen’s Web site addressed technologically savvy users, not the average consumer looking to make a quick copy of one of the Barney movies.
In 2003, 321 Studios, of St. Charles, Mo., launched a software product named DVD X Copy for these more
typical TV owners. The company built in aggressive measures to prevent piracy, including an antipiracy
splash screen that appeared when viewing any copy and watermarks that would enable copies to be traced
back to those who made them. The management at 321 Studios hoped that these cooperative measures
would stave off Hollywood’s wrath.

The company was wrong. Before the DMCA, 321 Studios would have been on relatively safe legal ground.
From the time of the Betamax case, U.S. courts had made it clear that copying devices were legal so long as
they had any substantial lawful use. But the DMCA changed the rules. When the movie studios sued 321
Studios, the Hollywood contingent did not argue that any of their movies had been unlawfully copied. Instead,
it said that the product circumvented a “technical protection measure,” which in this case was the Content
Scramble System (CSS) on DVDs.

The CSS is the scheme Hollywood uses to encrypt movies on DVDs. Decryption requires a key, which
manufacturers of DVD players obtain by signing a license with the DVD Copy Control Association, a
consortium of movie studios, including Fox and Warner, and technology providers, such as Intel and Toshiba.
This license, in turn, forbids licensed devices from making digital copies of DVD content or from offering
playback modes that the studios disapprove of. (DVD recorders can copy only unencrypted digital material,
such as home movies.) The licensing rules and DMCA put companies like 321 Studios in a quandary. If they
signed the license in order to obtain the CSS decryption keys, the document prohibited them from using those
keys in software capable of copying a DVD. If they didn’t sign the license and forged ahead anyway, deriving
the CSS keys on their own, they risked prosecution or a civil suit under the DMCA for circumventing the CSS.

After consideration, 321 Studios opted to go forward without a license. The DMCA quickly washed away DVD
X Copy. After the movie studios prevailed in court in 2004, manufacturers pulled DVD X Copy and similar
ripping tools off the U.S. market.

Though DVD-copying software has been swept off U.S. retail shelves, plenty of it escaped to higher ground.
Freeware DVD-copying applications like DVD Shrink, MacTheRipper, and HandBrake wander the Web. To
escape the Hollywood hunters, most live on Web servers located outside the United States.

Unencumbered digital television tuners are a bit higher up on the beach, yet they represent another
class of products that may be eliminated by legislation. These peripherals slip into a computer’s PCI card slot
or hook up to a USB port to enable it to receive digital television broadcasts, turning a PC into a TV or video
recorder. The cards, which cost from $100 to $350, came to market in 2004 from a variety of manufacturers,
including ATI, Dvico, Elgato, and pCHDTV. With a tuner card, a hobbyist can build his or her own DVR.

The entertainment companies do not like the flexibility of these home-built machines—or, more significant to
them, the flexibility of the machines that consumer electronics manufacturers could offer under the current
copyright law and its Betamax rule.

Envisioning a world in which copyrighted works are indiscriminately distributed on the Internet, the
entertainment industry looked for ways to force limitations into the design of these devices. Hollywood went
first to the U.S. Federal Communications Commission (FCC) to demand a “broadcast flag mandate,” that is,
a requirement that every device capable of receiving digital television broadcasts incorporate restrictions
against redistribution of those programs. Such a law would give Hollywood a say in the design of all the new
hardware consumers would need to make DTV work. The mandate would require devices capable of receiving
over-the-air DTV signals to detect and respond to a flag, known officially as the Redistribution Control
Descriptor, in the broadcast stream. The flag indicates that the owner of the rights to the transmission has
imposed restrictions on its copying or redistribution. The mandate required that the technology designed to
detect the flag and implement the restrictions be embedded in every tuner that has digital outputs.

Hollywood lobbyists actually convinced the FCC to impose broadcast flag regulations in 2003, but a U.S. Court
of Appeals found that the Commission lacked the authority to regulate the internal workings of televisions.
Hollywood is now asking Congress to give the FCC that legal authority by passing the Audio Broadcast Flag

If Congress does enact these broadcast flag regulations, existing tuner cards will ignore the flag, but it will be
unlawful to manufacture any new cards without the feature. Products that would have to be redesigned in
response to the flag mandate would include the wide variety of inexpensive tuner cards available today, as
well as TV hard disk digital recorders, DVD recorders, and any other hardware or software that would make it
possible to receive or view digital broadcast television. The broadcast flag law would force designers of
tomorrow’s digital television devices to either implement one of a limited list of approved content-protection
technologies to restrict flagged broadcasts or hire lawyers to seek FCC approval for any newly developed
content-protection mechanism. Neither option would ensure backward-compatibility with existing
high-definition television systems or interoperability with the other digital media equipment consumers might have
already purchased. These requirements would inevitably mean higher costs for technology developers and
would handicap the introduction of new features. And all this would happen without stopping those who are
truly determined to redistribute HDTV programming.

Like the DMCA’s provisions, broadcast flag legislation, if established in the United States, is likely to
proliferate around the world.
Hollywood is no longer waiting for products to actually be invented, manufactured, and shipped to retailers before trying to bar them from the market. Instead, the entertainment industry has already begun attacking some consumer electronics devices before the manufacturing process begins. That's happening to products that would give consumers the ability to record digital radio in the same way we "TiVo" television shows.

In the United States, 3000 FM broadcasters have committed to augmenting their traditional analog AM and FM broadcasts with digital signals using a technology called In-Band On-Channel Digital Audio Broadcasting, more commonly called HD Radio, which debuted around 2004. Some 700 of these stations already have HD Radio on the air. Europe has deployed a similar digital radio system. HD Radio promises increased fidelity for AM broadcasts and increased capacity for FM broadcasts: using digital radio, broadcasters could transmit as many as three compressed digital programs in the same width of spectrum that supports only one analog program today, albeit at lower fidelity than with analog FM.

For decades, music fans have been recording analog music from radio broadcasts. The recording industry never liked this home taping, and in the 1970s and early 1980s it repeatedly tried but failed to convince legislators to tax analog tape. In 1991, the music industry took the issue to the courts, suing to block the first digital audio tape recorders, asserting that digital music is different from analog because digital copies are as good as the originals, whereas analog copies are not. Congress brokered a compromise between the music industry and the consumer electronics manufacturers and enacted the Audio Home Recording Act of 1992. Among other items, the law resolved the question of taping off the radio, making it clear that analog taping for noncommercial use was perfectly legal but digital taping would be legal only if the recording devices and blanks included a small royalty, for example, 3 cents on a $1.00 recordable audio CD, payable to the music industry. The law also required that covered digital audio recorders include a primitive copy-control system known as the Serial Copy Management System.

With the advent of HD Radio, the recording industry wanted to reopen the issue. The industry, represented by the Recording Industry Association of America (RIAA), is trying to renege on the bargain struck in the Audio Home Recording Act, in which it agreed to accept the royalty in exchange for permitting digital radio recording. The RIAA is urging the FCC and Congress to impose design restrictions on any future HD Radio recorders to stave off a successful new mutation: a digital hard disk recorder that allows easy and flexible archiving of radio broadcasts. As similar devices have appeared for satellite radio, the recording industry has also begun pushing for legislation to restrict them, such as S. 2644, the Platform Equity and Remedies for Rights Holders in Music (PERFORM) Act of 2006, introduced by Sen. Diane Feinstein (D-Cal.).

The restrictions sought by the RIAA would prevent users from storing individual song tracks, searching by title or artist, or creating playlists. What the RIAA wants, according to documents it filed with the FCC, are digital recorders that record only in segments at least 30 minutes long. This action would prevent users from splitting the 30-minute segment into individual songs or skipping to the beginnings of songs. Limitations such as these would make off-the-air recordings less desirable and therefore, the industry hopes, prevent them from cutting into record sales, and they would also deny users key benefits of the new technology.

The industry argues that the regulations should also require that recordings be cryptographically bound to the recording device, thereby making them nontransferable to iPods, MP3 players, or computers. Further, the regulations should also limit the use of metadata—that is, identifying information that may supplement the audio file—and so deny users the convenience of setting up devices to record only favored artists or genres. In essence, these rules would force future digital recorders to ape the analog cassette recorders of decades past. The regulations would ban all "noncompliant" recorders from the marketplace.

The good news for radio fans is that the recording industry’s proposal met with a chilly reception both at the FCC and at a Senate hearing this past January. The bad news is that the recording industry continues to push hard for it.

While some gizmos in the eye of the storm are exotic or newly evolved, one is, today, as common as a house cat. This is the type of device that transforms analog signals into digital ones: the analog-to-digital converter.

The MPAA has made plugging the "analog hole" a top legislative priority. The concept is simple: most of
today's digital entertainment devices, whether they are DVD or CD players, hard disk recorders like TiVo, or television tuners, have analog as well as digital outputs. The analog outputs include composite video (a single yellow RCA jack), component video (a trio of RCA jacks, usually green, blue, and red), and S-video (a multipin jack). These jacks let consumers easily connect modern digital products to home entertainment devices that predate the digital era. Hundreds of millions of consumers worldwide use these jacks to enjoy DVDs and other digital media without having to run out and replace all their existing consumer electronics.

New and emerging products are increasingly encrypting their digital outputs. The list includes DVD-Audio players and the new Blu-Ray Disc and HD DVD players, the much-hyped high-definition successors to DVD players, the first examples of which are just reaching the market. In contrast, device designers can't encrypt or scramble analog outputs, at least not if they intend the products to continue to work with older devices. This means that users can freely record and manipulate analog signals, using an old VCR, for example.

Nevertheless, what really bothers Hollywood about standard, unencrypted analog interfaces is that it cannot use licensing to impose restrictions on the makers of analog devices; unlike digital devices, most analog interfaces do not need decryption keys. If such interfaces are eliminated, however, then when analog devices wear out and consumers replace them with digital devices, Hollywood will have tighter control over the evolution and interconnection of consumer entertainment technologies than it did in the analog era.

Hollywood, therefore, is going on the attack against devices that convert analog content to digital. This category covers an incredibly broad array of products, from basic components found on RadioShack shelves to fully formed gadgets ubiquitous in the marketplace. For example, for just a few hundred dollars consumers can buy video capture cards and use them in their personal computers to digitize old home movies. With a video capture card, you can make a copy of a movie for your video iPod, excerpt video for a school project, or take a clip to remix with your own footage.

In an attempt to put an end to all that, Hollywood has drafted the Digital Transition Content Security Act, introduced as H.R. 4569 in December 2005 by Reps. F. James Sensenbrenner Jr. (R-Wis.) and John Conyers Jr. (D-Mich.). This legislation, better known as the Analog Hole Bill, would impose a design mandate on any "analog video input device that converts into digital form an analog video signal."

The act would require digital recorders, video capture cards, and other devices that can convert analog signals into digital data to detect and respond to two different analog signaling technologies. One of them, the Copy Generation Management System for Analog (CGMS-A) would set a flag in a television transmission that would identify whether or not the show being broadcast has copy restrictions on it. If it does, the flag would identify the generation of the recording and the number of times it could be copied: not at all, once, or some preset number. The television broadcaster would transmit this identification during the video-blanking interval of the analog transmission, that moment in which the electron gun that paints the pixels on a television screen jumps from the bottom to the top. The second signal, called Video Encoded Invisible Light (VEIL), would be inserted into the video picture itself and, like CGMS-A, would not be visible to the eye. Originally developed to trigger responses by toys to daytime cartoons, VEIL would operate as a backup for CGMS-A and would be present in every content-controlled broadcast. If a device covered by the legislation detected a VEIL signal without accompanying copy-control information, the mismatch would tip off the device that the copy-control flag had been stripped or tampered with.

Hollywood is going on the attack against devices that convert analog content to digital

The Analog Hole Bill is Hollywood's attempt to control an even broader range of devices than the DMCA does. The chips used to convert video from analog to digital are in today's digital cameras, camera phones, and personal media players. A host of future new devices are likely to include this basic technology. The Analog Hole Bill would require that all these products incorporate content-protection technologies certified by federal regulators and include hardware and software to block any end-user modifications. The days of hardware "tweaking" would end. The legislation would also dictate the kinds of video outputs permitted, potentially orphaning generations of older products, including television sets, stereo speakers, and VCRs. Such legislation, combined with other laws already passed and pending, would lead to a world in which federal regulators, not creative engineers, would dictate many product features and design decisions. In place of the new era's digital developments, Hollywood's vision takes us back to the Stone Age.

Hollywood is good at telling stories. The one it has been screening in Washington—that music and movies will perish if the regulators don't kill the dangerous gizmos first—is powerful drama but has about as much basis in reality as Lord of the Rings. Killing off gizmos and subjecting technological development to the whims of federal regulators will ultimately hurt not just consumers but also tomorrow's creative industries—both technology and entertainment.

About the Author

FRED VON LOHMANN is a senior staff attorney with the Electronic Frontier Foundation, a nonprofit group based in San Francisco that is devoted to protecting civil liberties and free expression in the digital world. He handles various areas of litigation involving copyright and new technologies, and he advises policymakers about the importance of protecting the public interest when enacting intellectual property laws and regulations.

WENDY SELTZER is a visiting professor of law at Brooklyn Law School, where she teaches Internet Law and Information Privacy and writes about free speech online. Previously, she was a staff attorney with the Electronic Frontier Foundation. As a fellow with Harvard Law School's Berkman Center for Internet & Society, Wendy founded and leads the Chilling Effects Clearinghouse (http://www.chillingeffects.org), which helps
Internet users understand their rights in response to cease-and-desist threats.

**To Probe Further**


Deep Links ([http://www.eff.org/deeplinks](http://www.eff.org/deeplinks)), the official blog of the Electronic Frontier Foundation, follows legal and policy issues surrounding copyright, digital rights management, and the Digital Millennium Copyright Act.


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### Sidebar 1

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DMCA Brings Good Things to Life

Few single pieces of legislation have done more to spur technological innovation and expand the supply of movies and other entertainment than the Digital Millennium Copyright Act (DMCA).

When Congress passed the DMCA in 1998, neither consumers nor innovators in the technology and entertainment industries imagined that just eight years later people would be viewing movies and TV shows on their computers, their video iPods, their PlayStation Portables, and even their cellphones. During these years, innovators were not only able to imagine new ways to provide movies to consumers but were also able to deliver them. They could do so because they knew that the products of their creativity would be protected from theft and abuse by a fair set of rules.

The DMCA put into law a common-sense proposition: that it is wrong to break through technical “locks” that keep digital content from being stolen or to market devices that do so. The DMCA gave innovators and creators an effective means of protecting themselves against thieves who try to beat the system by unlawfully making copies and redistributing movies and other entertainment.

Perhaps the best example of the innovation that the DMCA is bringing home to consumers is the DVD. DVD players are the most successful consumer electronics devices in history. Since the passage of the DMCA, tens of millions of consumers have enjoyed a wide variety of entertainment in this high-quality format. We at the Motion Picture Association of America (MPAA) attribute the triumph of the DVD directly to the DMCA, because in providing some protection against unbridled theft, the DMCA empowered entertainment companies to release their products in digital format.

Although critics have accused the DMCA of damping technological innovation and preventing the “fair use” of copyrighted works, recent history supports the opposite conclusions. (“Fair use” is a legal concept that permits the reproduction of copyrighted works for certain purposes without permission or payment.)

Rather than discouraging innovation, the DMCA has fostered an innovative environment that has given consumers greater access to movies, TV shows, and other copyrighted material than ever before, advancing new technologies as well as new business models.

The DMCA recognizes the historical importance of fair use. In fact, under a DMCA requirement, the U.S. Copyright Office is conducting its third investigation into fair use practices. It has found no evidence to support claims that the DMCA diminishes consumers’ ability to fairly use copyrighted materials.

Although the DMCA has greatly expanded consumers’ viewing choices, threats to the future expansion of these choices still remain, especially in the realm of over-the-air broadcast television. Cable and satellite subscription services can protect their high-quality programs from being illegally copied and infinitely transmitted over the Internet, but over-the-air broadcasters cannot. The broadcast signal must be unprotected so that all consumers can receive it on their existing televisions. Congress can help ensure the future growth of viewing choices for over-the-air viewers by enacting “broadcast flag” legislation. This law would allow broadcasters to invisibly protect their programs from copying and redistribution in the same way that satellite and cable providers do, so broadcasters will not be forced to limit new television programs to fee-based subscription services to make them safe from theft.

But neither protecting digital programs nor inserting broadcast flags in analog programs is enough to ensure that everyone enjoys the benefits of new and expanding entertainment options. As we make the transition to the digital television, we must keep in mind that the majority of U.S. consumers still use analog TVs. Therefore, digital programs still must be converted into analog for viewing on these nondigital TV sets. When such programs are converted back to digital, say, for use with a DVD recorder, they lose their original digital protections and are exposed to unlimited illegal copying and redistribution. It is not hard to understand why producers would choose not to expand viewing options in a realm with such vulnerability to theft.

Hence, we at the MPAA are urging Congress to enact the “Analog Hole” legislation. This law can help ensure that consumer choices are not undermined by the risk of theft—by laying out simple rules of the road for programming and equipment.

While these issues remain to be resolved, the DMCA and related legislation have fostered a climate of unbridled innovation and development and an explosion of consumer entertainment choices. No one exposed to today’s video marketplace could possibly argue that consumers do not have more and better viewing choices now than they did before the DMCA. Enacted on the eve of the 21st century, it has truly ushered in a digital millennium of incredible achievement and infinite promise.
—Fritz Attaway,
Executive Vice President and Special Policy Advisor, Motion Picture Association of America