

Who Killed TiVoToGo?

Digital Cable and Satellite DRM Harms TV Fans and Innovators

It's the latest digital media murder mystery: TiVo Series2's TiVoToGo¹ enabled limited portability of recorded content to PCs and other devices, but the TiVo Series3 HD did not include this feature when recently released.² In other words, if you want to upgrade to HD, you have to downgrade your TiVo's features.

You don't need to be Sherlock Holmes to guess that this story somehow involves Hollywood, the FCC, and "digital rights management" (DRM) restrictions. The Electronic Frontier Foundation (EFF) has opposed these restrictions every step of the way, and, in this article, we'll explain digital cable DRM's sordid history, how digital cable and satellite DRM may affect you, and what you can do to fight back.

In short, get ready for copying limits on cable and satellite content that won't stop "Internet piracy"³ but will stop you from making legitimate use of lawfully acquired content. You'll be forced to only buy devices with limited features, and restricted digital outputs could break compatibility with your current HD displays and receivers, even though you may have already invested thousands of dollars in them. Innovators will have to beg permission before inventing new digital devices that help you get more from your satellite and cable content.

Unfortunately, TiVoToGo's disappearance is just the tip of the iceberg.

DRM in the Digital TV World

Remember, Hollywood tried to stamp out Digital Video Recorders (DVRs) when they started to become widespread, loudly railing against digital recording⁴ while suing DVR-maker ReplayTV into bankruptcy.⁵

Fortunately for TV fans, independent DVR makers have not had to get permission to help you record standard definition quality TV. In fact, all technology developers are free to use typical analog connections to help you create restriction-free, digital copies of over-the-air, cable, and satellite TV content.⁶ Furthermore, cable providers have had to offer the basic analog tier⁷ in unencrypted form,⁸ allowing users to hook up any TV device without worrying about proprietary set-top box compatibility. Anyone can also create DRM-free devices for over-the-air HDTV received via antenna, despite Hollywood's pushing for government mandated "broadcast flag" restrictions.⁹

But restrictions may apply when it comes to receiving cable and satellite TV through digital inputs and making HD quality recordings. Cable and satellite providers are held hostage to Hollywood's demands for DRM.¹⁰ If a service provider refused to do Hollywood's bidding, the studio oligopoly could decide to solely provide content -- and thus a huge advantage -- to competitors that are willing to implement DRM.¹¹ The service providers might also have independent reasons for wanting to control customer behavior in certain ways.

DRM gives Hollywood and these service providers a veto over innovation. With the Digital Millennium Copyright Act (DMCA)¹² in effect, technology developers like TiVo cannot lawfully build devices that receive content through digital inputs and unlock the DRM unless they get permission to do so.

DRM in Action: CableCARD, TiVoToGo's Demise, and Beyond

So how was the FCC involved in this "voluntary" licensing process? The Telecommunications Act of 1996 requires¹³ the FCC to clear the way for useful, competitive alternatives to your cable company's proprietary set-top box while still ensuring that you can't get channels like HBO without paying for them. This was a laudable goal, because proprietary set-top boxes annoy customers and hold up innovation, creating a maze of incompatibility. These proprietary boxes could also help facilitate a race to the bottom -- in trying to curry favor with Hollywood, each cable company would have an incentive to ratchet up DRM requirements for set-top box-compatible devices.

In the "Plug and Play" proceedings, the FCC required¹⁴ all cable companies to make available CableCARDS,¹⁵ which enable anyone to offer an alternative to set-top boxes. The CableCARD is slotted into a compatible device like a TV or a DVR, and then that device acts as a set-top box. Inter-industry agreements force anyone who wants to create a CableCARD-compatible device to get licensed through a private organization jointly run by cable companies called CableLabs.¹⁶

Unfortunately, Hollywood intruded into the FCC's proceedings in order to ensure that CableCARD-compatible devices incorporated DRM. With the FCC's blessings, CableLabs' license can require DRM.¹⁷

And that's how TiVoToGo for Series 3 HD met its maker. As TiVo's website suggests,¹⁸ CableLabs has yet to permit TiVo to implement TiVoToGo in the CableCARD-compatible Series 3 HD. TiVo must first create a set of restrictions that satisfies CableLabs, and, if it cannot, the feature will remain extinct.¹⁹ Hollywood has openly wanted to rein in TiVoToGo,²⁰ and any revived version will be more limited than its predecessor. Again, if Hollywood and cable companies had originally obtained such a veto power over the DVR itself, TiVo might never have been born.

TiVoToGo's disappearance is just one concrete example of the harm that digital TV restrictions can cause. Among other things,²¹ CableLabs requires that devices obey certain copying controls. For instance, if Hollywood tells the cable company to mark a show as "allow only one generation of copies," then your CableLabs-approved digital devices have to obey.²² The license requires restricted digital outputs (e.g., HDMI/HDCP and DTCP), so that content can only be transferred to or displayed on devices that obey DRM.²³ Devices must also be capable of purposely reducing resolution of programming ("down-rezzing") when using HD analog outputs.²⁴

Even if you use your cable company's set-top box instead or opt for satellite TV, you won't be able to escape DRM. In fact, innovators may face even worse DRM requirements when attempting to interoperate with these proprietary receivers. Satellite providers' conditional access devices can also include DRM, and each satellite provider can set its own set of DRM requirements in its license.²⁵ Similarly, as discussed above, each cable provider can define its own restrictive licensing requirements for set-top box compatibility.

Limits on DRM

On the bright side, the FCC "Plug and Play" proceedings also put certain caps on how bad the DRM can get from both cable and satellite providers.²⁶

First, no copying restrictions can be put on any unencrypted over-the-air broadcast content carried via cable or satellite, including shows like *Lost*, *24*, *Desperate Housewives*, and *The Office*. Satellite and cable providers must allow at least one generation of copies for "pay television, non-premium subscription television, and free conditional access" programming, though they can prohibit all copying of video-on-demand, pay-per-view, and subscription-on-demand programming.²⁷ Of course, these caps provide only a little comfort; since the time of the VCR, TV fans have been technically able to time-shift using a device of their choosing and copy recorded content to any other device. Now those abilities can be taken away.

Second, the FCC prohibited use of "selectable output control,"²⁸ a technology that allows cable or satellite providers to block certain outputs on a program-by-program basis. For example, by blocking the analog outputs on which many existing digital devices rely, cable and satellite providers could force you to use DRM-restricted outputs or buy an entirely new set of DRM-laden devices.

Finally, the FCC prohibited "down-rezzing"²⁹ of over-the-air content carried via cable or satellite. Like selectable output control, down-rezzing can be employed to encourage use of restricted digital outputs instead of unrestricted analog outputs. Unfortunately, the FCC left the door open for down-rezzing of other programming.³⁰

As noted above, anyone is also free to build a DRM-free device for recording and receiving broadcast over-the-air HDTV via antenna,³¹ rather than by cable or satellite. EFF, Public Knowledge, and a coalition of groups mounted a successful legal challenge to the FCC's "broadcast flag" DRM mandate. Congress has not reinstated it, though several proposed bills backed by Hollywood would do so.³²

Fight Back Against Digital TV DRM

So that's what you have to look forward to in the brave new world of HD. TiVoToGo is one endangered -- perhaps extinct -- gizmo. Many more novel uses may never be invented under these restrictions.

Still, there are some actions you can take to fight back:

1. Don't let cable companies block competition with proprietary set-top boxes.

<<http://action.eff.org/cablecard>>

The real solution to DRM's harm here is to reform the DMCA and revisit the "Plug and Play" proceedings. However, it is important to recognize that while DRM for CableCARD-compatible devices is bad enough, digital cable DRM as a whole could be even worse. As long as customers can forgo cable providers' set-top boxes and switch to alternative CableCard-compatible devices instead, the providers' set-top box DRM requirements can be kept in check by competition; CableLabs' licensing restrictions could essentially act as a ceiling. Starting on July 1, 2007, the FCC's "integration ban" will in effect oblige cable companies to rely on CableCARDS for the conditional access functions in their own set-top boxes.³³

But now cable companies are trying to hold CableCARD back, killing competition and squeezing even more money from customers by forcing them to rent proprietary boxes. Along with frustrating customers' attempts to get CableCARDS,³⁴ the cable providers are petitioning the FCC to delay the "integration ban" for a third time.³⁵ They insist that a superior technology to the CableCARD is right around the corner,³⁶ but in the meantime customers are being denied the useful, competitive alternatives to proprietary set-top boxes that the Telecommunications Act of 1996 was intended to produce.

Take action now and tell the FCC to reject cable companies' dragging their feet on competitive alternatives to proprietary set-top boxes.

<<http://action.eff.org/cablecard>>

If your cable company frustrates your attempt to get a CableCARD, submit your complaint to the FCC here:

<<http://svartifoss2.fcc.gov/cib/fcc475.cfm>>.

Let us know about any problems by writing to hdtvdrm@eff.org, too.

2. Don't let Congress "plug the analog hole."

<<http://action.eff.org/blockhole>>

Though it is less convenient and you will lose picture quality, you can still use typical analog inputs to make DRM-free, digital copies of recorded content. For instance, you can use DVRs to record satellite or digital cable TV through analog inputs at standard definition quality. But that will be restricted if Congress passes "analog hole" legislation.³⁷

3. Don't let service providers violate the FCC's DRM rules.

<<http://www.eff.org/IP/pnp/filecomplaint>>

The FCC imposed some limits on DRM, but it is hard to determine the extent to which the service providers are abiding by those rules. For example, in its first review of the TiVo Series3 HD,³⁸ CNET had trouble using the analog output to save content to a VCR or a DVD recorder. Was this a random technical glitch, or could it have been a purposeful use of selectable output control in violation of the FCC's ruling? The answer is not clear.

If you run into any problems like this, submit complaints to the FCC here:

<<http://svartifoss2.fcc.gov/cib/fcc475.cfm>>

In addition, remember that FCC rules say that basic tier cable must be provided in unencrypted form. **While the FCC declined to clarify whether that regulation applies to digital cable, you should file a complaint if you face such restrictions using the URL above.**

Let us know about your problems, too, by writing to hdtvdrm@eff.org.

4. Support DMCA reform.

<<http://action.eff.org/site/Advocacy?id=115>>

But for the DMCA, the DRM stranglehold wouldn't be nearly as bad. The DMCA limits your ability to circumvent certain DRM for non-infringing uses. Moreover, it restricts third-parties -- in particular, ones that aren't bound by the cable and satellite providers' restrictive licensing agreements -- from distributing new technologies that strip the DRM. DMCA reform could lift these limits; at the same time, circumventing to obtain access to cable content you haven't paid for could still be prohibited, and that already was restricted even before the DMCA under "theft of service" laws.

5. Keep over-the-air HDTV DRM-free

<<http://action.eff.org/broadcastflag>>

Remember that broadcast HDTV is still DRM-free, so long as Congress does not reinstate the broadcast flag mandate. If you run into DRM on over-the-air HDTV, let us know about the problems by writing to hdtvdrm@eff.org.

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¹ <<http://www.tivo.com/4.9.4.1.asp>>.

² See TiVo's website <<http://www.tivo.com/2.0.3hdDvr.faq.asp#8>> as well as CNET's review <http://reviews.cnet.com/TiVo_Series3_HD_DVR/4505-6474_7-32065631.html>.

³ For why they won't, see <http://www.eff.org/IP/DMCA/DMCA_against_the_darknet.pdf>.

⁴ Some executives went as far as to equate "stealing" with skipping commercials and, by analogy, getting up to go to the bathroom without permission: <<http://www.eff.org/effector/HTML/effect15.15.html#II>>.

⁵ For case documents: <http://www.eff.org/IP/Video/Paramount_v_ReplayTV/> and <http://www.eff.org/IP/Video/Newmark_v_Turner/>.

⁶ For cable and satellite, this can sometimes involve a few additional, relatively simple steps -- see, e.g., <<http://customersupport.tivo.com/knowledge/root/public/tv1024.htm?>>>.

⁷ 47 CFR 76.901, <http://www.access.gpo.gov/nara/cfr/waisidx_04/47cfr76_04.html>.

⁸ 47 CFR 76.630, <http://www.access.gpo.gov/nara/cfr/waisidx_04/47cfr76_04.html>.

⁹ Learn more at <<http://www.eff.org/IP/broadcastflag>>.

¹⁰ EFF Senior Staff Attorney Fred von Lohmann offers a more detailed explication of the oligopoly's power over the service providers as well as unencrypted analog cable's impact on innovation in April 2003 "Plug and Play" comments to the FCC, <<http://www.eff.org/IP/broadcastflag/20030430-fcc-reply.pdf>>.

¹¹ EFF urged the FCC to clarify that existing rules already require basic tier digital cable to be provided in unencrypted form, <http://www.eff.org/IP/broadcastflag/pnp.php?f=20030328_fcc_cable-ce_comments.html> and <<http://www.eff.org/IP/broadcastflag/20030430-fcc-reply.pdf>>. However, in its October 9, 2003 "Plug and Play" ruling, the FCC declined to clarify the regulations, <http://www.eff.org/IP/broadcastflag/FCC_PnP_Ruling.pdf> (at 10).

¹² Learn more about the DMCA here: <<http://www.eff.org/IP/DMCA>>.

¹³ 47 U.S.C. 549, <http://www.law.cornell.edu/uscode/uscode47/usc_sec_47_00000549----000-.html>.

¹⁴ 47 CFR 76.1200-1210, <http://www.access.gpo.gov/nara/cfr/waisidx_04/47cfr76_04.html>.

¹⁵ For general info on CableCARDs, see <<http://arstechnica.com/guides/other/cablecard.ars>>.

¹⁶ <<http://www.cablelabs.com/>>.

¹⁷ See the FCC's September 18, 2000 ruling,

<http://www.eff.org/IP/broadcastflag/pnp.php?f=20000918_fcc_hdtv_rule.html>. The FCC can review petitions regarding changes to the license's compliance and robustness rules as well as CableLabs' decisions to reject new outputs and associated content protection technologies, see the October 9, 2003 ruling <http://www.eff.org/IP/broadcastflag/FCC_PnP_Ruling.pdf> (at 34-36).

¹⁸ <<http://www.tivo.com/2.0.3hdDvr.faq.asp#8>>.

¹⁹ In 2003 comments to the FCC, EFF predicted that this specific harm would occur, <http://www.eff.org/IP/broadcastflag/20030328_fcc_cable-ce_comments.pdf>.

²⁰ During the FCC's separate "broadcast flag" proceedings regarding over-the-air HDTV DRM, the studios argued that TiVoToGo should only be permitted with draconian restrictions. For instance, restricting sending shows to other devices on the same subnet was "insufficient security"; see MPAA's comments, <http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6516284434> (at 12).

See also Rob Pegoraro's article in the Washington Post describing the incident,

<<http://www.washingtonpost.com/wp-dyn/articles/A29428-2004Jul31.html>>.

²¹ The DFAST license, laying out the restrictions, can be found here:

<http://www.cablelabs.com/udcp/downloads/DFAST_Tech_License.pdf>. More specifications can be found at: <<http://www.cablelabs.com/udcp/>> and <<http://opencable.com/specifications/>>.

²² The DFAST license states that copying restrictions can be specified in four discrete ways: copy once, copy no more, copy never, and copying not restricted; see Exhibit A, Section 6.1.1, and Exhibit B, Section 3, <http://www.cablelabs.com/udcp/downloads/DFAST_Tech_License.pdf>. Note that "copy once" permits a recording to be made and then moved off of a recording device onto another compatible medium, but the original recording device's copy must be rendered "unusable," see Exhibit B, Section 3.5.2, <http://www.cablelabs.com/udcp/downloads/DFAST_Tech_License.pdf>.

²³ See Exhibit B, Section 2.4, <http://www.cablelabs.com/udcp/downloads/DFAST_Tech_License.pdf>.

²⁴ See Exhibit B, Section 2.3, <http://www.cablelabs.com/udcp/downloads/DFAST_Tech_License.pdf>.

²⁵ For instance, DirecTV's HD DVR has USB, Ethernet, and SATA outputs for transferring copies of recorded shows to other devices a la TiVoToGo, but these outputs are inactive; see CNET's review, <http://reviews.cnet.com/DirecTV_HR20_HD_DVR/4505-6474_7-32065196.html#more>.

²⁶ For the FCC's ruling, <http://www.eff.org/IP/broadcastflag/FCC_PnP_Ruling.pdf>.

²⁷ 47 CFR 1904 <http://www.access.gpo.gov/nara/cfr/waisidx_04/47cfr76_04.html>.

²⁸ 47 CFR 1903 <http://www.access.gpo.gov/nara/cfr/waisidx_04/47cfr76_04.html>.

²⁹ 47 CFR 1904, <http://www.access.gpo.gov/nara/cfr/waisidx_04/47cfr76_04.html>.

³⁰ If a service provider wants to activate down-rezzing, they must provide at least 30 days notice, <http://www.eff.org/IP/broadcastflag/FCC_PnP_Ruling.pdf> (at 29). The FCC initiated another proceeding to determine rules for down-rezzing on non-over-the-air programming, but that proceeding has yet to conclude. For EFF's comments,

<http://www.eff.org/IP/broadcastflag/pnp.php?f=eff_fcc_comments.html>.

³¹ You can learn how to build your own here: <<http://www.eff.org/IP/broadcastflag/?f=dlf.html>>.

³² To learn more, <<http://www.eff.org/IP/broadcastflag>>.

³³ 47 CFR 76.1204, <http://www.access.gpo.gov/nara/cfr/waisidx_04/47cfr76_04.html>. To be more precise, the ban requires conditional access and other functions to be separated. The cable companies have unsuccessfully challenged the ban in court. For the decision in *Charter Communications Inc., and*

Advance/Newhouse Communications v. FCC,

http://www.cesweb.org/shared_files/edm/2006/govalert/DCCircuitAdvanceNewhousevFCCOrder081806.pdf#search=%22Charter%20Comm.%20Inc.%20and%20Advance%2FNewhouse%20Comm.%20v.%20FCC%2C%22; see also News.com's story about it

http://news.com.com/Cable+companies+lose+round+in+CableCard+battle/2100-1033_3-6107359.html.

³⁴ See, e.g., <http://blogs.pcworld.com/staffblog/archives/002768.html>,

<http://www.consumerfury.com/twcraleigh072506.aspx>, and

<http://www.nytimes.com/2006/07/03/technology/03cable.html?ex=1309579200&en=4051c7b474d19c71&ei=5088&partner=rssnyt&emc=rss>. In filings before the FCC, the Consumer Electronics Association (CEA) and cable providers have disagreed over who is responsible for failures to support CableCARD --

see, e.g., National Cable & Telecommunications Association's (NCTA) recent filing,

http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6518382202, and CEA's response,

http://gullfoss2.fcc.gov/prod/ecfs/retrieve.cgi?native_or_pdf=pdf&id_document=6518423713.

³⁵ NCTA Request for Waiver (August 16, 2006) <http://www.ncta.com/DocumentBinary.aspx?id=467>.

Verizon and Charter have recently filed petitions for waivers.

³⁶ Namely, the Downloadable Conditional Access System (DCAS), <http://www.opencable.com/dcas/>.

See also a general description here: <http://arstechnica.com/guides/other/cablecard.ars/3>.

³⁷ Learn more at <http://www.eff.org/IP/analoghole>. Of course, it is possible for your DVR creator to voluntarily limit use of the analog output regardless of the FCC's ruling with respect to cable and satellite providers. The DFAST license states that licensees must only allow content through the analog output if they also apply the Automatic Gain Control and Colorstripe copy control systems, see Exhibit B, Section 2.2, http://www.cablelabs.com/udcp/downloads/DFAST_Tech_License.pdf. However, other technology developers can build products that ignore such controls, with the exception of VCR makers who must build in the controls by law, see 17 USC 1201(k),

http://www.law.cornell.edu/uscode/html/uscode17/uscode17_usc_sec_17_00001201----000-.html. See also

<http://www.eff.org/deeplinks/archives/004878.php> (discussing *Macrovision v. Sima*, a lawsuit erroneously claiming that ignoring Automatic Gain Control is a circumvention under the DMCA).

³⁸ http://reviews.cnet.com/TiVo_Series3_HD_DVR/4505-6474_7-32065631.html.