2009-1374

IN THE

UNITED STATES COURT OF APPEALS

FOR THE FEDERAL CIRCUIT

TIVO INC.,

Plaintiff-Appellee,

v.

ECHOSTAR CORPORATION, ECHOSTAR DBS CORPORATION, ECHOSTAR TECHNOLOGIES CORPORATION, ECHOSPHERE LIMITED LIABILITY COMPANY, ECHOSTAR SATELLITE LLC, AND DISH NETWORK CORPORATION,

Defendants-Appellants.

Appeal from the United States District Court for the Eastern District of Texas in case no. 2:04-CV-01, Judge David Folsom.

BRIEF OF DEFENDANTS-APPELLANTS

DONALD R. DUNNER
DON O. BURLEY
ERIK R. PUKNYS
FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, LLP
901 New York Avenue, NW
Washington, DC 20001-4413
(202) 408-4000

E. JOSHUA ROSENKRANZ
JOSEPH EVALL
ALEX V. CHACHKES
ORRICK, HERRINGTON & SUTCLIFFE LLP
666 Fifth Avenue
New York, NY 10103-0001
(212) 506-5000

RACHEL KREVANS
JASON A. CROTTY
SCOTT F. LLEWELLYN
MORRISON & FOERSTER LLP
425 Market Street
San Francisco, CA 94105-2482
(415) 268-7000

Attorneys for Defendants-Appellants

CERTIFICATE OF INTEREST

Counsel for Defendants-Appellants certify the following:

1. The full name of every party or amicus represented by us is:

   EchoStar Corporation
   EchoStar DBS Corporation
   EchoStar Technologies Corporation
   Echosphere Limited Liability Company
   EchoStar Satellite LLC, and
   Dish Network Corporation

2. The foregoing parties are the real parties in interest.

3. The following are parent corporations and publicly held companies that own 10% or more of the stock of any party represented by us:

   EchoStar Communications Corporation k/n/a Dish Network Corporation, a publicly traded company is the parent corporation that holds, indirectly and through a series of wholly owned entities, 100% of the stock of Defendants-Appellants EchoStar DBS Corporation k/n/a Dish DBS Corporation, Echosphere LLC, and EchoStar Satellite LLC k/n/a Dish Network LLC.

   EchoStar Corporation, a publicly traded company is the parent corporation that holds, indirectly and through a series of wholly owned entities, 100% of the stock of Defendant-Appellant EchoStar Technologies Corporation k/n/a EchoStar Technologies LLC.

4. The names of all law firms and the partners or associates that appeared for the parties now represented by us in the District Court or are expected to appear in this Court are:

   Harold J. McElhinny, Rachel Krevans, Karl J. Kramer, Charles S. Barquist, Emily A. Evans, Alison M. Tucher, Marc J. Pernick, Seth M. Galanter, Robert M. Harkins, Jason A. Crotty, Paul A. Friedman, Scott F. Llewellyn,

Peter P. Meringolo, Ann Aronovitz Citrin, Kristina Paszek, Jay Hoon Lee, Nancy S. Halpin

MORRISON & FOERSTER

Damon Young, John Pickett

YOUNG, PICKETT & LEE

Donald R. Dunner, Don O. Burley, Erik R. Puknys, Andrew J. Vance, Tina E. Hulse

FINNEGAN, HENDERSON, FARABOW, GARRETT & DUNNER, L.L.P.

E. Joshua Rosenkranz, Joseph Evall, Alex V. Chachkes

ORRICK, HERRINGTON & SUTCLIFFE LLP

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STATEMENT OF RELATED CASES

On May 1, 2006, this Court granted EchoStar's petition for a writ of mandamus. *See In re EchoStar Commc'ns Corp.*, 448 F.3d 1294 (Fed. Cir. 2006) (Schall, Gajarsa, and Prost, JJ.).

An appeal also was previously filed in *TiVo, Inc. v. EchoStar Commc'ns Corp.*, 516 F.3d 1290 (Fed. Cir. 2008) (Bryson, Plager, and Keeley, JJ.). On January 31, 2008, this Court affirmed in part and reversed in part.

A second petition for a writ of mandamus in conjunction with the contempt proceedings was filed in this Court in *In re Dish Network Corp.*, Misc. No. 889. On December 10, 2008, the writ was voluntarily dismissed as moot.

A declaratory judgment action is pending before Judge Folsom in *Dish Network Corp. v. TiVo Inc.*, No. 2:09-CV-171. This case involves the same patent and the same redesigned products. The case was stayed on June 19, 2009, pending the outcome of this appeal.

INTRODUCTION[1]

> ***ATTENTION ALL BUSINESSES:*** *Once you are found liable for patent infringement, you are well advised to abandon the technology entirely. If you try to design around the infringed claims, and the patent holder again accuses you of infringement—even on a different theory—a judge can hold you in contempt and brand you a repeat offender. The judge can then enjoin any further design-around, with a decree such as,* ***"Even if EchoStar had achieved a non-infringing design around, this Court would still find that EchoStar is in contempt of this Court's permanent injunction."*** Ad26.

That effectively was the District Court's ruling in this case, and the quote comes verbatim from the District Court's opinion. That was just plain wrong.

EchoStar provides satellite television services to millions of subscribers across the country. A staple of that service is digital video recorder ("DVR") functionality, which enables viewers to fast-forward, rewind, and pause while shows are playing in real time. In 2006, EchoStar was found liable for infringing—in very specific ways—a TiVo patent on certain aspects of DVR functionality. For its infringement, EchoStar paid dearly, over $100 million in total.

EchoStar then threw itself into a redesign initiative to serve its customers *without* infringing. The effort was inventive, intensive, and in good faith. *EchoStar wrenched out of the guts of its DVRs, the very elements that TiVo deemed*

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[1] The Joint Appendix will be cited as "A__." Joint Appendix documents that are reproduced in the Addendum to this brief will be cited as "Ad__," with the Joint Appendix's numbering.

infringing. It commissioned 15 engineers to figure out how to restore the DVR function without those critical features. Prominent members of the patent bar guided the redesign and gave it a clean bill of health. One nail-biting year later, the engineers accomplished the mission.

TiVo returned to the District Court, more than two years after the trial, protesting that the new design also infringed its patent—*albeit in different ways*. Instead of directing TiVo to follow this Court's precedent and file a new infringement suit, the District Court summarily held EchoStar in contempt. The District Court held that it did not matter that TiVo's infringement allegation depended on new features that had never been found infringing and new theories that the jury had never heard. Worse yet, with the words quoted above, the District Court construed its earlier injunction as prohibiting EchoStar from installing *any* DVR functionality on its subscribers' equipment—even new, non-infringing technology—even though TiVo had never requested such an unlawfully broad injunction.

This holding imperils businesses across the country for doing what patent law and policy affirmatively encourage—applying ingenuity to develop new solutions without infringing patents.

This Court should reverse.

JURISDICTIONAL STATEMENT

The District Court had jurisdiction under 28 U.S.C. §§ 1331 and 1338(a). The District Court issued the contempt order and Amended Permanent Injunction on June 2, 2009. Ad1, Ad11. EchoStar timely filed a notice of appeal that day. *See* 28 U.S.C. § 2107(a); Fed. R. App. P. 4(a); A7689. This Court has jurisdiction under 28 U.S.C. § 1295(a)(1).

ISSUES PRESENTED

1. EchoStar's DVR functions were found to infringe TiVo's patent. In a massive redesign effort, EchoStar: (A) removed multiple features that TiVo had matched to key claim limitations in its patent; (B) dedicated a team of 15 engineers, who devoted 8,000 hours to the effort; and (C) secured guidance and opinions from outside counsel. In a contempt hearing, TiVo argued that EchoStar's redesigned products infringed, albeit with different features, under new infringement theories. Did the District Court err in adjudicating the infringement claims in a summary contempt hearing based on the conclusion that EchoStar's redesigned devices were not more than "colorably different" from the infringing products?

2. EchoStar's redesign removed multiple features that TiVo had matched to various claim limitations. TiVo argued that the redesigned devices also infringed, pointing now to different features. These newly designated features do

not, however, map onto the claim elements. Did the District Court err in finding infringement?

3. The District Court retroactively interpreted a provision of its earlier injunction to unlawfully bar EchoStar from redesigning its subscribers' receivers to avoid infringing. Such an interpretation is inconsistent with the injunction's plain language, the context, and the legal limits on the court's patent jurisdiction. Did the District Court err in finding EchoStar in contempt even if its design-around was non-infringing?

4. Must this Court vacate ancillary relief founded on a contempt order that is invalid?

STATEMENT OF THE CASE

This litigation began in January 2004, when TiVo Inc. sued Defendants-Appellants (collectively "EchoStar") in the United States District Court for the Eastern District of Texas, Civ. No. 2:04-cv-01 (DF), alleging infringement of United States Patent No. 6,233,389 ("the '389 Patent"). A426. On April 13, 2006, a jury returned a verdict of infringement on multiple claims. Ad14. On August 17, 2006, the court entered its Final Judgment and Permanent Injunction (subsequently amended on September 8, 2006). A161, A166.

On appeal, this Court reversed the infringement verdict as to all of the claims-at-issue except two (claims 31 and 61). *TiVo Inc. v. EchoStar Commc'ns Corp.*, 516 F.3d 1290 (Fed. Cir.), *cert. denied*, 129 S. Ct. 306 (2008); A151.

On remand, TiVo moved for contempt, asserting that EchoStar was violating the injunction with a redesigned product. Ad13. The District Court held EchoStar in contempt, and amended the injunction to add new burdens, in an order dated June 2, 2009. Ad1. EchoStar timely filed a notice of appeal that day. A7689. This Court stayed the contempt order and amended injunction pending appeal. A540.

STATEMENT OF FACTS

TiVo Invents a Specific DVR Solution

TiVo did not invent the DVR. Ad815. TiVo merely claimed that it made some advances over the prior art as it stood in 1998, when TiVo filed for the '389 Patent. *Id.* TiVo's patent claimed an improvement relating to various "trick-play" features, which viewers have now come to take for granted, such as fast-forwarding, rewinding, and pausing a show while the show is playing in real time. *Id.* TiVo's patent claimed a way of performing these functions using a less powerful—and therefore less expensive—microprocessor. *Id.*

The District Court clustered the patent's claims into two categories, which it called "Hardware Claims" and "Software Claims." Ad14. The only claims still at

issue on this appeal are the Software Claims—claims 31 (a process claim) and 61 (the corresponding, almost identical, apparatus claim). Ad19. *Compare* Ad821–22 *with* Ad823. These claims are reproduced at the start of the Addendum.

TiVo Sues EchoStar for Patent Infringement

TiVo sued EchoStar in 2004, alleging that the DVR functions it placed on its receivers infringed the '389 Patent. A425–28. TiVo accused eight models of EchoStar receivers, which the parties divided into two categories: the "50X DVRs" (models DP501, DP508, and DP510) and the "Broadcom DVRs" (models DP522, DP625, DP721, DP921, and DP942, all containing Broadcom chips). Ad14. TiVo accused all these DVRs of infringing nine claims of the '389 Patent—seven Hardware Claims and the two Software Claims mentioned above. *Id.*

In April 2006, the jury found that all asserted claims were not invalid and that the accused DVRs all infringed each of those claims. Ad14. The jury awarded lost profits totaling $32.7 million, and a royalty totaling over $41 million.

The District Court Enjoins Further Infringement

The District Court granted TiVo an injunction on August 17, 2006 (later slightly amended). A161, A166. The injunction included two provisions that TiVo drafted and the District Court adopted almost verbatim. *Compare* A6061, A6064 *with* A162–63. These provisions—referred to as the "Infringement

Provision" and the "Disablement Provision"—are reproduced in full in the Addendum. *See* Ad1–3. Their essence is as follows:

[The Infringement Provision]

> Each Defendant … [is] hereby restrained and enjoined, pursuant to 35 U.S.C. § 283 and Fed. R. Civ. P. 65(d), from making, using, offering to sell, selling, or importing … the Infringing Products … and all other products that are only colorably different therefrom in the context of the Infringed Claims ….

[The Disablement Provision]

> Defendants are hereby FURTHER ORDERED to, within thirty (30) days of the issuance of this order, disable the DVR functionality (i.e., disable all storage to and playback from a hard disk drive of television data) in all but 192,708 units of the Infringing Products that have been placed with an end user or subscriber. The DVR functionality, i.e., disable all storage to and playback from a hard disk drive of television data) [*sic*] shall not be enabled in any new placements of the Infringing Products.

At no point did TiVo ever so much as suggest the risible notion that it would seek to block EchoStar from taking the perfectly legal step of trying to design around TiVo's patent. To the contrary, TiVo assured the District Court and EchoStar that it was seeking to enjoin "infringement of the patent by devices adjudged to infringe and infringement by devices no more than colorably different therefrom"—"nothing more, nothing less." A7354.

This Court Stays the Injunction as EchoStar Labors on a Redesign

EchoStar immediately moved this Court for a stay pending appeal. A6084–113. In support of its stay application, EchoStar predicted financial ruin if it were

suddenly forced to eliminate its customers' DVR capabilities. Ad15 (quoting EchoStar's stay motion). In hopes of averting such a catastrophe, EchoStar was also working in overdrive to redesign its DVR functionality so it could serve its subscribers in the event this Court were to deny the stay or (further down the line) uphold the injunction. A5185–86.

The District Court noted with disapproval that "EchoStar never mentioned its design-around efforts to the Federal Circuit." Ad15. But at the time, there was nothing to report. As detailed below, a design-around of this magnitude is a dicey proposition. A5186; *see also infra* at 9–16. In fact, when EchoStar sought the stay, the redesign software was still being tested and had not even been *submitted* to the engineers who were to determine if it was ready to download to customers. A5241–42. It had no way of knowing whether its redesign would work.

In any event, the design-around was no state secret. Before the injunction issued, EchoStar had *already* announced to the world that it was "working on modifications to our DVRs intended to avoid future infringement." A6313–16. TiVo stipulated that it was fully aware that EchoStar was working on a design-around, A528, but did not consider the fact sufficiently important to mention to this Court either.

On October 3, 2006, this Court stayed the injunction pending EchoStar's first appeal, concluding that "there [wa]s a substantial case on the merits." A525.

EchoStar Devises and Tests an Ingenious Design-Around in a Year-Long Process of Trial and Error

While the appeal was pending, EchoStar continued toiling on the redesign. EchoStar's basic approach was to replace the software on its subscribers' receivers by beaming messages from its satellites. A5271–72. As simple as it sounds, EchoStar's design-around was a Herculean endeavor—"the largest effort [EchoStar had] ever undertaken to replace existing software in the field." A5271. "EchoStar … assigned some of its best engineers"—15 of them. Ad14. They worked tirelessly, devoting 8,000 hours (i.e., four person-years) to designing and testing a solution. A6343, A5269. In the process, they wrote or modified about 20,000 lines of code. A7685–86. And they had to address challenges presented by the distinct categories of DVR models. A6348.

The engineers began by writing test code for one DVR model to determine whether the concept would work. A6343. They then proceeded to roll out the solutions for each of the other models, one by one over the next several months—until they had reprogrammed about 4 million receivers. A6343–49. The new software repeatedly failed, at times generating thousands of angry customer complaints in a single day. A5265, A5303, A6345. The engineers completed the process around the verdict's one-year anniversary. A6349.

The Redesign Removes the Elements TiVo Accused of Infringing

As intricate as the redesign implementation was, the redesign's motivating principle was simple: Remove the elements of the original design that TiVo had identified as infringing, then figure out a way to make the device work without those elements in place. A5187–89. *There is no dispute that EchoStar did, indeed, remove those elements.* EchoStar produced two new—and different—solutions to the same problems that TiVo's patent was designed to address, and its approach was sufficiently innovative to merit a patent application. A6218.

EchoStar's two solutions related to two key categories of claim terms that lay at the heart of TiVo's infringement case: (1) the claimed flow of data from where it is "temporarily store[d]" to the "storage device," and particularly what the claim calls "automatic flow control"; and (2) "parses video and audio data." For the Broadcom models, EchoStar removed *both* features. Ad20–21. For the 50X models, EchoStar eliminated the second. Ad19.

Data flow and automatic flow control. A DVR must process the river of broadcast data that flows from the satellite, into the receiver's chip, and eventually to the hard drive, which is where the data must reside for trick-play to work. Ad815. Along the way, if the flow of data is not controlled, data can be overwritten by other data, and lost. Ad818, A1394. Automatic flow control was TiVo's solution. TiVo claimed an invention that forces all the data to pass through

a buffer en route from the chip (the claimed "physical data source") to the hard drive. Ad821–23. TiVo's patent claimed a way of structuring the flow so that data in this single buffer *could not* be overwritten unless and until they were emptied onto the hard drive. Ad818, A1391.

At trial, an inventor of the patent furnished an apt analogy to describe both the problem and TiVo's solution: Imagine a faucet that fills a pitcher; the pitcher, in turn, periodically empties into a bucket. A1392–96. The pitcher is what the claims describe as the "buffer," and the bucket is the DVR's hard-drive. A1392–93. The objective is to prevent the pitcher (the buffer) from overflowing and losing water. A1394. Otherwise, as new information flows in, it will overwrite other information in the buffer, before the buffer has a chance to dump the information onto the hard drive. *Id*. Overflow is prevented by providing "*flow control*"—a valve to prevent the faucet from filling a full pitcher until the pitcher is emptied into the bucket. *Id*. TiVo's contribution was to provide "*automatic* flow control," a system that monitors the pitcher and sends a signal to the valve to shut off the faucet when the pitcher is full—much like the bulb in a toilet tank shuts off the flow of water into the tank when it is nearly full. Ad818, A1390–91.

TiVo concedes that EchoStar eliminated what TiVo identified as corresponding to four separate claim elements, all relating to the flow of data. *See infra* Point II.A.3. In TiVo's analogy, EchoStar eliminated the pitcher (the

"buffer"), removed the valve (used for "automatic flow control"), and eliminated the now-vestigial elements involved in getting water for the pitcher and filling the pitcher. *Id*.

One of TiVo's named inventors swore at trial that a DVR receiver without this automatic flow control feature would "los[e] information" and, therefore, "wouldn't be a real product that anybody would want to use." A1394–95. EchoStar's engineers proved him wrong.

Here is what they did: The *old* Broadcom models moved data in three steps: from a "transport buffer" (the claimed "temporar[y] stor[age]") to a "record buffer" (the claimed "buffer") to the hard drive (the claimed "storage device"). *See generally* Point II.A. EchoStar removed that middle step—the "record buffer"—and with it the flow control of the data stream as it traveled from the transport buffer to the record buffer (the claimed "automatic flow control"). In the redesigned Broadcom models, the flow of data goes straight from the transport buffer to the hard drive, without flow control. In the redesign process, EchoStar also changed the transport buffer to effect a new way of moving data. The "transport buffer" can be viewed as a battery of 10 buffers for temporary storage. The redesigned Broadcom models operate as follows: The first quantum of data flows to its first buffer, then the next quantum of data to its second, then the next to its third, and so on. After the 10th and last buffer, the chip then starts over with the

first. At each stop along the way, the chip overwrites old data without pause or control. While that is going on, the software writes to the hard drive the contents of the earliest-filled buffer that have not already been saved to the hard drive.

Thus, EchoStar changed from the pipe-faucet-pitcher-bucket concept to something entirely different. The new system is more analogous to a robotic drink dispenser, dispensing lemonade from a spout into ten rotating Dixie cups, cyclically filling each cup, one after the next. A7621. The process is not self-regulated; the robot mindlessly fills the next Dixie cup whether or not it is already full. The process works only if the customers keep drinking individual cups in pace with the filling. So the chip does, at times, overwrite data in the transport buffer, causing data loss errors—in a way that would never happen in the device TiVo patented. A5114–15, A5231.

"Parses video and audio data." Beyond those changes to the Broadcom models, EchoStar redesigned all the models to eliminate their ability to "parse video and audio data," as another key claim limitation requires.

By way of background, the visual component of digital television comes in "frames," much like the visual component of the celluloid film of old. A5202. In a celluloid film, one frame is attached to the next, so that multiple frames become a moving image when played through a movie projector. Like those celluloid films, digital television strings together frames—which are digital data sets rather than

celluloid images—and processes them, one frame after the next, to create moving television images. *Id*. But whereas celluloid frames are all the same size, digital frames vary vastly in size. *Id*.

The variation presents no challenge for real-time play. The DVR simply reads one frame after the other, in sequence. But the variability does present a challenge for fast-forwarding, rewinding and other trick-play functions. By way of example, if one wishes to fast forward at a rate that skips 20 frames, there is no straightforward way to know where in the memory one might find the 20th frame. And it would require a very powerful microprocessor to sift through all the data in storage to find that frame if the DVR was trying to do it in real time, during trick play after storage.

TiVo's solution was to parse the incoming broadcast data *before storage* to find the video frame "start codes," the part of each frame that essentially says, "the frame starts here." Ad817, A5188. These start frames are then indexed. That way, on playback, the processor does not have to sift through huge volumes of undifferentiated data to locate the relevant frame. *Id*. As TiVo explained to this Court, the indexing function, and the parsing that makes it possible, is the "genius, the core of this invention," A6216—a sentiment that echoed throughout the trial testimony of TiVo's experts and the inventor, *see, e.g.*, A1366, A1383, A1552–53.

In the trial, TiVo and its experts pointed to one specific element—common to all the EchoStar DVRs—that satisfied the "parsing" limitation: the video frame start-code detection. A1366, A1369–70. The named inventor swore to it, too, in defending validity. *See* A1366. So, EchoStar's redesign focused on the element that TiVo said infringed—and ripped it out. Its redesigned DVRs are incapable of start-code detection before storage. A5207–09. TiVo does not dispute this. A1366.

EchoStar's challenge then was to figure out how to find particular frames during playback without having parsed the video and audio data. They said it couldn't be done. At the trial, TiVo's expert, Dr. Gibson, testified that a DVR cannot function without making an index of the parsed data before sending the data to storage. A1556. He believed that "since … you have all this data, … you have to know … where to find the frames you want." *Id*. An index, he opined, was the only way to find them. *Id.*

Once again, EchoStar's engineers proved him wrong. They devised an ingenious way to perform trick-play *without* parsing for start codes before storage. A5194–95. The redesigned DVRs perform trick-play not by identifying the precise location of frames *before storing the data*, but rather by storing the data and then, when necessary, statistically *estimating* where a given frame might be

while executing trick-play. *Id*. This methodology is the subject of pending U.S. Patent Application No. 2008/0056682. A6218.

As ingenious as it is, this approach has some drawbacks. The most notable one is that estimates can be inaccurate. A5202. Users often find that trick-play does not perform as well as a system with start code detection before storage. A5203.

EchoStar Secures Advance Opinions Vetting Its Proposed Approach

Before EchoStar even began field testing the new software, it enlisted Fish & Richardson, which had not been involved in the litigation, to review EchoStar's proposed design-around, and then render an opinion as to whether the proposed new designs would infringe. A5309–12, A5343–46. After a thorough investigation of the issue, former firm chair Robert E. Hillman and partner Lawrence Aaronson cleared EchoStar's proposed designs. EchoStar had directed them that it "wanted the utmost care" in assessing any design-around. A5348. They also observed that the level of care taken by EchoStar in obtaining their opinions "was in the very upper echelon of care that clients have taken." A5347. In three detailed sets of written opinions, they concluded that the proposed new designs would not infringe the '389 Patent, either literally or under the doctrine of equivalents. A6114–40, A6141–78, A6179–214. They issued these opinions in August and September of 2006. *Id*.

The Federal Circuit Reverses the Verdict on All But Two Claims

While EchoStar was redesigning and testing, this Court was reviewing the verdict in the original case. Ultimately, it reversed the infringement verdict on the seven Hardware Claims, but affirmed the verdict as to the two Software Claims. A151. This Court also dissolved its stay, allowing the permanent injunction to go into effect, for the first time, on April 18, 2008, when the mandate issued. *Id.*

By that point—two years after the original jury verdict—EchoStar had already disabled the infringing software and replaced it with software that three sets of counsel opinions had sustained as non-infringing. A34, A37, A6114–40, A6141–78, A6179–214. So the affirmance of the verdict on the Software Claims should have had no effect on the DVR technology EchoStar had in place, because by that time it was non-infringing. But the affirmance was hardly a non-event. It meant that EchoStar would have to pay the $74 million in damages that had been awarded, plus post-judgment interest, for a total of $104 million—which EchoStar promptly paid. A6732–34.

TiVo Moves for Contempt

On remand, TiVo challenged the redesign. A6232–52. Instead of filing a new patent infringement suit, TiVo asked the District Court to hold EchoStar in contempt. A772. The District Court conducted a two-and-a-half day hearing, involving just six witnesses. A5001–557.

At the contempt hearing, TiVo did not dispute that EchoStar had removed the very elements that TiVo had accused of infringement. Instead, its new infringement allegations rested on completely different elements and new theories. The contempt hearing was a classic "battle of the experts" with EchoStar's and TiVo's experts expressing diametrically opposite opinions on numerous questions about what the new features did and how they did it. *See infra* at pp.31–32.

The District Court held EchoStar in contempt—on two grounds. First, the District Court ruled that EchoStar violated the injunction's Infringement Provision. It held that a contempt proceeding was appropriate because the redesigned devices were "no more than colorably different" from the devices that had been adjudged to infringe. Ad24. And it held that the devices did, in fact, infringe. Ad26.

Second, the District Court ruled that, "[e]ven if EchoStar had achieved a non-infringing design-around, this Court would still find that EchoStar is in contempt of this Court's permanent injunction." Ad26. The reason, according to the court, was that "EchoStar never complied with the Disablement Provision of this Court's order." *Id.* Although neither TiVo nor the District Court had ever suggested any such thing in the past, the District Court now read that provision as a prohibition against designing around the claims, at least with regard to the receivers that were already in subscribers' homes. Ad27.

Based on the contempt ruling, the District Court amended the original injunction to require EchoStar (A) to "inform this Court of any further attempt to design around the '389 Patent"; and (B) to "obtain Court approval before any such design-around is implemented." Ad28. In addition to ordering a hearing on monetary sanctions, Ad12, the District Court also awarded TiVo infringement damages accruing while the District Court's injunction was stayed pending appeal—including over $86 million attributable to the *new* products, Ad4.

This Court stayed the District Court's order pending appeal. A539–41.

SUMMARY OF ARGUMENT

I. Colorable Differences. Contempt "is not a sword for wounding a former infringer who has made a good-faith effort to modify a previously adjudged or admitted infringing device to remain in the marketplace." *Arbek Mfg., Inc. v. Moazzam*, 55 F.3d 1567, 1570 (Fed. Cir. 1995). Resort to a contempt proceeding was improper unless EchoStar's new products were "no more than colorably different" from the old, *KSM Fastening Sys., Inc. v. H.A. Jones Co.*, 776 F.2d 1522, 1526 (Fed. Cir. 1985), which means that the changes were nothing but "a subterfuge," *Abbott Labs v. Torpharm, Inc.*, 503 F.3d 1372, 1379 (Fed. Cir. 2007), and the new products were "essentially the same" as the originals, *Acumed LLC v. Stryker Corp.*, 525 F.3d 1319, 1324 (Fed. Cir. 2008).

EchoStar's redesigned devices were nowhere near the same. First, the devices cannot be essentially *the same* if TiVo needed to focus on *different* features, resort to *different* theories, and present *different* facts to prove infringement. Second, TiVo's new theories called for resolution of "substantial open issues with respect to infringement" that the jury never resolved when it found that the original devices infringed. *Id.* at 1380 (citation and internal quotation marks omitted). Because TiVo's infringement argument depended on matching different features of the redesigned DVRs to the claim limitations, the hearing became a classic battle of experts dueling over numerous factual questions about what the new features were, how they worked, and how they mapped onto the claim language. Third, EchoStar presented abundant evidence of good faith, including the sheer magnitude of the redesign effort and counsel opinions pre-approving the proposed plan before it was even tried.

The District Court reached the wrong conclusion because it misapplied the colorable differences test. First, it never asked what theories the jury adjudicated against EchoStar. Second, it focused on the labels EchoStar used to describe its software routines, rather than on what those routines actually did. Third, it dismissed as irrelevant key evidence, including evidence of the magnitude of the redesign effort and of the counsel opinions.

II. Infringement. Even if it was proper to decide the infringement issues in the context of a contempt proceeding, TiVo did not sustain its burden of proving by clear and convincing evidence that the redesigned devices infringed.

The limitations related to data flow prescribed that the data must flow through various checkpoints in a particular order, and that various operations must occur on the data at specified points along the route. There is no dispute that EchoStar eliminated four features that TiVo had matched to the claim limitations. At that point, it became impossible for TiVo to map the new devices to those claims. There is nothing that *extracts* the data, nothing that *converts* it to data streams, nothing that *fills* the buffer with the data, and nothing that *automatically flow controls* how data moves from the physical data source to the buffer—as the claim requires. The District Court did not map any features onto these claim limitations. It merely pointed to several technical features of the products and concluded that the function exists somewhere among them. That is insufficient.

As to the "parses video and audio data" limitation, TiVo points to a feature—the PID filter—that had been part of the old device, but that TiVo had not accused of satisfying that claim limitation. To the contrary, in order to save the claim from invalidity, TiVo had to take the position that this feature *did not* satisfy this claim limitation. The District Court's analysis nevertheless concludes that the PID filter satisfies this limitation because a PID filter in some way "parses" or

"analyzes" *something*. But the claim does not say that this element can "parse *anything*"; it says that the element must "parse [i.e., analyze] *video and audio data*." A PID filter cannot "parse [or analyze] video and audio data." It looks *only* at the header of a data packet, not the payload where the video and audio are contained. In fact, at that point, the data is scrambled, and cannot even be read.

III. Disablement Provision. The District Court's alternative holding—that EchoStar violated the Disablement Provision—is based on this startling proposition: "Even if EchoStar had achieved a *non-infringing design-around*, this Court would still find that EchoStar is in contempt of this Court's permanent injunction." Ad26 (emphasis added). No other court has ever held that a judge exercising patent jurisdiction could permanently enjoin *non-infringing* products. Congress, the Supreme Court, and this Court have all decreed otherwise.

It was improper to hold EchoStar in contempt of the Disablement Provision unless the provision gave EchoStar "fair and precisely drawn notice of what the injunction actually prohibits," *KSM*, 776 F.2d at 1526 (citation omitted), in language that was "specific and definite," *Martin v. Trinity Indus., Inc.*, 959 F.2d 45, 47 (5th Cir. 1992). As a matter of law, the District Court erred in interpreting the injunction to contain such a sweeping proscription. First, TiVo never suggested that it was seeking such a broad order. It insisted that the order was intended to enjoin "infringement of the patent by devices adjudged to infringe and

infringement by devices no more than colorably different therefrom"—"nothing more, nothing less." A7354. Second, the only natural conclusion to be drawn from an order to "disable the DVR functionality … in … the *Infringing Products*," is that EchoStar was required to disable only products that have the *infringing* functions, and did not have some extraordinary and unprecedented obligation to disable functions in products lacking the infringing functions. Third, EchoStar was justified in reading the District Court's order in a way that would make it legal, rather than being expected to contort the language and ignore the context to adopt an interpretation that was not only strained, but unlawful.

Finally, if, indeed, the District Court was correct about the scope of the Disablement Provision, it cannot be enforced, for this Court has authoritatively held that: "If a trial court is faced with an overly broad injunction during a contempt proceeding, the court should interpret it according to the rule of law ... from *KSM*"—i.e., the rule that "'contempt proceedings ... are available only with respect to devices previously admitted or adjudged to infringe, and to other devices which are no more than colorably different therefrom.'" *Int'l Rectifier Corp. v. IXYS Corp.*, 383 F.3d 1312, 1316-17 (Fed. Cir. 2004) (citation omitted).

IV. Ancillary Relief. It should go without saying that if this Court topples the District Court's contempt order, any further relief based on that order should

fall as well. That includes the preclearance requirement, sanctions, and infringement damages related to the products that were adjudicated to infringe.

STANDARD OF REVIEW

As a general rule, a district court's decision to hold a contempt proceeding is reviewed for abuse of discretion, *see Abbott Labs. v. Torpharm, Inc.*, 503 F.3d 1372, 1380 (Fed. Cir. 2007), as is a finding of contempt, *see Int'l Rectifier Corp. v. Samsung Elecs. Co.*, 361 F.3d 1355, 1359 (Fed. Cir. 2004). But "[a]n abuse of discretion may be established under Federal Circuit law by showing that the court … exercised its discretion based on an error of law or clearly erroneous fact finding." *Id*. (citing *Joy Techs., Inc. v. Flakt, Inc.*, 6 F.3d 770, 772 (Fed. Cir. 1993)). This appeal presents dispositive questions of law that are subject to de novo review. *See KSM Fastening Sys., Inc. v. H.A. Jones Co.*, 776 F.2d 1522, 1532 (Fed. Cir. 1985) (discretion to proceed with contempt proceedings must operate within "constraint" of colorable differences standard); *Abbott Labs.*, 503 F.3d at 1382 (interpretation of a district court's prior order is subject to de novo review); *Int'l Rectifier Corp. v. IXYS Corp.*, 383 F.3d 1312, 1315 (Fed. Cir. 2004) ("[w]hether the terms of an injunction fulfill the mandates of Rule 65(d) is a question of law that we review without deference.").

ARGUMENT

I. THE DISTRICT COURT ERRED IN FINDING ECHOSTAR IN CONTEMPT OF THE INFRINGEMENT PROVISION BECAUSE THE REDESIGNED DEVICES WERE FAR "MORE THAN COLORABLY DIFFERENT" FROM THE ORIGINAL DEVICES.

There is no "one-strike rule" in patent law. A party found liable for patent infringement is not forever condemned to wear a scarlet "*I*." Patent law affirmatively encourages a party in EchoStar's position to use its ingenuity to design around a patent it has been found to have infringed. *See KSM*, 776 F.2d at 1530 (citing *McCullough Tool Co. v. Well Surveys, Inc.*, 395 F.2d 230, 233 (10th Cir. 1968)). When it is again accused of infringement, "the modifying party generally deserves the opportunity to litigate the infringement question at a new trial." *Arbek Mfg., Inc. v. Moazzam*, 55 F.3d 1567, 1570 (Fed. Cir. 1995).

A contempt proceeding is a drastic departure from this norm—and one that demands great "restraint." *KSM*, 776 F.2d at 1525. Contempt "is not a sword for wounding a former infringer who has made a good-faith effort to modify a previously adjudged or admitted infringing device to remain in the marketplace." *Arbek*, 55 F.3d at 1570. The contempt finding was impermissible unless TiVo carried "[a] heavy burden of proving … by clear and convincing evidence" that these extraordinary proceedings are warranted. *KSM*, 776 F.2d at 1524. Specifically, TiVo had to satisfy the stringent two-part test this Court laid out in *KSM*. In part one, which we address in this section, TiVo must persuade the Court,

at the threshold, that a contempt proceeding is the appropriate vehicle because the new products are so similar to the devices "previously adjudged" to infringe that any differences between them may be dismissed as "no more than colorabl[e]." *Id.* at 1526. Only if TiVo satisfies this "colorable differences" test is it appropriate to move to the second question—whether an injunction against infringement has been violated (a topic addressed in Point II, *infra*). *Id.*

A. The "Colorable Differences" Test Creates a Demanding Standard, Which TiVo Cannot Meet Unless the New Design Represents Nothing But a Bad-Faith, Cosmetic Change.

The threshold test—which asks whether the redesign is "no more than colorably different"—can be confusing. Lawyers often use the word "colorable" to mean "plausible"—as in, "You have a colorable claim for breach of contract." In the *KSM* context, however, a "colorable" difference is a difference "in appearance only, and not in reality." BLACK'S LAW DICTIONARY 265 (6th ed. 1991). A difference is "merely colorable" if it is "counterfeit, feigned," *id.*, "meant to deceive; not genuine," AMERICAN HERITAGE COLLEGE DICTIONARY 375 (3rd ed. 1992). As this Court has put it, the alteration of a device is merely colorable if it represents "an infringer's *flagrant disregard* for court orders," *Arbek*, 55 F.3d at 1570 (emphasis added), or if the redesign was "a subterfuge," *Abbott*, 503 F.3d at 1379, that was "obviously was made for the purpose of evading the decree *without essential change* in the nature of the device," *KSM*, 776 F.2d at 1531 (emphasis

added). To state these rules affirmatively, a contempt hearing is proper only if the redesign is "essentially the same" as the original. *Acumed*, 525 F.3d at 1324 (estoppel case equating "essentially the same" with "merely 'colorable'" difference); *KSM*, 776 F.2d at 1532 (estoppel principles inform colorable differences analysis). EchoStar cannot be held in contempt if there is a "fair ground of doubt" that the standard is met. *Arbek*, 55 F.3d at 1570 (quoting *KSM*, 776 F.2d at 1525).[2]

B. EchoStar's Good-Faith Redesign Initiative Effected Wholesale and Real Changes to Its DVRs.

TiVo captured the essence of the colorable differences standard when it explained to the District Court that EchoStar would violate the standard if it were to "take essentially the same design and put a new number on it, put a new shiny cover, make it gold instead of silver, black instead of gold." A4547. *That* is the

[2] The District Court recognized this Court's rule that contempt requires proof "'by clear and convincing evidence.'" A42 (quoting *KSM*, 776 F.2d at 1524). Yet it concluded that TiVo bears "no burden" with respect to the colorable differences analysis. A44. This conclusion is inconsistent with the admonitions quoted in the text, as well as with this Court's holdings that the test is not satisfied unless it is "obvious[]" and "evident that the modifications … were made for the purpose of evasion of the court's order," *KSM*, 776 F.2d at 1526, 1531. *See also Abbott*, 503 F.3d at 1381 (noting that "[c]lear and convincing evidence … supports [trial judge's] finding that there is no more than a colorable difference").

sort of bad-faith, purely cosmetic change that would warrant a contempt order.[3] In contrast to this classic example of cosmetic differences, EchoStar's redesigned devices cannot even plausibly be described as "essentially the same" as the originals, *Acumed*, 525 F.2d at 1324—as "a subterfuge," *Abbott*, 503 F.3d at 1379, "counterfeit [and] feigned," BLACK'S LAW DICTIONARY 265—where all the following facts were undisputed:

1. ***Accused features eliminated.*** EchoStar wrenched out of the devices the very features that TiVo had previously matched to claim elements, including an element TiVo had described as "the genius, the core of this invention." A6216.

2. ***New features accused.*** To compensate, TiVo had to assert, and the District Court had to find, that *new* features of EchoStar's products matched up to claim limitations.

3. ***New theories advanced.*** The new infringement accusations depended on theories never addressed or adjudicated in the earlier action, requiring resolution of new factual disputes.

4. ***Validity position contradicted.*** One of TiVo's new infringement accusations contradicted its trial position that a particular feature (the PID filter) did *not* perform the requisite function ("parses video and audio")—testimony that was both accepted and necessary to save the patent from invalidation.

5. ***Battle of experts.*** The District Court was unable to assess the differences without resolving conflicting expert testimony about what the new device does and how.

[3] *See, e.g.*, *Abbott*, 503 F.3d at 1381 (difference between two drugs was no more than colorable where the accused infringer's "own expert" testified "that when he tested and compared the [two drugs], they were identical").

6. ***Innovation.*** EchoStar's redesign achieved what TiVo's experts and inventor thought was impossible—an innovation sufficiently different from TiVo's device that it motivated EchoStar to file a patent application.

7. ***Diminished performance.*** In the interest of avoiding the patent, EchoStar sacrificed performance: (A) by substituting a feature that could *miscalculate* where a desired frame is for a feature that always *knows* in advance where it is; and (B) by substituting a feature that allows *some overwriting* for a feature that *never does*.

8. ***Magnitude of effort.*** It took 15 engineers a year—working 8,000 hours and tending to thousands of customer complaints—to complete the redesign.

9. ***Opinion letters.*** Before proceeding, EchoStar obtained advice and guidance from a respected patent firm, and then secured three opinions confirming that the contemplated redesign avoids five different claim limitations. A5347.

Most of these facts, standing alone, would defeat TiVo's argument that the differences were no more than merely colorable or cosmetic. But together they add up to an irrefutable case that the changes were substantial, not merely colorable or cosmetic. The District Court erred in proceeding with a contempt hearing for three independent reasons: (1) the redesigned devices are materially different from the originals; (2) the dispute over infringement calls for resolution of issues never adjudicated; and (3) EchoStar acted in good faith.

1. The differences are far more than cosmetic.

EchoStar must prevail on the basis of the simplest comparison between the original, infringing devices and the new, redesigned devices. First, the redesigned devices cannot be considered the same, once EchoStar removed the key elements

that were the focus of TiVo's claims of infringement. That EchoStar's redesign performed *at all* without those elements is itself compelling proof of a fundamental difference. But the difference is even starker, since one of TiVo's named inventors testified at trial that a DVR simply would not be the same invention without automatic flow control. The redesign achieved what TiVo thought impossible. Second, the District Court has never explained how it could conclude that the devices are essentially *the same* if TiVo needed to focus on *different* features, resort to *different* theories, and present *different* facts to prove infringement. Third, it does not ordinarily take 15 engineers 8,000 hours to make changes that are merely cosmetic. Fourth, if the changes were merely cosmetic, EchoStar would not have received thousands of customer complaints about them. Finally, it is incongruous to suggest that a difference is merely cosmetic when a respected patent firm views it as so different as to defeat an infringement claim outright on five limitations.

2. TiVo's new theories called for resolution of "substantial open issues."

Even if the facial differences were not so pronounced, EchoStar would still prevail because any infringement claim calls for the resolution of "substantial open issues with respect to infringement" that the jury never resolved when it found that the original devices infringed. *See Abbott*, 503 F.3d at 1380 (citation and internal quotation marks omitted). For purposes of this standard, the question is not, "Does

the redesigned device also infringe?" Nor is the question (as the District Court seemed to think), "Does the redesigned device also infringe *the same claims*?" *See* Ad17. Determining whether TiVo is raising "substantial open issues" entails ascertaining whether the redesigned devices are alleged to infringe *in the very manner that has already been* "admitted or adjudicated" to infringe. *KSM*, 776 F.2d at 1530, 1532.

Once EchoStar eliminated the very features that TiVo itself had identified as meeting claim limitations, TiVo had to match different features of the redesigned DVRs to those claim limitations. *See infra* Point II.A. (explaining that TiVo matched four claim limitations to EchoStar's old DVRs, all of which are gone from the redesign); Point II.B. (similar analysis for "parses video and audio"). That meant that the infringement analysis necessarily depended on entirely new theories and facts that had not yet been resolved.

Differences should not be characterized as "merely colorable" if "'expert and other testimony subject to cross-examination would be helpful or necessary.'" *Arbek*, 55 F.3d at 1570 (quoting *KSM*, 776 F.2d at 1531). That lesson is especially apt here, for the experts were dueling over numerous factual questions about what the new features were, how they worked, and how they mapped onto claim language, including the questions:

- whether a completely different feature (the PID filter, the writing of the WTT and TBK files, or the "frames list") executes the "pars[ing

of] video and audio data from said broadcast data," *compare* A5066–67, A5081–82 *with* A5207–09, A5441–42;

- whether use of statistics constitutes "pars[ing] video and audio data from said broadcast data," *compare* A5065–66 *with* A5201–02;

- whether sequential filling of the transport buffer within the physical data source constitutes "automatic flow control," *compare* A5110–11 *with* A5220–22;

- whether monitoring data loss constitutes "automatic flow control," *compare* A5121–22 *with* A5229–31; and

- what feature if any constitutes a "source object" that "fills [the] buffer," *compare* A5109–10, A5542 *with* A5217–18, A5227–28.

None of these facts had been adjudicated against EchoStar at trial. If anything, some of them had been adjudicated against TiVo. The very fact that TiVo—the prevailing party at trial—is now reversing position accentuates just how different the contempt issues are from the issues adjudicated at trial. *See infra* at 54–55 (arguing judicial estoppel).

3. EchoStar presented abundant evidence of good faith.

If ever there were a case where a party has improperly wielded contempt as "a sword for wounding a former infringer who has made a good-faith effort to modify a previously adjudged or admitted infringing device," *Arbek*, 55 F.3d at 1570—this is it. Securing advance guidance on the strategy to achieve a non-infringing design-around and an objective opinion approving the proposal in advance is not the "flagrant disregard for court orders" to which contempt

proceedings are limited. *Arbek*, 55 F.3d at 1570. And achieving what a respected patent firm considers to be "the very upper echelon of care," A5347, is the opposite of flagrancy. So is paying 15 engineers to spend 8,000 hours on a redesign that takes a year to perfect and generates untold thousands of customer complaints. And a redesign is not "a subterfuge," *Abbott*, 503 F.3d at 1379, when the accused embarks on the effort knowing that it probably will sacrifice performance, and ends up with a product whose performance does, indeed, suffer.

C. The District Court Reached the Wrong Conclusion Because It Misapplied the Colorable Differences Test.

The District Court did not disagree with any of the fundamental facts on which the foregoing analysis is based. It reached the opposite conclusion only because it applied the colorable differences test incorrectly—making legal rulings that clashed with this Court's directions. The District Court made three basic analytical mistakes.

Collapsing colorable differences & infringement. While the District Court held that "no substantial open issues of infringement exist," Ad24, it never paused to assess what theories of infringement TiVo pressed at trial and what theories the jury (and eventually this Court) adjudicated against EchoStar. In fact, the District Court held that its inquiry was "*not*, as EchoStar contends, limited by a jury's verdict or a patentee's theories at trial," Ad19 (citation omitted) (emphasis added), without explaining how, then, it could figure out which "issues of infringement"

were "open" and which were foreclosed. *See KSM*, 776 F.2d at 1532 (analogizing "open questions" inquiry to collateral estoppel analysis).

For example, the District Court held that "[b]ecause both the adjudicated and modified products utilize PID filtering *and thus may infringe* the Software Claims in the same manner, … the two products are not more than colorably different." Ad24. The District Court found that the new device was essentially the same as the old, merely because an entirely different component—which was in the original device but never accused of corresponding to the "parses" limitation—"may" infringe in the same manner. Ad24. The correct standard is not whether some future jury "*may*" find infringement of the same claim, but whether the previous jury *did* make that finding already—which it most assuredly did not.

The District Court's trespass analogy helpfully illustrates what the District Court misapprehended. The District Court observed:

> If this action involved real property, past and present trespasses to TiVo's land may occur in dissimilar ways (i.e. entry from the west versus entry from the south). As long as the trespasser is crossing the metes and bounds of TiVo's property, TiVo may argue that both are trespasses.

Ad22. The District Court was correct about this much: Having successfully prosecuted EchoStar's 2006 trespass "from the west," TiVo is free to challenge today's alleged trespass "from the south"—*in a new trespass action*. But the whole point of the colorable difference test is that just because TiVo proved one

trespass at trial does not entitle it to shoot EchoStar on sight for suspicion of a second—particularly when that suspected trespass involved a "dissimilar" crossing.

Conflating function with functional labels. The District Court's next overarching error was to focus on the labels EchoStar used to describe its software routines, rather than on what those routines actually did. The District Court dispatched virtually all of EchoStar's arguments about the differences between the old and the redesigned products in two sentences:

> EchoStar's own characterizations of its modifications ("start-code detection," "indexing," and "blocking") appear nowhere in the claim language as written or construed. Because these modifications do not relate to pertinent patent claims, this Court finds that any differences between the infringing and modified products are no more than colorable.

Ad24. Obviously, the new features that EchoStar emphasizes relate intimately to the patent claims, because they replace the features on which TiVo focused when it prevailed in its infringement suit in the first place.[4] In focusing on labels, the

[4] The District Court made a similar analytical error when it held that EchoStar's redesigned DVR must not be appreciably different because it worked so well—at least with regard to the function served by automatic flow control. A24. The District Court began by observing that the redesigned DVRs suffered only "minimal" data loss, so that in this one regard, the redesign operated as well as the original. *Id.* Next, the District Court observed that "the only difference is the manner in which the software deals with that data loss." *Id.* Ergo, reasoned the District Court, "the modified software is not more than colorably different from the infringing software." *Id.* Of course, these patent claims *are all about* "the manner in which the software deals with that data loss." Finding a "differen[t] manner" of

District Court did exactly what the Supreme Court has cautioned against for over a century: "in determining the question of infringement, the court or jury, as the case may be, are not to judge about similarities or differences by the names of things, but are to look at the machines or their several devices or elements in the light of what they do, or what office or function they perform, and how they perform it." *Union Paper-Bag Mach. Co. v. Murphy*, 97 U.S. 120, 125 (1877); *see Bates v. Coe*, 98 U.S. 31, 42 (1878) ("Devices in one machine may be called by the same name as those contained in another, and yet they may be quite unlike, in the sense of the patent law ….").

Ignoring key evidence. Finally, the District Court declined even to "consider[] evidence of the … amount of man-hours spent designing the modifications, or the fact that EchoStar obtained opinions of counsel." Ad24. The reason was that "[f]or the most part" this testimony is "evidence of EchoStar's alleged good faith, which is irrelevant in these proceedings." *Id*. The premise is wrong because the opinion letters and the sheer magnitude of the undertaking represent objective proof of material differences. In any event, the conclusion is wrong because evidence of good faith *is* relevant to the inquiry whether a summary contempt proceeding is an appropriate vehicle. After all, changes made in good

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achieving the same objective is not proof of infringement; it is the definition of a successful design-around.

faith will almost never be deceptive or merely cosmetic, which is why this Court has observed that contempt is inappropriate against "a former infringer who has made a *good-faith effort* to modify a previously adjudged … infringing device," *Arbek*, 55 F.3d at 1570 (emphasis added).

To return to the District Court's trespass analogy, in deciding whether to try EchoStar for a second trespass before a jury or shoot EchoStar on the spot for contempt, it is relevant that EchoStar invested thousands of hours of expert time to map out a new route and hired a respected surveyor to confirm the boundaries of TiVo's property.

* * *

This Court has warned that "[a]llowing the patentee to proceed by a summary contempt proceeding in all cases would unnecessarily deter parties from marketing new devices that are legitimately outside the scope of the patent in question." *KSM*, 776 F.2d at 1530. EchoStar did exactly what the law encourages. It designed around TiVo's patent—in ingenious ways that TiVo thought could not be achieved.

If TiVo believes EchoStar is still infringing, it has every right to try to hold EchoStar accountable—in a separate infringement action with the customary protections of due process. But if TiVo can do it by way of a contempt proceeding in this case—after the massive redesign effort EchoStar undertook—then all

accused infringers act on redesigns at their own peril. Patentees will get an impermissible expansion of their right to exclude. But innovation—and the public interest—will suffer.

II. THE DISTRICT COURT ERRED IN HOLDING ECHOSTAR IN CONTEMPT, BECAUSE TIVO FAILED TO PROVE, BY CLEAR AND CONVINCING EVIDENCE, THAT THE REDESIGNED DEVICES INFRINGE.

If the Court agrees that TiVo has failed to sustain its burden of proving that the redesigned devices are essentially the same as the old ones, then its inquiry is at an end insofar as the injunction's Infringement Provision is concerned. The Court need not address *KSM*'s second prong—whether the devices in fact infringe. *See KSM*, 776 F.2d at 1530–32. That said, EchoStar's redesigned devices do not infringe, and TiVo has not proven that they do—much less by clear and convincing evidence. The text of claims 31 and 61 simply does not map onto EchoStar's redesigned devices. We address the two major categories of changes in turn: (A) data flow and buffering; and (B) "parsing video and audio."

A. TiVo Failed to Show, By Clear and Convincing Evidence, That the Broadcom Models Still Infringe Despite the Changes to Their Data Flow and Buffering System.

The District Court's infringement analysis gets off to an inauspicious start by incorrectly describing the redesign of the Broadcom models as entailing little more than the removal of one buffer, "which in essence is a change from eleven buffers to ten." Ad39. The change was nowhere near that trivial. The redesign of

the Broadcom models touched multiple structures and functions, effecting a fundamental change in how those receivers move data.

1. The claims require data to move in a very specific way.

The focus of the infringement dispute is on a portion of the claims at issue that describes data moving through various checkpoints in a prescribed order. The route of the data is depicted in Figure 1, *infra* (which homes in on the data flow only in the relevant portion of the claim). Imagine the data as goods being transported from a shipyard to Ikea. For present purposes, the point of departure, the shipyard, is *temporary storage* connected to the *physical data source*. Ad821, Ad823. The ultimate destination, Ikea, is the *storage device*. *Id.* In between, the goods must be stored in a warehouse, the *buffer*. *Id.* The goods must stop at this middle stop, because the claims tell us it is illegal to move the goods directly from the shipyard to Ikea.

The claims require that certain functions be performed at specified points along the way. On the first leg of the trip—between the shipyard (the *temporary storage*) and the warehouse (the *buffer*)—three discrete functions must happen, in the following specified order. First, the goods must be *extracted* from the shipyard. *Id.* ("extracts video and audio data"). Next, after extraction, but before the warehouse, the goods must be *converted*—say, by being placed in boxes that can be stacked in a warehouse. *Id.* ("converts video and audio data into data

streams). After that conversion, only then can the warehouse be *filled*. *Id.* ("fills said buffer with said streams"). These functions cannot happen after the warehouse (the *buffer*). On the next leg of the trip—from the warehouse (the *buffer*) to Ikea (the *storage device*)—the goods are *stored* at Ikea, the *storage device*. *Id.* ("stores and retrieves data streams onto a storage device"). All of these functions must occur, and they must occur in this exact order, with the *extracts*, *converts*, and *fills* happening before arriving at the warehouse and the *stores* happening after.

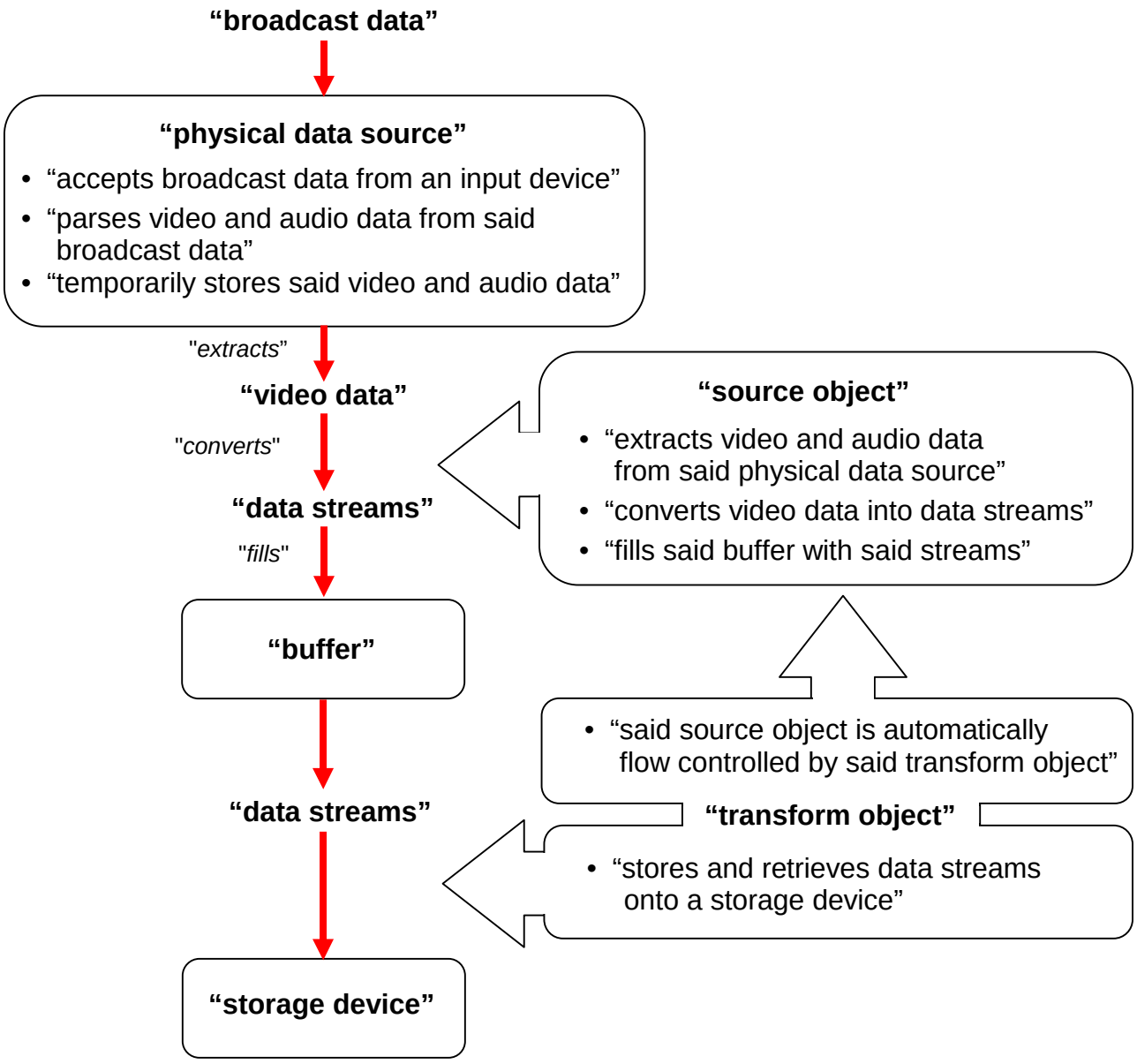
There are two categories of software that keep the goods moving and that perform the requisite functions. They are called the *source object* and the *transform object*. A142–43, A379–82. The *source object* is responsible for moving the goods from the shipyard (the *temporary storage*) to the warehouse (the *buffer*). *Id.* It performs the *extraction* from the shipyard, *conversion* en route, and the *fill* to the warehouse. *Id.* Then, in turn, the *transform object* is responsible for moving the data between the warehouse (the *buffer*) and Ikea (the *storage device*). *Id.* It performs the *stores* function. *Id.*

Finally, there is a supervisor who provides some control to the movement of the goods, the "*automatic flow control*." The *transform object* provides this supervisor to the *source object*. *Id.* ("said source object is automatically flow controlled by said transform object"). The *source object* only operates on the first

leg of the trip—between the shipyard and the warehouse—so the supervisor, it follows, must operate on that first leg. The supervisor regulates the flow of goods to make sure the warehouse does not overflow. The supervisor has no jurisdiction over the second leg of the trip (between the buffer and the storage device).

All of this follows the express wording of the software claims and the pertinent claim constructions. A142–43, A379–82, Ad821, Ad823; *accord Tivo v. EchoStar*, 516 F.3d at 1306.

Figure 1. Flow of Data Described in the Claims



2. TiVo argued that the infringing Broadcom models satisfied four particular limitations related to the intermediate buffer.

To win its infringement suit TiVo had to demonstrate which features of the old Broadcom models satisfied each individual claim limitation. The chart below presents TiVo's term-by-term matching, and Figure 2, *infra*, depicts those features in the schematic described by the claim. By way of warning, the word "buffer" is used in different ways, which can be confusing:

- as an express claim limitation (the claimed "buffer" filled by the source object);
- as the infringing structure in the Broadcom models for that limitation (the record buffer); and
- as the infringing structure in the Broadcom models for the "temporarily stores" limitation (in the transport buffer).

To confuse matters further, the transport buffer in the Broadcom models is sometimes described as consisting of 10 individual buffers.[5] With that caveat, here is the position on which TiVo prevailed:

[5] TiVo called the "transport buffer" 10 buffers, A5087, while EchoStar called the "transport buffer" one buffer with 10 descriptors, A5221. We use TiVo's terminology. As EchoStar's expert testified, this is only a semantic difference in this context. A5221.

INFRINGING STRUCTURES THAT TIVO IDENTIFIED	
claim limitation	infringing structure
"physical data source" accepts video and audio data	The physical data source was the Broadcom chip, A1662, A7291–92.
"physical data source … temporarily stores said video and audio data"	The storage was in the "transport buffer" in RAM, which TiVo called 10 buffers, A1662, A7291–92; *see supra* n. 5.
"source object extracts video and audio data from said physical data source"	The extraction was by the "ioctl" software operation, which took data from the transport buffer. A1664, A7293–94; *see infra* n. 6.
source object "fills said buffer with said stream"	The fill was by the "memcpy" software operation, which transferred data into the *record buffer*. A1678, A7318–20.
"said buffer" filled by source object	The buffer was the record buffer (sometimes referred to as the copy buffer). A1678, A1665, A7293, A7296, A7320.
"automatic flow control"	Filling of record buffer is blocked until transform object moves its contents to the hard drive, A1665, A1678, A7318–20.

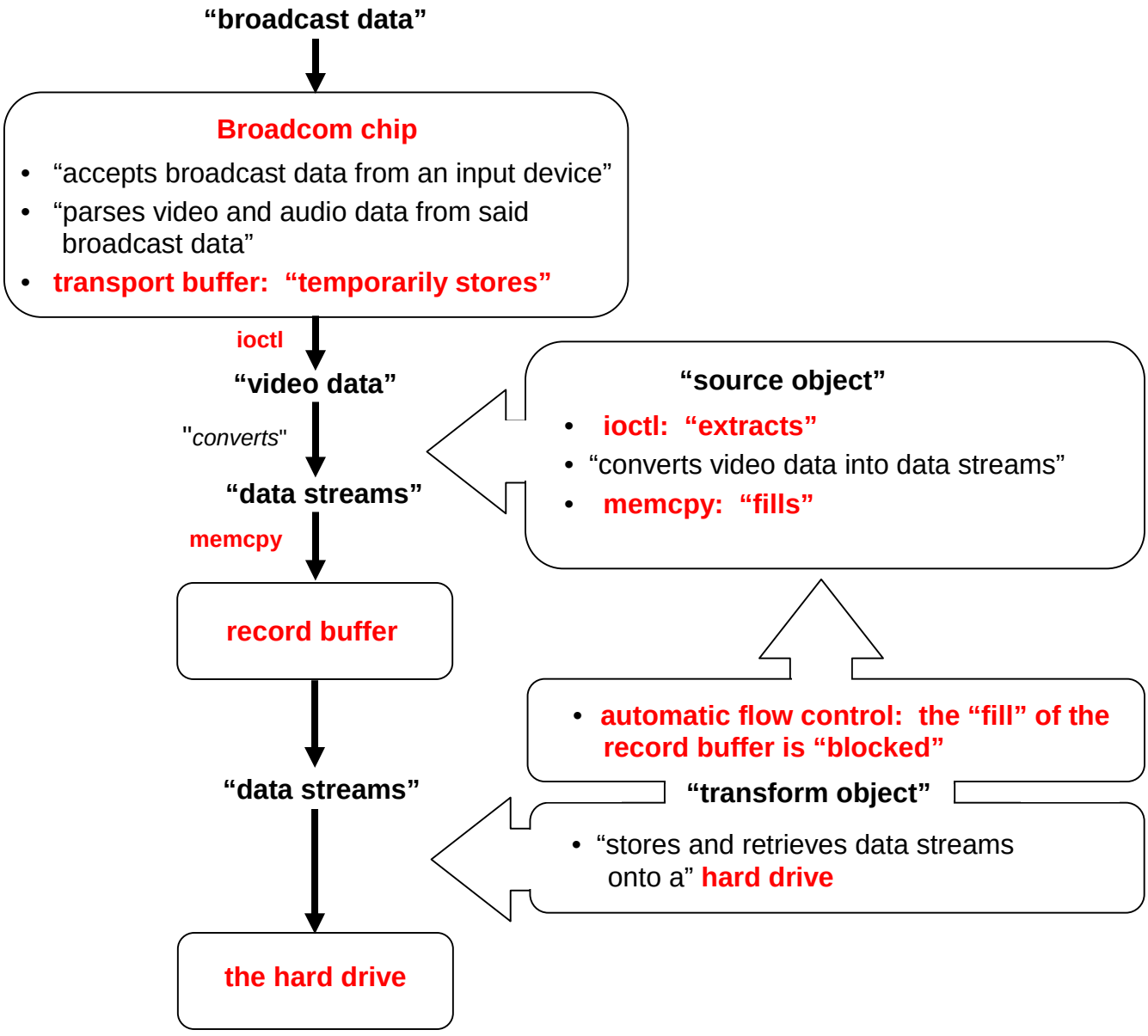
These structures can all be mapped to the claim language in the claimed way. Just as the leg bone is connected to the hip bone, in the infringing Broadcom models the data that was *temporarily stored* by the *physical data source* (in the transport buffer) was *extracted* (by the "ioctl" operation), which data then *filled* (by the

"memcpy" operation) the "*buffer*" (the record buffer), which buffer was between the *temporary storage* and the "*storage device*" (the hard drive).[6]

TiVo also showed that the "blocking" function in the Broadcom models provided "automatic flow control." Ad822–23, A1391, A1665, A1678, A3174, A7318–20, A7102–05. That is, in the infringing Broadcom models, the data that was *temporarily stored* by the *physical data source* (in the transport buffer) was automatically blocked from being written to the claimed *buffer* (the record buffer) until data already in the claimed *buffer* had been stored to the *storage device* (the hard drive). A1391–92, A1677–79; *see* Ad818 ("To obtain the buffer, the source object asks the down stream object in his pipeline for a buffer…. The source object is blocked until there is sufficient memory. This means that the pipeline is self-regulating; it has automatic flow control.").

[6] At trial, TiVo took the position that the temporary storage for the physical data source was located on the Broadcom chip. On appeal, TiVo changed position and successfully argued that the transport buffer in RAM connected to the physical data source was the temporary storage. *See TiVo*, 516 F.3d at 1310.

Figure 2. Flow of Data in the Old Broadcom Models



3. Neither TiVo nor the District Court could map the redesigned Broadcom models onto the claim limitations.

EchoStar removed several structures and functions from the old Broadcom models. A5216–18, A5223–24. Specifically, TiVo identified each of the following four items in connection with its successful infringement position, asserting that they satisfied the indicated claim limitations:

- the "ioctl operation," corresponding to "extracts";
- the "memcpy operation," corresponding to "fills";
- the record buffer, corresponding to "said buffer"; and
- the blocking function, corresponding to "automatic flow control."

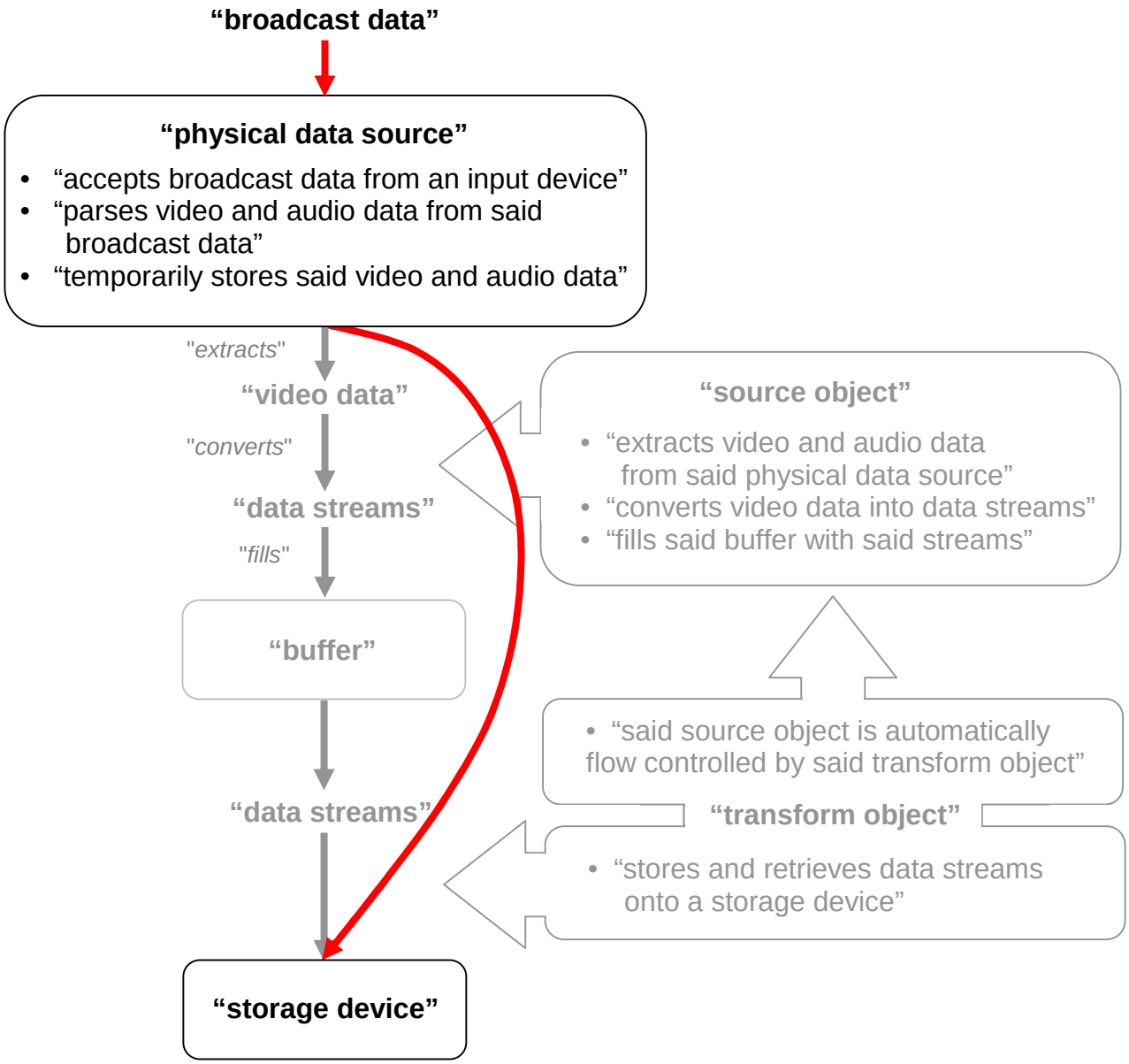
TiVo's expert at the contempt hearing confirmed that EchoStar removed all four of these features. A5110, A5112, A5177. Moreover, because of the manner in which these four features relate to other functions, two additional claim limitations cannot be satisfied by the modified devices either:

- without extraction and fill, there is no "source object"; and
- without automatic flow control, there is no "transform object".

Returning to the Ikea metaphor, EchoStar changed the flow of data in the Broadcom models from one where it was illegal to move goods directly from the shipyard to Ikea without putting the goods in a warehouse in between, to one where the goods speed directly from the shipyard (the *temporary storage*) to Ikea

(the *storage device*)—without making any stop in between. In so doing, EchoStar also necessarily removed all the functions (extracts, converts, fills, flow control) the claim describes as occurring between the shipyard and the warehouse. Now, the flow of data looks like Figure 3 (on the next page), with the lightened images representing the features that EchoStar eliminated.

Figure 3. Flow of Data in the Redesigned Broadcom Models



The District Court never explained how this data flow in EchoStar's redesigned models satisfies all the claim elements, or any of them for that matter. Instead, in a single paragraph of infringement discussion, the District Court substituted gestalt for analysis. Ad25–26. The District Court's argument appears to proceed as follows:

(1) the District Court already construed the word "automatic flow control" to mean "self-regulate";

(2) the redesigned Broadcom products in some way "regulate" *something*;

(3) ergo, the design-around products infringe.

The grand error here was compressing a very complicated infringement analysis—one that requires the identification of *temporary storage*, followed by an *extraction*, followed by a *conversion*, followed by a *fill*, into a *buffer*, all subject to *automatic flow control*—into the single phrase, "self-regulate." Ad25–26, A379–81. EchoStar raised all these claim limitations, and their interrelationship. A5408, A5427, A5473, A6991–7005. The District Court ignored all of these claim limitations but one.

In addressing that one limitation—automatic flow control—the District Court listed six technical features of the products and concluded that the function exists somewhere among them. Ad25–26 (listing "ten buffers"; "read and write 'pointers' and 'descriptors'"; "communications between the read and write processes"; "a timed 'semaphore'"; an occasional "extracting [of] data from

multiple buffers"; and a rare "flushing all ten buffers"). It is not enough to cite features that in some way affect the movement of data. *Automatic flow control* requires the self-regulation of the data flowing between (1) the *extraction* from *temporary storage* and (2) the *fill* to the *buffer*. The District Court cited no evidence, let alone clear and convincing evidence, that the Broadcom models do this. TiVo did not map which features performed each of these functions, because it cannot be done.

We defy TiVo to prove us wrong. We challenge TiVo to answer nine basic questions and supply just one supporting quote for each—the best it can muster—from any witness at the hearing.

***Claim elements*:**

1. ***Temporary storage***. The structure providing temporary storage is _____. Witness _____ testified: "_____."

2. ***Buffer***. The structure corresponding to the claimed "buffer" is _____. Witness _____ testified: "_____."

3. ***Extracts***. The "extraction" is performed by the software function _____. Witness _____ testified: "_____."

4. ***Converts***. The conversion is performed by the software function _____. Witness _____ testified: "_____."

5. ***Fills***. The "fill" is performed by the software function _____. Witness _____ testified: "_____."

6. ***Automatic flow control***. The "automatic flow control" is performed by the software function _____. Witness _____ testified: "_____."

7. ***Stores***. The "stores" function is performed by the software called _____. Witness _____ testified: "_____."

***Relationships with other claim elements*:**

8. ***The first data move***. We know that the structures that we filled into the blanks above are in the correct order for the first data move—*extraction* from the temporary storage, *then* conversion, *then* a fill into the buffer, *all in that order*—because _____ testified that: "_____."

9. ***The second data move***. We know that the structures that we filled into the blanks above are in the correct order for the second data move—from the buffer to the storage device—because _____ testified that: "_____."

If TiVo cannot complete this basic exercise of articulating how the new features map to the claims, then there is no way that it can even allege an infringement case, much less win one by clear and convincing evidence.

B. TiVo Failed to Show, By Clear and Convincing Evidence, That the Broadcom and 50X Models Infringe Despite the Elimination of Start-Code Detection and Indexing.

The District Court also erred in holding that the Broadcom and 50X models infringe, even though EchoStar eliminated start-code detection.

1. TiVo identified the "PID filter" as the infringing feature.

The District Court did not hold EchoStar's novel statistical solution to trick-play to be "parsing of video and audio data." Rather, it turned to a different

feature, one that had always been part of the Broadcom and 50X models: the PID filter, which stands for "packet identifier filter." Ad25, A7394.

To understand why that is incorrect, it is helpful to know what a PID filter does. Every channel is associated with a unique set of PID numbers—CBS has its own, The Disney Channel has its own, HBO has its own, etc. Digital TV arrives in "transport streams," each a river of data of multiple channels. A5421. That data is made up of "packets." *Id.* Each packet has two parts:

(1) a "header," which contains the PID number; and

(2) the payload, which contains the video, audio, and other data for a program (*e.g.*, closed captions). A5421, A5470.

When the viewer wants to watch, say, CBS, the receiver uses the PID filter to select only CBS from the multi-channel transport stream. *Id*. The filter looks at the header of each packet for the PID number and allows only those with a PID number associated with CBS to pass through. *Id*.

2. The District Court erred in finding clear and convincing evidence that the redesigned Broadcom and 50X models still infringe.

The District Court's analysis of whether the PID filter satisfies the "parsing of video and audio data" limitation is also found in a single flawed paragraph. Ad25. The argument proceeds essentially as follows:

(1) the District Court already construed the word "parse" to mean "analyze";

(2) a PID filter in some way "analyzes" *something*;

(3) ergo, the new products infringe.

The District Court, again, applied a snippet of claim language to the accused device by isolating that one word from its neighbors. The claim does not say "parse *anything*," and the District Court did not construe the term to mean "analyze *anything*." By the claim's express terms—as construed by the District Court—a device does not infringe unless it "parses [i.e., analyzes] *video and audio data from said broadcast data*." A PID filter, however, looks *only* at the header of a data packet, not the payload where the video and audio are contained—and thus does not "parse" or "analyze" the required "video and audio data." Nor can it: the payload is *scrambled*—which is the way the broadcast stream is sent to prevent pirated, unauthorized reception. A5469–70, A7218. It is unscrambled only *after* passing through the PID filter. Thus, the video and audio data in the payload are a gobbledygook of scrambled zeros-and-ones that *cannot* be analyzed at the time of PID filtering. *Id.*

The District Court observed "that EchoStar's own experts at trial testified that PID filtering satisfied that limitation." Ad44. At trial, the parties hotly contested that proposition, which was critical to TiVo's ability to survive a validity challenge. A3542-43. (EchoStar reserves the right to renew that argument in any new trial, in light of TiVo's new position on how the claims are construed.) TiVo won the argument; EchoStar lost. Each is now on the other side of the debate. The

most rudimentary rules of judicial estoppel prevent TiVo, the prevailing party, from taking a position that is "clearly inconsistent with its earlier [winning] position." *Transclean Corp. v. Jiffy Lube Int'l, Inc.*, 474 F.3d 1298, 1307 (Fed. Cir. 2007). The District Court erred in permitting TiVo to freely contradict its *winning* position, and upended normal principles of judicial estoppel when it bound EchoStar to its *losing* position. (The District Court duplicated this error by permitting TiVo to do an about face on its position regarding "automatic flow control.")

III. AS A MATTER OF LAW, THE DISTRICT COURT ERRED IN HOLDING ECHOSTAR IN CONTEMPT FOR VIOLATING THE INJUNCTION'S DISABLEMENT PROVISION.

The District Court's alternative holding is premised on this startling proposition: "Even if EchoStar had achieved a *non-infringing design-around*, this Court would still find that EchoStar is in contempt of this Court's permanent injunction." Ad26 (emphasis added). No other court has ever held that a judge exercising patent jurisdiction could permanently enjoin *non-infringing* products. Congress, the Supreme Court, and this Court have all decreed otherwise. By interpreting its Disablement Provision as a prohibition against design-arounds, the District Court has expanded TiVo's limited right to exclude others from practicing a discrete technology into an exclusive right to all DVR functionality. That is undeserved, unprecedented, and unlawful.

The District Court based this holding on its conclusion that "EchoStar never complied with the Disablement Provision of this Court's Order." Ad26. Specifically, the District Court interpreted that provision to mean that EchoStar was not permitted to design around TiVo's patent—that back in 2006 it had enjoined even unimagined products that would be entirely and indisputably non-infringing. *If* that is what the District Court had ordered in 2006, the order would have been unlawful. The Patent Act directs that a court "may grant injunctions" only "to prevent violation of any right secured by patent." 35 U.S.C. § 283. Since the dawn of the Republic, the Supreme Court has "always held that an inventor has no right of property in his invention … unless he obtains a patent for it, according to the acts of Congress; and … his rights are to be regulated and measured by these laws, and cannot go beyond them.'" *Deepsouth Packing Co. v. Laitram Corp.*, 406 U.S. 518, 526 n.8 (1972) (quoting *Brown v. Duchesne*, 60 U.S. 183, 195 (1857)). And this Court has been equally emphatic that judges have no authority to enjoin "lawful noninfringing activities." *Johns Hopkins University. v. CellPro, Inc.*, 152 F.3d 1342, 1366 (Fed. Cir. 1998).

In keeping with these bedrock rules, this Court should reject the District Court's alternative basis for its contempt ruling for two reasons. First, the 2006 injunction cannot reasonably be read to prohibit legal activity—and certainly does not do so clearly, as is required for a contempt finding. *See infra* Point III.A.

Second, if that was what the Disablement Provision meant, it cannot be enforceable because it is unlawfully overbroad. *See infra* Point III.B.

A. Contempt Was Improper Because the Disablement Provision Did Not Clearly Prohibit Non-Infringing Redesigns.

Contempt is such "a potent weapon" that the District Court should not have ordered it unless the injunctive order in question was framed "so that those who must obey [it] will know what the court intend[ed] to require and what it mean[t] to forbid." *Int'l Longshoremen Ass'n, Local 1291 v. Phila. Marine Trade Ass'n*, 389 U.S. 64, 76 (1967); *see* Fed. R. Civ. P. 65. It was improper to hold EchoStar in contempt of the Disablement Provision unless the provision gave EchoStar "fair and precisely drawn notice of what the injunction actually prohibits," *KSM*, 776 F.2d at 1526 (citation omitted), in language that was "specific and definite," *Martin v. Trinity Indus., Inc.*, 959 F.2d 45, 47 (5th Cir. 1992). Before contempt could even be considered, TiVo had to prove by "clear and convincing evidence," with all ambiguities resolved in EchoStar's favor, *see Martin*, 959 F.2d at 47, that the Disablement Provision did, indeed, prohibit EchoStar from engaging in non-infringing conduct.

As a matter of law, the District Court erred in interpreting the injunction to contain such a sweeping proscription. *See Abbott Labs. v. Torpharm, Inc.*, 503 F.3d 1372, 1382-83 (Fed. Cir. 2007) (matters of interpretation reviewed de novo). Neither the context, nor the language, nor the legal backdrop gave EchoStar the

subtlest hint that it might one day be held in contempt for devising a non-infringing design-around, as patent law and policy encourage it to do.

Context. One would never expect a district court to issue a ruling this expansive without at least two baseline prerequisites: (1) a request from the moving party; and (2) a clear statement from the court justifying the unprecedented relief. This order came unaccompanied by either.

The District Court copied the Disablement Provision almost verbatim from an order proposed by TiVo—the only difference being that TiVo pressed for "immediate" disablement, A7550, while the District Court gave EchoStar a 30-day grace period, A162. In originally defending the language the District Court ultimately adopted, TiVo insisted that the order was intended to enjoin "infringement of the patent by devices adjudged to infringe and infringement by devices no more than colorably different therefrom"—"nothing more, nothing less." A7354. TiVo even went so far as to tell the District Court that "EchoStar can *reprogram* and disable the infringing DVR functionality in all existing DVR units by *updating their software* via satellite transmission." A6064 (emphasis added). At no point did TiVo so much as suggest that it was seeking an order

prohibiting design-arounds. Nor did the District Court ever suggest that it was unilaterally expanding beyond the standard relief that was requested.[7]

Plain language. In light of these routine origins, no rational party in EchoStar's position would have surmised that the Disablement Provision might contain a latent trap unlawfully prohibiting legal activity.

The passage that the District Court referred to as the "Disablement Provision" consisted of two clauses, with two distinct directives. The first directive—which was the focus of the District Court's contempt order—related to receivers already in subscribers' homes. The court ordered EchoStar to "disable the DVR functionality … of the *Infringing Products* that have been placed with an end user or subscriber." A162 (emphasis added). Let us call this the "Disable Directive." The second directive (which the District Court did not invoke, but which is relevant for context) is directed to "any new placements" and related to receivers that were sitting on retailers' or distributors' shelves or that had yet to be manufactured. The court ordered that "[t]he DVR functionality … shall not be

[7] The District Court was mistaken when it observed (in its recitation of facts, though not in its legal analysis) that EchoStar had objected to "the exact language of the Disablement Provision," urging a narrower construction that would allow for a design-around. Ad15. The objection in question had nothing to do with the language of the Disablement Provision. EchoStar was objecting to a *recall order* proposed by TiVo but ultimately *rejected* by the District Court. A4534.

enabled in any new placement of the *Infringing Products*." *Id*. (emphasis added). Let us call this the "Do-Not-Enable Directive."

The only natural conclusion to be drawn from an order to "disable the DVR functionality … in … the *Infringing Products*," is that EchoStar was required to disable only products that have the *infringing* functions, and did not have some extraordinary and unprecedented obligation to disable functions in products that did not infringe.

This natural, and legal, reading is confirmed by two other verbal cues. First, the Disable Directive orders EchoStar to "*disable* the DVR functionality." Bearing in mind that the Disable Directive applies only to receivers that are already in subscribers' homes, the implication is evident: one disables a function that exists on a receiver—e.g., the infringing software that had already been downloaded. One does not disable a function that has yet to be devised or installed. Second, the Disable Directive requires EchoStar to disable "*the* DVR functionality." To anyone reading the order in context, that phrase refers to the specific "DVR functionality" that had been adjudged to have infringed, not to "*any* DVR functionality" that might be developed sometime in the future to avoid the patent's claims and, indeed, the Do-Not-Enable Directive uses the same language. The language provides not the slightest hint that the District Court was thinking about

some hypothetical non-infringing function that had yet to be invented, and might never be invented.

In concluding that the order was broader, the District Court noted that "for the sake of clarity this Court provided EchoStar with a definition of DVR functionality." Ad27. The parenthetical to which the court refers—which explains that EchoStar must "disable all storage to and playback from a hard disk drive of television data," A162—did not provide anywhere near the level of "clarity" that can sustain a contempt order. When the District Court issued this order, the *only* software for DVR functionality that the receivers in question had was software that was adjudged to infringe TiVo's patent in combination with the hardware. So an order directing EchoStar to disable "all" DVR functionality, in context, had to mean that EchoStar was required to disable the *entire* infringing function.

But all this sentence diagramming begs the larger interpretive question. A contempt order that rests on such minute semantic analysis of the definition of "Infringing Products," "the" versus "all," and "all" versus "any," cannot possibly be sufficiently "specific and definite" to satisfy the contempt standard. *Martin*, 959 F.2d at 46. An order that truly was intended to prohibit design-arounds for existing products would surely have communicated the point more clearly. The District Court had any number of options available to it. It could have made specific reference to "any further attempt to design around the '389 Patent," as the

Amended Injunction now on appeal does. Ad3. Or it could have specified (as its opinion now does) that the injunction applies to *any* DVR functionality, "[e]ven if EchoStar achieved a non-infringing design-around." A62. Any such order still would have been illegal, but at least it would have been clear.

Legal constraint. Even if the Disablement Provision could have been read as the District Court now reads it, EchoStar was justified in reading the District Court's order in a way that would make it legal. *See Int'l Rectifier Corp. v. IXYS Corp.*, 383 F.3d 1312, 1316–17 (Fed. Cir. 2004). A6218. The point here is not, as the District Court put it, that EchoStar claims a right to "ignore[] this Court's order because it subjectively believed it to be improper or overbroad." Ad27. Rather, the point is that EchoStar cannot be held in contempt unless the injunction *clearly* prohibited the conduct in question; EchoStar was entitled to understand the order from the perspective that the District Court intended to comply with clear legal rules, rather than positing that perhaps the District Court intended to flout fundamental and age-old jurisdictional axioms without invitation and without warning.

*** * ***

In sum, the District Court was wrong when it concluded that "EchoStar never complied with the Disablement Provision," as reasonably read. Ad26. Although the Disablement Provision was stayed pending appeal, EchoStar

voluntarily disabled the infringing functionality and immediately downloaded new software to create receivers with non-infringing DVR functionality. Thus, when this Court lifted the stay of the injunction, EchoStar had already complied and was not required to do anything else.

B. The District Court Erred in Ignoring the Overbreadth of Its Interpretation and in Finding Waiver.

Even if the District Court's reading of the Disable Directive had been correct, the contempt order was still improper because the prohibition was unlawful. As this Court has explained: "If a trial court is faced with an overly broad injunction during a contempt proceeding, the court should interpret it according to the rule of law ... from *KSM*"—i.e., the rule that "'contempt proceedings ... are available only with respect to devices previously admitted or adjudged to infringe, and to other devices which are no more than colorably different therefrom.'" *Int'l Rectifier Corp. v. IXYS Corp.*, 383 F.3d 1312, 1316-17 (Fed. Cir. 2004) (citation omitted). The District Court did not follow that command by this Court—or even acknowledge it.

The District Court gave one reason for ignoring the illegality of such a broad order: EchoStar "waived any argument that this Court's order is overbroad." Ad27. According to the District Court, "[i]f EchoStar believed that this Court's order was overly broad or that it improperly covered non-infringing practices, then EchoStar should have requested that this Court modify its order or should have

challenged the scope of the order on appeal." *Id*. This assertion misses the point of EchoStar's argument. EchoStar's point is that it *did not believe* the District Court's order was "overly broad or that it improperly covered non-infringing practices." *Id.* EchoStar believed the Disablement Provision was valid precisely *because* it did not, and could not reasonably be read to, "improperly cover[] non-infringing practices."

The District Court's position on waiver, then, rests on the Kafkaesque proposition that EchoStar was expected to appeal an interpretation before it was made. *But see United States v. Wells*, 127 F.3d 739, 742–43 (8th Cir. 1997) (holding that defendants did not waive argument that "could only have [been] raised … if they had anticipated … a position that the government adopted for the first time in a supplemental brief"); *Cal-Almond, Inc. v. Dep't of Agric.*, 67 F.3d 874, 880 (9th Cir. 1995) (holding that party did not waive right to challenge specific remedies where "it was not until our remand that the specifics of fashioning remedial relief came into focus"), *vacated on other grounds*, 521 U.S. 1113 (1997). This Court would surely rue the consequences of any suggestion that every litigant is required to appeal not only issues joined below, but every possible issue that *might* be joined one day in some future action.

One cannot leave the subject of overbreadth without a comment on the District Court's latest amendment to the injunction—requiring EchoStar to "inform

this Court of any further attempt to design around the '389 Patent and … seek approval from this Court before any such design is implemented," Ad3—which is especially troubling.[8] When this Court held that "[a]n enjoined party is entitled to design around the claims of a patent," it explained that this entitlement is subject to a constraint: The litigant that avails itself of the entitlement "bears the risk that the enjoining court may find [the] changes to be too insubstantial to avoid contempt." *KSM*, 776 F.2d at 1526. In stripping EchoStar of the entitlement—and accreting to its jurisdiction the decision whether to allow the design-around to proceed—the District Court undermined both that entitlement and the public benefit. As is evident from the story of EchoStar's first design-around, *see supra* at pp.8–9, the exercise is lengthy and fraught with risk of failure. A business like EchoStar should not have to bear the additional burden, and additional delay, that comes from having to seek advance approval for any design-around it might try. The delay could be ruinous.

IV. THE DISTRICT COURT'S DAMAGES AWARD AND PRECLEARANCE REQUIREMENT SHOULD BE VACATED.

This last point should be uncontroversial: If this Court topples the District Court's contempt order, any further relief based on that order should fall as well.

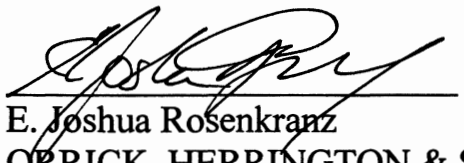
[8] EchoStar has identified potential design-around options in light of the District Court's order, and has been developing and testing potential design-around options in an engineering environment.

The Court should revise the relief granted in three respects in particular. First, the District Court has already scheduled a hearing on monetary sanctions, even while the appeal is pending. Obviously any sanctions founded upon a vacated contempt order must be vacated. Ad11. Second, the District Court awarded TiVo over $103 million (plus interest) for damages accruing while the District Court's injunction was stayed pending appeal. Ad2. Only about $16.4 million of that amount related to the products that were adjudicated to infringe; the other $86.6 million related entirely to the purported infringement by the redesigned devices. The damages should be reduced by the amount attributable to the redesigned devices. Third, this Court should vacate the District Court's order requiring EchoStar to inform the District Court of any further redesign attempts and to seek preclearance before implementing a design-around. Ad3.

CONCLUSION

The District Court's contempt order should be vacated, along with any relief arising therefrom.

Respectfully submitted,



E. Joshua Rosenkranz
ORRICK, HERRINGTON & SUTCLIFFE LLP
666 Fifth Avenue
New York, NY 10103-0001
(212) 506-5000

Counsel for Defendants-Appellants

July 17, 2009

Addendum

U.S. Patent No. 6,233,389, Claim 31

31. A process for the simultaneous storage and play back of multimedia data, comprising the steps of:

providing a physical data source, wherein said physical data source accepts broadcast data from an input device, *parses video and audio data from said broadcast data*, and *temporarily stores said video and audio data*;

providing a source object, wherein said source object *extracts* video and audio data from said physical data source;

providing a transform object, wherein said transform object stores and retrieves data streams onto a storage device;

wherein said source object obtains a *buffer* from said transform object, said source object *converts* video data into data streams and *fills* said buffer with said streams;

wherein said source object is *automatically flow controlled* by said transform object;

providing a sink object, wherein said sink object obtains data stream buffers from said transform object and outputs said streams to a video and audio decoder;

wherein said decoder converts said streams into display signals and sends said signals to a display;

wherein said sink object is automatically flow controlled by said transform object;

providing a control object, wherein said control object receives commands from a user, said commands control the flow of the broadcast data through the system; and

wherein said control object sends flow command events to said source, transform, and sink objects.

U.S. Patent No. 6,233,389, Claim 61

61. *An apparatus* for the simultaneous storage and play back of multimedia data, comprising:

a physical data source, wherein said physical data source accepts broadcast data from an input device, parses video and audio data from said broadcast data, and temporarily stores said video and audio data;

a source object, wherein said source object extracts video and audio data from said physical data source;

a transform object, wherein said transform object stores and retrieves data streams onto a storage device;

wherein said source object obtains a buffer from said transform object, said source object converts video data into data streams and fills said buffer with said streams;

wherein said source object is automatically flow controlled by said transform object;

a sink object, wherein said sink object obtains data stream buffers from said transform object and outputs said streams to a video and audio decoder;

wherein said decoder converts said streams into display signals and sends said signals to a display;

wherein said sink object is automatically flow controlled by said transform object;

a control object, wherein said control object receives commands from a user, said commands control the flow of the broadcast data through the system; and

wherein said control object sends flow command events to said source, transform, and sink objects.

Amended Final Judgment and Permanent Injunction, June 2, 2009

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

TIVO INC.,	§	
	§	
Plaintiff,	§	
	§	
vs.	§	**CIVIL ACTION NO. 2:04-CV-01 (DF)**
	§	
DISH NETWORK CORPORATION, et al.,	§	
	§	
Defendants.	§	

AMENDED FINAL JUDGMENT AND PERMANENT INJUNCTION

Pursuant to Rule 58 of the Federal Rules of Civil Procedure, and in accordance with the jury verdict delivered on April 13, 2006 and the Federal Circuit mandate issued April 18, 2008, and with the Court's contemporaneously filed opinions and orders, the Court hereby enters judgment for Plaintiff against Defendants for willful infringement of U.S. Patent No. 6,233,389 ("the '389 Patent") claims 31 and 61 ("the Infringed Claims") by Defendants' following DVR receivers (collectively the "Infringing Products"): DP-501, DP-508, DP-510, DP-522, DP-625, DP-721, DP-921, and DP-942. The jury in this case found EchoStar's infringement to be willful, but the Court, finding that Echostar did not act in bad faith and that this is not an "exceptional case," has determined that there should be no enhancement of damages and no award of attorneys fees pursuant to 35 U.S.C. Sections 284 and 285. The Court also enters judgment for Plaintiff on Defendants' counterclaims for declaratory judgment of non-infringement, invalidity, and unenforceability.

IT IS THEREFORE ORDERED THAT Plaintiff shall have and recover from Defendants, jointly and severally, the total sum of $73,991,964.00, together with prejudgment interest at the rate

of prime, said prejudgment interest in the total sum of $5,367,544.00, together with supplemental damages in the amount of $10,317,108.00, together with post-judgment interest on the entire sum calculated pursuant to 28 U.S.C. § 1961. In addition, Plaintiff shall have and recover from Defendants, jointly and severally, the sum of $103,068,836 in damages accrued during the stay of this Court's injunction, together with post-judgment interest on that sum calculated pursuant to 28 U.S.C. § 1961. The amounts awarded in this judgment shall bear interest from the date of judgment at the lawful federal rate.

It is **FURTHER ORDERED** that each Defendant, its officers, agents, servants, employees, and attorneys, and those persons in active concert or participation with them who receive actual notice hereof, are hereby restrained and enjoined, pursuant to 35 U.S.C. § 283 and Fed. R. Civ. P. 65(d), from making, using, offering to sell, selling, or importing in the Untied States, the Infringing Products, either alone or in combination with any other product and all other products that are only colorably different therefrom in the context of the Infringed Claims, whether individually or in combination with other products or as a part of another product, and from otherwise infringing or inducing others to infringe the Infringed Claims of the '389 Patent.

Defendants are hereby **FURTHER ORDERED** to, within thirty (30) days of the issuance of this order, disable the DVR functionality (i.e., disable all storage to and playback from a hard disk drive of television data) in all but 192,708 units of the Infringing Products that have been placed with an end-user or subscriber. The DVR functionality, storage to and playback from a hard disk drive, shall not be enabled in any new placements of the Infringing Products.

Defendants shall forthwith provide written notice of this judgment, and the injunction ordered herein, to their officers, directors, agents, servants, representatives, attorneys, employees,

subsidiaries and affiliates, and those persons in active concert or participation with them, including any and all manufacturers, distributors, retailers, and service providers who have been involved in the making, using, selling, offering for sale or importing of any Infringing Products, and to all other persons or entities involved in any way with the making, using, selling, offering for sale or importing of any Infringing Products. Defendants shall take whatever means are necessary or appropriate to ensure that this order is properly complied with. This injunction shall run until the expiration of the '389 Patent.

It is **FURTHER ORDERED** that Defendants shall inform this Court of any further attempt to design around the '389 Patent and shall seek approval from this Court before any such design-around is implemented.

This Court retains jurisdiction over Defendants to enforce any and all aspects of this Judgment and Permanent Injunction, including the award of monetary sanctions for EchoStar's contempt of this Court's injunction.

The Court further retains jurisdiction to award Plaintiff amounts for supplemental damages, interest, costs, attorneys fees and such other or further relief as may be just and proper.

All relief not specifically granted herein is denied. All pending motions not previously ruled on are denied. This is a Final Judgment and is appealable.

SIGNED this 2nd day of June, 2009.

DAVID FOLSOM
UNITED STATES DISTRICT JUDGE

June 2, 2009 Order (Damages)

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

TIVO INC.,	§	
	§	
Plaintiff,	§	
	§	
vs.	§	**CIVIL ACTION NO. 2:04-CV-01 (DF)**
	§	
DISH NETWORK CORPORATION, et al.,	§	
	§	
	§	
Defendants.	§	

O R D E R

Before the Court is TiVo's Revised Motion on Remand for Damages During the Stay of the Permanent Injunction. Dkt. No. 852. Also before the Court are EchoStar's response and TiVo's reply. Dkt. Nos. 854 & 857. The Court held a hearing on this and other matters on September 4, 2008. Dkt. No. 860 (transcript). Having considered the parties' arguments in light of this Court's holdings and relevant case law, the Court hereby establishes a royalty rate of $1.25 per DVR subscriber per month during the stay period.

I. BACKGROUND

In this patent infringement action, Plaintiff TiVo, Inc. ("TiVo") alleged that Defendants EchoStar Communications Corporation,[1] EchoStar DBS Corporation, EchoStar Technologies Corporation, EchoStar Satellite LLC, and EchoSphere LLC's (collectively "EchoStar") digital video recorders ("DVRs") infringe several claims in TiVo's U.S. Patent No. 6,233,389 ("the '389 Patent"). Dkt. No. 3 (Amended Complaint). In March 2006, the case was tried to a jury. The jury found that

[1] DISH Network Corporation has been substituted for EchoStar Communications Corporation and EchoStar Corporation has been joined as a defendant in this action. Dkt. No. 863.

the asserted claims of the '389 Patent were valid and that EchoStar's accused DVRs infringed each of those claims. The jury also found EchoStar's infringement to be willful and awarded TiVo $73,991,964 in compensatory damages. *See* Dkt. No. 690 (verdict form).

After trial, this Court issued a permanent injunction covering the infringing DVRs.[2] Dkt. No. 806 at 2. After this Court entered its injunction, EchoStar asked the Federal Circuit to stay the injunction during its pending appeal, which the Circuit granted. In its stay request, EchoStar represented that without the stay it would be unable to provide DVR service and would risk losing a significant portion of its existing or potential customers, which could cost the company $90 million per month. *See* Dkt. No. 920 at 20 (citing EchoStar's Reply Brief In Support of Its Emergency Motion to Stay the District Court's Injunction, at 9). EchoStar made this representation even though it had nearly completed certain design-around efforts. Dkt. No. 854 at 10. Indeed, EchoStar began downloading redesigned software into the infringing receivers on October 24, 2006, less than a month after the Circuit granted EchoStar's stay request. *Id.*

On appeal, the Federal Circuit affirmed the jury's verdict in part and remanded the case. *See TiVo Inc. v. EchoStar Commc'ns Corp*, 516 F.3d 1290 (Fed. Cir. 2008). In doing so, the Circuit dissolved the stay of this Court's injunction and remanded for "a determination as to the additional damages, if any, that TiVo has sustained while the stay of the permanent injunction has been in effect." *Id.* at 1312. On April 18, 2008, the Circuit's mandate issued and this Court's injunction was reinstated. Thus, the time period relevant to the determination of damages during the stay is the

[2] This Court's permanent injunction contained an exception for 192,708 infringing DVRs that had been placed with the end-user. Dkt. No. 806 at 2. This exception covered those DVRs on which TiVo has received lost profits, and against which TiVo was not pursuing an injunction. Dkt. No. 747 at 16.

twenty-month period from September 8, 2006, when this Court's injunction was entered and subsequently stayed, to April 18, 2008, when that stay was dissolved.

II. LEGAL PRINCIPLES

When a district court issues an injunction, which is subsequently stayed, damages may be awarded for infringements taking place after the injunction would have taken affect. *See TiVo*, 516 F.3d at 1312; *Amado v. Microsoft Corp.*, 517 F.3d 1353, 1362 (Fed. Cir. 2008) ("When a district court concludes that an injunction is warranted, but is persuaded to stay the injunction pending an appeal, the assessment of damages for infringements taking place after the injunction should take into account [a number of factors]."). Although such an award may take the form of monetary damages, an award that remedies a stay is equitable in nature and entrusted to the discretion of the court. *See Amado*, 517 F.3d at 1362; *cf. Paice LLC v. Toyota Motor Corp.*, 504 F.3d 1293, 1315-16 (Fed. Cir. 2007) (post-judgment award part of court's equitable powers as "not all money relief is properly characterized as 'damages.'"), *and Bowen v. Mass.*, 487 U.S. 879, 910 (1988) ("[E]ven if the District Court's order are construed in part as order for the payment of money . . . such payments are not 'money damages' . . . . That is, since the orders are for specific relief (they undo the Secretary's refusal to reimburse the state) rather than for money damages (they do not provide relief that substitutes for that which ought to have been done) they are within the District Court's jurisdiction . . . ."). Because such an award is within the court's equitable power, the Seventh Amendment right to jury trial is not implicated. *See Paice*, 504 F.3d at 1315-16.

In determining the award amount for infringements taking place during the stay, a court should consider (1) the change in the parties' bargaining positions; (2) the change in economic circumstances resulting from the determination of liability, including the infringer's likelihood of

success on appeal, the infringer's ability to immediately comply with the injunction, and the parties' reasonable expectations if the stay was entered by consent or stipulation; and (3) the evidence and arguments found material to the granting of the injunction and the stay. *Amado*, 517 F.3d at 1362. This determination is ultimately left to the sound discretion of the district court, provided that the court gives a clear explanation of its reasons for the award. *Id.*

III. PARTIES' POSITIONS & DISCUSSION

TiVo argues that it is due $220,349,154 for the period that the stay was in effect. Dkt. No. 852. EchoStar counters with an award of $16,400,809. Dkt. No. 854.

TiVo's amount can be dissected into two parts: $51,846,757 in lost profits and $168,502,397 in royalties. Dkt. No. 854 at 16-23. TiVo argues that it would have acquired over 519,000 new customers had the injunction gone into effect. *Id.* at 16-18. The bulk of these customers would have turned to TiVo in October of 2006, when EchoStar would have been forced to disable its DVR capabilities. *Id.* The remainder are customers that EchoStar acquired during the stay who may have turned instead to TiVo. *Id.* With respect to EchoStar subscribers not covered by TiVo's lost profits analysis, TiVo claims it is due $2.25 per DVR subscription per month. *Id.* at 19- 23. This $2.25 rate represents a $1 increase over the jury's $1.25 royalty rate. TiVo claims this increase is reasonable given fundamental differences in pre-judgment versus post-judgment infringement. *Id.* (citing *Amado*, 517 F.3d at 1361). In particular, TiVo notes that EchoStar increased its own prices by $1 during the stay period. Dkt. No. 852 at 23; Dkt. No. 860 at 26:23-27:4 ("[W]e have raised the royalty rate from $1.25 to $2.25. . . . In fact, during this same time period EchoStar actually raised its rates . . . by the same dollar. So we are simply raising the proposed royalty rate by the same amount that EchoStar raised its rates.").

In response, EchoStar argues that stay damages cannot be awarded on its design-around DVRs absent proof that they continue to infringe the '389 Patent. Dkt. No. 854 at 10-15. Thus, EchoStar's calcuation removes from consideration any receiver in which the design-around had been installed. *Id.* Those installations began in late October 2006 and were completed by April 2007, thus significantly reducing the stay period in EchoStar's calculation. *Id.* Moreover, EchoStar argues that the jury's royalty rate of $1.25 should continue to apply because the design-around placed EchoStar in a stronger negotiation position. *Id.* at 22-26. Finally, EchoStar argues that TiVo is not entitled to lost profits because 1) TiVo cannot recover lost profits twice on the same DVR placements, and 2) this Court's supplemental damages calculation, which applies to any period of infringement not covered by the jury verdict and did not include lost profits, is the law of the case. *Id.* at 15-18.

This Court has already determined that EchoStar's design-around was not more than colorably different from the adjudged DVRs and that EchoStar continues to infringe the '389 Patent. Memorandum Opinion of June 2, 2009. Therefore, all infringing products are subject to the Court's award for damages during the stay period, notwithstanding EchoStar's modified software.

In addition, this Court finds that a reasonable royalty rather than a lost profit analysis is more appropriate for this case. A lost profit analysis would force this Court to assume that the injunction went into effect on October 8, 2006. As a result, EchoStar would have lost a certain percentage of its customers after it disabled its DVR capability. TiVo would have then been able to capture some, but not all, of those customers. Finally, a certain number of customers who opted for EchoStar service during the twenty-month stay might have become TiVo customers. Such an analysis heaps speculation upon speculation. Instead, this Court finds it more appropriate to assume that the parties

negotiated for a license covering the twenty-month stay period. A post-judgment hypothetical negotiation can be grounded in the jury's verdict, the parties' positions following trial, and any arguments used to obtain the stay. *See Amado*, 517 F.3d at 1361-1362.

This Court finds that a hypothetical negotiation between TiVo and EchoStar, which would have occurred around September 8, 2006 and resulted in a twenty-month license, would have settled on the jury's royalty rate of $1.25 per DVR subscriber per month. This Court notes that TiVo is now requesting a royalty rate of $2.25 per DVR subscriber per month. This rate is probative of the rate that TiVo might have willingly accepted at that time. Thus, the logical award should fall somewhere within this $1.25 to $2.25 range.

A number of factors necessitate that the award remain on the lower end. First, EchoStar was in the process of designing around the '389 Patent. Although this Court has recently determined that EchoStar's design-around was ultimately unsuccessful, neither party would have been aware of that fact in September 2006. As a result, EchoStar could have well argued that the royalty rate for the twenty-month license should have been reduced. Second, EchoStar had a number of strong appellate points at that time, which is evidenced by the fact that this Court's claim construction and the jury's infringement finding regarding the '389 Patent's Hardware Claims was ultimately reversed. While the parties could not have foreseen the appeal's outcome, the strength of EchoStar's appellate points may have kept that parties near the status quo—the jury's verdict. Third, although the jury found EchoStar to be a willful infringer, this Court declined TiVo's request that damages be enhanced. Dkt. No. 775. Because this Court declined to enhance the jury's verdict for pre-judgment infringement, it is unlikely that the parties would have agreed to an enhancement for post-judgment infringement. Finally, as of September 2006, neither party was aware of the fact that EchoStar

would eventually raise its prices by $1. TiVo all but admits that EchoStar's $1 price increase is the reason that TiVo now requests a $2.25 rate. *See* Dkt. No. 860 at 26:23-27:6. Because the main impetus for TiVo's request would have been absent back in September 2006, it is unlikely that TiVo would have requested a $1 or 80% increase over the jury's royalty rate.

Therefore, this Court finds that a hypothetical negotiation between the parties in September 2006 would have settled on the jury's verdict for the twenty-month stay period. TiVo shall be awarded $1.25 per DVR subscriber per month, notwithstanding EchoStar's design-around efforts. By modifying the royalty rate reflected in Exhibit 12 of TiVo's expert declaration (Dkt. No. 853, Ex. 12), this Court calculates the total stay damages to be $103,068,836. TiVo is entitled to interest on this award in accordance with 28 U.S.C. § 1961.

IV. CONCLUSION

For the reasons set forth in this order, TiVo's Revised Motion on Remand for Damages During the Stay of the Permanent Injunction (Dkt. No. 852) is hereby **GRANTED IN PART**. TiVo is hereby awarded $1.25 per DVR subscriber per month plus interest for the stay period.

SIGNED this 2nd day of June, 2009.

DAVID FOLSOM
UNITED STATES DISTRICT JUDGE

June 2, 2009 Order (Contempt)

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

TIVO INC.,	§	
	§	
Plaintiff,	§	
	§	
vs.	§	**CIVIL ACTION NO. 2:04-CV-01 (DF)**
	§	
DISH NETWORK CORPORATION, et al.,	§	
	§	
	§	
Defendants.	§	

O R D E R

In accordance with the Memorandum Opinion entered on June 2, 2009, TiVo's Motion to Hold EchoStar In Contempt For Violation Of This Court's Permanent Injunction (Dkt. No. 832) is hereby **GRANTED**.

Although this Court finds EchoStar in contempt, it defers any ruling regarding sanctions. TiVo is hereby **ORDERED** to raise by motion any request for sanctions by June 26, 2009. It is further **ORDERED** that the following deadlines shall apply to this issue.

Date	**Event**
June 26, 2009	TiVo's Motion & Opening Brief on Sanctions due
July 10, 2009	EchoStar's Responsive Brief on Sanctions due
July 17, 2009	TiVo's Reply Brief due
July 24, 2009	EchoStar's Sur-reply Brief due

In addition, the Court hereby **SETS** the matter of sanctions to be heard on **July 28, 2009, at 10:00 a.m. in Texarkana.** Each side shall have **thirty (30) minutes** to present their arguments.

IT IS SO ORDERED.

SIGNED this 2nd day of June, 2009.

DAVID FOLSOM
UNITED STATES DISTRICT JUDGE

District Court Opinion

Only the Westlaw citation is currently available.

United States District Court,
E.D. Texas,
Marshall Division.
TiVO INC., Plaintiff,
v.
DISH NETWORK CORPORATION, et al., Defendants.
Civil Action No. 2:04-CV-01 (DF).

June 2, 2009.

Alexander Chester Giza, Andrei Iancu, Adam S. Hoffman, Brian D. Krechman, Christine W. S. Byrd, Laura W. Brill, Morgan Chu, Perry M. Goldberg, Richard E. Lyon, Irell & Manella LLP, Los Angeles, CA, Samuel Franklin Baxter, McKool Smith, Marshall, TX, Ben Yorks, Brian Jones, Irell & Manella, Newport Beach, CA, Nicholas H. Patton, Patton Tidwell & Schroeder, LLP, Texarkana, TX, R Scott Feldmann, Randall I. Erickson, Steven P. Rice, Van V. Nguyen, Crowell & Moring, Irvine, CA, Garret Wesley Chambers, McAkool Smith, Dallas, TX, for Plaintiff.

Alison M Tucher, Jason A. Crotty, Rachel Krevans, Harold J. McElhinny, Morrison & Foerster LLP, Robert M. Harkins, Jr., Howrey LLP, San Francisco, CA, Charles S. Barquist, Morrison & Foerster LLP, Los Angeles, CA, J Eric Elliff, Morrison & Foerster, Denver, CO, Karl J. Kramer, Morrison & Foerster, Palo Alto, CA, Damon Michael Young, Young Pickett & Lee, Texarkana, TX, for Defendants.

MEMORANDUM OPINION

DAVID FOLSOM, District Judge.

***1** Before the Court are TiVo's Motion to Hold EchoStar In Contempt For Violation Of This Court's Permanent Injunction and the parties' Post-Hearing Proposed Findings of Fact and Conclusions of Law. Dkt. Nos. 832, 919, and 920.Also before the Court are the transcripts and evidence from hearings regarding EchoStar's alleged contempt; those hearings were held on September 4, 2008 (Dkt.Nos.859-860) and on February 17-19, 2009 (Dkt.Nos.907-915). Having considered the papers in light of the testimony, evidence, and relevant case law, the Court now addresses all issues raised by TiVo's motion to hold EchoStar in contempt.

This opinion will begin by discussing the background and procedural history of this case, which is both lengthy and complex. What follows is a brief discussion of the basic legal principles for contempt proceedings in patent cases. Specifically, this Court will outline the Federal Circuit's seminal case, *KSM Fastening Systems, Inc. v. H.A. Jones Company, Inc.*, 776 F.2d 1522 (Fed.Cir.1985), and also address the relevance of particular evidence and the movant's burden of proof. Next, the opinion will analyze the modifications made to EchoStar's DVRs, that is whether the modified DVR software is more than colorably different from the adjudged software and whether the modified software continues to infringe TiVo's patent. Finally, the opinion will analyze EchoStar's alleged facial violation of this Court's injunction, that is whether EchoStar failed to comply with the specific directives of this Court's orders.

I.

In this patent infringement action, tried to a jury in March of 2006, Plaintiff TiVo, Inc. (hereafter "TiVo") accused Defendants EchoStar Communications Corporation,[FN1] EchoStar DBS Corporation, EchoStar Technologies Corporation, EchoStar Satellite LLC, and EchoSphere LLC of infringing certain claims of U.S. Patent No. 6,233,389 ("the '389 Patent").Dkt. No. 3 (Amended Complaint). Defendants (collectively referred to as "EchoStar") are a group of inter-related companies who together operate or support the satellite television service marketed as "Dish Network." EchoStar designs digital video recorders ("DVRs"), which are provided to customers as part of its satellite service. Such DVR technology is central to the '389 Patent, which is entitled "Multimedia Time Warping System" and generally describes a DVR system that allows for simultaneous storage and playback of television signals from sources such as cable and satellite providers.

FN1. DISH Network Corporation has been

substituted for EchoStar Communications Corporation and EchoStar Corporation has been joined as a defendant in this action. Dkt. No. 863.

At trial, TiVo accused EchoStar DVR receivers of infringing nine claims of the '389 Patent. Specifically, TiVo asserted claims 1, 5, 21, 23, 32, 36, and 52 (the "Hardware Claims"), as well as claims 31 and 61 (the "Software Claims"). The accused receivers fell into two categories depending on what processing chip controlled the DVR. The first category-containing model numbers DP-501, DP-508, and DP-510-operate using a chip from ST Microelectronics and are referred to as the "50X Products." The second category-containing model numbers DP-522, DP-625, DP-721, DP-921, and DP-942-operate using a Broadcom chip and are appropriately referred to as the "Broadcom Products."

***2** In its verdict, the jury found that all asserted claims of the '389 Patent were valid and that EchoStar's accused DVRs infringed each of those claims. *See*Dkt. No. 690 (verdict form). Specifically, the jury found that the 50X Products literally infringed all claims, while the Broadcom Products literally infringed the Hardware Claims and infringed the Software Claims under the doctrine of equivalents. Finally, the jury awarded TiVo $73,991,964 in damages and found by clear and convincing evidence that EchoStar's infringement was willful.

Following the jury's verdict, EchoStar immediately assigned some of its best engineers the task of designing around the '389 Patent. Dkt. No. 919 at 71-74.Although this Court, as more fully explained below, enjoined EchoStar from further infringement and ordered it to disable the DVR capability in the infringing products, that order was stayed pending an appeal to the Federal Circuit. By the time that stay was lifted and this Court's injunction was once again in effect, EchoStar had long since downloaded its design-around effort-modified DVR software-into its DVR products. It is TiVo's position, however, that EchoStar never complied with this Court's order and to this date provides infringing DVR service to its customers on the very products that the jury found to infringe. As a result, TiVo requests that EchoStar be found in contempt. Dkt. No. 832.In response, EchoStar contends that it has successfully designed around the '389 Patent. Dkt. No. 839.As a result, EchoStar believes that this Court's injunction, meant to enjoin only infringing activities, cannot cover EchoStar's modified products. *Id.*

A.

Following the jury verdict in its favor, TiVo asked this Court to issue an injunction prohibiting EchoStar from further infringement of the '389 Patent and requiring EchoStar to disable the DVR functionality in its infringing products. Dkt. No. 733.EchoStar opposed TiVo's request and asked the Court to stay any injunction that might issue pending appeal. Dkt. Nos. 737 and 754.After considering both parties' positions, this Court entered its Final Judgment and Permanent Injunction on August 17, 2006. Dkt. No. 776.This Court also denied EchoStar's request to stay the injunction pending appeal.Dkt. No. 773.The Court's injunction, as later amended by joint motion (Dkt. No. 800), reads:

> Each Defendant, its officers, agents, servants, employees and attorneys, and those persons in active concert or participation with them who receive actual notice hereof, are hereby restrained and enjoined, pursuant to 35 U.S.C. § 283 and Fed.R.Civ.P. 65(d), from making, using, offering to sell, selling or importing in the United States, the Infringing Products, either alone or in combination with any other product and all other products that are only colorably different therefrom in the context of the Infringed Claims, whether individually or in combination with other products or as part of another product, and from otherwise infringing or inducing others to infringe the Infringed Claims of the '389 patent.
>
> ***3** Defendants are hereby further ordered to, within thirty (30) days of the issuance of this order, disable the DVR functionality (i .e. disable all storage to and playback from a hard disk drive of television data) in all but 192,708 units of the Infringing Products that have been placed with an end user or subscriber. The DVR functionality, (i.e. disable all storage to and playback from a hard disk drive of television data) shall not be enabled in any new placement of the Infringing Products.

Dkt. No. 806 at 2.

As can be seen, the injunction contained two major

provisions. First, it contained an "Infringement Provision," which prohibited further infringement of the '389 Patent by the infringing DVRs. Second, it contained a "Disablement Provision," which required EchoStar to disable the DVR functionality, as specifically defined by the Court, in the infringing DVRs. The Disablement Provision did provide an exception for 192,708 DVR units, the number of units for which TiVo received lost profit damages and against which TiVo did not pursue an injunction. *See*Dkt. No. 747 at 16.

EchoStar took issue with the exact language of the Disablement Provision. Specifically, EchoStar argued that the provision was overbroad and EchoStar contended that the "appropriate scope of the injunction, if one were to issue, would enjoin *only the provision of infringing DVR software* to those boxes upon activation."*Id* . (emphasis added). TiVo opposed EchoStar's proposal and warned that it would be "an invitation for EchoStar to engage in mischief ... [and] would only result in EchoStar providing what it deemed as 'non-infringing' DVR software to its already-found-to-be-infringing DVRs, creating the opportunity for interminable disputes to determine what exactly is 'infringing DVR software.' "Dkt. No. 747 at 15.Such a dispute is presently before this Court.

While the parties were disputing the form that the injunction should take, EchoStar was already well on its way to implementing its design-around effort. Before this Court entered its Amended Final Judgment and Permanent Injunction on September 8, 2006, EchoStar's development efforts were so far advanced that it had obtained three written opinions of counsel. *Id.; see also* PX3028, PX3029, and PX3030. At that time, however, EchoStar had not informed this Court of any design-around efforts.

After this Court entered its permanent injunction, EchoStar asked the Federal Circuit to stay the injunction during EchoStar's pending appeal. In that request, EchoStar represented that without the stay it would be unable to provide DVR service and would risk losing a significant portion of its existing or potential customers, which could cost the company $90 million per month. *See*Dkt. No. 920 at 20 (citing EchoStar's Reply Brief In Support of Its Emergency Motion to Stay the District Court's Injunction, at 9). EchoStar never mentioned its design-around efforts to the Federal Circuit. As a result of EchoStar's representations, however, the Federal Circuit granted EchoStar's request for a stay of the injunction on October 3, 2006. Dkt. No. 812.Later that month, EchoStar began downloading modified software into its customers' DVRs (Dkt. No. 839 at 8); this fact did not become known to any court until May 2008, after the appellate process had concluded.

***4** TiVo contests whether EchoStar actually downloaded the modified software into all of its infringing products. Indeed, EchoStar has admitted that it "do [es] not have a way to check if every unit actually received the new software."Dkt. No. 912 at 30:11-15.For the purposes of this opinion, however, the Court will assume that the new software was downloaded to all infringing DVRs.

B.

On appeal, EchoStar challenged this Court's claim construction on a number of grounds. *See Ti Vo, Inc. v. EchoStar Commc'ns Corp.*, 516 F.3d 1290, 1295-1307 (Fed.Cir.), *cert. denied*, --- U.S. ----, 129 S.Ct. 306, 172 L.Ed.2d 152 (2008). While most of those challenges concerned the Hardware Claims, EchoStar did challenge this Court's interpretation of one term-"object"-within the Software Claims. *Id.* at 1306-07.Although the Federal Circuit reversed this Court's construction of certain terms within the Hardware claims (*id.* at 1304-05), it affirmed this Court's construction of "object" in the Software claims. *Id.* at 1306-07.EchoStar did not challenge the construction of any other term within the Software Claims. *Id.* In addition, the Circuit found that there was sufficient evidence to support the jury's finding of infringement regarding the Software Claims. *Id.*

At no point during the appellate process did EchoStar challenge the language or scope of this Court's injunction. As a result, the Federal Circuit's stay dissolved once EchoStar's appeal become final. *See id.* at 1312.Thus, when the mandate in this case issued on April 18, 2008, this Court's injunction was reinstated without alteration.

Shortly after the mandate issued, this Court requested letter briefs from the parties on how best to proceed in light of the Circuit's decision. Dkt. No. 822.Those letters were provided to the Court in May 2008. Dkt. Nos. 825 and 826.The substance of those letters raised, for the first time, the issue of EchoStar's de-

sign-around efforts and TiVo's belief that EchoStar was in contempt of this Court's injunction. *Id.* At that time, it became apparent that TiVo believes there are at least two theories under which EchoStar could be found in contempt. *See*Dkt. No. 825.First, TiVo believes that EchoStar violated the "face of the injunction," particularly the Disablement Provision, by never disabling DVR functionality in the infringing products. *Id.* Second, TiVo believes that EchoStar's modifications are not a sufficient design-around-that is, the new software downloaded into EchoStar's DVRs still infringes the '389 Patent. *Id.* EchoStar responds by arguing that its software modifications no longer infringe the '389 Patent and that EchoStar has fully complied with both the letter and the spirit of the injunction.Dkt. No. 825.

On May 30, 2008, this Court held a brief status conference related to these issues. Dkt. No. 830 (transcript). At that conference, this Court gave the parties a timeline under which TiVo could bring a motion requesting that EchoStar be found in contempt. *Id.* The Court, however, denied TiVo's request for limited discovery on EchoStar's design-around. Dkt. No. 829.This Court deemed it necessary to determine first whether EchoStar should be held in contempt for violating the Disablement Provision on its face. *Id.* Presented with the prospect of contempt proceedings in this Court, Echostar filed, less than an hour after the status conference had concluded, a declaratory judgment action in Delaware seeking a declaration that its modified software no longer infringes the '389 Patent.[FN2] *See*Dkt. No. 832 at 9.

> FN2. The Delaware Court recently denied TiVo's motion to dismiss the declaratory judgment action. *Dish Network Corp. v. TiVo, Inc.*, Civil Action No. 08-327-JJF (March 31, 2009). The Delaware court found that it had jurisdiction to decide the action under *MedImmune, Inc. v. Genentech, Inc.*, 549 U.S. 118, 127 S.Ct. 764, 166 L.Ed.2d 604 (2007) and that EchoStar was not engaged in improper forum shopping because TiVo is a Delaware corporation. The Delaware court, however, found that it was "unable to make a concrete determination as to whether the redesigned products present more than a 'colorable difference' over the infringing products."That determination, in the opinion of the Delaware court, is one best made by this Court given its experience with the case. Accordingly, the parties have been ordered by the Delaware Court to brief whether transfer of the declaratory judgment action to this Court would be appropriate.

***5** This Court held a hearing on September 4, 2008 to determine whether EchoStar had facially violated the Disablement Provision. Dkt. No. 860 (transcript). After that hearing, however, this Court concluded that an additional hearing was necessary to determine whether EchoStar's modified DVRs are more than colorably different from the adjudged devices and whether the modified DVRs continue to infringe the '389 Patent.[FN3] Dkt. No. 864.The Court set the additional hearing for February 2009 and ordered the parties to engage in related discovery. *Id.* Believing this to be an improper course of action under Federal Circuit precedent, EchoStar immediately filed a petition for writ of mandamus with the Circuit and requested that this Court stay the additional proceedings pending the appellate court's decision. Dkt. No. 865.This Court denied EchoStar's request for stay; due to the agreement of the parties, however, the Court limited the scope of the February hearing.Dkt. No. 869 and 870.The Court limited the hearing to two discrete issues:

> FN3. In its original formulation, the February hearing would have considered the continued infringement of both the Software Claims and the Hardware Claims. Dkt. No. 864.Although the jury's finding of literal infringement of the Hardware Claims had been overturned, the Federal Circuit did not render an opinion regarding EchoStar's infirngement of those claims under the doctrine of equivalents. *TiVo*, 516 F.3d at 1304-05. The Circuit remanded that issue for further proceedings should TiVo wish to pursue such. *Id.* TiVo, however, indicated that it did not wish to do so in these contempt proceedings, so the Hardware Claims have been dropped from consideration at this time.

(1) whether the software downloaded to EchoStar's DP-501, DP-508, DP-510, DP-522, DP-625, DP-721, DP-921, and DP-942 is no more than colorably different from the adjudged software; and (2) whether those receivers continue to infringe claims

31 and 61 of U.S. Patent No. 6,233,389, either literally or under the doctrine of equivalents.

Dkt. No. 870.With these changes in hand, EchoStar voluntarily moved to dismiss its mandamus petition. Dkt. No. 873.

After the parties had conducted discovery, the Court held a hearing to address these issues on February 17-19, 2009. Dkt. Nos. 910-914 (transcripts). Now that the parties have submitted proposed findings of fact and conclusions of law for this Court's consideration (Dkt. Nos. 919 and 920), this Court addresses all issues raised by TiVo's motion to hold EchoStar in contempt.

II.

A contempt proceeding for violation of an injunction issued in a patent case, "while primarily for the benefit of the patent owner, nevertheless, involves also the concept of an affront to the court for failure to obey its order." *KSM Fastening Sys., Inc. v. H.A. Jones Co.*, 776 F.2d 1522, 1524 (Fed.Cir.1985). The process of contempt, however, is a "severe remedy, and should not be resorted to where there is *fair ground of doubt* as to the wrongfulness of the defendant's conduct." *Id.* at 1525 (quoting *Cal. Artificial Stone Paving Co. v. Molitor*, 113 U.S. 609, 618, 5 S.Ct. 618, 28 L.Ed. 1106 (1885)). Such restraint is even more warranted when an enjoined party has taken steps to reform its conduct. *See id.*("[W]here the patent owner seeks to enforce an injunction against an enjoined infringer by reason of a manufacture which was not the subject of the original litigation, the courts have been uniform in exercising restraint ....").

In determining whether such restraint should be set aside and contempt found in a patent case, a court must address two separate questions. First, the court must decide whether contempt proceedings are the appropriate forum to determine whether the modified device infringes. *Id.* at 1530-32;*see also Additive Controls & Measurement Sys., Inc. v. Flowdata, Inc.*, 154 F.3d 1345, 1349 (Fed.Cir.1998). In making this threshold determination, the court must compare the adjudged and modified products; if the products are "more than colorably different" such that "substantial open issues" of infringement exist, then contempt proceedings are inappropriate. *KSM*, 776 F.2d at 1528-32; *Additive Controls*, 154 F.3d at 1349. In the event that contempt proceedings are inappropriate, the patent owner must enforce its rights in a separate infringement action. *KSM*, 776 F.2d at 1530-32; *Additive Controls*, 154 F.3d at 1349.

***6** If the court, however, finds that contempt proceedings are appropriate, then it must resolve a second question-whether the modified products continue to infringe the claims of the patent at issue. *KSM*, 776 F.2d at 1532; *Additive Controls*, 154 F.3d at 1349. In addressing this second question, "the court cannot avoid looking at the claims of the patent." *KSM*, 776 F.2d at 1528. The scope of those claims must be interpreted using the court's previous rulings and may not be broadened so as to catch the modified product. *Id.* at 1529.In some cases, however, it may "only be necessary to determine that the modified device has not been changed from the adjudged device in a way which affects an element of a claim." *Id.* at 1528-29.In such a case, the modified and adjudged devices may be treated as the same. *Id.* at 1529.

Within the general constraints of this two-step test, "the district court has broad discretion to determine how best to enforce its injunctive decrees." *Additive Controls*, 154 F.3d at 1349. To this end, a court may request the benefit of expert testimony to determine whether more than colorable differences and continued infringement exist. *See id.*("Although [Federal Circuit] case law suggests that the need for expert testimony counsels against the use of contempt proceedings ... the district court satisfied the procedural requirements of *KSM* by separately analyzing the questions whether contempt proceedings were appropriate and whether the redesigned device infringed the patent."); *Abbot Labs. v. Torpharm, Inc.*, 503 F.3d 1372, 1379 (Fed.Cir.2007) (court did not abuse discretion in electing to try issues in contempt proceedings even though expert testimony was needed).[FN4]

FN4. Given the complex technology in this suit, this Court believes that expert testimony was helpful in resolving both steps of the *KSM* test, as both steps required this Court to analyze the source code in EchoStar's modified software. Although expert testimony may not be necessary with regard to more tangible technology, the Court found it helpful under the circumstances of this case.

A.

As mentioned above, the Federal Circuit has cautioned that contempt is a "severe remedy," which should not be resorted to lightly. *KSM*, 776 F.2d at 1525;*see also Arbek Mfg., Inc. v. Moazzam*, 55 F.3d 1567, 1569 (Fed.Cir.1995). As a result, the Federal Circuit has stated that "the movant bears the heavy burden of proving violation by clear and convincing evidence." *KSM*, 776 F.2d at 1524 (citing 11 CHARLES ALAN WRIGHT & ARTHUR R. MILLER, FEDERAL PRACTICE AND PROCEDURE: CIVIL § 2960 at 591).

There is some question, however, as to whether a clear and convincing burden applies to both steps of the *KSM* test. EchoStar argues that it does (Dkt. No. 919 at 17-19), while TiVo argues that the heightened burden applies only to step two, infringement by the modified device (Dkt. No. 920 at 27-29). After reviewing both *KSM* and its progeny, this Court agrees with TiVo.

The Federal Circuit's only mention of the "clear and convincing" burden in the *KSM* decision comes at the very beginning of the opinion. *KSM*, 776 F.2d at 1525. At that point in the opinion, Judge Nies is discussing contempt proceedings in their broadest sense. *See id.*("Contempt proceedings are generally summary in nature and may be decided by the court ... without the formalities of trial, although the movant bears the heavy burden of proving violation by clear and convincing evidence."). Once the opinion turns to its two-step test, however, the Circuit is silent regarding this heightened burden.

***7** In later iterations, however, the Circuit has suggested that the clear and convincing burden only applies to the second step of the *KSM* test. Specifically, the Circuit has stated that to "show contempt, the patent owner must prove by clear and convincing evidence that 'the modified device falls within the admitted or adjudicated scope of the claims and is, therefore, an infringement." *Arbek*, 55 F.3d at 1569 (quoting *KSM*, 776 F.2d at 1530). This comparison of modified device to the claims and the connected conclusion that the modified device is or is not an infringement is what the second *KSM* step is designed to accomplish. *Compare Arbek*, 55 F.3d at 1569,*with KSM*, 776 F.2d at 1529-30,*and Additive Controls*, 154 F.3d at 1349 (discussing second step).

While a heightened burden clearly applies to step two of the *KSM* test, it is less clear what, if any, burden applies to the first step. Recall that under the *KSM* two-step test, the first and threshold question determines whether contempt proceedings are even appropriate given the facts of a case. *KSM*, 776 F.2d at 1530-32; *Additive Controls*, 154 F.3d at 1349. Although some district courts have applied a heightened burden to this threshold determination (*see e.g. Brine, Inc. v. STX, L.L.C.*, 367 F.Supp.2d 61, 67 (D.Mass.2005)), this Court does not believe that such is proper. Instead, this Court finds that no burden attaches to the first *KSM* step as it is a purely "procedural standard" entrusted to the discretion of the trial court. *See KSM*, 776 F.2d at 1532.

To clarify this Court's finding, it is helpful to quote *KSM* at length. After determining that the "colorable differences" test should be used over a competing doctrine-of-equivalents-based test, the Circuit concluded as follows:

> With respect to the issue of when contempt proceedings will be allowed, we conclude that the *procedural analysis* used by the majority of courts should be adopted as the general rule. A *standard based on procedural considerations* is more likely to meet due process requirements, considering the usual summary nature of contempt proceedings. Under *a procedural standard*, the district court is able to utilize principles of claim and issue preclusion (*res judicata*) to determine what issues were settled by the original suit and what issues would have to be tried. Such a determination may vary depending upon whether the original suit was settled by consent or fully litigated. If there are substantial open issues with respect to infringement to be tried, contempt proceedings are inappropriate. The presence of such disputed issues creates a fair ground for doubt that the decree has been violated. *So long as the district court exercises its discretion to proceed or not to proceed by way of contempt proceedings within these general constraints,* this court must defer to its judgment on this issue.
>
> In sum, the initial question to be answered in ruling on a motion for contempt is whether contempt proceedings are appropriate. That question is *answered by the trial court's judging* whether substantial disputed issues must be litigated. The sec-

ond question, whether an injunction against infringement has been violated, requires, at a minimum, a finding that the accused device is an infringement.

***8** *Id.* (emphasis added, internal citations omitted).

Thus, the threshold question of whether contempt proceedings are appropriate is left entirely to the discretion of the trial court. It is not for one party to *prove* that such proceedings are or are not appropriate. If, and only if, the trial court determines that contempt proceedings are appropriate does the movant bear a burden of proving the second question-infringement by the modified device-by clear and convincing evidence.

B.

Answering the steps of the *KSM* test requires comparisons between the original product, the modified product, and the claims. The first step determines whether there are more than merely colorable differences between the products. *KSM*, 776 F.2d at 1530-32. As such, the first step "turns on a comparison between the original infringing product and the redesigned device."*Additive Controls*, 154 F.3d at 1549. The actual claims of the patent are not truly at issue in *KSM*'s first step, though to be certain, any difference between the products must relate to some claim element. *See id.* at 1350 (finding no more than colorable differences or substantial questions of infringement because the differences related to "no elements of the pertinent patent claim").

If no more than colorable differences are found such that there are no substantial open issues of infringement, then the second step of the *KSM* test compares the redesigned product to the patent claims as previously adjudged. *KSM*, 776 F.2d at 1529-30. In making this comparison, the Court is bound by its previous rulings on the scope of the claims and may not broaden the scope of the claims to catch the modified device. *Id.* at 1530.This Court also finds, however, that the scope of the patent claims is not, as EchoStar contends (Dkt. No. 919 at 19-45), limited by a jury's verdict or a patentee's theories at trial. As the second step of the *KSM* analysis is nothing more than a normal patent infringement analysis involving the modified product, the proper scope of the patent claims is governed by the trial court's prior decisions on claim construction as upheld by the Federal Circuit. *See Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 976 (Fed.Cir.1995), *aff'd*, 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996) ("An infringement analysis entails two steps. The first step is determining the meaning and scope of the patent claims asserted to be infringed. The second step is comparing the properly construed claims to the device accused of infringing."(citation omitted)).

Finally, the comparisons in either step of the *KSM* test do not, as EchoStar also contends (*see*Dkt. No. 919 at 70-77), involve the infringer's intent or good faith. The general rule in civil contempt proceedings is that "a party need not intend to violate an injunction to be found in contempt." *Additive Controls*, 154 F.3d at 1353 (citing *McComb v. Jacksonville Paper Co.*, 336 U.S. 187, 191, 69 S.Ct. 497, 93 L.Ed. 599 (1947)). Moreover, "good faith is irrelevant as a defense to a civil contempt order."*Id.* (quoting *Waffenschmidt v. MacKay*, 763 F.2d 711, 723-26 (5th Cir.1985)).

***9** As a result, this Court will focus its analysis on EchoStar's DVR software (both old and new) and the Software Claims of TiVo's '389 Patent as construed by this Court and upheld by the Federal Circuit.

III.

EchoStar concedes that its DVRs-both its 50X Products and Broadcom Products-continue to satisfy most of the limitations in claims 31 and 61 as they did at trial. EchoStar believes, however, that it has changed its 50X Products in one significant way and has changed its Broadcom Products in two significant ways.Dkt. No. 920 at 10-15.

With respect to EchoStar's 50X Products, EchoStar contends that it has modified its DVR software to implement a "indexless" system. Dkt. No. 839 at 4-5;Dkt. No. 919 at 53-55.EchoStar's receivers at trial detected start codes in the incoming broadcast data and created an index of those start codes for use in "trick play" operations. *Id.* After trial, EchoStar modified the software in its 50X Products to remove this start-code detection capability.Dkt. No. 910 at 164:22-165:3; DX5160. At present, EchoStar's receivers perform trick play operations by transferring incoming data directly to a hard drive and using average frame rate statistics collected during playback to

estimate the location of stored video data. Dkt. No. 910 at 201:19-205:15.This method of playback requires greater processing power by the DVR hardware and EchoStar refers to the method as a "brute-force" search. *Id.;* PX3277, PX3278.

EchoStar contends that the move to an "indexless" or "brute-force" system means that its DVR software no longer satisfies the "parses" limitation of the '389 Patent's Software Claims. Dkt. No. 910 at 197:25-198:15;Dkt. No. 912 at 168:6-169.18;Dkt. No. 919 at 53-55, 92-119.Claim 31 of the ' 389 Patent claims a "process for the simultaneous storage and play back of multimedia data," which is further comprised of numerous steps.[FN5] ' 389 Patent at 14:52-53.The first such step requires "providing *a physical data source,* wherein said physical data source accepts broadcast data from an input device, *parses video and audio data from said broadcast data,* and temporarily stores said video and audio data[.]"*Id.* at 14:54-57 (emphasis added).

> FN5. Claim 61 is similar to claim 31, except that it recites an apparatus rather than a process. '389 Patent at 18:3-30.For all intents and purposes, however, the parties have treated the two claims alike for these proceedings.

TiVo argues that this limitation is still satisfied by EchoStar's modified 50X Products because those products still analyze the broadcast signal. During claim construction, this Court construed the term "parses" in all claims to mean "analyzes," and therefore defined "parses video and audio data from said broadcast data" in claims 31 and 61 as "analyzes video and audio data from the broadcast data."Dkt. No. 185 at 22.On appeal, EchoStar did not challenge this Court's construction of the term "parses." *See TiVo,* 516 F.3d at 1295-1307. Since parsing is defined as analyzing rather than indexing, TiVo contends that EchoStar's modified receivers still satisfy the limitation even though they may no longer index the incoming signal. Dkt. No. 920 at 36-41;Dkt. No. 910 at 66:9-67:19.Specifically, TiVo contends that the limitation is still met by PID filtering, which involves analyzing the incoming data stream and selecting the appropriate packets of data associated with a program or channel selected by the viewer. *Id.* In support of this position, TiVo cites to testimony at the 2006 trial in which experts, including EchoStar's own experts, testified that PID filtering satisfied the parsing limitation in the Software Claims. Dkt. No. 716 at 110:10-111:14;Dkt. No. 722 at 99:17-100:23.

***10** In response, EchoStar argues that judicial estoppel bars TiVo from arguing that PID filtering satisfies the parsing limitation. Dkt. No. 919 at 21-38, 92-98.EchoStar contends that TiVo argued at trial that the parsing limitation was satisfied by start-code detection and indexing. *Id.* Because the jury agreed with this position, in that it returned a verdict favorable to TiVo, EchoStar believes that TiVo cannot now assert that parsing is met by something other than start-code detection and indexing. *Id.* In addition, EchoStar argues that PID filtering does not involve the analyzing of data; instead, it involves merely looking at the header of an incoming packet of data rather than its payload. Dkt. No. 912 at 171:14-172:2;Dkt. No. 919 at 99-103.Moreover, EchoStar contends that the '389 Patent's specification makes it clear that PID filtering is not parsing and that PID filtering, common to digital receivers without DVR capability, is not central to the invention embodied in the '389 Patent. Dkt. No. 919 at 29-33, 103-107

With respect to EchoStar's Broadcom Products, EchoStar contends that it made two changes. First, EchoStar implemented the same "indexless" system found in the 50X Products. Dkt. No. 919 at 53-55.Thus, EchoStar argues that its Broadcom Products also do not satisfy the "parses" limitation of the Software Claims. Dkt. No. 919 at 92-119.Second, EchoStar modified the buffering structure used to record data to the Broadcom Product's hard drive. *See*Dkt. No. 919 at 38-42, 55-58.

At the time of trial, EchoStar's infringing Broadcom receivers utilized a pool of ten buffers (collectively the "transport buffer") and an intermediate "record buffer." Dkt. No. 910 at 219:24-223:20.When one of the ten buffers in the transport buffer was full, EchoStar's software would copy the data from that single buffer into the record buffer. That data would then be written to the hard drive from the record buffer. Additional data would not be transferred from any of the nine remaining buffers to the record buffer until the record buffer's data had been transferred to the hard drive. In other words, EchoStar's infringing product would never extract data from the transport buffer until the record buffer was empty and avail-

able. This "blocking of access to the record buffer" prevented data already in the record buffer from being overwritten. *Id.*;Dkt. No. 919 at 55-58.

EchoStar modified its software by removing the record buffer such that data is now transferred directly from the transport buffer to the hard drive. Dkt. No. 910 at 110:7-112:8, 217:6-218:19.Thus, EchoStar contends that the "blocking" function performed by the record buffer is no longer present in its modified receivers. Because it removed this blocking function, EchoStar believes that its DVR software no longer satisfies the "automatic flow control" limitation of the Software Claims. Dkt. No. 910 at 226:1-231:14;Dkt. No. 912 at 222:15-235:19;Dkt. No. 919 at 119-139.The fifth step of claim 31's storage and playback process requires a "source object [that] is *automatically flow controlled* by said transform object." '389 Patent at 15:1-2 (emphasis added).

***11** TiVo argues that this limitation is still satisfied by EchoStar's modified Broadcom Products because data transfer is still self-regulated in those products. During claim construction, this Court construed the term "automatically flow controlled" in claims 31 and 61 to mean "self-regulated." Dkt. No. 185 at 24.On appeal, EchoStar did not challenge this Court's construction of that term. *See* *TiVo*, 516 F.3d at 1295-1307. TiVo argues that self-regulation is not limited to the "blocking" of data flow. Dkt. No. 910 at 87:9-25;Dkt. No. 920 at 41-44, 53-56.As EchoStar's modified products still operate using ten buffers in a "circular" formation, in which data is written into one buffer at a time, TiVo argues that self-regulation is still present. Dkt. No. 910 at 86:9-117:19.

In response, EchoStar once again argues that judicial estoppel bars TiVo's arguments. Dkt. No. 919 at 38-42, 119-25.Echostar contends that TiVo argued at trial that the record buffer provided automatic flow control. *Id.* Because the jury agreed with this position, in that it returned a verdict favorable to TiVo, EchoStar believes that TiVo cannot now argue that the redesigned Broadcom receivers infringe notwithstanding the removal of the record buffer. *Id.* In addition, EchoStar argues that a circular buffer cannot by itself provide for flow control because overflow is still a possibility in such a system. Dkt. No. 910 at 221:15-222:9;Dkt. No. 912 at 227:24-228:5;Dkt. No. 919 at 130-32.Finally, EchoStar contends that the redesigned circular buffer system lacks the required source object and transform object. Dkt. No. 919 at 129-130.

To summarize, EchoStar contends that it made one change to its 50X Products-it removed start-code detection and implemented a indexless system. Under this system, EchoStar believes that its products no longer parse incoming data as required by the '389 Patent. EchoStar also implemented this indexless system in its Broadcom Products. Moreover, EchoStar changed the buffering structure in its Broadcom Products-it removed an intermediate buffer dubbed the "record buffer." EchoStar believes that its Broadcom Products, in the absence of this record buffer, are no longer automatically flow controlled as required by the ' 389 Patent.

Having now outlined the parties' basic positions with respect to the actual changes made to the infringing products, the Court will address EchoStar's judicial estoppel arguments before analyzing EchoStar's modifications under the two-step *KSM* test.

A.

The doctrine of judicial estoppel "prohibits a party from taking inconsistent positions in the same or related litigation." *Transclean Corp. v. Jiffy Lube Intl'l, Inc.*, 474 F.3d 1298, 1307 (Fed.Cir.2007) (citation omitted). The doctrine is designed to protect the integrity of the judicial process and may be invoked by the court at its discretion. *New Hampshire v. Maine*, 532 U.S. 742, 749-50, 121 S.Ct. 1808, 149 L.Ed.2d 968 (2001). In determining whether to invoke judicial estoppel courts typically look to several factors: (1) whether a party's later position is "clearly inconsistent" with its earlier position; (2) whether the party has succeeded in persuading the court to accept that party's earlier position, so that acceptance of the later position would create "the perception that either the first or second court was misled"; and (3) whether the party seeking to assert an inconsistent position would cause unfair prejudice if not estopped. *Id.*

***12** Here, EchoStar argues that TiVo should be estopped from taking positions that EchoStar believes are inconsistent with positions taken at trial. Dkt. No. 919 at 19-45.Specifically, EchoStar argues that TiVo should be prevented from arguing that start-code detection is not necessary to claims 31 and 61 when it argued at trial that start-code detection satisfied the

parsing limitation. In addition, TiVo should be prevented from arguing that those claims do not require the blocking of access to buffers to prevent the overflow of data when it argued at trial that automatic flow control was satisfied by such blocking.

This Court is unpersuaded by EchoStar's arguments. The Court finds that the positions taken by TiVo during these contempt proceedings and previously at trial are not "clearly inconsistent" with one another. There is nothing inconsistent with TiVo's position that EchoStar's past and present products fall within the scope of the '389 Patent as construed by this Court. If this action involved real property, past and present trespasses to TiVo's land may occur in dissimilar ways (i.e. entry from the west versus entry from the south). As long as the trespasser is crossing the metes and bounds of TiVo's property, TiVo may argue that both are trespasses. There is nothing inconsistent in those positions.

Here, the metes and bounds of TiVo's property are the patent claims as construed by this Court and affirmed by the Federal Circuit. TiVo's position that those boundaries have been crossed and continue to be crossed by EchoStar's products is not inconsistent. Thus, TiVo may argue that automatic flow control is satisfied by EchoStar's modified products even though the exact manner of infringement may be slightly different. Likewise, TiVo may argue that EchoStar's modified products continue to parse incoming data though the manner in which that is accomplished might have changed slightly. If this Court disallowed such arguments, then future infringers could easily side-step this and other courts' orders by making insignificant changes to their products. It would be tantamount to allowing an enjoined trespasser re-entry onto the land in dispute because he is now using a different road and compounding the injustice by silencing the property owner when he asked the court to enforce its decree.

This Court is also cognizant of the fact that TiVo made certain arguments at trial due to the fact that both Hardware and Software Claims were being asserted at that time. This Court finds that arguments made by TiVo regarding Hardware Claims should not limit the Software Claims. It is undisputed that the Hardware Claims-no longer an issue in the present proceedings-contain limitations not found in the Software Claims. In particular, the Hardware Claims require a "Media Switch" that both parses *and* separates the incoming data stream. '389 Patent at 12:48-50 (claim 1). TiVo argued at trial that EchoStar's products contained such a Media Switch, which satisfied the parsing and separating requirement of the Hardware Claims through start-code detection and indexing. Moreover, TiVo argued that the Media Switch could also be the "physical data source" that "parses video and audio data" as required by the Software Claims.

***13** The fact that TiVo argued that a Media Switch satisfied the "physical data source" requirement of the Software Claims, however, does not limit those claims. This Court has never held that the "physical data source" in the Software Claims is limited to a Media Switch. The Media Switch must parse *and* separate the incoming data, whereas the physical data source of the Software Claims need only parse. As a result, the physical data source of the Software Claims is less specific-in that it performs less functions-than the Media Switch of the Hardware Claims. Although the Media Switch could satisfy the Software Claims, there are potentially other, more generic physical data sources that could be sufficient.

By arguing that parsing in the Software Claims must be limited to start-code detection and/or indexing, this Court believes that EchoStar is trying to import the Media Switch or an equivalent into the Software Claims. This Court declines to do so. TiVo's positions at trial regarding a Media Switch must not be read onto the physical data source limitation of the Software Claims. Because the Software Claims require less of the physical data source than the Hardware Claims require of the Media Switch, it is possible for the physical data source to operate differently than the Media Switch and still meet the required limitation. Thus, whereas the Media Switch considered at trial carried out start-code detection and indexing, it is possible for the physical data source to do less. In other words, the physical data source could carry out a much simpler task than start-code detection and indexing while still satisfying the parsing limitation of the Software Claims. TiVo may take this position without being inconsistent, without creating the perception that the Court was misled, and without the danger of unfair prejudice to EchoStar.

Finally, EchoStar's argument that this Court must accept "the scope of the claims as adjudicated by the

jury" (Dkt. No. 910 at 33:5-6) is unpersuasive. EchoStar would have this Court introduce start-code detection, indexing, or blocking requirements into claims 31 and 61. EchoStar believes such is proper because the jury seemingly accepted TiVo's arguments at trial. Dkt No. 910 at 32:15-25.As a result, EchoStar argues that the adjudicated scope of the claims was determined by jury deliberations rather than this Court's claim construction. Dkt. No. 910 at 23:23-24:2 (modifications attempted to "design-around the scope of the claims as adjudicated by the jury"), 33:5-6 ("We have to be looking at contempt in the scope of the claims as adjudicated by the jury.").

EchoStar's position is erroneous in a number of ways. First, this Court instructed the jury as to the meaning of the claims. The jury was told that it had to apply this Court's interpretations of the claims. Dkt. No. 691 at 6. The Court must assume that the jury complied with its instruction and did not apply its own interpretation to the claims. Second, even if this Court accepted EchoStar's position, there is no way to determine the thought process of the jury. Some or even all members of the jury may have believed from the testimony that parsing was satisfied by PID filtering rather than start-code detection. Finally, EchoStar's position would allow experts to once again argue about the scope of claim terms. Indeed, at the February hearing EchoStar's expert, Dr. Rhyne, testified that he considered "what had been successful in the eyes of the jury" to determine his opinion of claim scope. Dkt. No. 912 at 168:6-169:9.Such postulation by experts as to the scope of patent claims has been repeatedly deemed improper by the Federal Circuit. *Markman*, 52 F.3d at 970-721 ("the interpretation and construction of patent claims, which define the scope of the patentee's rights under the patent, is a matter of law exclusively for the court"); *O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed.Cir.2008).

***14** In the end, this Court finds EchoStar's judicial estoppel argument to be a thinly veiled attempt to reargue claim construction and limit the scope of the '389 Patent. Such is not proper. This Court's constructions, which were affirmed by the Federal Circuit, are the settled law of the case and must be applied without further broadening or limitation. *W.L. Gore & Assocs. v. Garlock, Inc.*, 842 F.2d 1275, 1279 (Fed.Cir.1988). As such, "parses," in the context of the Software Claims, means "analyzes" and is not limited to start-code detection or indexing. Likewise, "automatic flow control" means "self-regulated" and is not limited to the blocking of access to buffers to prevent overflow.

B.

The Court now turns to the first step of the *KSM* test. Recall that this first step-the threshold question of whether contempt proceedings are appropriate-requires a comparison between the infringing and modified products. This comparison must be made in light of the claims; any difference will be deemed more than colorable if, and only if, it touches on some claim limitation. EchoStar argues that the changes made to its DVR software were significant. To that end, EchoStar points to the amount of source code that it changed-5,000 of the 10,000 lines of DVR code. Dkt. No. 912 at 26:8-14.TiVo argues that this change is insignificant when compared to the millions of lines of code found in the EchoStar boxes, of which hundreds of thousands could be characterized as DVR code. Dkt. No. 920 at 32;Dkt. No. 708 at 44:1-22.

In addition, EchoStar contends that it invested 8,000 man-hours of work and over $700,000 in its redesign efforts. Dkt. No. 912 at 19:1-16.TiVo points out, however, that these amounts are minimal when compared to the more than $120 million that EchoStar spent on advertising during the same time period, including $50 million on a campaign utilizing the slogan "Better than TiVo." Dkt. No. 291 at 140-12-141-13; PX3101, PX3102. The price-tag of EchoStar's alleged design-around effort is also well below its CEO's previous estimates that such a design-around could cost tens of millions of dollars. Dkt. No. 793 at 43:8-44:2 (noting that litigation would have cost less than pursuing a viable design-around). Although the Court notes the amount of money spent by EchoStar in its design-around effort and the amount of source code that was modified, this evidence has no effect on the *KSM* analysis. In the end, such evidence is just as insignificant as the amount of money EchoStar spent on advertising.

EchoStar also points to opinion of counsel letters received during the development of its new software and relies on the testimony of the letters' authors. Dkt. No. 912 at 59:17-61:10, 67:2-13, 97:18-98:2; DX5073, DX5074, DX5076.The Court, however,

chooses to give this evidence little weight. For the most part, the letters and testimony are evidence of EchoStar's alleged good faith, which is irrelevant in these proceedings. *See* *Additive Controls*, 154 F.3d at 1353. To the extent that the letters and testimony analyze EchoStar's modifications, their conclusions are cumulative of the testimony provided by EchoStar's expert, Dr. Rhyne. Furthermore, as the letters were drafted early in the modification process, their authors did not have benefit of the actual source code that implemented the modifications. Dkt. No. 912 at 61:11-19, 97:2-7.

***15** Instead of considering evidence of the amount of money the EchoStar spent on advertising, the amount of man-hours spent designing the modifications, or the fact that EchoStar obtained opinions of counsel, the Court limits itself to a comparison between the infringing and modified products in light of the claim language and the Court's construction thereof.

The only limitations at issue are those noted above. EchoStar has presented no evidence that its modifications affect any limitation other than the "parses video and audio data from said broadcast data" and the "wherein said source object is automatically flow controlled by said transform object" limitations found in claims 31 and 61. On their face, EchoStar's modifications do not read onto the language of the claims as construed. EchoStar's own characterizations of its modifications ("start-code detection," "indexing," and "blocking") appear nowhere in the claim language as written or construed. Because these modifications do not relate to elements of the pertinent patent claims, this Court finds that any differences between the infringing and modified products are no more than colorable. *See* *Additive Controls*, 154 F.3d at 1350 (affirming district court's decision to hold contempt proceedings where modifications did not affect "elements of the pertinent patent claim"). Although this Court could end the threshold analysis here and find that contempt proceedings are appropriate, further analysis is prudent.

With regard to EchoStar's "indexless" or "brute-force" modification, which allegedly affects the parsing limitation, this Court notes that EchoStar's own experts at trial testified that PID filtering satisfied that limitation.Dkt. No. 716 at 110:10-20.Moreover, Echostar's own engineers refer to PID filtering as "parsing." Dkt. No. 912 at 41:19-42:1.Because both the adjudicated and modified products utilize PID filtering and thus may infringe the Software Claims in the same manner, this Court finds that the two products are not more than colorably different. This conclusion is bolstered by EchoStar's own internal documents, which originally referred to its modified software by the moniker "Indexless DVR and *TS Parsing.*"PX3277 (emphasis added). Only in a later drafts did EchoStar remove the word "parsing" from its product characterization and begin referring to its modified DVR as an "Indexless / Brute Force DVR." PX3278; Dkt. No. 910 at 81:3-82:3.Although EchoStar now refers to its product as operating with brute-force, its own internal correspondence suggests that "pure brute force won't work." PX3170; Dkt. No. 910 at 83:8-24.

With regard to Echostar's buffering change, which allegedly affects the automatic flow control limitation, this Court notes that when EchoStar's modified DVRs were tested, 99% of them never exhibited any data loss. Dkt. No. 910 at 117:20-118:14.In the small percent that did exhibit data loss, that loss was extremely small, in the range of 0.0002%. Dkt. No. 910 at 120:12-21.This amount data loss is minimal. Moreover, EchoStar admits that such data loss would occur in both the infringing products and the modified products; the only difference is the manner in which the software deals with that data loss.Dkt. No. 912 at 244:20-245:1.Thus, the modified software is not more than colorably different from the infringing software. In addition, there is substantial evidence suggesting that both the modified and original products operate using the same circular buffer structure-each of the ten buffers (or "descriptors") within the structure having a 140,000 byte capacity. Dkt. No. 910 at 91:14-98:16, 122:3-25.EchoStar's efforts to re-brand its modified buffer as a linear buffer are misplaced. *Compare* PX3298, *and* Dkt. No. 912 at 32:13-16, %iwith *PX3161*, and *Dkt. No. 910 at 89:3-17*,and Dkt. No. 43:24-44:2.The actual change, the removal of the "record buffer," which in essence is a change from eleven buffers to ten, is not more than colorably different from the original product.

***16** For these reasons, this Court finds that any differences between the infringing and modified products are no more than colorable and that no substantial open issues of infringement exist. As a result, contempt proceedings in this case are appropriate.[FN6]

FN6. This Court finds that no burden of proof is attached to step one of the *KSM* test (as it is ultimately a "procedural" determination). If, however, EchoStar is correct and TiVo must prove no colorable differences by clear and convincing evidence, then this Court finds that TiVo has also met this heightened burden.

C.

The Court now turns to second step of the *KSM* test. Recall that this step requires a comparison between the modified products and the patent claims as construed by the court to determine if those products continue to infringe. The movant must demonstrate continued infringement by clear and convincing evidence.

The Federal Circuit has allowed, however, that in some cases it may "only be necessary to determine that the modified device has not been changed from the adjudged device in a way which affects an element of a claim." *KSM,* 776 F.2d at 1528-29. In such a case, the modified and adjudged devices may be treated as the same. *Id.* at 1529.As discussed above, EchoStar's modifications do not affect express elements of the disputed claims. The disputed claims do not require "start-code detection," "indexing," and/or "blocking." The disputed claims also do not require a specific buffering structure, much less a specific number of buffers. Instead, the claims require that the incoming data be "parsed," which this Court has construed to mean "analyzed," and also require "automatic flow control," which this Court has construed to mean "self-regulated."

If this Court was to adopt EchoStar's view of the claim requirements, then it would effectively be reconstruing the claims. The time for this has long passed. Even if this Court believed that its constructions were overly broad, it is bound by its earlier constructions as affirmed by the Federal Circuit. *See Del Mar Avionics, Inc. v. Quinton Instrument Co.,* 836 F.2d 1320, 1324 (Fed.Cir.1987) ("The prior determination of certain issues, including the issues of claim construction ..., bars judicial redetermination of those issues .... [T]he relitigation of issues previously decided is barred on principles of finality and repose."). This Court's constructions as affirmed are the law of the case. *See W.L. Gore & Assocs.,* 824 F.2d at 1279. If EchoStar wished to argue for a more limited interpretation of "parsing" or "automatic flow control," then it should have done so on appeal. Because EchoStar did not, it has waived any argument that this Court's constructions are incorrect.

Because Echostar's modifications do not affect elements of the disputed claims as construed, this Court finds that the infringing and modified devices may be treated as the same. As such, this Court finds that EchoStar's modified software continues to infringe the Software Claims of the '389 Patent.

Furthermore, even if this Court were to assume that EchoStar's modifications affected elements of the Software Claims, this Court still finds that the modifications continue to infringe the '389 Patent and that TiVo has proven such by clear and convincing evidence.

***17** With regard to EchoStar's "indexless" or "brute-force" modification, this Court finds by clear and convincing evidence that the modified products-both the 50X and Broadcom Products-still "parse[ ] video and audio data from said broadcast data."It is undisputed that EchoStar's products filter incoming data using a PID filter. Internally, EchoStar engineers refer to PID filtering as parsing. Dkt. No. 912 at 41:19-42:1.Furthermore, an EchoStar technical document on the modification uses the term "TS Parsing" to describe the design-around. PX3277. Numerous experts, some of them EchoStar's own, have testified that PID filtering is a form of parsing. Dkt. No. 716 at 110:10-20;Dkt. No. 719 at 38:2-8;Dkt. No. 910 at 66:9-67:19.A PID filter can be classified as a "physical data source" as required by the claims. A PID filter is transport demultiplexor, which is a type of physical data source envisioned by the '389 Patent. Dkt. No. 900 at 103; '389 Patent at 6:30-32.Finally, the claims do not require that parsing be completed on the payloads of the incoming data rather than their headers. EchoStar's arguments to this effect are thus inapposite. Therefore, this Court finds that PID filtering satisfies the parsing limitation of the Software Claims, the PID filter is a physical data source that parses incoming data.

With regard to Echostar's buffering change, this Court finds by clear and convincing evidence that the Broadcom Products still operate using a "source object [that] is automatically flow controlled by said

transform object."The patent does not require the blocking of data flow, nor does it require that there never be data loss within the DVR. The patent only requires that data flow be self-regulated. Dkt. No. 185 at 24 (citing '389 Patent at 8:48-49). As explained above, EchoStar's system utilizes ten buffers in a circular arrangement. EchoStar's software manages the flow of data into and out of those buffers. Dkt. No. 910 at 91:14-98:16.Read and write "pointers" and "descriptors" manage the process by which data is deposited into and extracted from the circular buffer. *Id.* Furthermore, there is evidence that certain data structures, including a "no sync" structure, provide communication between the read and write processes within the modified receivers. Dkt. No. 910 at 128:18-130:11, 225:10-25;Dkt. No. 914 at 46:5-14.In addition, EchoStar's software contains a timed "semaphore," which paces the extraction process.Dkt. No. 912 at 5:1-4.Also, in the event that the read process falls behind in its extraction of data from the circular buffer, EchoStar's modified software catches up by extracting data from multiple buffers at once and writing that data to the hard drive. Dkt. No. 912 at 184:11-195:6.Thus, this Court finds that EchoStar's software retains a collection of data and operations-a transform object-that is self-regulating with respect to the source object. Lastly, in the rare instance of overflow (0.0002% of the time in 1% of receivers), EchoStar's software handles the situation by flushing all ten buffers and correcting the error condition. Dkt. No. 910 at 114:23-115:8.Based on all this evidence, the Court finds that the flow of data in EchoStar's Broadcom products is self-regulated. Therefore, this Court finds that EchoStar's buffering system satisfies the automatic flow control limitation of the Software Claims.

***18** Finally, EchoStar's modifications do not affect any other limitations in the Software Claims. Dkt. No. 910 at 57:5-58:5;Dkt. No. 912 at 158:10-22.Thus, all remaining limitations are met by the modified products in the exact same manner as they were met in the infringing products. Because all limitations in claims 31 and 61 of the '389 Patent are practiced by EchoStar's modified 50X and Broadcom Products, those products continue to infringe TiVo's patent. TiVo has proven such by clear and convincing evidence.

Accordingly, this Court finds EchoStar in contempt of this Court's permanent injunction. Specifically, EchoStar is in contempt of the Infringement Provision of this Court's order, which enjoined EchoStar from "making, using, offering to sell, selling or importing in the United States, the Infringing Products, either alone or in combination with any other product and all other products that are only colorably different therefrom in the context of the Infringed Claims."

IV.

Even if EchoStar had achieved a non-infringing design-around, this Court would still find that EchoStar is in contempt of this Court's permanent injunction. EchoStar never complied with the Disablement Provision of this Court's order, which ordered EchoStar to "disable the DVR functionality (i.e. disable all storage to and playback from a hard disk drive of television data) in all but 192,708 units of the Infringing Products that have been placed with an end user or subscriber."

Whether EchoStar did or did not comply with the Disablement Provision of this Court's order does not raise any issue unique to patent law. As a result, the regional circuit law of the Fifth Circuit applies to this issue. *See* *Eagle Comtronics, Inc. v. Arrow Commc'n Labs., Inc.*, 305 F.3d 1303, 1313 (Fed.Cir.2002) (applying regional circuit law to civil contempt proceedings). In civil contempt proceedings, "the party seeking an order of contempt need only establish (1) that a court order was in effect, and (2) that the order required certain conduct by the respondent, and (3) that the respondent failed to comply with the court's order." *FDIC v. LeGrand*, 43 F.3d 163, 170 (5th Cir.1995) (citation omitted). The movant must prove such by clear and convincing evidence. *Id.;* *Martin v. Trinity Indus., Inc.*, 959 F.2d 45, 47 (5th Cir.1992).

This Court's permanent injunction, which was issued on September 8, 2006, was stayed by the Federal Circuit pending EchoStar's appeal. On appeal, EchoStar did not challenge the language or validity of this Court's injunction. Thus, the Federal Circuit upheld the injunction and dissolved its stay once EchoStar's appeal became final, which occurred on April 18, 2008. *TiVo*, 516 F.3d at 1312.

This Court, aware of the Federal Circuit's general disdain for broad or vague prohibitions of future infringement, drafted its permanent injunction in narrow terms that captured particular infringing devices

and required EchoStar to take certain action regarding those devices. *See* KSM, 776 F.2d at 1526 ("those against whom an injunction is issued should receive fair and precisely drawn notice of what the injunction actually prohibits"). In particular, EchoStar was ordered to disable DVR functionality in the infringing products that had been placed with an end-user. For the sake of clarity, this Court provided EchoStar with a definition of DVR functionality: "storage to and playback from a hard disk drive of television data."

***19** Although EchoStar did not challenge the scope of this Court's order on appeal, EchoStar now argues that the injunction only covers "Infringing Products," which in terms of the Software Claims would be infringing software. *See*Dkt. No. 839 at 10-12.EchoStar argues that it complied with this Court's order when it downloaded new software into the infringing receivers, thus disabling their infringing DVR functionality. This Court's order, however, was not limited to infringing software; rather the infringing receivers in their entirety were subject to the order. Indeed, although claims 31 and 61 have been referred to as the "Software Claims" they actually cover a process and apparatus that may also contain hardware elements. *See* TiVo, 516 F.3d at 1309 ("[T]he hardware/software distinction made by EchoStar is unhelpful. What matters is whether the operations performed by the interaction of software and hardware in the accused DVRs, taken as a whole, are covered by the claim term."). By not disabling DVR functionality in adjudged receivers that had been placed with end-users, EchoStar failed to comply with the plain language of this Court's order.

If EchoStar believed that this Court's order was overly broad or that it improperly covered non-infringing practices, then EchoStar should have requested that this Court modify its order or should have challenged the scope of this Court's order on appeal. Because EchoStar failed to do either, it has waived any argument that this Court's order is overbroad. *See W. Water Mgmt., Inc. v. Brown*, 40 F.3d 105, 108 (5th Cir.1994) ("[C]ollateral attack on an injunction during contempt proceedings is prohibited if earlier review of the injunction was available."). Instead of requesting review of this Court's order by itself or another court, EchoStar merely ignored this Court's order because it subjectively believed it to be improper or overly broad. This cannot be allowed. *See GTE Sylvania, Inc. v. Consumers Union*, 445 U.S. 375, 386-87, 100 S.Ct. 1194, 63 L.Ed.2d 467 (1980) ("[P]ersons subject to an injunctive order issued by a court with jurisdiction are expected to obey that decree until it is modified or reversed, even if they have proper grounds to object to the order ."); *Carborundum Co. v. Molten Metal Equip. Innovations, Inc.*, 72 F.3d 872, 883 (Fed.Cir.1995). A party may not unilaterally decide whether it will or will not comply with a court order.

Accordingly, this Court finds by clear and convincing evidence that a court order, which required certain conduct by EchoStar, was in effect as of April 18, 2008, and that EchoStar failed to comply with that order. Therefore, this Court finds EchoStar in contempt of this Court's permanent injunction. Specifically, EchoStar is in contempt of the Disablement Provision, which ordered EchoStar to "disable the DVR functionality (i.e. disable all storage to and playback from a hard disk drive of television data) in all but 192,708 units of the Infringing Products that have been placed with an end user or subscriber."

V.

***20** For the reasons set forth above, this Court finds EchoStar in contempt of its permanent injunction. EchoStar's modified software is not more than colorably different from the products adjudged to infringe; furthermore, EchoStar's products continue to infringe TiVo's patent. Finally, EchoStar failed to comply this Court's order that it disable the DVR functionality in the infringing products.

The harm caused to TiVo by EchoStar's contempt is substantial. EchoStar has gained millions of customers since this Court's injunction issued, customers that are now potentially unreachable by TiVo. *See*Dkt. No. 773 at 10.As this Court has noted in the past, "loss of market share and of customer base as a result of infringement cause severe injury," and "every day of Defendant's infringement affects Plaintiff's business."*Id.* at 10-11.Although EchoStar requests that this Court stay its injunction further, this Court declines to do so. EchoStar has escaped this Court's injunction for over two years and further delay will be manifestly unjust to TiVo and cause TiVo substantial harm.

Although EchoStar is required to bring itself into compliance with this Court's permanent injunction,

the Court will defer any ruling on the issue of monetary sanctions at this time. Additionally, EchoStar is required to inform this Court of any future attempts to design-around the '389 Patent and obtain Court approval before any such design-around is implemented.

An Order and an Amended Final Judgment and Permanent Injunction will soon be entered in accordance with this opinion.

E.D.Tex.,2009.
TiVo Inc. v. Dish Network Corp.
Slip Copy, 2009 WL 1562872 (E.D.Tex.)

END OF DOCUMENT

U.S. Patent No.: 6,233,389 B1

US006233389B1

(12) **United States Patent**
Barton et al.

(10) **Patent No.: US 6,233,389 B1**
(45) **Date of Patent: May 15, 2001**

(54) **MULTIMEDIA TIME WARPING SYSTEM**

(75) Inventors: **James M. Barton**, Los Gatos; **Roderick James McInnis**, Milpitas; **Alan S. Moskowitz**, San Francisco; **Andrew Martin Goodman**, Menlo Park; **Ching Tong Chow**, Fremont; **Jean Swey Kao**, Cupertino, all of CA (US)

(73) Assignee: **TiVo, Inc.**, Alviso, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/126,071**

(22) Filed: **Jul. 30, 1998**

(51) **Int. Cl.**[7] **H04N 5/92**

(52) **U.S. Cl.** **386/46**; 386/68

(58) **Field of Search** 386/1, 33, 45, 386/46, 111–112, 125–126, 68; 369/60; 366/7, 33; 348/7, 10, 571, 714, 722, 725; H04N 5/76, 5/92, 9/79, 5/14

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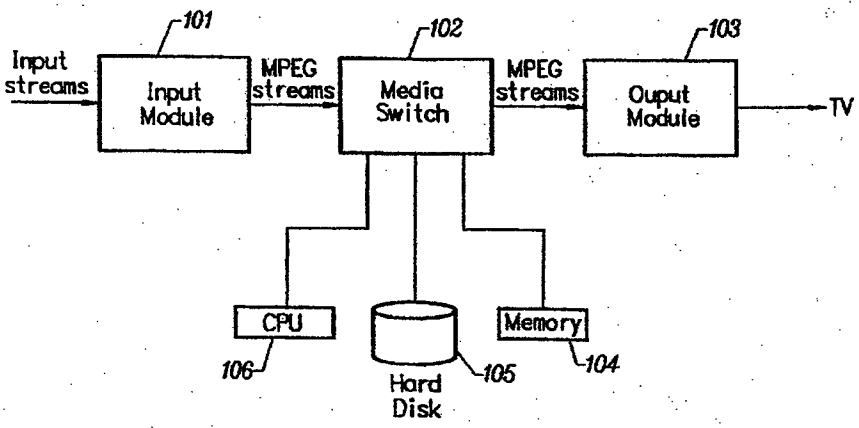
ASTARTE DVDirector™ Beta Testing Program.

Primary Examiner—Thai Tran
(74) *Attorney, Agent, or Firm*—Michael A. Glenn; Kirk Wong

(57) **ABSTRACT**

A multimedia time warping system. The invention allows the user to store selected television broadcast programs while the user is simultaneously watching or reviewing another program. A preferred embodiment of the invention accepts television (TV) input streams in a multitude of forms, for example, National Television Standards Committee (NTSC) or PAL broadcast, and digital forms such as Digital Satellite System (DSS), Digital Broadcast Services (DBS), or Advanced Television Standards Committee (ATSC). The TV streams are converted to an Moving Pictures Experts Group (MPEG) formatted stream for internal transfer and manipulation and are parsed and separated it into video and audio components. The components are stored in temporary buffers. Events are recorded that indicate the type of component that has been found, where it is located, and when it occurred. The program logic is notified that an event has occurred and the data is extracted from the buffers. The parser and event buffer decouple the CPU from having to parse the MPEG stream and from the real time nature of the data streams which allows for slower CPU and bus speeds and translate to lower system costs. The video and audio components are stored on a storage device and when the program is requested for display, the video and audio components are extracted from the storage device and reassembled into an MPEG stream which is sent to a decoder. The decoder converts the MPEG stream into TV output signals and delivers the TV output signals to a TV receiver. User control commands are accepted and sent through the system. These commands affect the flow of said MPEG stream and allow the user to view stored programs with at least the following functions: reverse, fast forward, play, pause, index, fast/slow reverse play, and fast/slow play.

61 Claims, 12 Drawing Sheets



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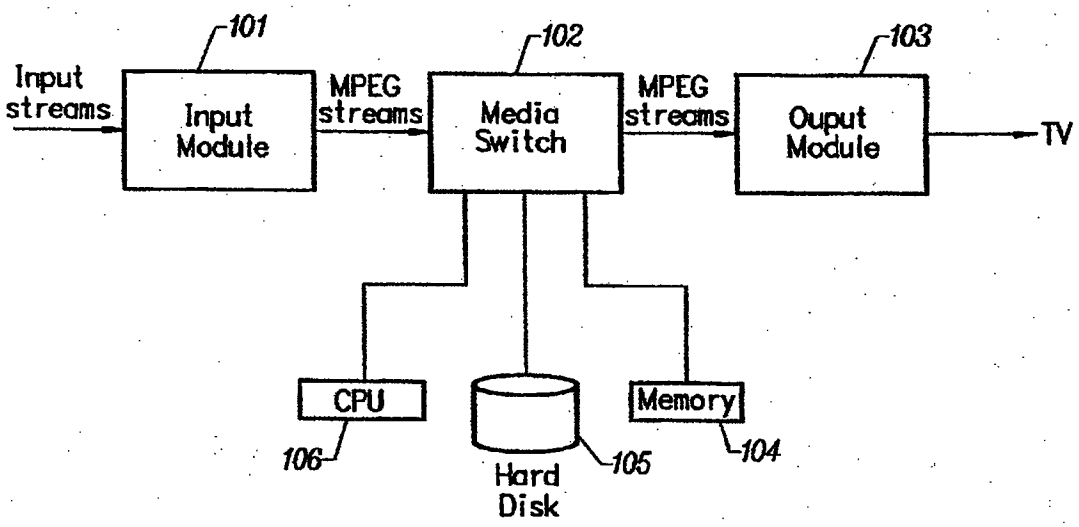
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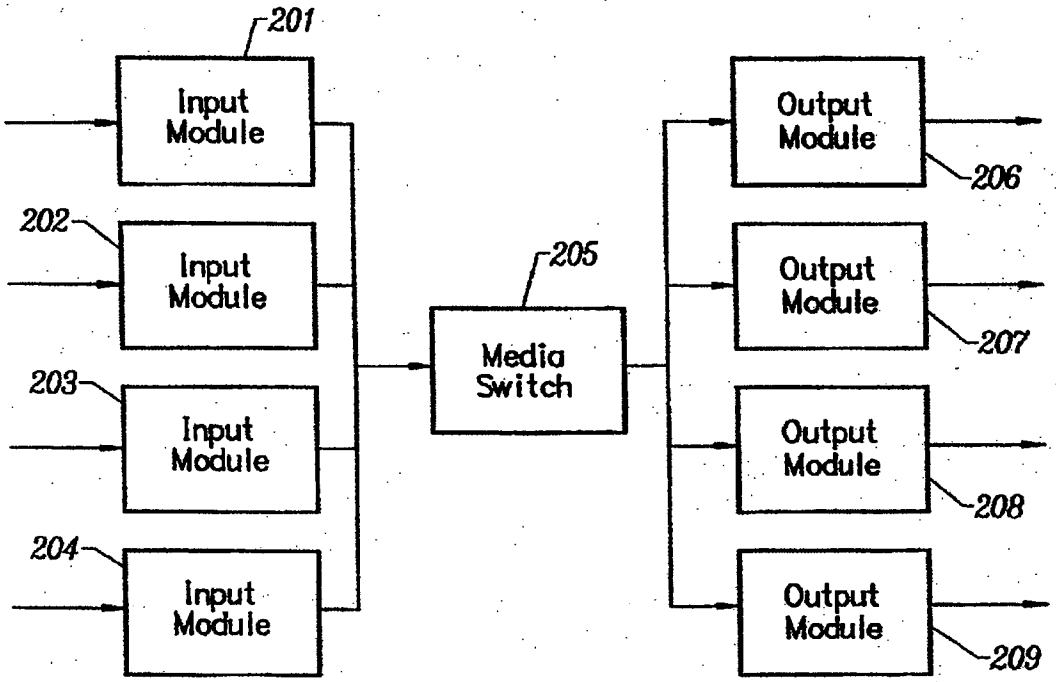
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FIG. 2

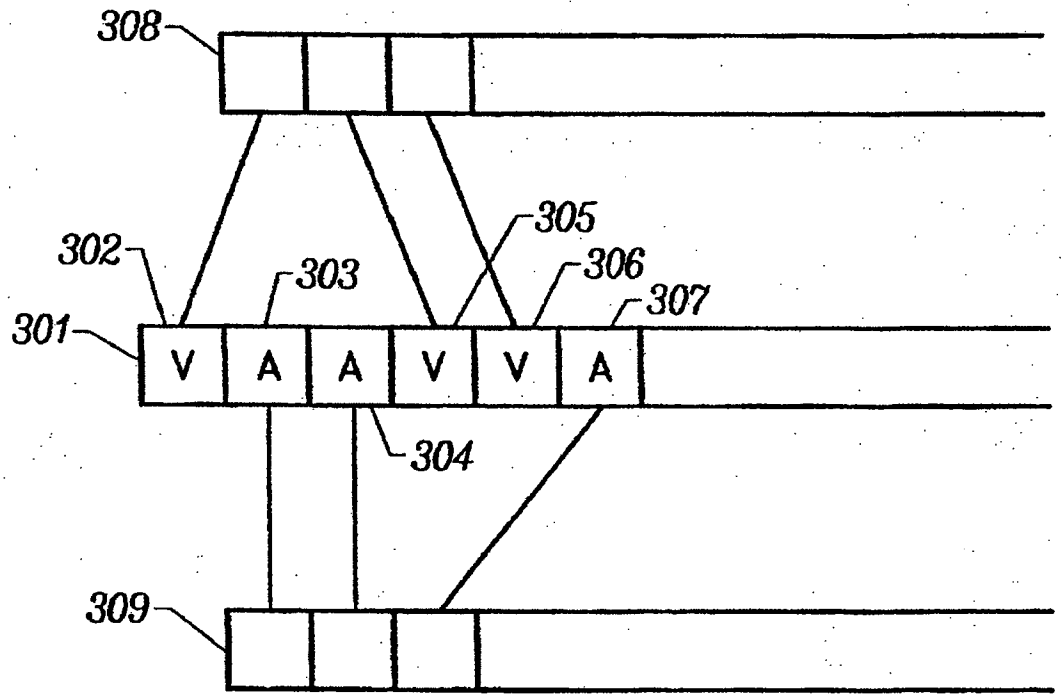

FIG. 3

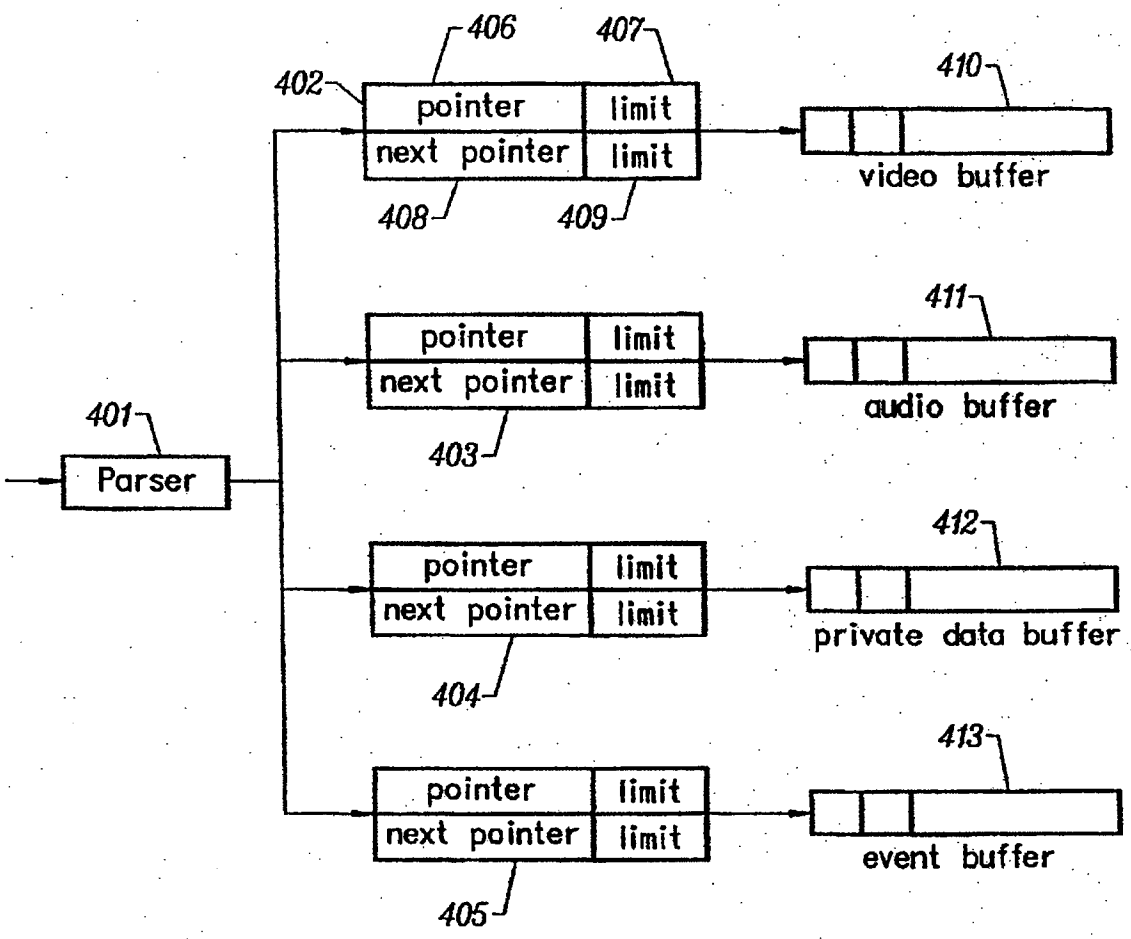
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FIG. 4

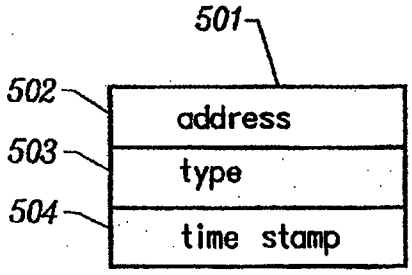
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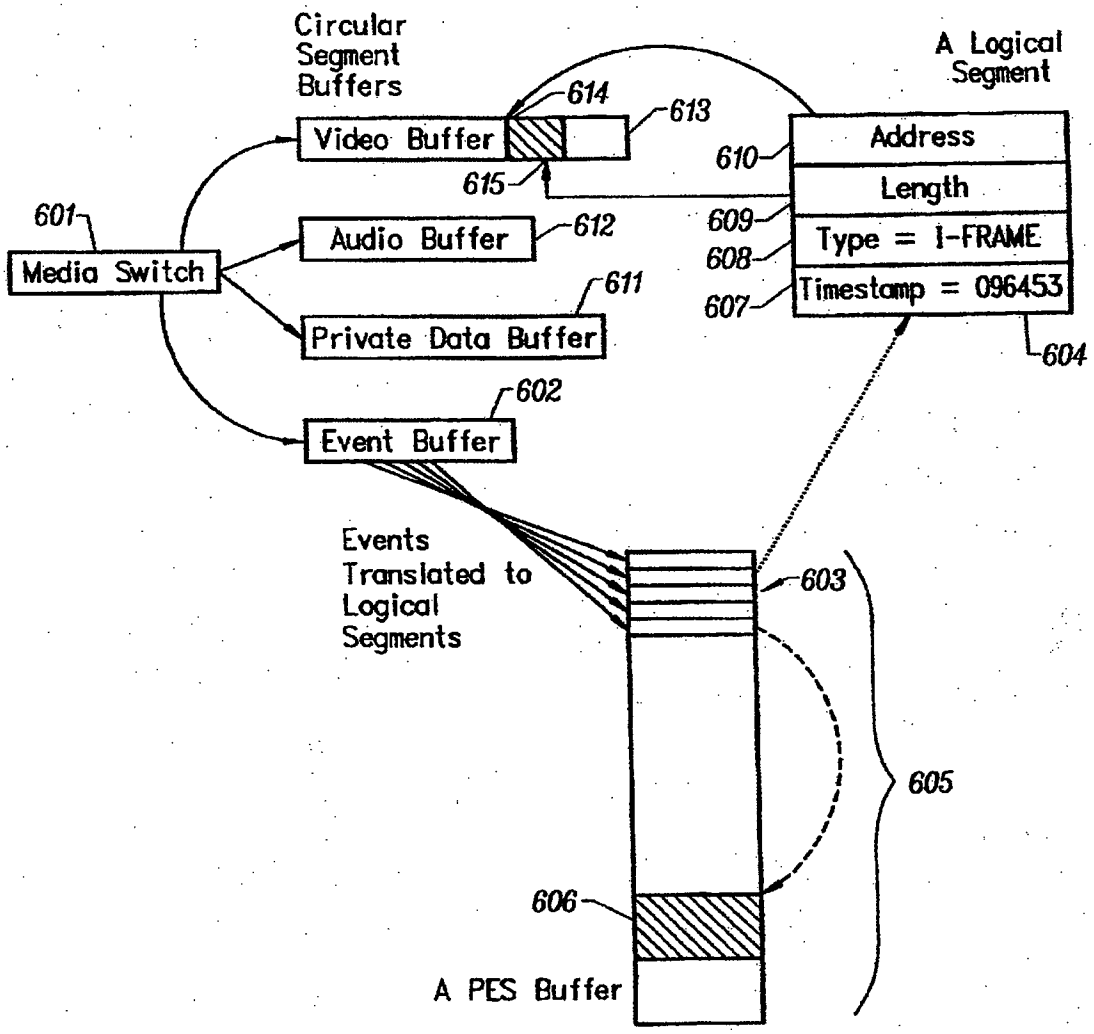
FIG. 5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602
Event Buffer
Events
Translated to
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Segments
603
605
606
A PES Buffer

FIG. 6

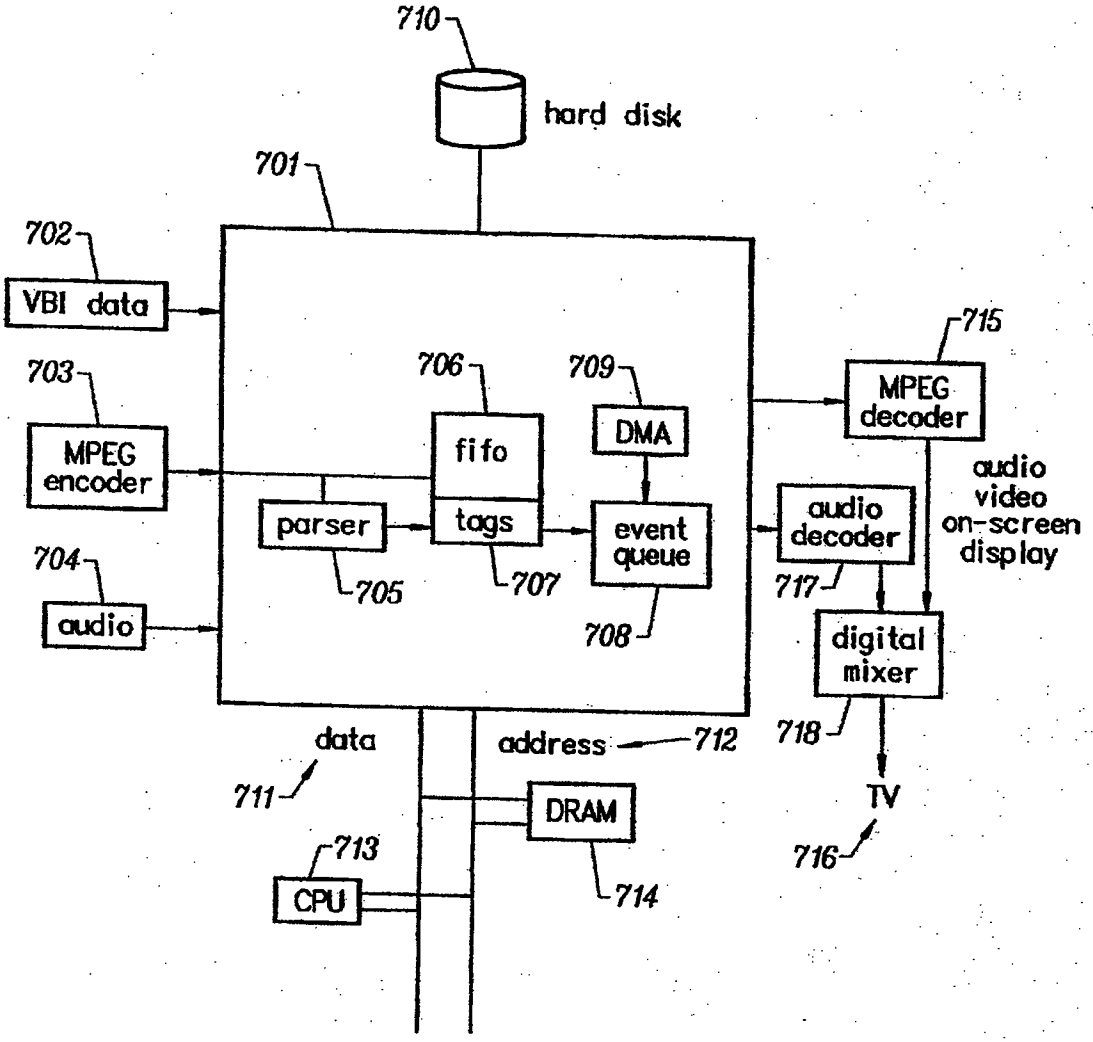
710
hard disk
701
702
VBI data
703
MPEG encoder
704
audio
706
fifo
tags
parser
705
707
709
DMA
event queue
708
715
MPEG decoder
audio decoder
717
audio video on-screen display
digital mixer
718
TV
716
data
711
address
712
DRAM
714
713
CPU

FIG. 7

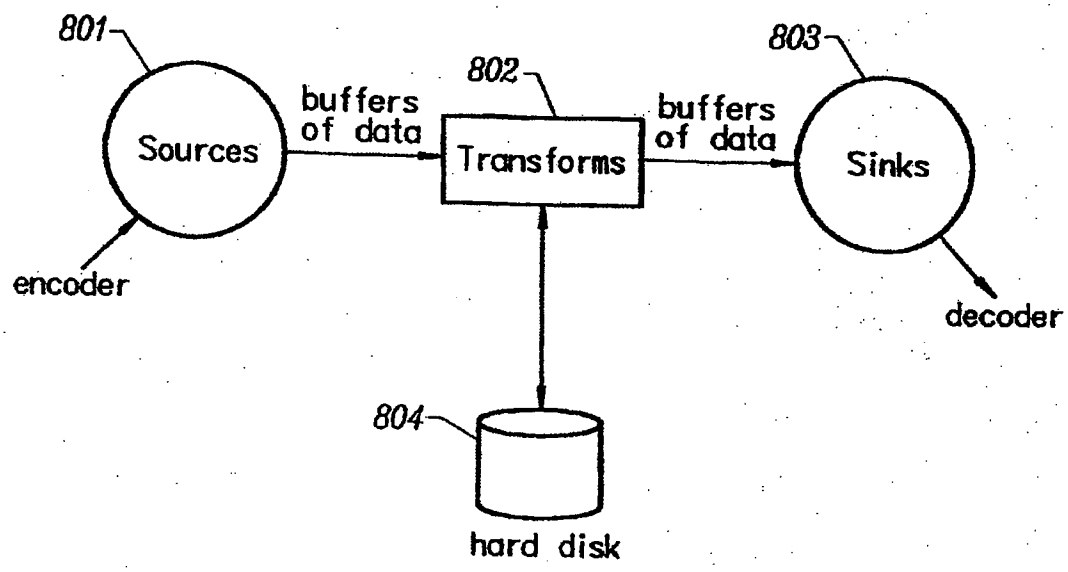
801
Sources
encoder
buffers of data
802
Transforms
buffers of data
803
Sinks
decoder
804
hard disk

FIG. 8

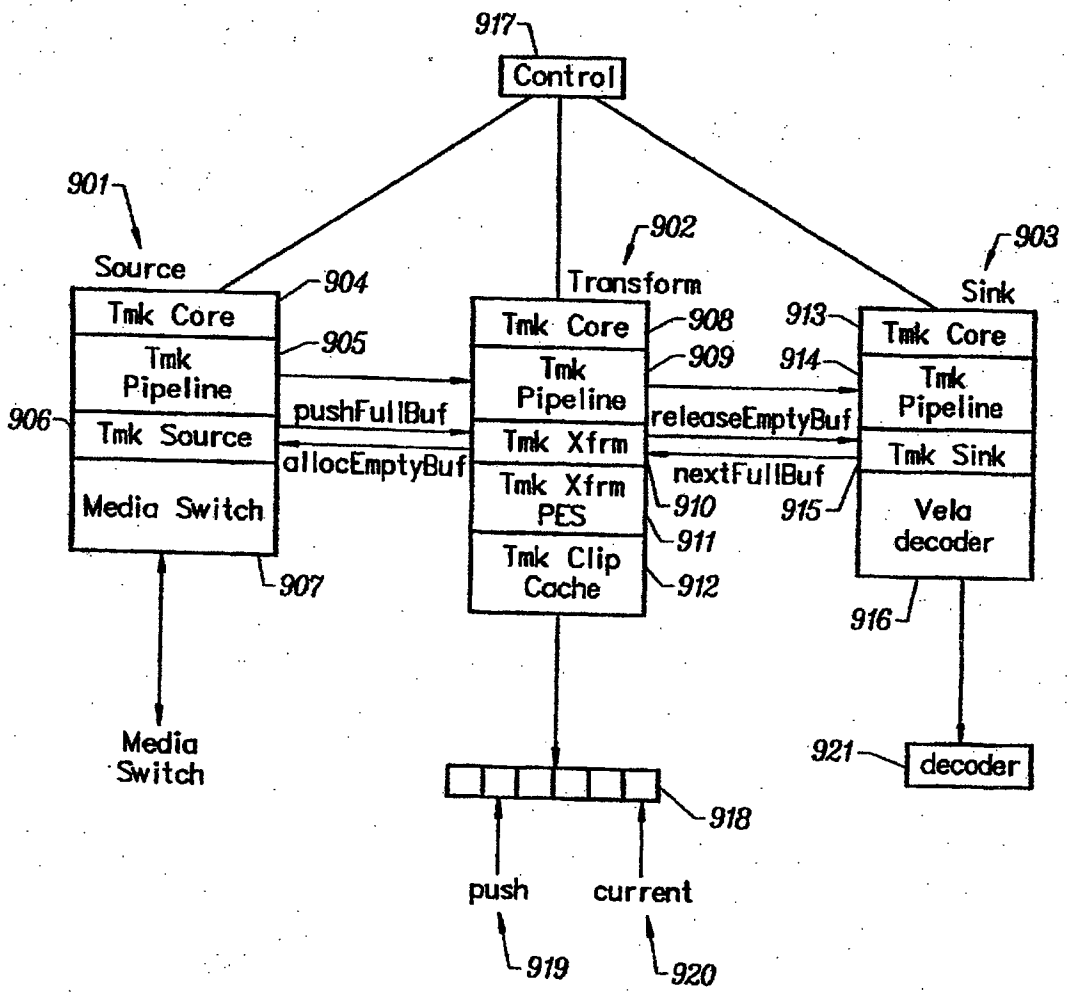
917
Control
901
Source
902
Transform
903
Sink
904
905
906
907
908
909
910
911
912
913
914
915
916
921
Tmk Core
Tmk Pipeline
Tmk Source
Media Switch
pushFullBuf
allocEmptyBuf
Tmk Core
Tmk Pipeline
Tmk Xfrm
Tmk Xfrm PES
Tmk Clip Cache
releaseEmptyBuf
nextFullBuf
Tmk Core
Tmk Pipeline
Tmk Sink
Vela decoder
Media Switch
decoder
918
push
current
919
920

FIG. 9

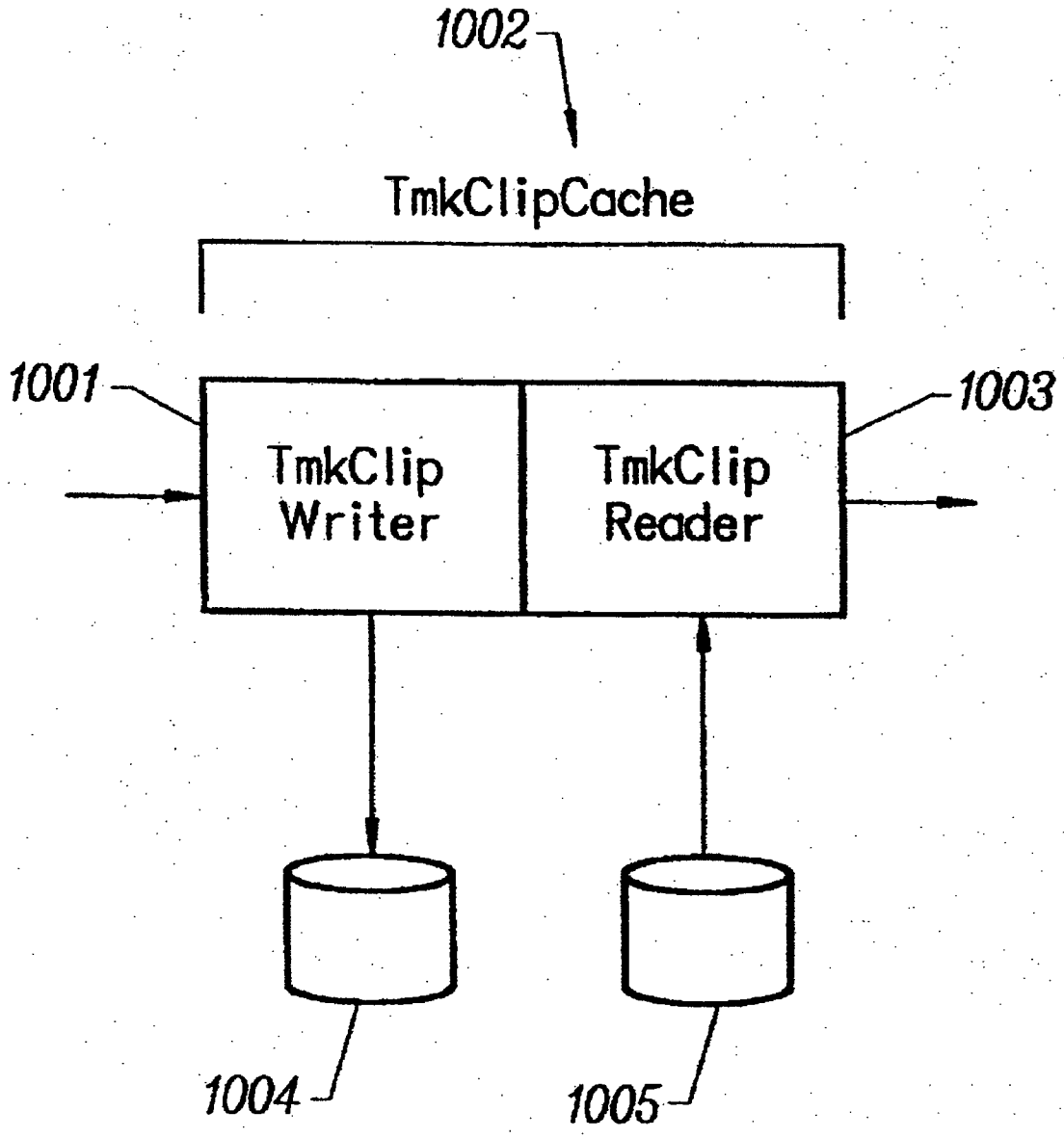
1002
TmkClipCache
1001
1003
TmkClip Writer
TmkClip Reader
1004
1005

FIG. 10

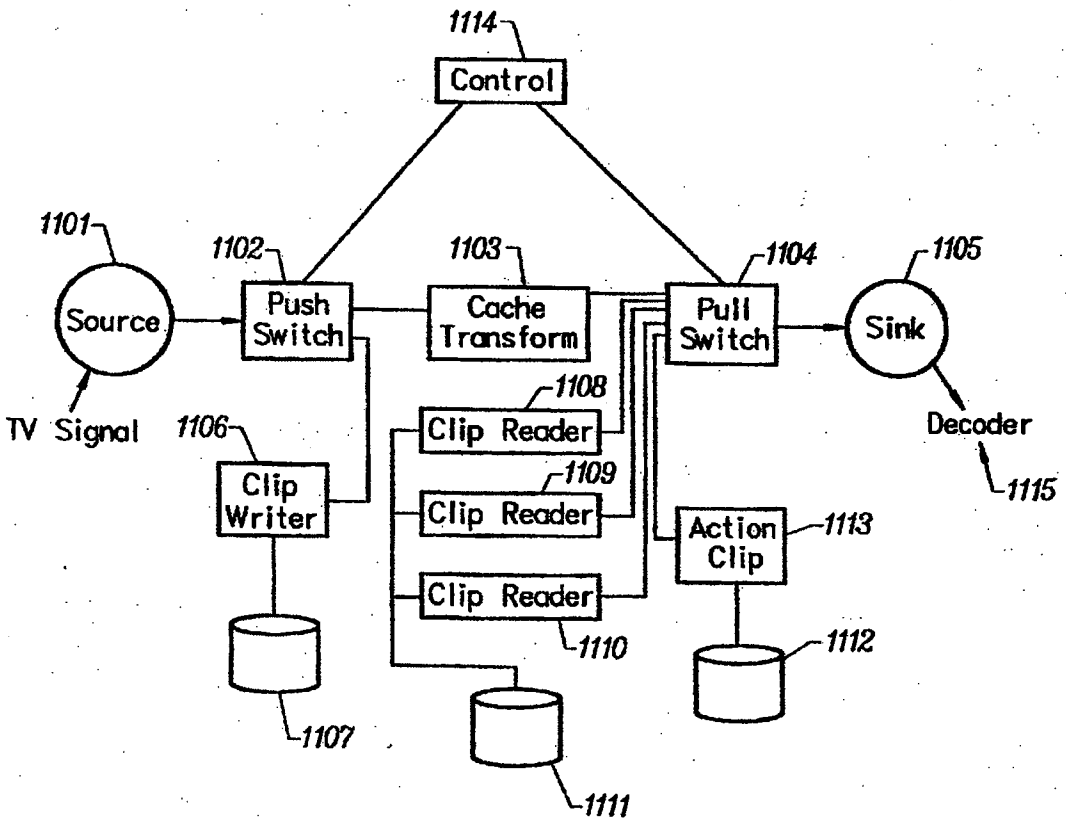
1114
Control
1101
Source
TV Signal
1102
Push Switch
1103
Cache Transform
1104
Pull Switch
1105
Sink
Decoder
1115
1108
Clip Reader
1109
Clip Reader
Clip Reader
1110
1106
Clip Writer
1107
1111
Action Clip
1113
1112

FIG. 11

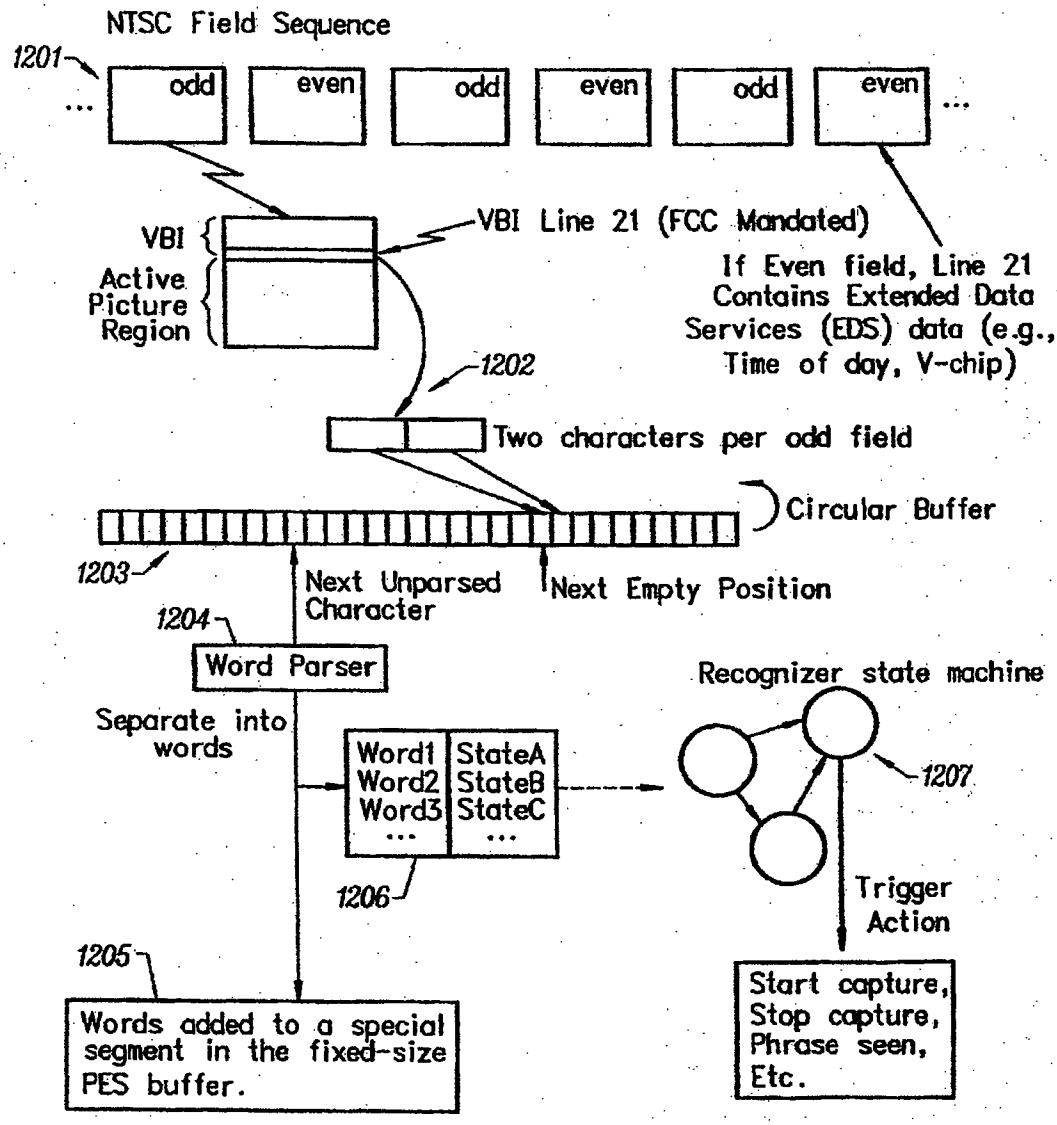
NTSC Field Sequence
1201
odd
even
odd
even
odd
even
VBI
Active Picture Region
VBI Line 21 (FCC Mandated)
If Even field, Line 21 Contains Extended Data Services (EDS) data (e.g., Time of day, V-chip)
1202
Two characters per odd field
Circular Buffer
1203
Next Unparsed Character
Next Empty Position
1204
Word Parser
Separate into words
Word1 Word2 Word3
StateA StateB StateC
1206
Recognizer state machine
1207
Trigger Action
1205
Words added to a special segment in the fixed-size PES buffer.
Start capture, Stop capture, Phrase seen, Etc.

FIG. 12

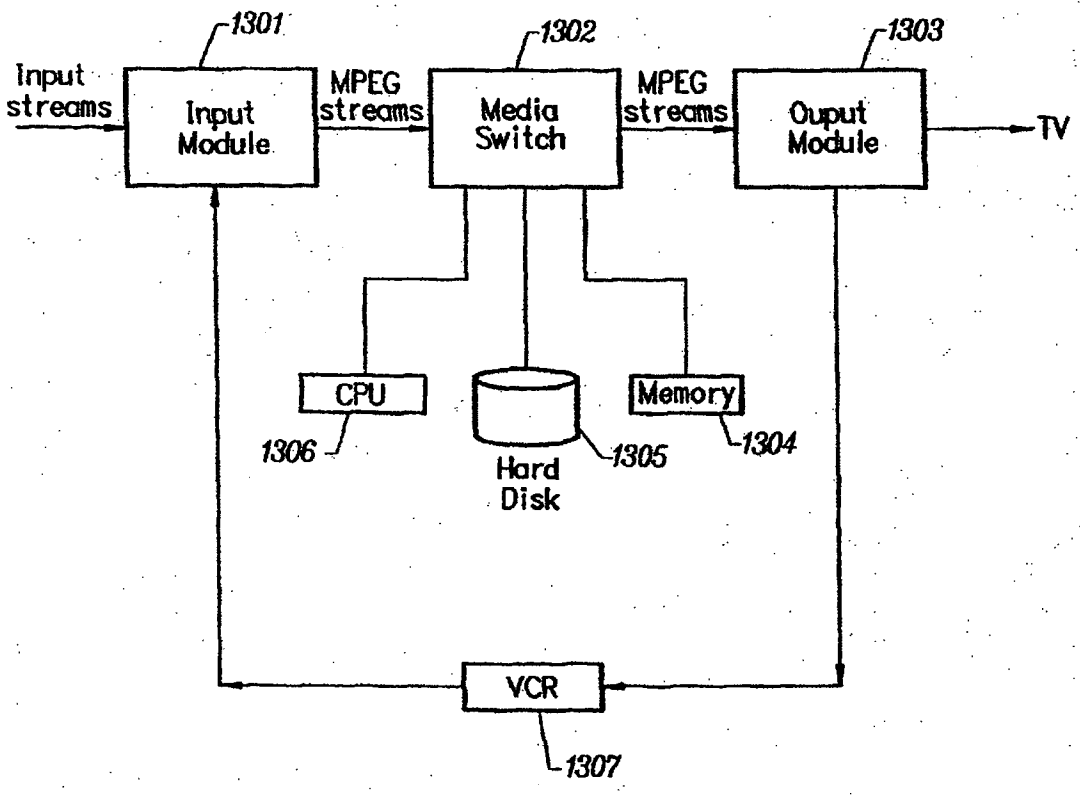
1301
1302
1303
Input streams
Input Module
MPEG streams
Media Switch
MPEG streams
Ouput Module
TV
CPU
1306
Hard Disk
1305
Memory
1304
VCR
1307

FIG. 13

MULTIMEDIA TIME WARPING SYSTEM

BACKGROUND OF THE INVENTION

1. Technical Field

The invention relates to the time shifting of television broadcast signals. More particularly, the invention relates to the real time capture, storage, and display of television broadcast signals.

2. Description of the Prior Art

The Video Cassette Recorder (VCR) has changed the lives of television (TV) viewers throughout the world. The VCR has offered viewers the flexibility to time-shift TV programs to match their lifestyles.

The viewer stores TV programs onto magnetic tape using the VCR. The VCR gives the viewer the ability to play, rewind, fast forward and pause the stored program material. These functions enable the viewer to pause the program playback whenever he desires, fast forward through unwanted program material or commercials, and to replay favorite scenes. However, a VCR cannot both capture and play back information at the same time.

One approach to solving this problem is to use several VCRs. For example, if two video tape recorders are available, it might be possible to Ping-Pong between the two. In this case, the first recorder is started at the beginning of the program of interest. If the viewer wishes to rewind the broadcast, the second recorder begins recording, while the first recorder is halted, rewound to the appropriate place, and playback initiated. However, at least a third video tape recorder is required if the viewer wishes to fast forward to some point in time after the initial rewind was requested. In this case, the third recorder starts recording the broadcast stream while the second is halted and rewound to the appropriate position. Continuing this exercise, one can quickly see that the equipment becomes unwieldy, unreliable, expensive, and hard to operate, while never supporting all desired functions. In addition, tapes are of finite length, and may potentially end at inconvenient times, drastically lowering the value of the solution.

The use of digital computer systems to solve this problem has been suggested. U.S. Pat. No. 5,371,551 issued to Logan et al., on Dec. 6, 1994, teaches a method for concurrent video recording and playback. It presents a microprocessor controlled broadcast and playback device. Said device compresses and stores video data onto a hard disk. However, this approach is difficult to implement because the processor requirements for keeping up with the high video rates makes the device expensive and problematic. The microprocessor must be extremely fast to keep up with the incoming and outgoing video data.

It would be advantageous to provide a multimedia time warping system that gives the user the ability to simultaneously record and play back TV broadcast programs. It would further be advantageous to provide a multimedia time warping system that utilizes an approach that decouples the microprocessor from the high video data rates, thereby reducing the microprocessor and system requirements which are at a premium.

SUMMARY OF THE INVENTION

The invention provides a multimedia time warping system. The invention utilizes an easily manipulated, low cost multimedia storage and display system that allows the user to view a television broadcast program with the option of instantly reviewing previous scenes within the program. In addition, the invention allows the user to store selected television broadcast programs while the user is simultaneously watching or reviewing another program.

A preferred embodiment of the invention accepts television (TV) input streams in a multitude of forms, for example, analog forms such as National Television Standards Committee (NTSC) or PAL broadcast, and digital forms such as Digital Satellite System (DSS), Digital Broadcast Services (DBS), or Advanced Television Standards Committee (ATSC). Analog TV streams are converted to an Moving Pictures Experts Group (MPEG) formatted stream for internal transfer and manipulation, while pre-formatted MPEG streams are extracted from the digital TV signal and presented in a similar format to encoded analog streams.

The invention parses the resulting MPEG stream and separates it into its video and audio components. It then stores the components into temporary buffers. Events are recorded that indicate the type of component that has been found, where it is located, and when it occurred. The program logic is notified that an event has occurred and the data is extracted from the buffers.

The parser and event buffer decouple the CPU from having to parse the MPEG stream and from the real time nature of the data streams. This decoupling allows for slower CPU and bus speeds which translate to lower system costs. The video and audio components are stored on a storage device. When the program is requested for display, the video and audio components are extracted from the storage device and reassembled into an MPEG stream. The MPEG stream is sent to a decoder. The decoder converts the MPEG stream into TV output signals and delivers the TV output signals to a TV receiver.

User control commands are accepted and sent through the system. These commands affect the flow of said MPEG stream and allow the user to view stored programs with at least the following functions: reverse, fast forward, play, pause, index, fast/slow reverse play, and fast/slow play.

Other aspects and advantages of the invention will become apparent from the following detailed description in combination with the accompanying drawings, illustrating, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block schematic diagram of a high level view of a preferred embodiment of the invention according to the invention;

FIG. 2 is a block schematic diagram of a preferred embodiment of the invention using multiple input and output modules according to the invention;

FIG. 3 is a schematic diagram of an Moving Pictures Experts Group (MPEG) data stream and its video and audio components according to the invention;

FIG. 4 is a block schematic diagram of a parser and four direct memory access (DMA) input engines contained in the Media Switch according to the invention;

FIG. 5 is a schematic diagram of the components of a packetized elementary stream (PES) buffer according to the invention;

FIG. 6 is a schematic diagram of the construction of a PES buffer from the parsed components in the Media Switch output circular buffers;

FIG. 7 is a block schematic diagram of the Media Switch and the various components that it communicates with according to the invention;

FIG. 8 is a block schematic diagram of a high level view of the program logic according to the invention;

FIG. 9 is a block schematic diagram of a class hierarchy of the program logic according to the invention;

FIG. 10 is a block schematic diagram of a preferred embodiment of the clip cache component of the invention according to the invention;

FIG. 11 is a block schematic diagram of a preferred embodiment of the invention that emulates a broadcast studio video mixer according to the invention;

FIG. 12 is a block schematic diagram of a closed caption parser according to the invention; and

FIG. 13 is a block schematic diagram of a high level view of a preferred embodiment of the invention utilizing a VCR as an integral component of the invention according to the invention.

DETAILED DESCRIPTION OF THE INVENTION

The invention is embodied in a multimedia time warping system. A system according to the invention provides a multimedia storage and display system that allows the user to view a television broadcast program with the option of instantly reviewing previous scenes within the program. The invention additionally provides the user with the ability to store selected television broadcast programs while simultaneously watching or reviewing another program and to view stored programs with at least the following functions: reverse, fast forward, play, pause, index, fast/slow reverse play, and fast/slow play.

Referring to FIG. 1, a preferred embodiment of the invention has an Input Section **101**, Media Switch **102**, and an Output Section **103**. The Input Section **101** takes television (TV) input streams in a multitude of forms, for example, National Television Standards Committee (NTSC) or PAL broadcast, and digital forms such as Digital Satellite System (DSS), Digital Broadcast Services (DBS), or Advanced Television Standards Committee (ATSC). DBS, DSS and ATSC are based on standards called Moving Pictures Experts Group 2 (MPEG2) and MPEG2 Transport. MPEG2 Transport is a standard for formatting the digital data stream from the TV source transmitter so that a TV receiver can disassemble the input stream to find programs in the multiplexed signal. The Input Section **101** produces MPEG streams. An MPEG2 transport multiplex supports multiple programs in the same broadcast channel, with multiple video and audio feeds and private data. The Input Section **101** tunes the channel to a particular program, extracts a specific MPEG program out of it, and feeds it to the rest of the system. Analog TV signals are encoded into a similar MPEG format using separate video and audio encoders, such that the remainder of the system is unaware of how the signal was obtained. Information may be modulated into the Vertical Blanking Interval (VBI) of the analog TV signal in a number of standard ways; for example, the North American Broadcast Teletext Standard (NABTS) may be used to modulate information onto lines **10** through **20** of an NTSC signal, while the FCC mandates the use of line **21** for Closed Caption (CC) and Extended Data Services (EDS). Such signals are decoded by the input section and passed to the other sections as if they were delivered via an MPEG2 private data channel.

The Media Switch **102** mediates between a microprocessor CPU **106**, hard disk or storage device **105**, and memory **104**. Input streams are converted to an MPEG stream and sent to the Media Switch **102**. The Media Switch **102** buffers the MPEG stream into memory. It then performs two operations if the user is watching real time TV: the stream is sent to the Output Section **103** and it is written simultaneously to the hard disk or storage device **105**.

The Output Section **103** takes MPEG streams as input and produces an analog TV signal according to the NTSC, PAL, or other required TV standards. The Output Section **103** contains an MPEG decoder, On-Screen Display (OSD) generator, analog TV encoder and audio logic. The OSD generator allows the program logic to supply images which will be overlayed on top of the resulting analog TV signal. Additionally, the Output Section can modulate information supplied by the program logic onto the VBI of the output signal in a number of standard formats, including NABTS, CC and EDS.

With respect to FIG. 2, the invention easily expands to accommodate multiple Input Sections (tuners) **201**, **202**, **203**, **204**, each can be tuned to different types of input. Multiple Output Modules (decoders) **206**, **207**, **208**, **209** are added as well. Special effects such as picture in a picture can be implemented with multiple decoders. The Media Switch **205** records one program while the user is watching another. This means that a stream can be extracted off the disk while another stream is being stored onto the disk.

Referring to FIG. 3, the incoming MPEG stream **301** has interleaved video **302**, **305**, **306** and audio **303**, **304**, **307** segments. These elements must be separated and recombined to create separate video **308** and audio **309** streams or buffers. This is necessary because separate decoders are used to convert MPEG elements back into audio or video analog components. Such separate delivery requires that time sequence information be generated so that the decoders may be properly synchronized for accurate playback of the signal.

The Media Switch enables the program logic to associate proper time sequence information with each segment, possibly embedding it directly into the stream. The time sequence information for each segment is called a time stamp. These time stamps are monotonically increasing and start at zero each time the system boots up. This allows the invention to find any particular spot in any particular video segment. For example, if the system needs to read five seconds into an incoming contiguous video stream that is being cached, the system simply has to start reading forward into the stream and look for the appropriate time stamp.

A binary search can be performed on a stored file to index into a stream. Each stream is stored as a sequence of fixed-size segments enabling fast binary searches because of the uniform time stamping. If the user wants to start in the middle of the program, the system performs a binary search of the stored segments until it finds the appropriate spot, obtaining the desired results with a minimal amount of information. If the signal were instead stored as an MPEG stream, it would be necessary to linearly parse the stream from the beginning to find the desired location.

With respect to FIG. 4, the Media Switch contains four input Direct Memory Access (DMA) engines **402**, **403**, **404**, **405** each DMA engine has an associated buffer **410**, **411**, **412**, **413**. Conceptually, each DMA engine has a pointer **406**, a limit for that pointer **407**, a next pointer **408**, and a limit for the next pointer **409**. Each DMA engine is dedicated to a particular type of information, for example, video **402**, audio **403**, and parsed events **405**. The buffers **410**, **411**, **412**, **413** are circular and collect the specific information. The DMA engine increments the pointer **406** into the associated buffer until it reaches the limit **407** and then loads the next pointer **408** and limit **409**. Setting the pointer **406** and next pointer **408** to the same value, along with the corresponding

limit value creates a circular buffer. The next pointer **408** can be set to a different address to provide vector DMA.

The input stream flows through a parser **401**. The parser **401** parses the stream looking for MPEG distinguished events indicating the start of video, audio or private data segments. For example, when the parser **401** finds a video event, it directs the stream to the video DMA engine **402**. The parser **401** buffers up data and DMAs it into the video buffer **410** through the video DMA engine **402**. At the same time, the parser **401** directs an event to the event DMA engine **405** which generates an event into the event buffer **413**. When the parser **401** sees an audio event, it redirects the byte stream to the audio DMA engine **403** and generates an event into the event buffer **413**. Similarly, when the parser **401** sees a private data event, it directs the byte stream to the private data DMA engine **404** and directs an event to the event buffer **413**. The Media Switch notifies the program logic via an interrupt mechanism when events are placed in the event buffer.

Referring to FIGS. **4** and **5**, the event buffer **413** is filled by the parser **401** with events. Each event **501** in the event buffer has an offset **502**, event type **503**, and time stamp field **504**. The parser **401** provides the type and offset of each event as it is placed into the buffer. For example, when an audio event occurs, the event type field is set to an audio event and the offset indicates the location in the audio buffer **411**. The program logic knows where the audio buffer **411** starts and adds the offset to find the event in the stream. The address offset **502** tells the program logic where the next event occurred, but not where it ended. The previous event is cached so the end of the current event can be found as well as the length of the segment.

With respect to FIGS. **5** and **6**, the program logic reads accumulated events in the event buffer **602** when it is interrupted by the Media Switch **601**. From these events the program logic generates a sequence of logical segments **603** which correspond to the parsed MPEG segments **615**. The program logic converts the offset **502** into the actual address **610** of each segment, and records the event length **609** using the last cached event. If the stream was produced by encoding an analog signal, it will not contain Program Time Stamp (PTS) values, which are used by the decoders to properly present the resulting output. Thus, the program logic uses the generated time stamp **504** to calculate a simulated PTS for each segment and places that into the logical segment time stamp **607**. In the case of a digital TV stream, PTS values are already encoded in the stream. The program logic extracts this information and places it in the logical segment time stamp **607**.

The program logic continues collecting logical segments **603** until it reaches the fixed buffer size. When this occurs, the program logic generates a new buffer, called a Packetized Elementary Stream (PES) **605** buffer containing these logical segments **603** in order, plus ancillary control information. Each logical segment points **604** directly to the circular buffer, e.g., the video buffer **613**, filled by the Media Switch **601**. This new buffer is then passed to other logic components, which may further process the stream in the buffer in some way, such as presenting it for decoding or writing it to the storage media. Thus, the MPEG data is not copied from one location in memory to another by the processor. This results in a more cost effective design since lower memory bandwidth and processor bandwidth is required.

A unique feature of the MPEG stream transformation into PES buffers is that the data associated with logical segments need not be present in the buffer itself, as presented above. When a PES buffer is written to storage, these logical segments are written to the storage medium in the logical order in which they appear. This has the effect of gathering components of the stream, whether they be in the video, audio or private data circular buffers, into a single linear buffer of stream data on the storage medium. The buffer is read back from the storage medium with a single transfer from the storage media, and the logical segment information is updated to correspond with the actual locations in the buffer **606**. Higher level program logic is unaware of this transformation, since it handles only the logical segments, thus stream data is easily managed without requiring that the data ever be copied between locations in DRAM by the CPU.

A unique aspect of the Media Switch is the ability to handle high data rates effectively and inexpensively. It performs the functions of taking video and audio data in, sending video and audio data out, sending video and audio data to disk, and extracting video and audio data from the disk on a low cost platform. Generally, the Media Switch runs asynchronously and autonomously with the microprocessor CPU, using its DMA capabilities to move large quantities of information with minimal intervention by the CPU.

Referring to FIG. **7**, the input side of the Media Switch **701** is connected to an MPEG encoder **703**. There are also circuits specific to MPEG audio **704** and vertical blanking interval (VBI) data **702** feeding into the Media Switch **701**. If a digital TV signal is being processed instead, the MPEG encoder **703** is replaced with an MPEG2 Transport Demultiplexor, and the MPEG audio encoder **704** and VBI decoder **702** are deleted. The demultiplexor multiplexes the extracted audio, video and private data channel streams through the video input Media Switch port.

The parser **705** parses the input data stream from the MPEG encoder **703**, audio encoder **704** and VBI decoder **702**, or from the transport demultiplexor in the case of a digital TV stream. The parser **705** detects the beginning of all of the important events in a video or audio stream, the start of all of the frames, the start of sequence headers—all of the pieces of information that the program logic needs to know about in order to both properly play back and perform special effects on the stream, e.g. fast forward, reverse, play, pause, fast/slow play, indexing, and fast/slow reverse play.

The parser **705** places tags **707** into the FIFO **706** when it identifies video or audio segments, or is given private data. The DMA **709** controls when these tags are taken out. The tags **707** and the DMA addresses of the segments are placed into the event queue **708**. The frame type information, whether it is a start of a video I-frame, video B-frame, video P-frame, video PES, audio PES, a sequence header, an audio frame, or private data packet, is placed into the event queue **708** along with the offset in the related circular buffer where the piece of information was placed. The program logic operating in the CPU **713** examines events in the circular buffer after it is transferred to the DRAM **714**.

The Media Switch **701** has a data bus **711** that connects to the CPU **713** and DRAM **714**. An address bus **712** is also shared between the Media Switch **701**, CPU **713**, and DRAM **714**. A hard disk or storage device **710** is connected to one of the ports of the Media Switch **701**. The Media Switch **701** outputs streams to an MPEG video decoder **715** and a separate audio decoder **717**. The audio decoder **717** signals contain audio cues generated by the system in response to the user's commands on a remote control or

other internal events. The decoded audio output from the MPEG decoder is digitally mixed **718** with the separate audio signal. The resulting signals contain video, audio, and on-screen displays and are sent to the TV **716**.

The Media Switch **701** takes in 8-bit data and sends it to the disk, while at the same time extracts another stream of data off of the disk and sends it to the MPEG decoder **715**. All of the DMA engines described above can be working at the same time. The Media Switch **701** can be implemented in hardware using a Field Programmable Gate Array (FPGA), ASIC, or discrete logic.

Rather than having to parse through an immense data stream looking for the start of where each frame would be, the program logic only has to look at the circular event buffer in DRAM **714** and it can tell where the start of each frame is and the frame type. This approach saves a large amount of CPU power, keeping the real time requirements of the CPU **713** small. The CPU **713** does not have to be very fast at any point in time. The Media Switch **701** gives the CPU **713** as much time as possible to complete tasks. The parsing mechanism **705** and event queue **708** decouple the CPU **713** from parsing the audio, video, and buffers and the real time nature of the streams, which allows for lower costs. It also allows the use of a bus structure in a CPU environment that operates at a much lower clock rate with much cheaper memory than would be required otherwise.

The CPU **713** has the ability to queue up one DMA transfer and can set up the next DMA transfer at its leisure. This gives the CPU **713** large time intervals within which it can service the DMA controller **709**. The CPU **713** may respond to a DMA interrupt within a larger time window because of the large latency allowed. MPEG streams, whether extracted from an MPEG2 Transport or encoded from an analog TV signal, are typically encoded using a technique called Variable Bit Rate encoding (VBR). This technique varies the amount of data required to represent a sequence of images by the amount of movement between those images. This technique can greatly reduce the required bandwidth for a signal, however sequences with rapid movement (such as a basketball game) may be encoded with much greater bandwidth requirements. For example, the Hughes DirecTV satellite system encodes signals with anywhere from 1 to 10 Mb/s of required bandwidth, varying from frame to frame. It would be difficult for any computer system to keep up with such rapidly varying data rates without this structure.

With respect to FIG. **8**, the program logic within the CPU has three conceptual components: sources **801**, transforms **802**, and sinks **803**. The sources **801** produce buffers of data. Transforms **802** process buffers of data and sinks **803** consume buffers of data. A transform is responsible for allocating and queuing the buffers of data on which it will operate. Buffers are allocated as if "empty" to sources of data, which give them back "full". The buffers are then queued and given to sinks as "full", and the sink will return the buffer "empty".

A source **801** accepts data from encoders, e.g., a digital satellite receiver. It acquires buffers for this data from the downstream transform, packages the data into a buffer, then pushes the buffer down the pipeline as described above. The source object **801** does not know anything about the rest of the system. The sink **803** consumes buffers, taking a buffer from the upstream transform, sending the data to the decoder, and then releasing the buffer for reuse.

There are two types of transforms **802** used: spatial and temporal. Spatial transforms are transforms that perform, for example, an image convolution or compression/decompression on the buffered data that is passing through. Temporal transforms are used when there is no time relation that is expressible between buffers going in and buffers coming out of a system. Such a transform writes the buffer to a file **804** on the storage medium. The buffer is pulled out at a later time, sent down the pipeline, and properly sequenced within the stream.

Referring to FIG. **9**, a C++ class hierarchy derivation of the program logic is shown. The TiVo Media Kernel (Tmk) **904, 908, 913** mediates with the operating system kernel. The kernel provides operations such as: memory allocation, synchronization, and threading. The TmkCore **904, 908, 913** structures memory taken from the media kernel as an object. It provides operators, new and delete, for constructing and deconstructing the object. Each object (source **901**, transform **902**, and sink **903**) is multi-threaded by definition and can run in parallel.

The TmkPipeline class **905, 909, 914** is responsible for flow control through the system. The pipelines point to the next pipeline in the flow from source **901** to sink **903**. To pause the pipeline, for example, an event called "pause" is sent to the first object in the pipeline. The event is relayed on to the next object and so on down the pipeline. This all happens asynchronously to the data going through the pipeline. Thus, similar to applications such as telephony, control of the flow of MPEG streams is asynchronous and separate from the streams themselves. This allows for a simple logic design that is at the same time powerful enough to support the features described previously, including pause, rewind, fast forward and others. In addition, this structure allows fast and efficient switching between stream sources, since buffered data can be simply discarded and decoders reset using a single event, after which data from the new stream will pass down the pipeline. Such a capability is needed, for example, when switching the channel being captured by the input section, or when switching between a live signal from the input section and a stored stream.

The source object **901** is a TmkSource **906** and the transform object **902** is a TmkXfrm **910**. These are intermediate classes that define standard behaviors for the classes in the pipeline. Conceptually, they handshake buffers down the pipeline. The source object **901** takes data out of a physical data source, such as the Media Switch, and places it into a PES buffer. To obtain the buffer, the source object **901** asks the down stream object in his pipeline for a buffer (allocEmptyBuf). The source object **901** is blocked until there is sufficient memory. This means that the pipeline is self-regulating; it has automatic flow control. When the source object **901** has filled up the buffer, it hands it back to the transform **902** through the pushFullBuf function.

The sink **903** is flow controlled as well. It calls nextFullBuf which tells the transform **902** that it is ready for the next filled buffer. This operation can block the sink **903** until a buffer is ready. When the sink **903** is finished with a buffer (i.e., it has consumed the data in the buffer) it calls releaseEmptyBuf. ReleaseEmptyBuf gives the buffer back to the transform **902**. The transform **902** can then hand that buffer, for example, back to the source object **901** to fill up again. In addition to the automatic flow-control benefit of this method, it also provides for limiting the amount of memory dedicated to buffers by allowing enforcement of a fixed allocation of buffers by a transform. This is an important feature in achieving a cost-effective limited DRAM environment.

The MediaSwitch class **909** calls the allocEmptyBuf method of the TmkClipCache **912** object and receives a PES

buffer from it. It then goes out to the circular buffers in the Media Switch hardware and generates PES buffers. The MediaSwitch class **909** fills the buffer up and pushes it back to the TmkClipCache **912** object.

The TmkClipCache **912** maintains a cache file **918** on a storage medium. It also maintains two pointers into this cache: a push pointer **919** that shows where the next buffer coming from the source **901** is inserted; and a current pointer **920** which points to the current buffer used.

The buffer that is pointed to by the current pointer is handed to the Vela decoder class **916**. The Vela decoder class **916** talks to the decoder **921** in the hardware. The decoder **921** produces a decoded TV signal that is subsequently encoded into an analog TV signal in NTSC, PAL or other analog format. When the Vela decoder class **916** is finished with the buffer it calls releaseEmptyBuf.

The structure of the classes makes the system easy to test and debug. Each level can be tested separately to make sure it performs in the appropriate manner, and the classes may be gradually aggregated to achieve the desired functionality while retaining the ability to effectively test each object.

The control object **917** accepts commands from the user and sends events into the pipeline to control what the pipeline is doing. For example, if the user has a remote control and is watching TV, the user presses pause and the control object **917** sends an event to the sink **903**, that tells it pause. The sink **903** stops asking for new buffers. The current pointer **920** stays where it is at. The sink **903** starts taking buffers out again when it receives another event that tells it to play. The system is in perfect synchronization; it starts from the frame that it stopped at.

The remote control may also have a fast forward key. When the fast forward key is pressed, the control object **917** sends an event to the transform **902**, that tells it to move forward two seconds. The transform **902** finds that the two second time span requires it to move forward three buffers. It then issues a reset event to the downstream pipeline, so that any queued data or state that may be present in the hardware decoders is flushed. This is a critical step, since the structure of MPEG streams requires maintenance of state across multiple frames of data, and that state will be rendered invalid by repositioning the pointer. It then moves the current pointer **920** forward three buffers. The next time the sink **903** calls nextFullBuf it gets the new current buffer. The same method works for fast reverse in that the transform **902** moves the current pointer **920** backwards.

A system clock reference resides in the decoder. The system clock reference is sped up for fast play or slowed down for slow play. The sink simply asks for full buffers faster or slower, depending on the clock speed.

With respect to FIG. **10**, two other objects derived from the TmkXfrm class are placed in the pipeline for disk access. One is called TmkClipReader **1003** and the other is called TmkClipWriter **1001**. Buffers come into the TmkClipWriter **1001** and are pushed to a file on a storage medium **1004**. TmkClipReader **1003** asks for buffers which are taken off of a file on a storage medium **1005**. A TmkClipReader **1003** provides only the allocEmptyBuf and pushFullBuf methods, while a TmkClipWriter **1001** provides only the nextFullBuf and releaseEmptyBuf methods. A TmkClipReader **1003** therefore performs the same function as the input, or "push" side of a TmkClipCache **1002**, while a TmkClipWriter **1001** therefore performs the same function as the output, or "pull" side of a TmkClipCache **1002**.

Referring to FIG. **11**, a preferred embodiment that accomplishes multiple functions is shown. A source **1101** has a TV signal input. The source sends data to a PushSwitch **1102** which is a transform derived from TmkXfrm. The PushSwitch **1102** has multiple outputs that can be switched by the control object **1114**. This means that one part of the pipeline can be stopped and another can be started at the users whim. The user can switch to different storage devices. The PushSwitch **1102** could output to a TmkClipWriter **1106**, which goes onto a storage device **1107** or write to the cache transform **1103**.

An important feature of this apparatus is the ease with which it can selectively capture portions of an incoming signal under the control of program logic. Based on information such as the current time, or perhaps a specific time span, or perhaps via a remote control button press by the viewer, a TmkClipWriter **1106** may be switched on to record a portion of the signal, and switched off at some later time. This switching is typically caused by sending a "switch" event to the PushSwitch **1102** object.

An additional method for triggering selective capture is through information modulated into the VBI or placed into an MPEG private data channel. Data decoded from the VBI or private data channel is passed to the program logic. The program logic examines this data to determine if the data indicates that capture of the TV signal into which it was modulated should begin. Similarly, this information may also indicate when recording should end, or another data item may be modulated into the signal indicating when the capture should end. The starting and ending indicators may be explicitly modulated into the signal or other information that is placed into the signal in a standard fashion may be used to encode this information.

With respect to FIG. **12**, an example is shown which demonstrates how the program logic scans the words contained within the closed caption (CC) fields to determine starting and ending times, using particular words or phrases to trigger the capture. A stream of NTSC or PAL fields **1201** is presented. CC bytes are extracted from each odd field **1202**, and entered in a circular buffer **1203** for processing by the Word Parser **1204**. The Word Parser **1204** collects characters until it encounters a word boundary, usually a space, period or other delineating character. Recall from above, that the MPEG audio and video segments are collected into a series of fixed-size PES buffers. A special segment is added to each PES buffer to hold the words extracted from the CC field **1205**. Thus, the CC information is preserved in time synchronization with the audio and video, and can be correctly presented to the viewer when the stream is displayed. This also allows the stored stream to be processed for CC information at the leisure of the program logic, which spreads out load, reducing cost and improving efficiency. In such a case, the words stored in the special segment are simply passed to the state table logic **1206**.

During stream capture, each word is looked up in a table **1206** which indicates the action to take on recognizing that word. This action may simply change the state of the recognizer state machine **1207**, or may cause the state machine **1207** to issue an action request, such as "start capture", "stop capture", "phrase seen", or other similar requests. Indeed, a recognized word or phrase may cause the pipeline to be switched; for example, to overlay a different audio track if undesirable language is used in the program.

Note that the parsing state table **1206** and recognizer state machine **1207** may be modified or changed at any time. For example, a different table and state machine may be provided for each input channel. Alternatively, these elements may be switched depending on the time of day, or because of other events.

Referring to FIG. **11**, a PullSwitch is added **1104** which outputs to the sink **1105**.

The sink **1105** calls nextFullBuf and releaseEmptyBuf to get or return buffers from the PullSwitch **1104**. The PullSwitch **1104** can have any number of inputs. One input could be an ActionClip **1113**. The remote control can switch between input sources. The control object **1114** sends an event to the PullSwitch **1104**, telling it to switch. It will switch from the current input source to whatever input source the control object selects.

An ActionClip class provides for sequencing a number of different stored signals in a predictable and controllable manner, possibly with the added control of viewer selection via a remote control. Thus, it appears as a derivative of a TmkXfrm object that accepts a "switch" event for switching to the next stored signal.

This allows the program logic or user to create custom sequences of video output. Any number of video segments can be lined up and combined as if the program logic or user were using a broadcast studio video mixer. TmkClipReaders **1108, 1109, 1110** are allocated and each is hooked into the PullSwitch **1104**. The PullSwitch **1104** switches between the TmkClipReaders **1108, 1109, 1110** to combine video and audio clips. Flow control is automatic because of the way the pipeline is constructed. The Push and Pull Switches are the same as video switches in a broadcast studio.

The derived class and resulting objects described here may be combined in an arbitrary way to create a number of different useful configurations for storing, retrieving, switching and viewing of TV streams. For example, if multiple input and output sections are available, one input is viewed while another is stored, and a picture-in-picture window generated by the second output is used to preview previously stored streams. Such configurations represent a unique and novel application of software transformations to achieve the functionality expected of expensive, sophisticated hardware solutions within a single cost-effective device.

With respect to FIG. **13**, a high-level system view is shown which implements a VCR backup. The Output Module **1303** sends TV signals to the VCR **1307**. This allows the user to record TV programs directly on to video tape. The invention allows the user to queue up programs from disk to be recorded on to video tape and to schedule the time that the programs are sent to the VCR **1307**. Title pages (EPG data) can be sent to the VCR **1307** before a program is sent. Longer programs can be scaled to fit onto smaller video tapes by speeding up the play speed or dropping frames.

The VCR **1307** output can also be routed back into the Input Module **1301**. In this configuration the VCR acts as a backup system for the Media Switch **1302**. Any overflow storage or lower priority programming is sent to the VCR **1307** for later retrieval.

The Input Module **1301** can decode and pass to the remainder of the system information encoded on the Vertical Blanking Interval (VBI). The Output Module **1303** can encode into the output VBI data provided by the remainder of the system. The program logic may arrange to encode identifying information of various kinds into the output signal, which will be recorded onto tape using the VCR **1307**. Playing this tape back into the input allows the program logic to read back this identifying information, such that the TV signal recorded on the tape is properly handled. For example, a particular program may be recorded to tape along with information about when it was recorded, the source network, etc. When this program is played back into the Input Module, this information can be used to control storage of the signal, presentation to the viewer, etc.

One skilled in the art will readily appreciate that such a mechanism may be used to introduce various data items to the program logic which are not properly conceived of as television signals. For instance, software updates or other data may be passed to the system. The program logic receiving this data from the television stream may impose controls on how the data is handled, such as requiring certain authentication sequences and/or decrypting the embedded information according to some previously acquired key. Such a method works for normal broadcast signals as well, leading to an efficient means of providing non-TV control information and data to the program logic.

Additionally, one skilled in the art will readily appreciate that although a VCR is specifically mentioned above, any multimedia recording device (e.g., a Digital Video Disk-Random Access Memory (DVD-RAM) recorder) is easily substituted in its place.

Although the invention is described herein with reference to the preferred embodiment, one skilled in the art will readily appreciate that other applications may be substituted for those set forth herein without departing from the spirit and scope of the present invention. For example, the invention can be used in the detection of gambling casino crime. The input section of the invention is connected to the casino's video surveillance system. Recorded video is cached and simultaneously output to external VCRs. The user can switch to any video feed and examine (i.e., rewind, play, slow play, fast forward, etc.) a specific segment of the recorded video while the external VCRs are being loaded with the real-time input video. Accordingly, the invention should only be limited by the claims included below.

What is claimed is:

1. A process for the simultaneous storage and play back of multimedia data, comprising the steps of:

accepting television (TV) broadcast signals, wherein said TV signals are based on a multitude of standards, including, but not limited to, National Television Standards Committee (NTSC) broadcast, PAL broadcast, satellite transmission, DSS, DBS, or ATSC;

tuning said TV signals to a specific program;

providing at least one Input Section, wherein said Input Section converts said specific program to an Moving Pictures Experts Group (MPEG) formatted stream for internal transfer and manipulation;

providing a Media Switch, wherein said Media Switch parses said MPEG stream, said MPEG stream is separated into its video and audio components;

storing said video and audio components on a storage device;

providing at least one Output Section, wherein said Output Section extracts said video and audio components from said storage device;

wherein said Output Section assembles said video and audio components into an MPEG stream;

wherein said Output Section sends said MPEG stream to a decoder;

wherein said decoder converts said MPEG stream into TV output signals;

wherein said decoder delivers said TV output signals to a TV receiver; and

accepting control commands from a user, wherein said control commands are sent through the system and affect the flow of said MPEG stream.

2. The process of claim 1, wherein said Input Section directs said MPEG stream to the destination indicated by said control commands.

3. The process of claim 1, wherein said Output Section extracts said video and audio components from the storage device indicated by said control commands.

4. The process of claim 1, further comprising the step of:

creating custom video output sequences, wherein said sequences are specified by a user or program control.

5. The process of claim 1, wherein the storing and extracting of said video and audio components from said storage device are performed simultaneously.

6. The process of claim 1, wherein said Media Switch calculates and logically associates a time stamp to said video and audio components.

7. The process of claim 1, wherein said Media Switch extracts time stamp values from a digital TV stream and logically associates said time stamp values to said video and audio components.

8. The process of claim 1, further comprising the steps of:

placing said video component into a circular video buffer;

posting an event in a circular event buffer, wherein said event contains an indication that a video component was found and the location of said video component in said circular video buffer; and

sending notice of said event posting.

9. The process of claim 1, further comprising the steps of:

placing said audio component into a circular audio buffer;

posting an event in a circular event buffer, wherein said event contains an indication that an audio component was found and the location of said audio component in said circular audio buffer; and

sending notice of said event posting.

10. The process of claims 8 or 9, further comprising the steps of:

receiving said notice;

retrieving said event posting from said event buffer; and

indexing into the appropriate buffer indicated by the type and location information in said event buffer.

11. The process of claim 10, further comprising the steps of:

generating a buffer containing the logical audio or video segments in order, including ancillary information, wherein each of said logical segments points to the appropriate circular buffer location where corresponding audio or video components have been placed.

12. The process of claim 1, further comprising the step of:

increasing the decoder system clock rate for fast playback or fast reverse playback.

13. The process of claim 1, further comprising the step of:

decreasing the decoder system clock rate for slow playback or slow reverse playback.

14. The process of claim 1, further comprising the step of:

combining system audio cues and on-screen displays with said TV output signals.

15. The process of claim 1, further comprising the steps of:

decoding the Vertical Blanking Interval (VBI) data or private data channel information from said TV signal; and

examining said data to determine the starting or ending indicators of a specific program.

16. The process of claim 1, further comprising the step of:

scanning the words contained within the closed caption (CC) fields to determine program starting and ending times, wherein particular words or phrases are used to trigger the recording of a specific program and wherein the CC information is preserved in time synchronization with the audio and video, and can be correctly presented to the viewer when the stream is displayed.

17. The process of claim 16, further comprising the step of:

performing a specific action when a specific word is found in said CC information.

18. The process of claim 1, wherein said Media Switch has a data bus connecting it to a CPU and DRAM.

19. The process of claim 1, wherein said Media Switch shares an address bus with a CPU and DRAM.

20. The process of claim 1, wherein said Media Switch operates asychronously and autonomously with a CPU.

21. The process of claim 1, wherein said storage device is connected to said Media Switch.

22. The process of claim 1, wherein said Media Switch allows the CPU to queue up Direct Memory Access (DMA) transfers.

23. The process of claim 1, wherein said Media Switch is implemented in hardware.

24. The process of claim 1, further comprising the step of:

providing a multimedia recording device, including, but not limited to, a Video Cassette Recorder (VCR) or a Digital Video Disk-Random Access Memory (DVD-RAM) device, wherein said recording device is attached to the output side of said decoder, allowing said user to record said TV output signals.

25. The process of claim 24, wherein said user queues up programs from said storage device to be stored on said recording device.

26. The process of claim 24, wherein said user sets time schedules for said programs to be sent to said recording device.

27. The process of claim 24, wherein title pages may be sent to said recording device before sending a program to be stored on said recording device.

28. The process of claim 24, wherein a program that is longer in duration than a magnetic tape in said recording device allows, is sped up to fit within the desired time limit.

29. The process of claim 24, wherein a program that is longer in duration than a magnetic tape in said recording device allows, has frames dropped from it to fit within the desired time limit.

30. The process of claim 24, wherein the output of said recording device is routed to said Input Section, allowing said recording device to act as a storage back up system, said recording device accepts overflow storage, TV programs, software updates, or other data that are later retrieved and sent to said Input Section.

31. A process for the simultaneous storage and play back of multimedia data, comprising the steps of:

providing a physical data source, wherein said physical data source accepts broadcast data from an input device, parses video and audio data from said broadcast data, and temporarily stores said video and audio data;

providing a source object, wherein said source object extracts video and audio data from said physical data source;

providing a transform object, wherein said transform object stores and retrieves data streams onto a storage device;

wherein said source object obtains a buffer from said transform object, said source object converts video data into data streams and fills said buffer with said streams;

wherein said source object is automatically flow controlled by said transform object;

providing a sink object, wherein said sink object obtains data stream buffers from said transform object and outputs said streams to a video and audio decoder;

wherein said decoder converts said streams into display signals and sends said signals to a display;

wherein said sink object is automatically flow controlled by said transform object;

providing a control object, wherein said control object receives commands from a user, said commands control the flow of the broadcast data through the system; and

wherein said control object sends flow command events to said source, transform, and sink objects.

32. An apparatus for the simultaneous storage and play back of multimedia data, comprising:

a module for accepting television (TV) broadcast signals, wherein said TV signals are based on a multitude of standards, including, but not limited to, National Television Standards Committee (NTSC) broadcast, PAL broadcast, satellite transmission, DSS, DBS, or ATSC;

a module for tuning said TV signals to a specific program;

at least one Input Section, wherein said Input Section converts said specific program to an Moving Pictures Experts Group (MPEG) formatted stream for internal transfer and manipulation;

a Media Switch, wherein said Media Switch parses said MPEG stream, said MPEG stream is separated into its video and audio components;

a module for storing said video and audio components on a storage device;

at least one Output Section, wherein said Output Section extracts said video and audio components from said storage device;

wherein said Output Section assembles said video and audio components into an MPEG stream;

wherein said Output Section sends said MPEG stream to a decoder;

wherein said decoder converts said MPEG stream into TV output signals;

wherein said decoder delivers said TV output signals to a TV receiver; and

accepting control commands from a user, wherein said control commands are sent through the system and affect the flow of said MPEG stream.

33. The apparatus of claim **32**, wherein said Input Section directs said MPEG stream to the destination indicated by said control commands.

34. The apparatus of claim **32**, wherein said Output Section extracts said video and audio components from the storage device indicated by said control commands.

35. The apparatus of claim **32**, further comprising:

a module for creating custom video output sequences, wherein said sequences are specified by a user or program control.

36. The apparatus of claim **32**, wherein the storing and extracting of said video and audio components from said storage device are performed simultaneously.

37. The apparatus of claim **32**, wherein said Media Switch calculates and logically associates a time stamp to said video and audio components.

38. The apparatus of claim **32**, wherein said Media Switch extracts time stamp values from a digital TV stream and logically associates said time stamp values to said video and audio components.

39. The apparatus of claim **32**, further comprising:

a module for placing said video component into a circular video buffer;

a module for posting an event in a circular event buffer, wherein said event contains an indication that a video component was found and the location of said video component in said circular video buffer; and

a module for sending notice of said event posting.

40. The apparatus of claim **32**, further comprising:

a module for placing said audio component into a circular audio buffer;

a module for posting an event in a circular event buffer, wherein said event contains an indication that an audio component was found and the location of said audio component in said circular audio buffer; and

a module for sending notice of said event posting.

41. The apparatus of claims **39** or **40**, further comprising:

a module for receiving said notice;

a module for retrieving said event posting from said event buffer; and

a module for indexing into the appropriate buffer indicated by the type and location information in said event buffer.

42. The apparatus of claim **41**, further comprising:

a module for generating a buffer containing the logical audio or video segments in order, including ancillary information, wherein each of said logical segments points to the appropriate circular buffer location where corresponding audio or video components have been placed.

43. The apparatus of claim **32**, further comprising:

a module for increasing the decoder system clock rate for fast playback or fast reverse playback.

44. The apparatus of claim **32**, further comprising:

a module for decreasing the decoder system clock rate for slow playback or slow reverse playback.

45. The apparatus of claim **32**, further comprising:

a module for combining system audio cues and on-screen displays with said TV output signals.

46. The apparatus of claim **32**, further comprising:

a module for decoding the Vertical Blanking Interval (VBI) data or private data channel information from said TV signal; and

a module for examining said data to determine the starting or ending indicators of a specific program.

47. The apparatus of claim **32**, further comprising:

a module for scanning the words contained within the closed caption (CC) fields to determine program starting and ending times, wherein particular words or phrases are used to trigger the recording of a specific program and wherein the CC information is preserved in time synchronization with the audio and video, and can be correctly presented to the viewer when the stream is displayed.

48. The apparatus of claim **47**, further comprising:

a module for performing a specific action when a specific word is found in said CC information.

49. The apparatus of claim **32**, wherein said Media Switch has a data bus connecting it to a CPU and DRAM.

50. The apparatus of claim **32**, wherein said Media Switch shares an address bus with a CPU and DRAM.

51. The apparatus of claim **32**, wherein said Media Switch operates asychronously and autonomously with a CPU.

52. The apparatus of claim 32, wherein said storage device is connected to said Media Switch.

53. The apparatus of claim 32, wherein said Media Switch allows the CPU to queue up Direct Memory Access (DMA) transfers.

54. The apparatus of claim 32, further comprising:

a multimedia recording device, including, but not limited to, a Video Cassette Recorder (VCR) or a Digital Video Disk-Random Access Memory (DVD-RAM) device, wherein said recording device is attached to the output side of said decoder, allowing said user to record said TV output signals.

55. The apparatus of claim 54, wherein said user queues up programs from said storage device to be stored on said recording device.

56. The apparatus of claim 54, wherein said user sets time schedules for said programs to be sent to said recording device.

57. The apparatus of claim 54, wherein title pages may be sent to said recording device before sending a program to be stored on said recording device.

58. The apparatus of claim 54, wherein a program that is longer in duration than a magnetic tape in said recording device allows, is sped up to fit within the desired time limit.

59. The apparatus of claim 54, wherein a program that is longer in duration than a magnetic tape in said recording device allows, has frames dropped from it to fit within the desired time limit.

60. The apparatus of claim 54, wherein the output of said recording device is routed to said Input Section, allowing said recording device to act as a storage back up system, said recording device accepts overflow storage, TV programs, software updates, or other data that are later retrieved and sent to said Input Section.

61. An apparatus for the simultaneous storage and play back of multimedia data, comprising:

a physical data source, wherein said physical data source accepts broadcast data from an input device, parses video and audio data from said broadcast data, and temporarily stores said video and audio data;

a source object, wherein said source object extracts video and audio data from said physical data source;

a transform object, wherein said transform object stores and retrieves data streams onto a storage device;

wherein said source object obtains a buffer from said transform object, said source object converts video data into data streams and fills said buffer with said streams;

wherein said source object is automatically flow controlled by said transform object;

a sink object, wherein said sink object obtains data stream buffers from said transform object and outputs said streams to a video and audio decoder;

wherein said decoder converts said streams into display signals and sends said signals to a display;

wherein said sink object is automatically flow controlled by said transform object;

a control object, wherein said control object receives commands from a user, said commands control the flow of the broadcast data through the system; and

wherein said control object sends flow command events to said source, transform, and sink objects.

* * * * *

CERTIFICATE OF SERVICE

The undersigned certifies that on the 17th day of July, 2009, two true and correct copies of the foregoing were served on all counsel of record identified on the service list below via Overnight Courier and electronic mail.

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Via Overnight Courier and Electronic Mail:	
Raymond Millien, Esq. **PCT LAW GROUP, PLLC** 818 Connecticut Avenue, N.W. Suite 700 Washington, D.C. 20006 *Counsel For Amicus Curiae*	Seth P. Waxman, Esq. **WILMER CUTLER PICKERING HALE** 1875 Pennsylvania Avenue, N.W. Washington, D.C. 20006 Morgan Chu, Esq. **IRELL & MANELLA LLP** 1800 Avenue Of The Stars Suite 900 Los Angeles, CA 90067-4276 *Counsel For Plaintiff-Appellee*

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Dated: July 17, 2009 ORRICK, HERRINGTON & SUTCLIFFE LLP

By Tamara Gosho for
E. JOSHUA ROSENKRANZ
Attorney for Defendants-Appellants

No. 2009-1374

IN THE UNITED STATES COURT OF APPEALS
FOR THE FEDERAL CIRCUIT

TiVo v. Echostar

DECLARATION OF AUTHORITY

In accordance with Fed. Cir. R. 47.3(d) and pursuant to 28 U.S.C. § 1746, I, Tamara Grosko, hereby declare under penalty of perjury that E. Joshua Rosenkranz has authorized me to sign the foregoing Certificate of Compliance with Type-Volume Limitation, Typeface Requirements, and Type Style Requirements on his behalf.

Dated: July 17, 2009

Respectfully submitted,

ORRICK, HERRINGTON & SUTCLIFFE LLP

Tamara Grosko

Tamara Grosko
Columbia Center
1152 15th Street, NW
Washington, DC 20005
Tel: (202) 339-8470