Self-build
Patronus Tower

By Steven Abrams

Notes on how to build your own Patronus copy-protected duplication tower...

I was going to start this article by saying: "Imagine this scenario...", but in reality I think we have all experienced it already, so the word 'imagine' is just not necessary. So here is the scenario...

You've put in a lot of time and effort producing a sell through video, school play, First Communion or any other programme in which you are relying on sales numbers to make your money - then all too frequently you find that the expected sales fall far short of what should have been a certainty. Early indications were that everybody wanted to buy a copy, so why the disappointing sales? The answer is obvious, you just know that somebody is copying the discs for other people and selling them off cheaper than you are. In effect they are stealing your business and maybe even making a profit for themselves out of all your hard work. I am sure that most videographers will have experienced this frustration on a number of occasions.

I have found that the IOV hologram stickers will address a certain amount of this problem by embarrassing some people into buying an original copy. But, alas, there are still plenty of people out there for whom as long as they have a disc they can watch aren't bothered if it is 'moody'. These people cause a considerable drop in your potential earnings and profits.

DVDs are so easy to copy. You don't need any special equipment and anybody with a computer can easily copy your DVD for all their friends. But now at last there is a way of making it a lot more difficult to copy your work. In fact, so difficult to copy that 99.99% of people will give up trying. A company called Fortium has brought out the Patronus system of writing DVDs that cannot be copied.

Before I go any further I need to clarify the statement 'cannot be copied'. All the programs that are generally available for ripping and copying discs are not able to copy discs that have been encrypted with the Patronus system. A really determined hacker who knows what they are doing, and given enough time, will probably be able to get around it, but the ordinary person will usually give up and hopefully decide to buy their own copy. For this reason Fortium will say that their encryption should be regarded as a series of 'speed bumps' in the copy process. From my own experience of trying to copy a Patronus-protected disc, I would say that they are very large speed bumps indeed. But more on this later.

Patronus Towers

The Patronus system does not work like a normal DVD duplication tower simply because a protected disc cannot be copied. For this reason the conventional tower consisting of a source drive, controller and the bank of destination DVD writers that we are all used to is out of the question. Very briefly; instead of burning a DVD you will instead have to make an ISO image file. Most disc burning software will make the image file instead of burning the disc and if it doesn't there are freeware programs that enable you to make an ISO file from an existing DVD. That file then has to be processed by the Patronus software to make a protected ISO file. You then use any disc burning package, such as Nero, to burn the protected ISO file to a DVD, but there is still one more thing that you need.

Programs such as Nero will convert any ISO file to a full blown DVD with all the original chapters and other formatting, however to copy the protected ISO files must have a Patronus dongle plugged into one of the computer's USB slots. It will still burn the disc without the dongle, but without the dongle attached then the resulting DVD is unplayable. The same applies to the converting software. It will only work if the dongle is attached to the computer.

That is fine for making DVDs one at a time, but most of us using this system will want to burn many discs simultaneously and would normally use a duplication tower to make multiple copies at a time. As I have already said, a standard tower is out of the question, so what is needed is to have multiple DVD writers attached to the output of the computer, and that is where the fun begins, because most computers only have enough connections to allow you to output to one or two DVD drives at very most. Not only that, but you are going to need some very special software to allow the computer to address both drives so that they can both burn the same thing at the same time.

I have built a number of DVD duplication towers and computer systems in the past, so I was undaunted by the prospect of building a Patronus tower. One criticism I have of Fortium is their lack of documentation, but they more than make up for it with their excellent telephone help desk. The staff that man it are all really knowledgeable and are a pleasure to deal with.

Because of the lack of documentation, before I started putting the tower together I spoke with a few other members who had previously built one, just to find out what was needed. I have to say that the technology used in this was quite new to me and I found myself phoning around to ask for parts that I had not even heard of, and in many cases neither had the suppliers.

I decided to build a five-drive tower and the parts required were:

The Right Bits

The first snag I hit was when building the tower. The power connectors on the power supply were all standard IDE drive Molex connectors, so I had to get some converters to make them SATA connectors. I was able to buy these locally and as it turned out they were cheaper than if I had bought them from the case supplier. If you are building a tower, make sure the internal power cables are for SATA drives and, if not, make sure you get the correct number of adapters.

The bridge board is something I hadn't come across before. It is a small board that goes in the tower and is connected to the computer by a single SATA cable. This breaks out into five separately addressable SATA connections, one for each of the DVD writers. If you want to build a larger tower then you will need an additional bridge board for each extra set of five DVD drives. Not many places stock this item and those that did were charging high prices, but I eventually found that Scan in Bolton had plenty of them in stock at a reasonable price.

At the computer end you will need a PCIe to SATA card. It may seem like stating the obvious, but this also means that you will need to have a computer with a PCIe slot on the motherboard. There are two different sizes of PCIe slot and most of these cards seem to fit the smaller one. Take special notice of that little 'e' in PCIe, because it is also possible to buy a SATA card that will fit into a standard PCI slot, but this is unlikely to work very well because to control all five DVD writers at the same time requires the extra speed that only a PCIe slot can give. The card I bought had two outputs, which is capable of controlling either one
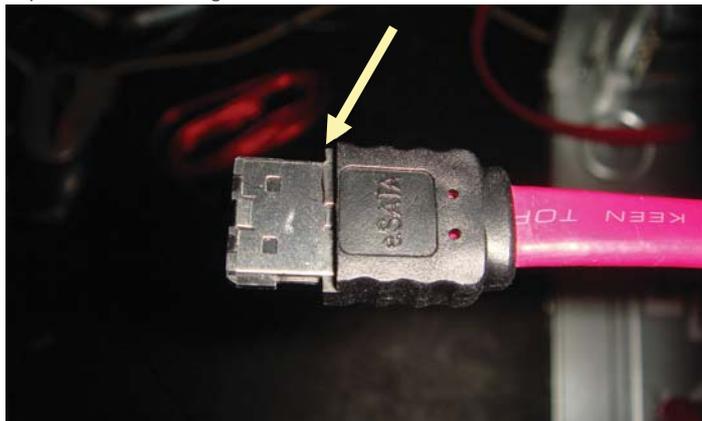
or two bridge boards, but if you are building a tower with more than ten drives in it, you will need to get a card with more outputs.

Between Computer & Tower

The computer and tower are connected by a either a SATA or an eSATA cable. These are two entirely different types of SATA connector. There is the standard internal SATA connector that is used to connect to the motherboard and drives. The bridge card socket has an eSATA connector (I presume that in this case the 'e' stands for External). Before buying the connecting cables you will need to double check which type it is as some cards have internal and some have external sockets. Once the PCI-SATA card has been fitted to your computer, you then need to install the drivers from the CD supplied.
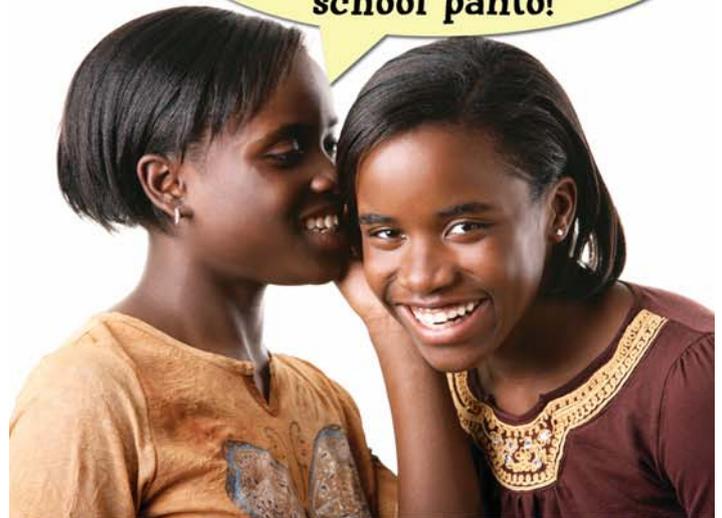
When I first built the system, my computer could not see the DVD writers in the tower. My first thought was that it was a faulty bridge board, but it turned out to be something totally different.

The slot on the bridge board was near the bottom of the backplate. The backplate fastened into a pre-stamped hole in the tower casing and I just had to push the centre out to make the hole for the socket. Because it was near to the bottom of the opening the plastic edge of the plug was preventing the plug from pushing fully home, so internal contact was not being made. This was cured by cutting a bit of the plastic away with a Stanley knife. A similar situation was happening at the computer end. When I later built another tower for somebody else I had the same problem. So it seems that carefully trimming a bit of the plastic back is mandatory. ☞

In the PC... **PCIe to SATA card**
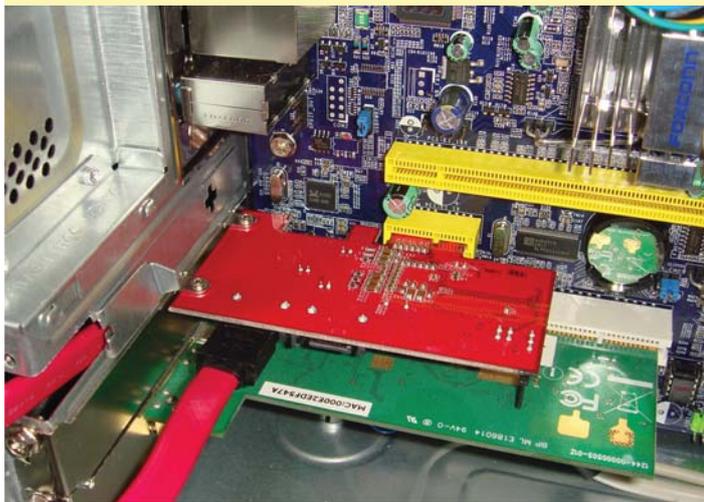
Power Up

On firing up the computer, and opening up Windows Explorer, it was a pleasure to see all six DVD drives showing. "Hang on," I hear you say, "you only built a five bay tower." Well, the DVD burner in the computer counts too and it can also be used to burn protected discs. In fact, if you have any spare slots in your computer case for additional drives, and as long as you have corresponding spare SATA drive connectors on the motherboard, then I see no reason why you couldn't add even more DVD writers.

To burn multiple discs at the same time you need to get a copy of Fortium's Multiburner software. It is easy to use. You just select the protected ISO file that you want to copy, put blank discs into the drives then press 'Burn'. The program then converts and burns the discs. It is only at the end of the burn that the quantity of discs you have copied are deducted from the total on the dongle. This prevents you having to pay for any discs that fail. It's as simple as that.

Field Test

Now to the acid test to see if it was all worthwhile. The first job that I duplicated with Patronus was a dance school show. Over the years this has been a regular job, but sales of their summer show had dropped from over 30 a few years ago, to just 11 copies ordered this time. The 11 copies that went out were all copy protected. Within a week a further 7 copies had been ordered. Still not up to full potential, but it is still an extra 7 copies that I'm sure I wouldn't have otherwise sold. It's also early days and hopefully the message will get through. Let's wait and see what the Christmas show brings.

I passed a number of copies of the show out to four computer experts and challenged them to try to copy the disc and let me know how they got on. At first they were all sceptical about the copy-proof claim and they were all convinced that they had some favourite copying program in mind that they were certain was going to defeat the system. Three admitted defeat, reluctantly. The fourth disc went

In the tower... **1 to 5 port multiplier bridge board**

to a really serious hacker who took it personally. This person, although now fully legal, had some years ago been in trouble with the law for hacking. He spent a weekend on it and did manage to beat the encryption – eventually. He kindly passed on the results of his labours, which I in turn passed back to Fortium. Within hours the loophole was closed with a new software version being issued. Speed humps indeed, but Fortium are also prepared to increase the height of any speed hump when they are aware that somebody is getting over.

Support

I mentioned the excellent customer help desk. Well when I first assembled the system and got it going, I experienced more failures than successes. In fact, the successes were a rarity and I had to contact Fortium for some urgent help, and help they did.

Fortium asked me to download a program that gave them remote access to my computer. That done they went through my computer with a fine toothcomb to try to find out what the problem was. Eventually it turned out to be the make of blank discs I was using. Whether the discs were a faulty batch or just incompatible I don't know because part way through the problem I opened a new packet of discs and the problem cleared up.

I use Ritek discs and Riteks can be made by a number of different companies. Strangely enough I also had the same problem with some older Verbatim discs. Fortium recommend Tiayo Yuden and they even sent me some to test out, which established that the problem was with the discs I had been using. Strangely enough, I am still using Ritek, but from a different manufacturer, and they are working perfectly.

Not wishing to leave it at that, I sent some of the incompatible discs to Fortium, who then burned them on their own test systems without any failures at all. A bit more digging and we came to the conclusion that although Pioneer drives are generally excellent drives, their latest version, the 216, for some reason doesn't like burning Fortium protected discs. Fortium now recommend using a Samsung drive.

Having built a system and finally got it going, I felt confident enough to build a ten-drive system for another IOV member. Having dropped into all the pitfalls on the first system, his build went a lot smoother; however it was not completely without its snags. I bought a PCI

– SATA card, instead of a PCIe – SATA, only to discover that the ordinary PCI slots are not able to support the bridge board, so the computer could only see two out of the ten drives. Swapping it for a PCIe version did the trick.

The other problem was that the bridge boards each need a floppy disc drive type of power connector. The power supply that came with the case only had one of these connectors and nobody had an adapter or another plug. Eventually I snipped an unused one off the power supply from an old computer and soldered it on to one of the cables on the tower.

Parts Finder

If you are thinking of making one yourself then here is the shopping list.

Tower case: I got mine from MT-Electronics in Birmingham, however there are plenty of others available if you search the Internet for 'duplication tower cases'.

SATA bridge board: There are not many places in UK that stock this item, but Scan.co.uk (their part number 26132) had plenty in stock. I paid just under £40 incl. VAT for it. I also purchased from Scan the **eSATA to eSATA cables** needed to connect the tower to the computer at £2.99 each. The **PCIe to SATA board** can be purchased from Scan, but they are also available slightly cheaper from Maplins for £19.99 for the two port card.

The **DVD writers** can be purchased from most computer suppliers for about £16 each.

As long as you have the dongle plugged in, you can run the tower from any computer that has a PCIe slot, but it does tie up your computer if you are burning a lot of discs. So if you are likely to be doing a lot of copying I would seriously consider having a dedicated computer to run the tower.

Finally, one extra thing I bought was a 1TB hard drive just to store the converted ISO files. When you purchase the Fortium package you get a fixed number of burns for a fixed number of events. Each time you convert an ISO file it counts down one event. If you delete the converted ISO file and need to make another copy, then you will have to convert it again, and this will count against your allowance. You should be able to store about 200 ISO files on a 1TB drive. More if they are only short discs. ■

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Notes: More information and pricing for the IOV Patronus Event Packs can be found on www.iov.com/patronus