

Transfer Sound on a Laser

by [saites2001](#) on May 13, 2006

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Intro: Transfer Sound on a Laser

This is a neat project I picked up about a month ago. It's a simple project allowing you to transfer sound across a space on light with little quality loss. The credit of this project goes [here](#)

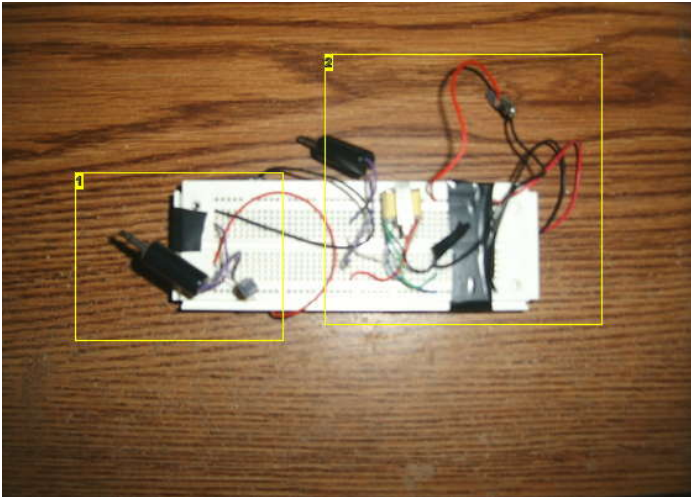


Image Notes

1. Solar Receiver
2. Laser Transmitter

Step 1: Gather Your Materials

Things You Will Need:

- Two Mono Jacks
- 1 Audio Transformer
- 1 Solar Resistor
- 1 Laser
- 1 Single AA Battery Clip (for receiver)
- 1 Triple AAA Battery Clip (for laser)
- Batteries (1 AA, 3 AAA's)
- Some wires and tape

A breadboard is optional, but I chose to use one to save time.

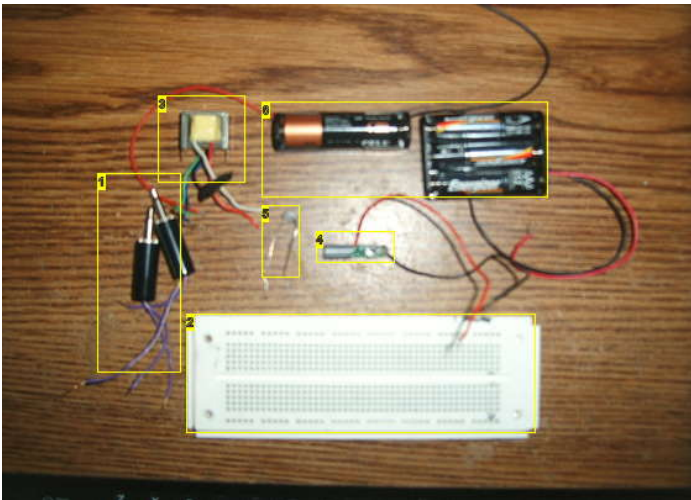


Image Notes

1. Mono jacks and spare wires
2. Optional breadboard
3. Audio Transformer
4. Laser
5. Solar Resistor
6. Batteries and clips

Step 2: Add a Mono jack

Start by adding two wires to the leads of a mono jack. This will be the input of your transmitter.

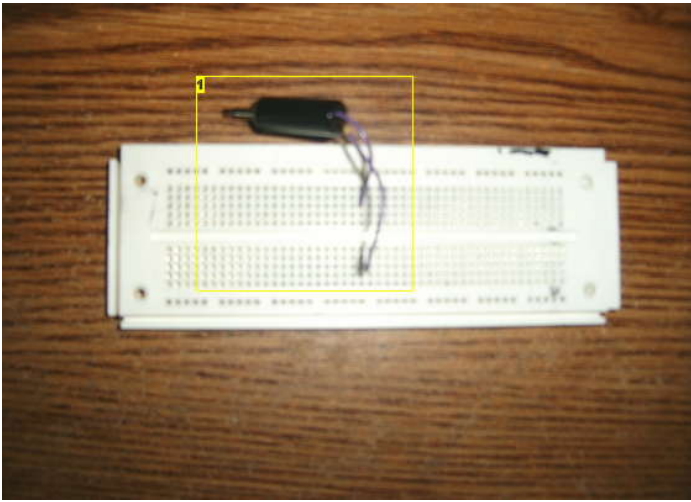


Image Notes

1. I first connected the mono jack to my breadboard.

Step 3: Add the Transformer

Next we add the first two wires of our audio transformer. Connect the red and white leads of the transformer to the mono jack.

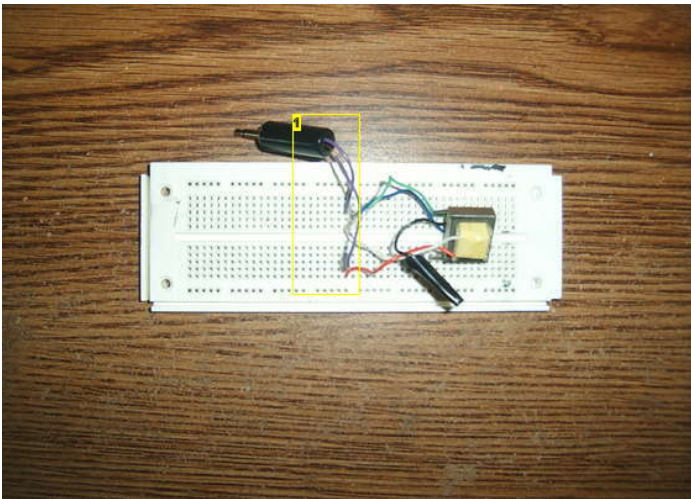


Image Notes

1. If you're using a breadboard, insert the red and white leads of the transformer into the same lines as the mono jack (which must be in different lines themselves).

Step 4: Connect the other leads

The blue and green leads need to be connected to the breadboard and will later be connected to the laser. The middle black lead will not lead to anything, so it's best to wrap a piece of electrical tape around it, as I have done.

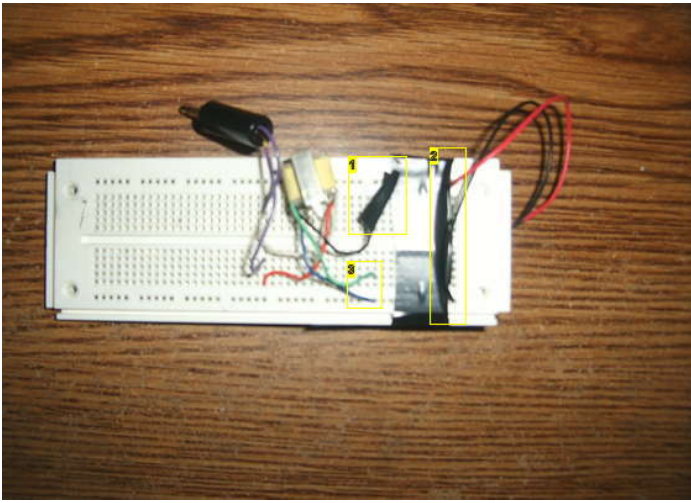


Image Notes

1. Center lead has been wrapped with electrical tape.
2. Negative and positive leads have been connected to the board, and the batteries have been taped under the board.
3. Blue lead connects to the negative battery terminal, while the green lead has a new line.

Step 5: Complete the transmitter

Next we add the laser. The green lead of the transformer connects to the negative lead of the laser, and the positive lead of the laser leads to the positive lead of the battery. If everything is connected properly, you should be able to turn your laser on. This is the completed transmitter.

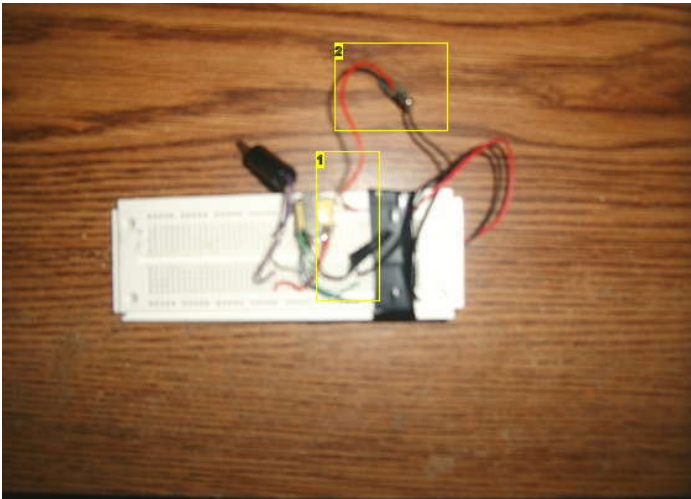


Image Notes

1. The negative lead of the laser connects to the green lead of the transformer, and the positive lead of the laser connects to the positive lead of the battery.
2. You should be able to turn on your laser.

Step 6: Using the Circuit

Now that the transmitter is built, you can use it. Simply connect an audio source (such as a CD player) to the mono jack and turn on the laser. The modulations of current produced by the audio device causes the laser to modulate accordingly. It will get slightly dimmer and brighter, depending on the music. However, this is very difficult to detect by the human eye, and it isn't particularly useful. In order to make the circuit useful, we need build a receiver.

Step 7: Building the Receiver and Using the device

The receiver is the easiest part. Connect your second mono jack to the solar resistor and battery. You can even place it on the same breadboard, as I have. Just make sure you keep the circuits separate.

Use:

As stated before, connect an audio source to the first mono jack (the one connected to the laser) and turn the laser on. Connect the other jack to a receiver (such as an amp or the mic. port of your computer) and aim the laser at the solar resistor. The light modulation of the laser are reversed on the receiver and converted back into sound.

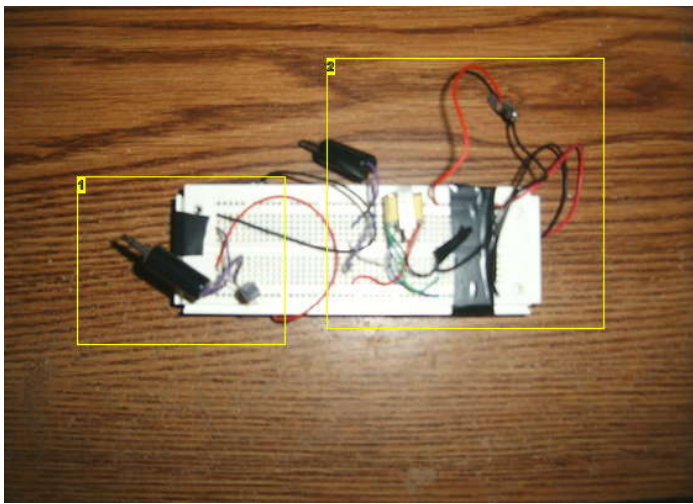


Image Notes

- 1. Solar Reciever
- 2. Laser Transmitter

Step 8: Alternate construction and Theory

Instead of using a battery and solar resistor, you could just use a small solar panel. However, these are more expensive and tend to break more easily.

Theory: It may be possible to bounce the laser of glass behind which a conversation is occuring (such as a window) and pick up the sounds on the reciever, but I've yet to test it. Please let me know if anyone has tried this or has a better way to do this.

Related Instructables



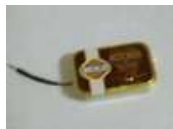
HOW TO: Send Audio/Your Voice Over a Beam of Light
by mortaldoom780



Send Music over a Laser Beam by navaburo



The Altoid Box Laser Transmitter! (video) by HM-Innovations



How to Send Sound using a Laser by HM-Innovations



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Build a very simple AM Transmitter. by SciToys

Comments

50 comments

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 **ZenX** says: instead of using a single laser, could this function with many LED's? Jan 12, 2011. 2:31 PM [REPLY](#)

 **RAYED** says: HOW CAN I IDENTIFY AN AUDIO TRANSFORMER Oct 30, 2010. 2:51 AM [REPLY](#)

 **frogjake9** says: I can't seem to find a solar resistor anywhere. Where can I get one? May 20, 2010. 10:31 AM [REPLY](#)

 **AntzyP** says: you can search for LDR(light dependent resistor)... i think.... Aug 17, 2010. 9:14 AM [REPLY](#)

 **rejsps** says: I built a laser pointer modulator many years ago using a power FET instead of a transformer. I biased the gate using a voltage divider with one leg being a potentiometer. The audio was coupled in through a capacitor (0.22 microF). With no signal, the bias was set to have the laser partially on. Then the audio modulation was in a fairly linear part of the laser diode's I-V characteristic. The resulting audio is very high fidelity when picked up by a good photodiode. FYI, the power FET came from Radio Shack, but they no longer carry it. Apr 14, 2010. 5:49 AM [REPLY](#)



jules15 says:

can u replace the audio trans. with something?

Mar 29, 2010. 2:27 PM [REPLY](#)



akinich says:

hey nice instructable
is it possible to get the audio transformer out of any items then just buying
i kinda the recycling type

Jan 18, 2010. 3:59 AM [REPLY](#)



kamathIn says:

Oh Boy! This reminds me of a funny happening. When in college, my classmate had done this very project at home. One early morning he brought it to the college's electronics lab to show off.

Oct 8, 2009. 10:41 PM [REPLY](#)

The electronics lab is soundproof, so we should not actually hear the morning prayer which is loudly sung using a loudspeaker. But on that day, we did hear it faintly! We guessed the door was not completely closed. Anyways, with respect for the prayer, we all stood up. After a while our ears were able to finally locate the sound and realize the door was closed after all. The prayers were coming from the receiver!

What actually happened completely stunned us! The college used a loudspeaker/amplifier which induced the signals strongly back into the lighting power supply. It was a cloudy day, and we had switched on the lights in the electronics lab. So we got the "signal" that was being "transmitted" by the speaker/amplifier!



Theinventor94 says:

If I connect the transformer with the lower ohm side being the laser side, what differences would it make?

Jun 14, 2009. 5:12 PM [REPLY](#)



Theinventor94 says:

I am using a phototransistor and the receiver doesn't work. I don't know if it could be the laser. Is there any special laser that will work great with this project. On another topic: other than radioshack, is there any other good store to get my electrical components from even if it is a web store?

Jun 9, 2009. 5:20 PM [REPLY](#)



saites2001 says:

Without knowing more specific details about your problem, I would venture to guess that it's not the laser. Any general purpose laser should do. I find it more likely that you don't have something hooked up correctly. As far as an electronics store, online is probably your best bet. I like Jameco, but Digikey is also a good and popular supply company.

Jun 9, 2009. 7:03 PM [REPLY](#)



Theinventor94 says:

What laser did you use?

Jun 8, 2009. 5:32 PM [REPLY](#)



bing2you says:

I, like ReCreate, would also like to know what model of transformer you are using. I'm a beginner, maybe it isn't very important, but I thought I'd ask anyway.

Apr 9, 2009. 6:43 PM [REPLY](#)



7Chris Crash says:

He is using a RadioShack Catalog No. 273-1380.

May 21, 2009. 8:25 PM [REPLY](#)



kyles89 says:

you can use phono jack to, just do it the same way have both channels going to the same place, and then ground to ground still. id use the phono jack cause sometimes the mono ones do not get all of the such as in fat bottom girls by queen, also with the phono one you could technically have the sound go to different places at the same time, for a different experience.

Feb 14, 2009. 12:08 PM [REPLY](#)



ReCreate says:

what kind of transformer is this? from how many volts to what?

Feb 9, 2009. 5:49 PM [REPLY](#)



aesopiankitty says:

Quick stupid question. I got the mono jacks, and I don't know how to wire them. Any help would be greatly appreciated. Thanks TAK

Dec 20, 2008. 11:31 AM [REPLY](#)



saites2001 says:

There should be only two leads on the jack. Connect a wire to each one of these leads. Next, add the mono jack to the breadboard according to the instructions and pictures above. Hope this helps.

Dec 20, 2008. 1:20 PM [REPLY](#)



aesopiankitty says:

i don't think my jacks have leads. did i screw up?

Dec 21, 2008. 6:42 PM [REPLY](#)



saites2001 says:

Dec 21, 2008. 7:48 PM [REPLY](#)

No. The jack should have a couple of places to solder wires to. In a sense, one of these is positive and one is negative. You'll be connecting these to one side of the transformer. It's been a while since I've done this project, but IIRC, it doesn't matter to which you connect each wire (of course, they can't be connected to the same lead). If you still are having problems, post a picture of the jack and we'll see if we can get this taken care of.



aesopiankitty says:

Dec 22, 2008. 8:34 PM [REPLY](#)

I think I see one lead. It's inside the jack, and when i shined a light into the jack, I saw it glimmer. Where do I put the other one?



saites2001 says:

Dec 22, 2008. 11:15 PM [REPLY](#)

I'm confused. You shouldn't have to shine a light into anything. Please post a picture so I can see what you're seeing.



aesopiankitty says:

Dec 24, 2008. 2:09 PM [REPLY](#)

hope this is helpful. where do i find the leads?



saites2001 says:

Dec 24, 2008. 5:30 PM [REPLY](#)

It looks like it has a covering on it. If I'm right, you'll have to remove that first. I was actually kind of expecting a picture from the side. Where did you get this jack? Did you buy it or harvest it?



aesopiankitty says:

Dec 26, 2008. 6:48 PM [REPLY](#)

I bought it from some store online. I'll look for the covering. What's it look like? Sorry about this and thanks for all your help.



saites2001 says:

Dec 26, 2008. 9:10 PM [REPLY](#)

On the jacks used in the project there is a sort of covering that screws over the jacks. The top of the jack is still exposed (to be inserted into a device), while the bottom (where the wires have been soldered on) are covered (to prevent electric shock). There is likely some sort of cover obstructing your view. There should be two distinct and obvious places on the jack itself to which you may attach wires (if it were a stereo jack, there would be three contact points). You don't have to apologize -- this is what Instructables was made for.



aesopiankitty says:

Jan 13, 2009. 3:31 PM [REPLY](#)

well after a long break i found them. thank you so much for all your help and one more question :P there are two leads: one in the center of the cavity of the bottom of the jack. and the others on the wall. which is positive and negative.



saites2001 says:

Jan 13, 2009. 11:54 PM [REPLY](#)

If I'm not wrong, it shouldn't make a difference. And if I am wrong, you can probably just reverse the wiring (as in no harm to the project). Sorry that I can't be more specific or directive than this.



aesopiankitty says:

Jan 14, 2009. 5:19 PM [REPLY](#)

believe me, after all that i'm more likely to kiss the ground you walk on than to be sad about specifics. i'll let you know how this turns out. thanks so much AK



wee_man says:

Oct 18, 2008. 11:40 PM [REPLY](#)


for this what types of diodes is it leds red one or proper lasers or could i substitute the leds or ir leds and with add a lot of them and have a range of like 1km or so would this would be possible gradly apprishate some info please.





Alvin Pontejos says:


Aug 1, 2008. 11:51 PM [REPLY](#)


what kind of laser you used for it? a laser diode? and can i ask for the circuit design please...thank you,

 **rrrmanion** says: Jul 27, 2008. 9:50 AM [REPLY](#)
could you forget the receiver and use it to control stage/party lights? e.g. control 4 lights with a 4 channel (quadraphonic) sound system and add a dmx output?


 **saites2001** says: Jul 27, 2008. 1:33 PM [REPLY](#)
It sounds like it would work, but I'm not sure about the power requirements.


 **tdhelder** says: Jul 27, 2008. 12:40 AM [REPLY](#)
Concerning the wireless Ethernet, rather than switching the laser on and off why not bias the laser on and then just bump the voltage to change the intensity. The lag should be greatly reduced then. Effectively AM.

 **saites2001** says: Jul 27, 2008. 1:31 PM [REPLY](#)
Well, though that may or may not be true (to be honest, I'm not exactly sure), I still wouldn't try it. Interference would be to great, and electromagnetic waves (radio waves in this case) also move at the speed of light (light is electromagnetic energy). Therefore, wireless communication via radio waves just makes more sense. Using a laser would not theoretically be any faster, and would be more prone to interference and other issues.

 **Rocket Boy** says: Jul 20, 2008. 5:56 PM [REPLY](#)
do you have to use mono jacks? couldn't you use decapitated earphone cords?


 **rrrmanion** says: Jul 27, 2008. 9:38 AM [REPLY](#)
yer if the earphones are mono you probably could


 **zachninme** says: Oct 14, 2006. 1:03 PM [REPLY](#)
Hey, do you guys think there is any way of doing this for a "wireless" network? The only problem I see, is that an eathernet cable has what, 8 pins? And that could get annoying. And if it goes through mirrors or something, the 3x3 dot matrix (hypothetically) would be distorted. Then again, a wireless router has one output, the antenna. Maybe you could rig that up... or maybe not... Then again again, you could do a USB network, since that is really only 2 I/O's...


 **Zlwilly** says: May 6, 2008. 5:24 PM [REPLY](#)
I actually talked to one of my college professors about this awhile back. CAT-5 would require I think 4 lasers to generate the proper number of data lines. I wanted to set up a laser network that was controlled via a pair of microcontrollers, that way a wireless connection could be made between my house and barn.

The one thing that came to mind was whether or not you could turn the lasers on and off fast enough to generate the steady 'square wave' signals that CAT-5 is known for. And then I found this.

Hmm... Collaboration maybe? :]

 **mikemmcmeans** says: Jan 12, 2008. 4:17 PM [REPLY](#)
do it im going to try this with my wifi antennas cause my garage is too far away for my internet radio also try it with the audio i/o on 2 computers for linked conversation also also try it with coaxial input on a tv


 **Mr.Devious** says: Dec 31, 2006. 1:59 PM [REPLY](#)
You would need a laser for each pin on the ethernet cable, and a receiving counterpart aswell for each. Thusly, it would cost more than just using it for audio and is exactly why fiberoptic systems are still very expensive.

 **ionix** says: Jun 25, 2007. 12:55 PM [REPLY](#)
actually you wouldn't

10BaseT and 100BaseT networks..like the ones you use at home only use 2 pairs of wires... one pair to transmit and one pair to receive..

http://www.ertyu.org/steven_nikkel/ethernetcables.html

...so you would only need two lasers...
would be a cool instructable if someone got this to work....

 **Blackened** says: May 11, 2007. 10:03 AM [REPLY](#)
You wouldn't necessarily need a laser for every pin. There is for eg. the wireless way. Convert the diff wires into different frequencies and transmit them along the same line. The fibre optic (and laser) is fast enough to transmit all of it though the same data line. Only thing being, it wouldn't be that hard to tap into. All you need is (I think it is a refractor prism) somewhere along the link and you are into the network. which is the main reason that alot of major networks haven't wanted to use the laser networks. Fibre on the other hand is harder to get a physical link into an established network. (easier to tell if someone has cut the cable coz your link doesn't work) feel free to point out any flaws coz I am dead tired right now and not thinking straight.



PKM says:

May 26, 2007. 9:02 AM [REPLY](#)

It's true, lasers are one of the highest bandwidth media available- a single fibre optic trunk line could carry every phone call in the world simultaneously. The problem is this requires hugely expensive modulation/demodulation hardware. A \$10 laser pointer has a significant rise/fall time so switches on or off slowly (in networking terms, at least). Fast Ethernet runs at hundreds of megahertz, while the best you can get out of a cheap laser pointer is a few kilohertz. There's theoretically nothing to stop you splicing one of these into any type of wired connection apart from the laser switching speed and signal/noise ratio, but the physical limitations of a cheap laser mean that 2400 baud serial is achievable but gigabit Ethernet isn't. If you have a serial cable you don't mind cutting up, experiment! Program microcontrollers from across the room... the possibilities are endless...



zachninme says:

Dec 31, 2006. 9:23 PM [REPLY](#)

Thats what I said ;-)



Mr.Devious says:

Jan 1, 2007. 12:41 AM [REPLY](#)

Hmm, actually I think it's more like what sbus said: "The "laser networking" has already been done. Fiber optics anyone? This is a fun project to play with to learn about laser and sound. I just might have to build one myself..."



VIRON says:

Jan 18, 2007. 5:50 PM [REPLY](#)

Like this maybe?



Mr.Devious says:

Jan 19, 2007. 11:57 AM [REPLY](#)

Mmm, that would work, but for the amount of bandwidth you would get out of the satellite itself, the fibre optics wouldn't make it any faster I wouldn't think due to the latency of a satellite. So ruining 2 dvd burners isn't worth it now is it?. Besides, this would be a slower setup overall because it's basically 1/2 wire serial transmission, one has to stop before the other does download/upload functions and it's just a stupid idea.



VIRON says:

Jan 19, 2007. 3:41 PM [REPLY](#)

The idea is stupid because it's "dumbed down". You could transmit much more than one block of 4.7GB wirelessly in half an hour, more easily. With a flock of carrier pigeons, for example!



Mr.Devious says:

Jan 19, 2007. 5:43 PM [REPLY](#)

Alright, tell me when you invent some hybrid wireless/pigeon system, I'll be first in line to buy it. >_>

[view all 110 comments](#)