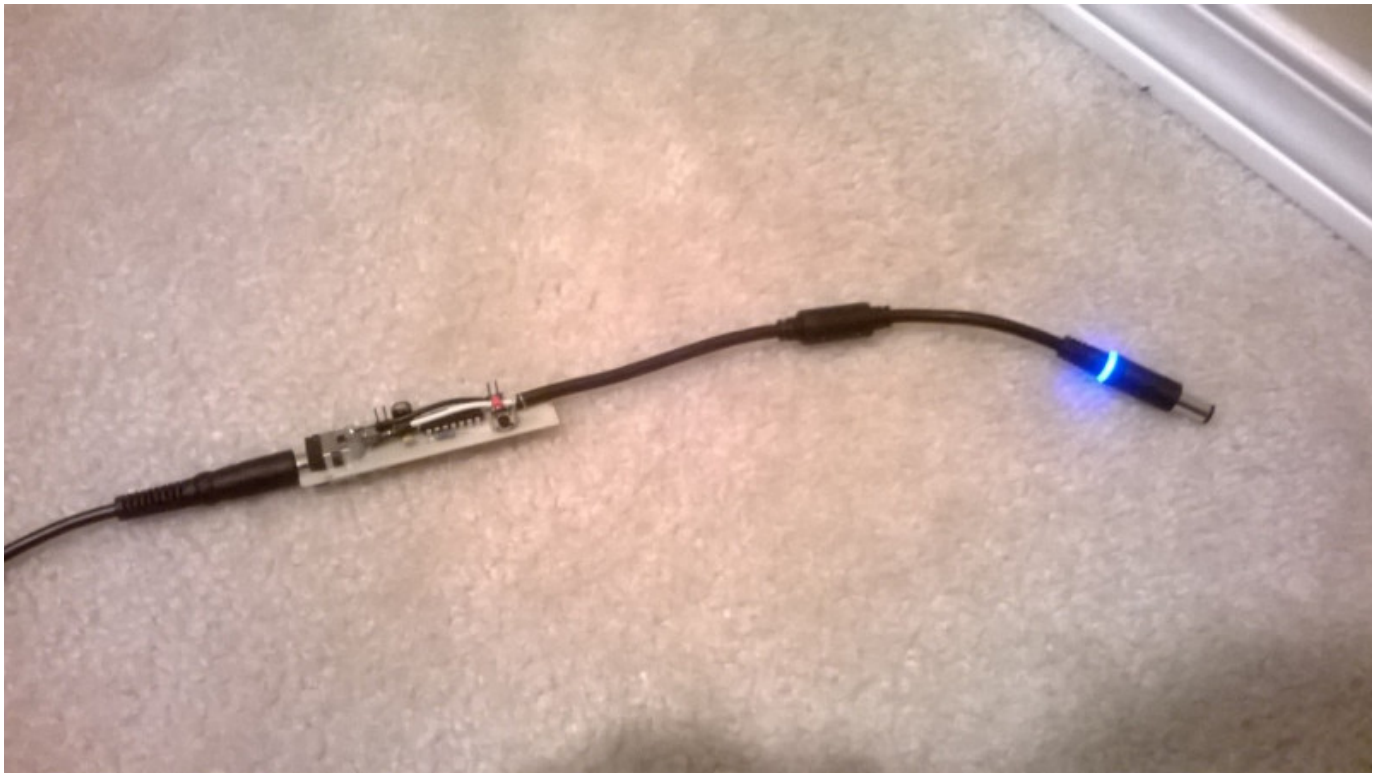
HACKADAY

# HACKING DELL LAPTOP CHARGER IDENTIFICATION

by: Eric Evenchick

86 Comments

March 3, 2014



If you've ever had a laptop charger die, you know that they can be expensive to replace. Many laptops require you to use a 'genuine' charger, and refuse to boot when a knock off model is used. Genuine chargers communicate with the laptop and give information such as the power, current, and voltage ratings of the device. While this is a good safety measure, ensuring that a compatible charger is used, it also allows the manufacturers to increase the price of their chargers.

[Xuan] built a device that spoofs this identification information for Dell chargers. In the four-part series (1, 2, 3, 4), the details of reverse engineering the communications and building the spoofer are covered.

could be examined to find the fields that specify power, voltage, and current.

Next, a custom PCB was made with two Dell DC jacks and an MSP430. This passes power through the board, but uses the MSP430 to send fake data to the computer. The demo shows off a 90 W adapter pretending to run at 65 W. With this working, you could power the laptop from any supply that can meet the requirements for current and voltage.

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Tagged 1-wire, charger, dell, reverse engineering, spoof

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SEARCHING FOR MAKERS IN WASHINGTON DC →

# 86 THOUGHTS ON "HACKING DELL LAPTOP CHARGER IDENTIFICATION"

**jasgio** says:

March 3, 2014 at 1:24 am

That's why i hate laptops, only good computer is a desktop computer!

Reply Report comment

**Benjamin Ingeborg Schwarz** says:

March 4, 2014 at 5:22 am

This comment is complete nonsense in every way.

**Pete Willard** says:

December 2, 2014 at 5:33 am

Yes, Benjamin Ingeborg Schwarz, your comment *is* complete nonsense in every way.

Reply Report comment

**Tritonio** says:
December 20, 2015 at 3:34 am

You realize that a laptop is a computer that you can move around right? So unless you want to spend all your computer-time in the same room, or moving heavy parts and cabling around, a laptop is what you need.

Sure they have more issues than desktops but they are not intended for exactly the same use. It's like hating spoons and loving forks: you still need them to eat soup.

Reply Report comment

**Daniel Berend** says:
October 23, 2016 at 2:07 am

I think someone at my house is shooting heroin cause the spoons are always missing. That being said I have learned to eat cereal with a fork so I would imagine it can be done to soup.

Reply Report comment

**Théo Chapaate** says:
January 15, 2018 at 3:53 am

Yes it's posssible, with a pipe

Reply Report comment

**Sven** says:
March 3, 2014 at 1:49 am

Nice work, i really dislike locking people into having to buy new original parts instead of

On that subject, The newer Apple laptop PSUs have the ability to start up at either ~16V 3.6A or ~18V 4.6A. There doesn't seem to be any digital communication between the computer and the PSU. If a normal load (for example a LED driver) is attached the PSU starts up at 16V, Does anyone know what load characteristics one would need to get it to start up at 18V?

Reply Report comment

**narmo** says:

April 26, 2019 at 1:43 am

I know this is 5 years later, gonna post a reply nonetheless :)

While the magsafe adapters don't have any communication between the charger and the laptop, the magsafe connector has a chip and a one-wire communication (center pin) to let the laptop know the power and to light up the charging LED. Basically it says "Hi, this is a 45W charger and let me know when I should change the LED colour"

So the 85(?)W adapter starts at 16V, and as the current draw increases it ramps up the voltage, so that the power loss over the cable decreases (more voltage = less current for the same power, and less current at the same cable resistance = less power loss).

I have just taken a magsafe cable and applied 20V to it, and haven't had a problem with my 2015 macbook pro up to now. It even seems to handle 22V, but I didn't dare to go above that.

You can get USB PD 20V "negotiation" chips thingys off Aliexpress (as well as magsafe cables), and make your own PD – magsafe adapter like that so you can charge your macbook with a powerbank :)

Reply Report comment

**adlerweb** says:

March 3, 2014 at 2:14 am

Reply Report comment

**valdas** says:

March 3, 2014 at 2:23 am

good one, hmmm only if it was made on atmega8 :) i have lots if them and none of msp430 :) and i have two options :D option 1. make on atmega or option 2, get some msp430 :D By the way my dell boots with non genuine charger but refuses to charge battery :)

Reply Report comment

**Dave** says:

March 3, 2014 at 2:49 am

Having just checked my local element14, a dip packaged atmega8 is about $6 in singles. The msp430g2121 used in this is 90 cents in singles (14 pin dip).

If you need a programmer for it, the launchpads can be picked up for about 10 bucks.

Reply Report comment

**fartface** says:

March 3, 2014 at 5:22 am

Wow they are expensive, buy from other places atmega8 for $3.00 or less in 10 quantity on ebay as well as other sellers. You can find them as cheap as $1.95 but I think those are grey market.

Reply Report comment

**tekkieneet** says:

March 3, 2014 at 6:10 am

recently.

If I have to buy from authorized distributors, I might as well buy the much cheaper ARM chips. The shipping charges from mail order alone can already buy me 5 of the grey market ATmega8. So guess who has my business?

Reply Report comment

**ejonesss** says:

March 3, 2014 at 2:33 am

or why doesnt dell just fully utilize the bms module inside the battery to include voltage and current limiting so any charger will work

also what usually dies in the power supplies are the capacitors so they can be replaced and bring the charger back to life.

Reply Report comment

**TacticalNinja** says:

March 3, 2014 at 2:58 am

Didn't you just read the article? It's all about the money, and "safety".

Reply Report comment

**Indyaner** says:

March 3, 2014 at 3:32 am

I agree with you that it might be majorly because of money. But also, those LED indicators are quite nice. I understand that people will choose an original psu when it got those little extras. But also, the safety-part really is a thing. I came across quite a lot of replacement PSU and am kinda stunned what people plug into their wall outlet. You get what you pay for. And if you

PSU have cached their money in when you leave the store.

Reply Report comment

**fartface** says:
March 3, 2014 at 5:24 am

The funny part, that exact charger is $19.00 to $29.00 used all over ebay and amazon.com Dell chargers are dirt cheap due to the massive amounts of corperate dumping.

Reply Report comment

**Eric** says:
March 3, 2014 at 6:21 am

More like $8 if you have patience to wait for the container ship

Report comment

**Edward** says:
March 3, 2014 at 11:20 am

I've read that there are a lot of FAKE Dell AC adapters. See for yourself.

One had several metal plates in it – not as a heatsink, but to make it heavier.

Report comment

**San Diego Bill** says:
May 31, 2018 at 9:23 pm

(the end that plugs into the side of the laptop) has a center pin (it does) and that center pin is the One-Wire connection point.. sometimes they break. My own problem is a result of a pet that had a chewing compulsion. The cable was chewed into at several points. I did some cheesy repairs and moved on. Now I have to move the cable just-so until the Dell laptop allows a battery charge. I will need to reopen the repaired regions of the cable and repair the bad connections again.

Reply Report comment

**yoe** says:

March 3, 2014 at 3:25 am

Nice! But the big hack we need is one in the legal system: force large manufacturers to adopt one standard charger, like what is happening with mobile phones in Europe.

Reply Report comment

**Metalwolf** says:

March 3, 2014 at 3:23 pm

unlike phones, which most people want to plug into USB ports and are generally required to meet the USB specs, laptops are like desktop computers and each have different power requirements. my old netbook uses a lot less power than my laptop. and the voltages are different as well

Reply Report comment

**John** says:

March 4, 2014 at 2:22 am

There could be a few standardized levels. One voltage will work for all of

you'd just need a charger equal to or greater than the wattage needed for your computer.

Reply Report comment

**adlerweb** says:
March 5, 2014 at 6:37 am

...but they all meet the local AC-plug standards and use ATX-PSUs, right? ;)

Reply Report comment

**Tony** says:
March 5, 2014 at 6:30 am

That would be this: http://en.wikipedia.org/wiki/Common_External_Power_Supply which is why phones (bar Apple) are all micro-USB now. About time too.

There's also one for laptops, the IEC announced a new standard a few months back.

Actually there are two proposals for laptops, the other is to allow USB to handle 100W (typical charger is ~65W) which might be interesting.

Reply Report comment

**adlerweb** says:
March 5, 2014 at 6:36 am

Well... Apple never adopted the standard and most manufacturers are considering new connectors since USB can't handle enough current to charge modern phones quickly...

Reply Report comment

**Bogdan** says:

March 3, 2014 at 3:39 am

It may be true that OEM chargers are more expensive but it is a very wrong idea to think that the cheap replacement ones are of the same quality.
Most of the time it is the user's fault that the charger died and it usually has to do with overheating. People cover it with stuff on their desk or keep it covered with a blanket while using the laptop in bed, or use it on soft surfaces that don't allow venting under it etc.

Reply Report comment

**TacticalNinja** says:

March 3, 2014 at 3:52 am

"Spooling" the cables properly when stored is a must-know for everyone owning one. I know people who just spun the wires around their chargers (or on the cables itself), and left with a peeled cable, that looks like it has been bitten off by mice, in a few months time.

Reply Report comment

**Paul Kastner** says:

March 3, 2014 at 3:59 am

Exactly. I crack open and solder new DC-side cables to Dell charges all the time. After reading all four pages I have an idea as to why some never recognize properly again. Thanks!

Reply Report comment

**SavannahLion** says:

March 3, 2014 at 7:51 am

Nevermind that the design of the Dell bricks seem to imply the cables are to be wound around the brick?

Reply Report comment

**phuzz** says:
March 3, 2014 at 9:01 am

All the Dell chargers I've seen make it very easy to wrap the mains cord end of the cable round the brick, but the end that goes to the laptop sticks straight out from the other end. The number of times I've seen people wrap that end as tight as they can, which generally starts breaking the cable where it exits the brick within a month or two.

Reply Report comment

**Bogdan** says:
March 3, 2014 at 8:22 am

Yes, that one too. I know someone who's cables(not just laptop) look like curled telephone cord.

Reply Report comment

**metalwolfhax** says:
March 3, 2014 at 3:29 pm

Im guilty of wrapping my cables around the chargers. after i damaged the covering on the cable for a few of my mobile computers, i got into the habit of zip tieing the cable on the brick with some slack on the cable. I still wrap the cables around the brick and worst case scenario, there is enough wire left over i can fix it with a wire stripper and heat shrink. I have yet to actually need to repair any cables since i started doing that.

Reply Report comment

**ejonesss** says:

March 3, 2014 at 3:54 am

if it is about money then why doesnt dell send out c&d notices and threaten to sue just like hollywood does with movies on p2p?

if it is safety then why not either thermally monitor the battery on the hardware level and stop the charging if the battery gets too hot or charge it slower or switch to a safer lithium sayyyyyyy lifepo4?

Reply Report comment

**Bogdan** says:

March 3, 2014 at 4:05 am

There are plenty of monitoring circuits in the hardware and the fact that your laptop doesn't burst into flames even with a different power supply says quite a lot. Remember that the power brick is not just a charger, it is powering the laptop as well.
I have a friend who worked in servicing laptops. The policy was that warranty is lost the moment when you replace the charger with a 3rd party one(some people do that although it could have been replaced by warranty) and they will not fix stuff used with third party chargers even outside of warranty.
Cheap chargers will have worse noise, worse stability, worse efficiency, shorter life time and they will be unable to hold the rated power for long.

Reply Report comment

**matt** says:

March 3, 2014 at 10:03 am

The power brick isnt a charger at all, laptops generally have dedicated circuitry for this. All it is, is a power supply.

Reply Report comment

Give me one reason a properly designed computer could “burst into flames” in any reasonable realistic scenario.
There isn’t any. Even in a cheap design the power MOSFETs and controller should be designed to tolerate a higher input voltage than the design specs – otherwise the chips are under dimensioned and will in most cases be generating extra heat.
If the PSU can supply more power than needed? No problem.
If it can’t supply enough power? The cheap way to handle that is just treat it as if not there, the proper way is to either power the battery changing circuits or the computer proper with a fallback to the cheap way if it still is too little.
If it supplies too high voltage? If significantly over the design voltage input protection circuit should handle it, if not the switching DC/DC regulators should have no problem.
If it supplies too _low_ voltage? The cheap way (as stated above) is the easiest but if it is withing a reasonable range from the design voltage the DC/DC should tolerate it too (given that the PSU then can deliver enough power at that voltage – otherwise look above).

Doing anything else is just laziness.

Reply Report comment

**v00** says:

March 3, 2014 at 4:31 am

I recently cracked open a ‘replacement’ charger after its own said that it had stopped working. I discovered that a large piece of offcut heatsink aluminum was wedged between active and neutral, hence producing a dead short on 240 Volt mains. He said he’d heard a ‘pop’. No shit! Estimated breakage current 20-30 amps. Apparently this happens somewhat frequently.

Normally I’d be all for breaking out of manufacturer lockins, but in this case I heartily recommend people stop being so cheap and just buy the bloody OEM charger. It’s far less likely to burn your house down or kill your laptop, either of which will cost you a lot more than the cost of a decent charger. Get a second user one if you have to, just stay

**John** says:
March 4, 2014 at 2:24 am

This does not happen frequently. Knock off chargers often fail, but it's because of underspecced components and circuit designs with cut corners.

Reply Report comment

**ejonesss** says:
March 3, 2014 at 4:42 am

unless the warranty department explicitly asks for the charger omit it without the charger they cant say void.

probably with the sensitivity of the data on the laptop it is best to just drop another several hundred on a new laptop than to get it repaired with all the horror stories of child porn and pirated movies and software being found by the technicians.

while i dont condone child porn or piracy there is still sensitive data that a rogue technician could steal

Reply Report comment

**fartface** says:
March 3, 2014 at 5:25 am

Because removing the hard drive is too difficult?

Reply Report comment

**metalwolfhax** says:
March 3, 2014 at 3:42 pm

As someone who worked behind a service desk for a few months, i will say yes, it is too hard. I know people who ask me to set up their desktops even

alone removing the panels on a laptop.

Reply Report comment

**Bogdan** says:

March 3, 2014 at 8:25 am

I don't know if it is valid for all countries, but everywhere I had to deal with warranty(never for a laptop) you are supposed to bring in all power supplies and accessories in with the product. I couldn't get an mp3 player accepted in warranty without the original headphones which I gave away and used my own...

Reply Report comment

**Sven** says:

March 3, 2014 at 10:11 am

That practice is illegal in many countries, it's seen as an obvious attempt to avoid warranty claims.

I know of people who successfully got warranty repairs from the manufacturers without any receipt, box, accessories or anything simply because the product had been for sale on the market for less than the factory warranty and thus had to be within warranty.

Reply Report comment

**Brandon** says:

March 3, 2014 at 5:41 am

Most Dell laptops let you turn off adapter warnings in the BIOS. Otherwise, they just produce an annoying warning.

**SavannahLion** says:

March 3, 2014 at 7:02 am

However some Dells will cripple the running hardware. For instance I have an Inspiron that runs at half the clock speed and refuses to recharge the battery if it can't communicate with the PSU.

I went through two PSUs before I got fed up and sliced the I2C circuit out and grafted it directly into the laptop. No more flakey I2C.

Reply Report comment

**adlerweb** says:

March 3, 2014 at 7:08 am

Some models don't charge with Non-Dell-adapters...

Reply Report comment

**Brandon** says:

March 3, 2014 at 2:39 pm

Enterprise environment (Latitudes/Precisions) over here. Don't remind me of the horrors of consumer grade Dell.

Good point though.

Reply Report comment

**Mika** says:

August 7, 2014 at 6:27 am

This applies to enterprise environment also, I have a Latitude E6520 and it refuses to charge with a non-Dell adapter.

**Michael W. Perry** says:

March 3, 2014 at 7:33 am

This is actually one area where that “Apple tax” pays dividends.
For years, Mac laptops have used the same family of power supplies. And not only that, but the more powerful supplies (i.e. for the MacBook Pro) will work with the less powerful laptops (i.e. the MacBook Air). That’s a counter to the proprietary lock-in that comes when manufacturers can lock a specific power supply to a specific laptop. Owners get more choices.
There’s actually a lively third-party market selling used Apple power supplies at about half Apple’s price. And it’s also true that your older Mac’s power supply just may work with the new one, giving you a spare.
Used, these power supplies so cheap I’ve got three for my MacBook: one for the office, one for on-the-go, and one as a spare.
I do have a hunch, however, that Apple’s about to make a switch to a lighter and more compact supply. The brick that ships with the feather-weight MacBook Air is ridiculous. I hope at the time they also build in USB power.
–Michael W. Perry, author of Untangling Tolkien

Reply Report comment

**matt** says:

March 3, 2014 at 10:06 am

I’m not sure why you’re surprised that a more powerful adapter will work with a computer which came with a smaller adapter.

Reply Report comment

**Sven** says:

March 3, 2014 at 10:24 am

Because unlike everyone else who uses 19V or 20V (usually interchangeable) they use 16.5V for the lower power and 18.5V for the higher power. The voltage is higher for the new higher power laptops because their proprietary plug can only handle so much current.

**Pun** says:

March 3, 2014 at 8:49 am

Speaking of low quality power bricks, this site (http://www.lygte-info.dk/info/usbPowerSupplyTest%20UK.html) tore down and tested a bunch of non-OEM USB power adaptors. The results were interesting. Sometimes you really do get what you pay for.

Reply Report comment

**HackJack** says:

March 3, 2014 at 10:55 am

I know cheap knock-off power supplies from China is usually low quality. However, there are plenty of old power supplies from Dell, Lenovo, HP, Toshiba, etc. They are good quality and it just makes me sad that they don't get a 2nd life.

Reply Report comment

**mike** says:

March 3, 2014 at 11:16 am

There are a number of people commenting here who do not appear to understand how smart power systems work, because communication between charger and device is an extremely useful feature. Yes, it's annoying when the laptop limits its performance or won't charge when the incorrect adapter is installed. But this is a safety mechanism to prevent damage to the adapter.

A truly smart power system will poll the amount of power available from the source, then modulate the charge current fed to the battery with the inverse of the power drawn by the system itself, in order to maintain a constant power load on the charger. To ignore the available power number and charge as fast as the battery wanted would draw too much current from the adapter and possibly damage it (or at least cause it to drop out from its thermal or overcurrent protection). To ignore the available power number and charge at a safe level such that the adapter can never be damaged could add hours to the charge time and leave the full capacity of the adapter underutilized

The battery is in no danger from incorrect adapters. There is an internal charge manager in the laptop between the DC input and the battery, and it and the battery are in constant communication so that it can provide the battery with the voltage and current that it wants (within the bounds of available power). So it's not an issue of not using the battery's built-in smarts, because they are indeed being used.

Regarding alternate chemistries, for what it's worth, LiFePO4 is nowhere near energy dense enough yet to replace lithium cobalt, unless you're willing to settle for a third of the life of your current laptop.

The only valid complaint here is perhaps that the specification is closed. But there are reasons for everything – I for one would not like a shady Chinese shop wrapping a 20W AC-DC supply in a box with the appropriate chip and selling it to me as a 90W adapter. The spec is closed to the general public because Dell wants to make sure the folks making adapters for their systems know their stuff, so they don't have to fix your crap after something like this destroys it.

No, I don't work for Dell. But I support the decision to implement this, even if it is sometimes inconvenient. I'd rather have the system inform me of trouble with the adapter than blindly draw too much power until it eventually fries.

Reply Report comment

**Sven** says:

March 3, 2014 at 1:17 pm

The way many Lenovo laptops do it is probably the best. They have an ID system to determine if the adapter is 60, 90 or 120W, if there is no communication the computer will treat the adapter as a 60W one. This means the computer will run and charge on any 20V source with the right physical adapter, but the top power machines may be limited in maximum performance and charging may be slowed down.

Reply Report comment

**Ralph** says:

March 3, 2014 at 2:35 pm

mildly inaccurate as well. The laptop could easily be designed to ramp up power slowly, and if the adapter cuts out settle at a lower current value and run continuously there. No communication protocol needed!

Reply Report comment

**tekkieneet** says:
March 3, 2014 at 4:40 pm

According to A123's website, their 18650 LiFePO4 has: Nominal voltage: 3.3V, Nominal capacity: 1.1Ah I have seen some Chinese "1.35AHr", but not sure about actual measured results.

http://www.candlepowerforums.com/vb/showthread.php?257543-LiIon-18650-battery-comparison

Looking at the *measured* results, most of the tested 18650 Li-Ion have a capacity of above 2 to 2.5AHr under load.

So far LiFePO4 has a factor of 2 less on the capacity and approximately 90% of nominal voltage. May be you can point me to *better* LiFePO4?

Reply Report comment

**mike** says:
March 3, 2014 at 5:57 pm

Beg pardon? LG et al have been making >10Whr 18650 cells for four or five years. I have yet to see a name-brand LiFePO4 18650 cell much over 4Whr. Okay, so I said 1/3 when I should have said 1/2.5... sorry? I don't care about theoretical, laboratory-bound capacities, my figures are based on what I've seen to be real, commercially manufactured cells. LiFePO4 has it in the bag for power density, but in terms of energy density, it's got a long way to go.

And what you've proposed for charger detection is about the worst thing you can do, with regard to "cheap" non-OEM supplies. How long do you think a no-name Chinese power supply is going to run, on the very bleeding edge of overheat/overcurrent? Or any supply, for that matter? Nevermind

spend more time ‘off’ than ‘on’. Plus the operating point will vary with ambient temperature and amount of time the system has been on. A real nightmare from a reliability and predictability standpoint.

Or what happens if the battery is missing or completely flat? System comes on for five minutes, you start working – oops, adapter cut out, have to wait a few minutes. I’m sure there won’t be many angry customers complaining about that.

And as far as inaccuracies in the remainder are concerned, I encourage you to go read SBS IF’s Smart Battery System specifications and correct me if I’ve gotten anything wrong. I design things utilizing these features for a living, so if I’m doing it wrong I’d like to know…

Reply Report comment

**Paul Uszak** says:

September 29, 2015 at 5:01 pm

Technically you might be correct in your analysis, but holistically, you’re very wrong. When you gain some more commercial and engineering experience you’ll see that this issue highlights a modern and worrying trend – over engineering. I don’t mean too big or too strong, but only just big /strong enough to satisfy the accountants.

A rechargeable consumer device is nothing new or clever. That’s what a laptop is, in whatever guise. Cars, CD players and cruise boats have been rechargeable for many decades. Rather than eking out 99.9% efficiency with a smart controller, you could go with a 50% efficient transformer designed like a toilet building – indestructible. Reflect it’s cost in the price and bask in the adulation of users who never have to replace their PSU. There are also reputation al and other intangible benefits. You don’t drive a Defender, do you?

Hopefully you’ll eventually come to realise that this issue is not a technical one, but created by the marketing and finance departments of Dell.

Reply Report comment

**Zach Malpensado** says:

August 16, 2016 at 1:26 am

I'm sorry but I had to chime in- there are no 10Wh 18650s on the market. Not that can handle the power of a laptop. The most common cell used in laptop batteries right now are the Sony VTC5s, and they're 2.6Wh.

And also, that theoretical situation wouldn't happen nowadays. People wouldn't use that charger anymore. People aren't completely stupid. They'd get sick of it stopping charging all of the time and get a new one. If that would even happen, I'd have to imagine that most of these laptops nowadays don't even pull over 60W. I've had non-OEM power supplies to last me for ages. Hell, my Thinkpad still runs off of one, it's going on 6 years like that.

Reply Report comment

**anon** says:

November 7, 2017 at 11:27 am

VTC5s are 2.6 Ah, not Wh. The capacity in Wh is not quite 10, but close enough (http://lygte-info.dk/review/batteries2012/Sony%20US18650VTC5%202600mAh%20(Green)%20UK.html), and there certainly are other higher-capacity cells (up to 3.5 Ah) that would have well over 10 Wh of real capacity.

Report comment

**NewCommentor1283** says:

March 3, 2014 at 10:45 pm

reminds me of a USB hub i have...
the model name is "USB 2.0 Hub" but is clearly NOT a USB 2.0 device

need XTAL accuracy for USB 2.0 speeds

i doubt soldering on the XTAL would enable the 2.0
pins are disabled when internal CLK is used anyway???

Reply Report comment

**Matz05** says:

April 7, 2014 at 11:55 am

I've had this problem before. Old Inspiron N5040 underclocks itself and refuses to charge the battery when the (insanely fragile) DRM wire is broken or the (unprotected) lockout chip damaged, even if power quality is perfect (it was the factory charger). Modern batteries and charge circuits have safeties built-in anyway, so it's purely a moneygrab — and one that seems to have been hurriedly added to the design as an afterthought. We ended up just buying another charger and armouring the cable rather than mess around with spoofing the challenge-response thing. Don't buy stuff from Dell.

Reply Report comment

**Ed Becerra** says:

April 7, 2014 at 10:30 pm

I could really use a spoofing cable like this for my Dell Mini 9 – I want to try to run it entirely from solar cells. Maybe a smart cable that'll take any power source or even a battery.

Can't build one myself, but I'd be happy to talk to someone who can.

Reply Report comment

**Robert Glynn** says:

June 11, 2014 at 11:44 am

At one point I forgot my Dell charger at home, and even in likely the most diverse retail market in the US (NYC) I couldn't buy one. It's great that there may have been thousands on eBay, but I needed it NOW and even at $100 it would have been worth avoiding the loss of work. I did have a PS with the exact same connector, voltage, and amperage but it didn't work. The end result: never going to buy another Dell again (including workstations, and including at any company where I get a say).

Reply Report comment

**LW.WANG** says:

November 5, 2014 at 7:24 pm

Dell Laptops will only receive 3 bytes of data for it to check the adapter. The default location is PAGE 1 address of 0x0008 to 0x0010 (DS2502 as the 1-wire eeprom)

Below are what i found by decoding the 1 wire signal

Send by master

0011 0011 0xCC Skip
0000 1111 0xF0 Read RAM from location
0001 0000 0x08 Address Lower
0000 0000 0x00 Address Higher
1101 1111 0xFB CRC of (F0 08 00)

By slave
1000 1100 0x31 1
0001 1100 0x38 8
0000 1100 0x30 0

Reply Report comment

**Efi** says:

August 9, 2016 at 2:03 am

can you drop me an email, i have some Q about this issue for you

Reply Report comment

**Ivan** says:

May 22, 2015 at 4:06 pm

it sounds great but a little difficult. i broke accidently that chip dallas 2501.. so my charger dont work.. i hope i could hack the bios to by pass this check and charge

Reply Report comment

**Michael Shreeve** says:

January 9, 2017 at 11:39 am

The reason this topic was important to me was I was trying to take a 19.5 boost converter (from 12 v) and make it work for a Dell Laptop. Darn, always something to make what should be simple NOT. Noticed the 3 pin system and started investigating and ended up here !

Reply Report comment

**michaelshreeve** says:

January 9, 2017 at 12:01 pm

Amazing work. Not sure I could actually do that. Wanted to be able to use a boost inverter from 12vdc to charge using the three pin cord but, Dell had to make it VERY complicated. Darn.

Reply Report comment

**Warren** says:

January 10, 2017 at 6:37 pm

Hi Michael
I am wanting to do the same.
Wanted to be able to use a boost inverter from 12vdc to charge using the three pin cord
What does the middle pin need to present to the laptop to make it think its a valid

Reply Report comment

**michaelshreeve** says:

January 11, 2017 at 7:33 pm

its here , unfortunately, or at least an attempt at it. A good one at that ! A four page explanation of some fairly esoteric electronics communications work using a system called 1 wire. This is happening because that center pin, the really small one, has a special digital signal on it which essentially makes ONLY the dell power supplies work .Damn them !

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**michaelshreeve** says:

January 11, 2017 at 7:43 pm

https://hclxing.wordpress.com/2014/02/06/hacking-the-dell-laptop-power-adapter/

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**daich** says:

January 27, 2017 at 5:26 am

Simpler way to make 3rd party 12V car adapter DELL friendly is to get DELL AC adapter and to transplant 2501 portion to car adapter cable, which I've just done. I and my PC are very much happy with it. Thanks for the useful information!!

Reply Report comment

**warren ht monaro** says:

January 27, 2017 at 11:54 pm

I plan to do the same as Daich did. Hey Daich. Do you have any pictures on exactly the components needed from the original Dell supply?

**daich** says:

January 28, 2017 at 8:12 am

Mine is PA-12, PA-1650-05D2, F7970, $3 in junk box in local store.
http://imgur.com/a/yUOk7

Reply Report comment

**Warren HT Monaro** says:

February 5, 2017 at 6:32 pm

Thanks so much Daich. I'm part way through doing the same as you did with extracting the ID part from an old supply. The detailed pictures are a help showing what you did. I presume the ID device gets its power from the LapTop using the center pin and sends its ID down the same connection? I would have achieved it anyway but great to see your process.
Removing the firm white sealer is a bit of a pain.
Thanks again, Warren.

Reply Report comment

**warren** says:

January 28, 2017 at 12:01 am

Thanks Michael. I have previously had a read of the 4 pages. The one wire signal (code) is it but I'll try butchering an old supply. I just don't want to turn doing it into another project.

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I buy OEM Dell chargers $10.00 USD, here in L.A.
So many surplus laptops here..
China knock-offs everywhere, but so are the OEMs.
In L.A., http://www.siliconsalvage.com ask for Dan.

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**Jonas** says:
October 15, 2017 at 12:00 pm

Very interesting indeed
have been looking for a way to run the computer at 12V
Need to use it on the snowmobile, run Autotune, Tunerstudio MS.
Dell Precision M4700 have an 180W charger
have finde a converter on AliExpress and are Waterproof
https://www.aliexpress.com/store/product/DC-DC-Step-Up-Converter-12V-9V-18V-To-19V-10A-190W-Boost-Power-Module-Car/1477120_32265333795.html

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**Greek** says:
March 3, 2018 at 4:19 am

Nice project! I was looking for info on why my charger is not recognized and ended up reading your white article. Now i know more, thanks!

Reply Report comment

**Ben** says:

September 26, 2018 at 4:34 am

I wouldn't recommend it as a Dell adapter has a 3rd connection for communication between the adapter, battery and motherboard. This tests the input from the adapter. I have written a blog about this in the past. [http://shop.blackcatpc.co.uk/blog/][1]

[1]: http://shop.blackcatpc.co.uk/blog/

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**izhadapter** says:

April 8, 2019 at 11:47 pm

https://www.aliexpress.com/af/dell-chip.html?site=glo&g=y&d=y&origin=n&spm=2114.search0604.0.0.5d763b969Xt3C6&filterCat=200216562%2C200004734%2C200215223&jump=afs&groupsort=1&SortType=price_asc&SearchText=dell+chip&initiative_id=SB_20190408223811&isViewCP=y

Reply Report comment

**Stephen Plustwik** says:

June 17, 2019 at 8:20 am

This article and what it points to, [Xuan]'s four-part series, are a fascinating read! It looks like a brilliant hack. But without training and skills to that level, I am just going to fork out the AUD38 for a 90W genuine-Dell charger.

Reply Report comment

**MastahNinja** says:

June 27, 2019 at 12:01 pm

trying to be desktop computers saying they need a certain power cord and drawing from the AC instead of the battery. What sense does that make? This is a stupid system in my opinion. Also, if you don't know what type of charger you should be using for your computer you really shouldn't be using a computer.

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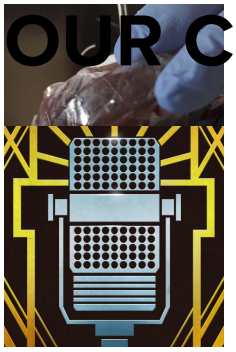

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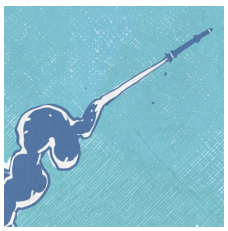

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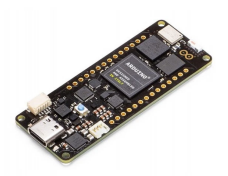

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