

## Hardware issues and resolution

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This paper is intended to explain the problems that arise when hardware is connected to a PC running a Linux distribution. It will cover the major categories of PCs and peripherals, and how to find whether they are compatible with Linux or not.

Mention of a company in this paper does not mean that I'm getting anything from it. There may be others that are equally good. The buyer should, as always, make up their own mind as to what to buy from where.

### **Introduction**

The most important thing to remember is that there are very few standards; manufacturers do their own thing whenever they can, and whatever the computer you use, to a large extent you are in the hands of the device manufacturer as to whether it is supported.

### **Manufacturers of peripherals**

The business of building a PC for general use is a very competitive one with the result that there are incentives to avoid doing what everyone else is doing in order to do something that gives some sort of advantage. Consequently, they believe it is in their interests to do something unique and adapt the software appropriately for only their systems; and that means they think that their unique contributions to the software are valuable and not to be released to the general public.

They concentrate on Windows because that is where the bulk of the market is; and they can therefore keep the details of the code and hardware quiet because Microsoft Windows is proprietary. The open source software developers have the unenviable task of trying to figure out how the hardware works so they can write software to interface to it and make it do what they want.

In the past, they have had very little help, and some cases active hindrance, in getting information about the device so they can write appropriate drivers for it.

Ironically, the manufacturers' engineers these days almost certainly are using Linux as their development system, because it is so flexible that they can create diagnostic frameworks to help in the engineering work. They just don't allow the details out.

Some businesses are now getting a bit wiser, and at least providing their own drivers for Linux, especially those bits of hardware that have to connect to servers. But we are a long way from them embracing the idea that releasing fully open drivers may actually help their sales by increasing the total market they are selling into. Being first to market is the advantage they have and development could maintain.

An important point to bear in mind, is that as a device ages, the support for it improves. So it may on occasion be better to get an end-of-range sale item rather than a new one. But always check the details.

## Types of peripherals

Peripherals and devices can be classified, so far as we are here concerned, into two types. First, there are those that you all recognise. They are plugged in externally, like printers, scanners, etc. And then there are the internal ones that you may not be aware of, like video cards, wifi chips, power / battery control, etc. The latter are what makes buying a machine difficult; it depends on what the manufacturer has decided to buy to implement a feature, and we are in the hands of the maker of the component, not necessarily the maker of the product you purchase.

The worst manufacturers do things that are very difficult to guard against. They will keep a product number the same, but change the internal chipset. In these cases, you just have to discover the chipset characteristics. Fortunately, this situation is very rare. You can ignore it in practice.

## How to find out what to get

The obvious way is through your friendly search engine, and it is definitely the best way. Lots of people have taken the time to try things out and report results. The older the product, the more comments there will be, and the more likely it is to work.

The key to all such queries is to include exact name of the product, *the model number*, and something to indicate Linux support is being asked about. Doing a search before you buy will tell you whether it is worth continuing.

A word about prices: you will find some of the products that Linux supports well, may be more expensive. But you have to consider what your own labour is worth in getting a less expensive model working. And also consider the value of the developers' work in getting the better quality model ready for use. Manufacturers can keep things cheap by cutting corners and not providing information for others to write drivers for it.

There is one company in the UK that sells only products that are guaranteed to work with Linux, viz. Linux Emporium at <http://www.linuxemporium.co.uk/>

## Desk machines

The vast majority of PCs sold in the UK will have Windows of some form already installed and paid for. If you do not want Windows, you can either ferret out a supplier of a bare machine, or you can refuse to accept the license and then claim back the money from Microsoft. I have only done the former. The latter route may require contacting the manufacturer or reseller for the refund. Here is one example of the process: <http://www.theopensourcerer.com/2009/07/21/getting-your-microsoft-tax-refunded-1010-for-amazon-uk/> Other sellers may need a different approach.

There are surprisingly few examples of companies selling bare machines in the UK. If you are keen to get exactly the range of components you ask for, then someone like Novatech would be useful: <http://www.novatech.co.uk/novatech/pc/> Always check on the motherboard details and search for other examples and experiences if you are not sure. You can probably discover whether the motherboard is well supported by Linux, and any other issues that have occurred.

If the motherboard has built-in functions that are not well supported, then it is often possible to buy add-on cards that you can install to take over that function. Display technology is a case in point here, where an extra videocard could help if the video controller built into the cpu does not work well.

## **Laptops**

Laptops offer different problems. It is usually not possible to swap one part of the machine for another as they are built around the particular components the maker has chosen. Manufacturers vary widely in the choice and that affects support by Linux drivers. A good strategy here is either to go to a seller who will guarantee Linux by installing it in advance (difficult to find such people), or search on the net to check others' experiences with the model you select to see whether there are any problems that you do not wish to deal with. The information is out there, and almost every product gets some mention quickly among the developer community.

## **Displays / video**

This is the most important part from the user's perspective, since if there is no sign of anything on the screen you cannot even see what the PC is doing. When buying a new machine, you should always check that the video support is what you want. Unfortunately, if it doesn't work immediately, it can be troublesome to fix it, especially for those who are not used to handling a command line.

If all you want to do is simple e-mail, browsing for information, and letter writing, then almost any video card would work as they will support a basic level of graphical interface. However, that may not be adequate for most of you these days, when a lot of stuff is coming in through video clips and the like. Also, you may fancy seeing things with a "nice" presentation on the screen itself where windows merge in a filmic manner. These special features are managed using modern display chipsets with so-called 3-D abilities and similar goodies. Not all of these are supported yet by everyone.

Any seller should be able to provide details of the video capabilities and identify the chipsets used. If not, go to the manufacturer's site directly and get the specifications of the model, and then check the details with a search for Linux support.

## **Printers**

Printers are among the best understood devices, but even so, there is a wide range among them of how good the support is. It depends crucially on the manufacturer. Some of them are good, like HP, others are not so good. This despite the fact that printers often need to be driven from servers, and many commercial servers these days run Linux.

The key website for support information is at <http://www.openprinting.org/printers> where you can determine whether support is easy or not. Be aware that the term "Mostly" on that site can often mean that printing is fine, what is missing is information about the levels of ink in the reservoirs and other subsidiary stuff. Look around the net for more information if that concerns you.

HP provide special support for Linux in their component "hplip" and they usually supply updates for their latest models that may require extra support until the Linux distros catch up. So it is worthwhile getting detailed information from <http://hplipopensource.com/hplip-web/index.html>. The distros are often several versions behind HP on this. Older printers will be supported by the distro version.

## **Scanners**

Scanners have in the past been a nightmare, but things now are very much improved. Some

scanners work out of the box and it is essential to check for each new one you buy whether it is supported yet. I suspect that it may also depend on the software used to so the scanning as some will require more functionality of the hardware than others. Simple scanning is easier than some of the more sophisticated options on other programs. The key website is at <http://www.sane-project.org/> which collects information from users and developers on what works and what doesn't. They claim its database of scanners is updated once a day.

### ***All-in-ones (printer / scanner)***

These are best treated as two separate devices, and look them up both as a printer and as a scanner. Do a separate search if you want to use more of their special features.

### ***External storage***

From a hardware point of view, these are usually no problem, although some new large USB solid state memory sticks are beginning to show oddities. The more common problems here are with the file systems defined by default on a new device. If you want to use it for Linux only, then it is worthwhile partitioning and re-formatting the whole thing to your own requirements. Otherwise, if you want to use it to move data among different types of machine, then you are probably better off leaving it alone.

### ***Webcams***

Modern webcams may well just simply work as expected. There is a “standard” for USB connected webcams, called Universal Video Class, so if you can find a camera that is stated to be conformant to the UVC standard, it will need no extra drivers and work as soon as installed. There is more detail on it here <https://help.ubuntu.com/community/Webcam> which also describes how to record video and sound from the camera using some of the software available on Ubuntu.

### ***TV cards***

Great strides have been made in this area. The key site appears to be this list of possible cards: [http://linuxtv.org/wiki/index.php/DVB-T\\_PCI\\_Cards](http://linuxtv.org/wiki/index.php/DVB-T_PCI_Cards) If there is interest, I would like to hear of any experiences of these.

### ***Wifi***

Some of the new chipsets for wifi connections are not as easy as Linux users would like. It is worthwhile searching out something that will definitely work. Broadcom used to be notorious for lack of support of their chips in Linux, but have now released firmware for the use of Linux as well as drivers. Things are improving in this area too.