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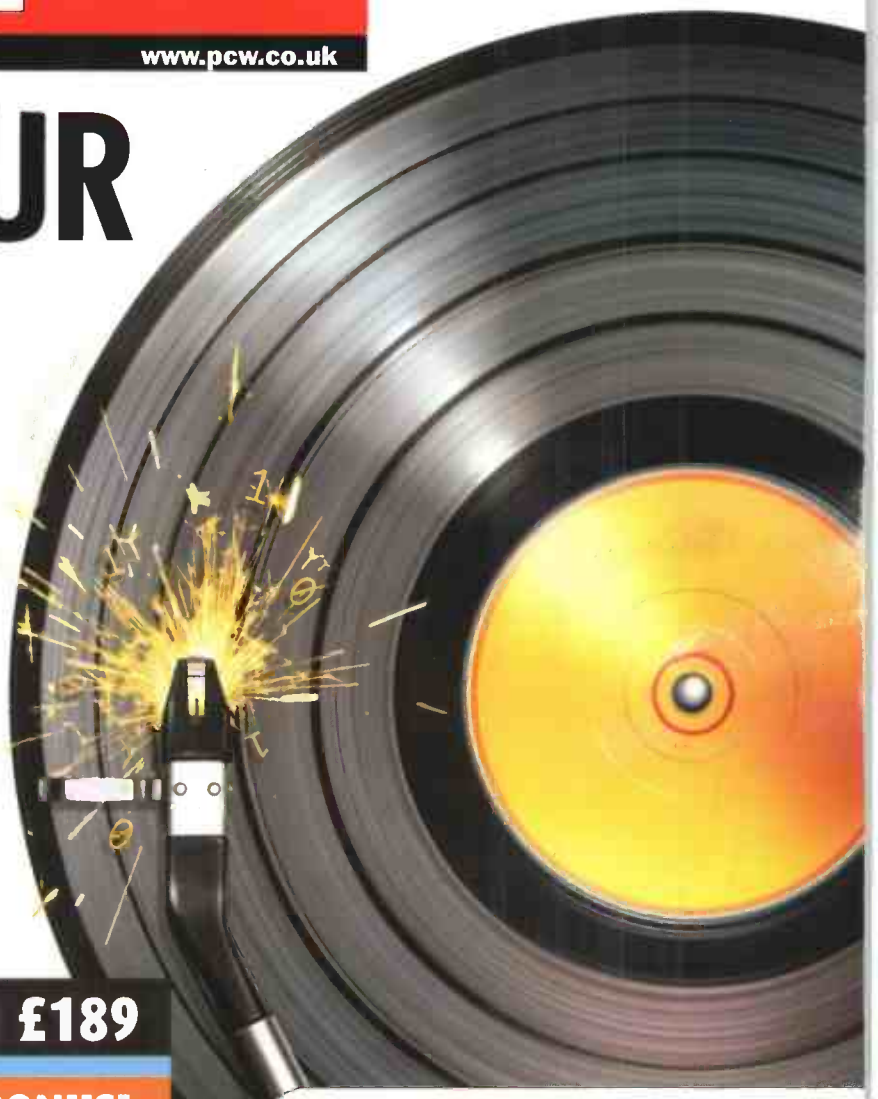

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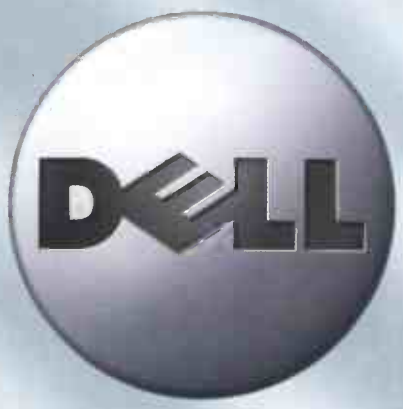

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May 2007

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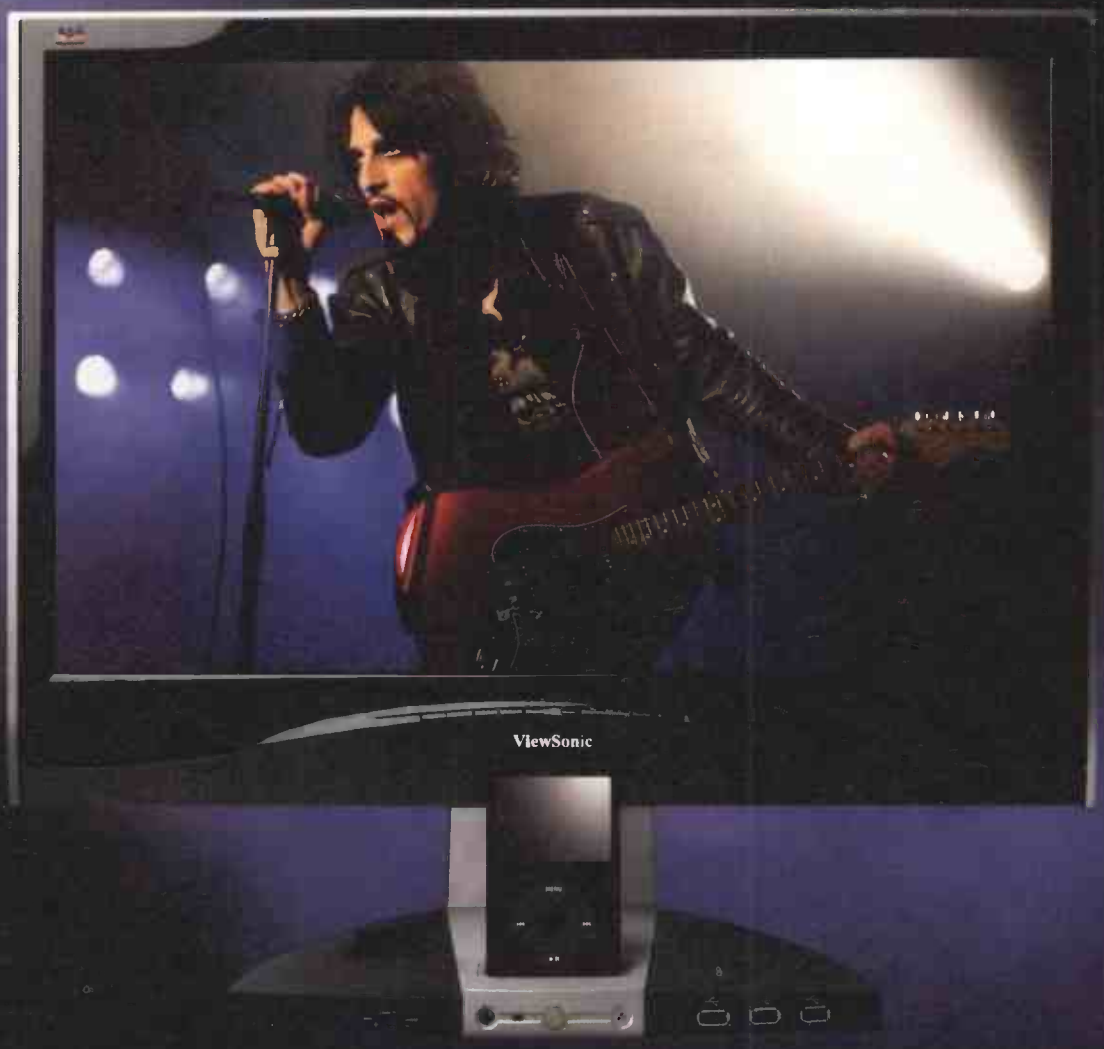

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Editorial

The demise of the floppy is a timely reminder to back up

As the floppy disk finally bites the dust, Dylan Armbrust wonders if we can place our faith in any storage format

An interesting milestone was reached recently, one that you probably read about in the news, perhaps in *PCW*'s own news pages in the last issue. It was the demise of the floppy disk. Actually, it wasn't the real demise of the floppy, just the announcement that PC World was going to stop selling them in its stores. But this event has certainly marked the beginning of the end for our good old 3.5in friend. It has had a good run, but it has been replaced by CD-Roms, DVD-Roms and, more importantly, USB memory keys. And who knows what the next medium will be?

Don't get me wrong, I will miss the floppy, but with a maximum capacity of 2MB (1.44MB formatted) per disc, it stopped being useful to me as a storage device many years ago. But it was this very fact that got me thinking about the longevity of storage media. I remember when CD-Roms came out and the hype was such that we believed they were indestructible and held data for an infinite length of time. You could drop them in water, leave them in sunlight or run your bike over them, yet you would still be able to play your music or retrieve your data. How wrong we were.

The sad fact is that the life-span of digital recording media is nowhere near as long as we'd like it to be. Paper, stone, even wooden tablets with carvings on last longer than your average hard drive, which has a design life of about five years. Magnetic tape is estimated to last about 10 years and CDs and DVDs about 20 years, and that's if they are looked after well. Factor into this the issue of changing data storage and retrieval technologies on a regular basis and we could be heading for a big problem.

'Even wooden tablets with carvings on last longer than your average hard drive'

I say this because we are depositing more and more of our vast knowledge and experience onto various digital storage media and we could run the risk that we may not be able to access it, or that it may just degrade and disappear.

This may sound alarmist but it is possible and I present a case in point. How many of us have 8mm films from our parents or grandparents tucked away in a cupboard or attic somewhere? An awful lot, I'm sure. But do you have a working projector? And if you do, do you think the film would still be in good enough shape to be played? Maybe not. My family has loads of reels, with some treasured family history on them. But our projector is old and the film is in a bad way. To recover most of it would cost thousands, and that's if the film could take it.

And this brings me back to the floppy. When I heard the news I decided to go through a large box of old floppies. I had to see what was on them, and I found that more than half of them were unreadable. They had just stopped working. And I realised that I had had some interesting things on them: letters to old friends, some old digital photos, and a few old, but memorable Dos games and who knows what else. Of course I should have backed it all up, but the truth is I forgot about it. Even though I don't know exactly what I've lost, I still know it had some value, just like the 8mm films, and it makes me a bit sad.

I'm sure that a huge swathe of society will do exactly the same; simply forget or put off transferring, saving, or printing out their data, and as a result much will be lost. So I say let's use the beginning of the end of the floppy to remind ourselves not to let this happen to us and our memories. I know I will from now on. **PCW**

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Internet Cleanup 4.0
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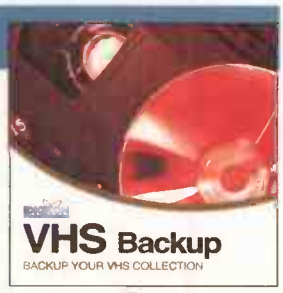

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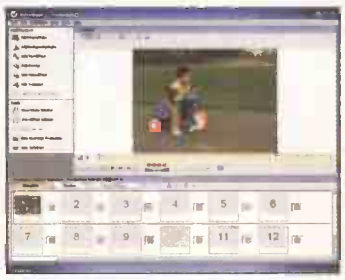

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Vista fallout rattles Microsoft

The launch of Vista and Office 2007 has had the odd effect of piling unprecedented pressure on Microsoft from both competitors and customers.

As we went to press, more than 8,000 people had signed a petition on the 10 Downing Street website against being charged up to twice as much (inc Vat) as US buyers for a copy of Vista. Their anger was fuelled further by news of a family-pack of three copies of Vista for US buyers which will cost a third of what a UK buyer would pay. **(www.pcw.co.uk/2184014)**.

But the company had bigger, more long-term worries. Its software revamp is forcing companies and organisations to rethink their IT – and some have taken this as a cue to look at alternatives to Microsoft.

These are no longer restricted to open source and Apple. Google has launched a business version of its online suite of applications and services, offering to meet a firm's messaging and basic software needs for £26 per user, per year. Google Apps Premier Edition includes word processor, spreadsheet, calendar, contact management and messaging apps with a guarantee of 99.9 per cent up time. And it can push email to Blackberry handhelds, a facility that will be extended to other devices later.

Broadband has made web-based applications viable and they offer a lot of advantages to businesses, according to Robert Whiteside, Google enterprise sales manager for the UK and Ireland. Start-up costs are low, the software is free, dispersed users can easily collaborate on documents, low-cost thin-clients or low-spec PCs can be used, and expensive servers (not to mention expensive IT staff) are not required.

In addition, staff can access the system from virtually any device anywhere with a web link, and sensitive data can be held on secure servers rather than on vulnerable mobile devices. **(www.pcw.co.uk/2183921)**. Google Premier gained some credibility with the news that the US Federal Aviation Authority is considering using it instead of Microsoft software.

Corel is taking a hybrid approach by offering a free online version of WordPerfect to users of its PC-based package. It says the WordPerfect Lightning word-processing service, now in beta form, has the advantage of offering offline use **(www.pcw.co.uk/2184311)**

Microsoft has been sufficiently worried to offer similar hosting on its Office Live services. But it has yet to offer applications such as word processing online, at least in the UK, perhaps for fear of undercutting Office sales.

Meanwhile, the EU is claiming that Microsoft is not complying with a 2004 anti-trust order on interoperability; and, as we reported last month, the company's bid to get its OpenXML formats accepted as an ISO standard is meeting opposition.

The new formats, while undoubtedly an improvement, are certain to cause disruption and have revived arguments for an openly-developed open document standard **(www.pcw.co.uk/2184571)**.

Microsoft showed its concern last month by going on a charm offensive to persuade journalists that its programming interfaces are completely open, the standards process is on course, and it is doing all it can to ensure interoperability **(www.pcw.co.uk/2185058)**.

Whether all this amounts to anything more than transient turbulence remains to be seen. But it is surely a sign that Microsoft no longer enjoys absolute dominance. *Clive Akass*

Mobile revolution as screens go on a bender

New bendable screens shown at the 3GSM show in Barcelona could have a profound effect on the design of mobile devices.

Developer Polymer Vision, a Philips spinoff, is pitching them as a form of e-paper. First products, expected next year, are likely to be e-magazine handhelds with a battery life of days.

The display layer is a well-known technology from E-Ink, that works by flipping tiny black-and-white spheres. It requires no power to retain an image and, like paper, requires no backlight.

But flexibility, achieved by using polymer rather than rigid silicon driver transistors, is what sets the screen apart. One prototype at the 3GSM show (see page 14) had been rewrapped 750,000 times without degradation.

Open and shut case... prototype handheld with scroll-out screen

Polymer Vision has shown two form factors: a scrolling model (pictured), and one that folds in two places to wrap round the host device (see **www.pcw.co.uk/2185085** for a video of this in action).

Intel pushes PRam to nirvana

Intel is set to supply the first samples of revolutionary phase-change memory chips to device makers within weeks.

It combines the speed of DRam but, like Flash memory, it is non-volatile, requiring no power to retain data. It could eventually replace both technologies.

"The nirvana is to make non-volatile DRam," Ed Doller, chief technology officer at Intel's Flash memory group, told a press briefing at the company's headquarters. "Phase-change memory gets us pretty close."

The memory, co-developed with European giant STMicroelectronics, is called PCM or PRam (phase-change Ram) and stores information by changing the phase of chalcogenide glass from crystalline to amorphous using heat.

Doller claimed initial read and write speeds will be at least a thousand times faster than Flash. One reason is that data can be overwritten without first being deleted, as is the case with Flash.

He demonstrated a 128Mbit silicon module manufactured last September on a 90nm process.

PRam is currently more expensive than Flash and DRam but Doller said prices will drop. Intel will initially target products at mobile phones, which typically store the operating system and user data on Nor Flash memory.

Samsung produced a 512Mbit PRam prototype late last year that is scheduled to go into production in 2008. IBM published a paper in December on its own work on PRam, which it said has the potential to kill off Flash.

Tom Sanders in Silicon Valley

Pen input hits the desktop

Half the hacks at *PCW* have been using Wacom's Graphire 4 pen tablet – and not simply because the manufacturer took us out to lunch and gave us samples to play with.

Vista has Tablet PC functionality, which means that with a new downloadable driver for the £85 (ex Vat) Graphire you can pen-drive a standard desktop screen – complete with handwriting recognition. And it works very well. Writing by hand is nothing like as fast as typing but if you have RSI, or for some other reason can't type, this is a viable alternative. One tip: putting a piece of paper over the tablet makes writing more comfortable.

Pen tablets have long been used by artists and photo-retouchers because they provide better control than a mouse. They also allow you to scribble out messages, including diagrams or drawings, rather than sending a standard email.

Wider use of pen input could also help prime a market for Tablet PCs and ultra-mobiles, on which you write directly onto the screen.

→ **www.wacom.com**

Fibre in mains cable could bring optical nets home

A new and potentially low-cost way to implement optical home networks uses plastic fibre within mains cable – allowing buildings to be wired for power and data at the same time.

The system could prove popular with developers wishing to future-proof buildings, though it is as yet unclear whether or not the combined fibre and mains cable would conform to UK regulations.

The idea was mooted late last year in Test Bed (**http://tinyurl.com/3a5hmv**) but it seems that Mitsubishi was already working on it. The system uses plastic optical fibre (POF) widely used for in-car links and is said to be easier to install than glass – Mitsubishi claims a connecter can be put on within 40 seconds.

Left: Cross-section of fibre-power cable; right: combined data and mains socket

It lacks the limitless bandwidth of glass fibre (Mitsubishi rates it at up to 800Mbits/sec), but unlike any electrical link it is immune to interference and creates none.

The system was shown at the IPTV Forum in London by German specialist Homefibre, which supplies modular optical networking kits including combined mains and network sockets.

→ **www.pcw.co.uk/2184813**

See also page 19

In brief

Slim chance

Researchers have created the thinnest material in the world – just one atom thick – which could form the tiniest-ever transistors. The carbon-based material called Graphene was created at the University of Manchester and the Max Planck Institute in Germany.

Researchers say it could form the basis for terahertz ballistic transistors, which are structured so that electrons do not collide with atoms and so flow faster.

→ **www.pcw.co.uk/2184636**

Hotspot spotter

Travellers can find the location of free and paid-for wireless hotspots on their intended route thanks to a new feature on the maps website Map24.

It uses data from the hotspot directory at Spotigo, which provides the location of 50,000 access points in Europe and a further 50,000 worldwide.

→ **www.pcw.co.uk/2184267**

Battery scare

Notebook vendor Lenovo has recalled 205,000 battery packs sold with its notebooks in the latest scare over the safety of lithium-ion rechargables.

Customers who bought the nine-cell packs with the part number FRU P/N 92P1131, will get replacements free of charge. Batteries with fewer than nine cells are not affected.

→ **www.pcw.co.uk/2184526**

4GB micro SD

Sandisk unveiled the world's first 4GB micro SD High Capacity (SDHC) card at the 3GSM World Congress 2007.

→ **www.pcw.co.uk/2174654**

160GB flash drive

Adtron has launched a 160GB solid-state drive – the most capacious yet commercially available.

→ **www.pcw.co.uk/2184182**

Quadro 1.5GB graphics card

Nvidia has announced two new high-end Quadro graphics cards for professional use.

Oren Paynton, technical account manager at distributor PNY, said the new Quadro FX 4600 will supersede the FX 4500 and is based on an 8800GTS board with 768MB of GDDR3 memory and a memory bandwidth of 57.6GBytes/sec, double that of its predecessor. It costs £1,325 (inc Vat).

The Quadro FX 5600, which replaces the FX 5500, uses the same board but has 1.5GB of GDDR3 Ram clocked at 1.6GHz, the most available on any graphics card. Its memory bandwidth is 76.8Gbytes/sec. It will cost "fractionally more" than the £1,704 (inc Vat) FX 5500.

See **www.pny.com** *Emil Larsen*

Cheap Blu-ray

A new Sony Blu-ray player is 40 per cent cheaper than its older $999 (£509) BDP-S1 model – even though it can do more. The $599 (£305) price tag on the new BDP-S300 brings it more in line with Toshiba's $499 (£254) player, which uses rival HD-DVD technology.

Free calls

A free module enabling free calls between Wifi mobile phones has been launched by a company called Barablu. It also supports instant-messaging over a GPRS link.

The deal looks similar to one offered by Truphone but Barablu also supports PC web calls, conference calling for up to 50 people, file transfers and text messaging. Calls outside the Barablu network will typically cost 1p per minute, the company says.

→ **www.barablu.com**
→ **www.truphone.com**

What a contrast

LG says its new L1960TR display has a best yet contrast ratio of 3000:1 and a 2ms response time.

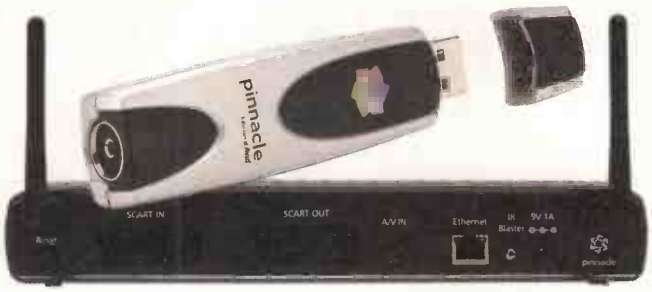
→ **http://tinyurl.com/3609ht**

Watch TV on your notebook

A new USB product from Pinnacle turns any notebook into a TV simply by plugging it in. The PTV DVB flash stick also doubles as a USB flash drive with 1GB of memory.

The memory also allows the £69.99 product to act as a personal video recorder, recording live TV in either DivX or Mpeg2 format. All the features run directly off the USB device, with no need to install any software.

Another new Pinnacle product called PCTV To Go provides competition for Sony's LocationFree and Sling Media's Slingbox products. All work in the same way: hook them up to you TV and you can view remotely on a PC, either over the internet or a home network.



DVB flash stick (top) and back view of the PCTV To Go box

You can even change channels remotely using an infra-red dongle, though the PC and TV set have to screen the same channels.

Pinnacle's software can be installed on any number of PCs without charge, but you can't download it over the net – a feature offered by the Slingbox. So you'll need to have the installation CD with you to view your home TV from, say, an internet cafe. No TV tuner is included and although there are two video inputs, Sony's LocationFree currently costs £229, plus £20 for each additional viewer; the standard PCTV To Go is priced the same as the Slingbox at £149, and a Wifi version costs £199.

→ **www.pinnaclesys.com**

Canon claims new Eos is fastest SLR

Canon has launched four new consumer digicams along with what it claims is the world's fastest digital single-lens-reflex (SLR), the Eos-1D Mark III.

The SLR can capture 10 frames per second, up to a maximum of 110 shots, and so will appeal to sports and nature photographers. A Live View mode on the device's 3in LCD provides an alternative to the optical viewfinder. Pricing and availability are still to be announced.

The new consumer Canons include the Ixus 70 and Ixus 75 (£249 and £269 respectively), which sport 7.1megapixel CCDs and come with face detection technology to ensure focus and exposure are optimised when taking portrait shots.

Eos-1D and Caplio R6

Both support ISO 1,600 sensitivity for low-light shots, but cannot match the ISO 3,200 of recent Fujifilm products.

Canon's Powershot range gains the A560 and A570 IS (£209 and £249), with the latter housing an image stabilising feature to eliminate camera shake. Both models include face detection.

Meanwhile, Ricoh launched the Caplio R6, which it says is the slimmest model to sport a 7.1x wide-angle zoom, equivalent to a 28-200mm lens. *Will Stapley*

• See DSLR group test, page 87

Charge your mobile from the sun's rays

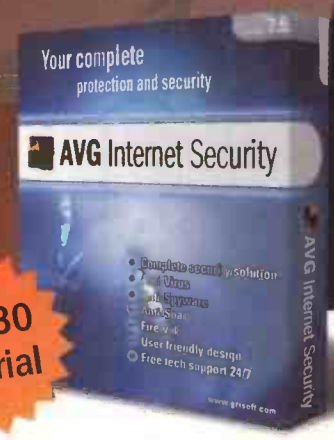
Solar Technology has launched a £29.99 portable charger called FreeLoader that draws its power (you've guessed it) from the sun. It can be used to top up batteries in digital cameras, PDAs and mobile phones.

It comes with two solar panels that attach to opposite sides of a base unit, which comes with 11 types of power plug. Supported devices are listed at Solar Technology's site at **www.solartechnology.co.uk**.

The company says the internal battery takes "as little as five hours" to charge, providing enough energy to charge a mobile phone for 44 hours or an iPod for 18 hours.

It's reasonably compact with the solar panels, although only just pocketable. Watch out for a review at **www.pcw.co.uk**

You wouldn't feel safe if your airbag was patched, it's the same with security software.



Free 30 day trial

AVG Internet Security

Unlike most security software, AVG offers you new version updates as well as regular program updates throughout your licence period. So with AVG you will always be able to update to the latest version for free - meaning there is no need for patching. AVG Internet Security provides complete protection against online threats including viruses, trojans, worms, spyware, adware, spam and hackers. All this, along with 24/7 support, makes it the best value in online security.

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www.avg-internetsecurity.co.uk

Fast mobile uplinks debut

Cellular links capable of uploading data at up to 2Mbits/sec came closer to being realised with a demonstration at 3GSM of a High Speed Uplink Packet Access (HSUPA) link. Canada's Sierra Wireless showed its prototype Aircard 880 HSUPA link in conjunction with Spanish operator Telefonica, which owns Britain's O2 network. Sierra director of marketing Greg Speakman said he expected HSUPA access to be available by the end of 2007, but could not say if it would come to the UK.

Users rarely get the full rated HSDPA speed and this will also be the case with uplinks. Speakman said he expected real-world speeds of 400-600Kbits/sec. But the service will be welcomed by those who need to send high-volume data, and HSUPA could improve the quality of mobile video calls.

The Aircard 880 is designed for laptops but Speakman said he expected the technology to be implemented in smart phones.

GPS phones call the shots

Smartphones packing satellite navigation were one of the big themes at this year's 3GSM show in Barcelona, the key event of the mobile phone industry's calendar.

The new devices make use of next generation Global Positioning Satellite (GPS) chips that are small enough to fit into handsets and use batteries frugally.

Nokia has said that nearly all of its new smartphones will have GPS as standard by next year, and the company plans to offer a personal mapping program that will enable users to text directions to someone. RIM and Motorola have also released GPS handsets.

David Wood, head of mobile software developer Symbian, said the trend was great for his company because GPS required only a few tweaks to the operating system.

"It's proving very popular with the [smartphone application] developers too. Mapping by mobile phone is going to become the norm," he said.

Antti Vasara, senior vice president of Nokia's mobile-devices unit, said: "We are making it easy for business professionals to get mobilised."

Europe has been quicker than the US to take up GPS because its roads are more confusing to navigate, according to a Motorola executive. But he added: "We are seeing a massive growth curve in the US too, albeit two years behind the Europeans. Once you get into using GPS it becomes an integral part of getting around and communicating and we are really gearing up for that."

Motorola goes for a Burton jacket

Motorola has teamed up with US clothing manufacturer Burton to create a winter sports jacket with built-in speakers and a controller for mobile phones or iPods.

The Active Lifestyle jackets have speakers built into the collar and a digital controller on the right sleeve so those on the slopes can play music from their phones and answer calls. With an additional cable an iPod can also be used.

"It is the next generation of clothing," a Motorola spokeswoman said at 3GSM.

The jacket comes with a battery pack that is designed to give enough life for a full day on the mountain. All the electronics can be removed so the jacket can be washed, and the internal wiring is waterproof.

Available in the US, they will go on sale in Europe this summer for about €500 (£340).

The Active Lifestyle jacket includes built-in speakers and iPod controller

Gartner slams HP's new Ipaq

HP unveiled a new Ipaq smartphone, featuring Wifi internet access, VoIP and speech recognition, at the 3GSM show.

The Ipaq 500 series Voice Messenger also supports GSM/Edge and runs Windows Mobile 6.

HP entered the smartphone market two years ago, but most of its early models looked like PDAs with a mobile phone stuck on. The 500 series is the firm's first model to resemble a consumer mobile. But it is targeted at enterprise users, with a new over-the-air remote administration service.

The 500 series was criticised by analysts at Gartner for looking 'dated' without a Blackberry-style keyboard. They said it was unlikely to attract a large market.

Sex-by-text firms turn coy

Mobile 'erotic entertainment' companies were thick on the ground at the 3GSM show – although few were prepared to talk about it.

One exception was Brickhouse Mobile, whose stand was used for the launch of its star performer Aria Giovanni's new website.

The bread and butter of the mobile porn industry is still one-to-one SMS chats with a 'model'. These services are increasingly being branded with the names of celebrity porn actresses.

"SMS pays the bills but other formats are becoming more popular," said the representative of a mobile erotica company who wished to remain nameless.

"Wallpaper is getting bigger, but movie loops are the future. Very few people are going to sit and watch a whole film on a handheld, but they will pay for a clip."

A row erupted during the show after Canadian Archbishop Raymond Roussin called for a boycott of Telus, his country's second-largest mobile operator, over its plans to sell pornographic pictures and film to network users for $3-$4 (£1.33-£1.77) per item.

He told a newspaper: "Given the increasing awareness of addiction to pornography through internet access, and the abuse that this perpetuates of vulnerable persons, the decision by Telus is disappointing and disturbing."

Hunt for 3G killer app

Mobile companies have sought in vain for a killer application to do for 3G data revenues what SMS texting did for 2G services.

Phil McKinney, chief technical officer at HP's Personal Systems Group, said: "As for 3G...mobile instant messaging is not taking off. MMS got killed by pricing. Mobile TV might work."

GPS was the talk of 3GSM (see above) but it has little appeal for enterprises other than industries such as transport and logistics.

Eduardo Conrado of Motorola Enterprise said network operators should concentrate on enterprise customers, since they are far more loyal than consumers and have the potential to be bigger data users.

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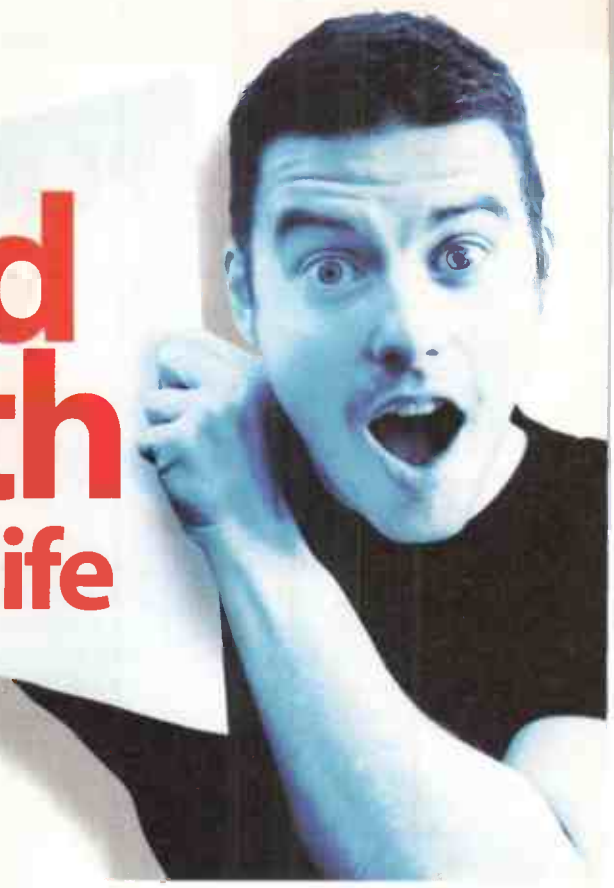

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Analogue chip breakthrough

A new form of analogue circuit will dramatically improve the efficiency of many devices, its developers say.

Analogue miniaturisation has been slower than that of digital devices because shrinking operational amplifiers, one of the most common analogue modules, often reduces gain and frequency response.

The new class of analogue circuits can replace 'op-amps' while retaining virtually all their benefits, say researchers at Massachusetts Institute of Technology (MIT).

The new design handles voltage differently to conventional analogue circuits, producing greater power efficiency.

Dave Robertson of Analog Devices said the work could eliminate op-amps by using "circuit blocks that are much more readily implemented on supply voltages of 1v or less."

PC phones 'launch this year'

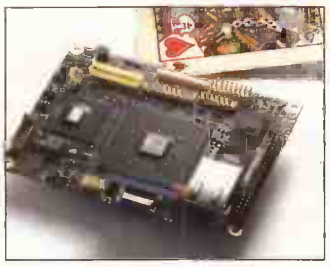
Smart phones using classic x86 PC chips will be available by the end of the year, according to Taiwanese chipmaker Via.

"The chips used in current phones don't have the headroom for the tasks they are being called on to do," said Richard Brown, vice president of marketing.

Via has had a lot of success recently with its low-drain C7 x86 processors, especially for devices such as the Samsung Q1 ultra-mobile PC.

Brown said that the company also makes products using ARM architecture, but that x86 has the advantage of offering more computing power, a wealth of applications, and greater flexibility.

Mobility, green computing, and low-cost computers for emerging markets are three main areas being targeted by Via, capitalising on its claim to have the lowest-drain x86 processors and chipsets available.



Via's pico-ITX motherboard runs a 1GHz C7 processor and measures 10cmx7.2cm – small enough for handheld and point-of-sale devices and media players

Brown backtracked a little on Via's 'carbon-free' initiative, launched late last year with a new range of low-drain C7-D processors. He showed off the company's own 'carbon-free' system design but admitted that the term was controversial.

There has been criticism of Via's offer to offset the carbon 'bill' of its products by paying for trees to be planted – including a claim that planting in more northerly latitudes can make global warming worse.

"It's much more complicated than we thought when we first looked at it," said Brown. "I prefer now to say we will encourage alternative sources of energy." He cited a number of Via-backed green projects.

Via has created two low-cost reference designs, one for PCs and one for thin clients, targeted at what the company calls the "next billion users" – people who cannot yet afford or obtain a computer.

- Via has launched a new Vista-compatible chipset, the CN896, for use with its C7 and Eden processors. It packs S3's Chrome0 HC integrated graphics processor with 2D and 3D acceleration.

DrayTek Broadband Firewall/Routers

Vigor3300V

DrayTek routers and firewalls provide a vast array of essential and advanced features, designed around users needs. The new Vigor2800 series provides compatibility with the latest ADSL2+ lines, as well as enhanced security, content filtering, VPN, 108Mb/s wireless and Voice-over-IP. Also available is the **Vigor2900** series for cable modem users and the new **Vigor3100** router/firewall for SDSL.

Vigor3100 SDSL

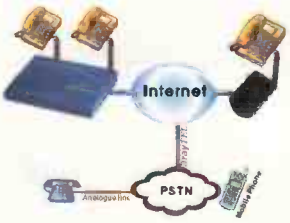
VigorTalk for DrayTEL
www.draytel.org

Vigor2900

The new **Vigor3300V** is a high performance firewall, VPN concentrator and VoIP (Voice-over-IP) device. Stateful Firewall, load balancing, content filtering, up to 200 VPN tunnels and up to 8 VoIP ports. (Due March).

Vigor2800 Series

DrayTek VoIP-equipped routers let you use your broadband line to make and receive voice calls. Calls to any other VoIP-equipped users are completely free and you can make calls to regular phones via DrayTEL with national & international calls from just 1p/min.



Available from SEG
020 8381 5500
VoIP : 800800@draytel.org

For full details of all models visit
www.draytek.co.uk

Specification subject to change. Facilities vary with model.

AMD low-drain quad challenge

AMD is fighting to regain the technology edge with a new low-drain microarchitecture for its quad-core processors to rival Intel's latest power-efficient Core architecture.

The new design will appear first in quad-core server chips codenamed 'Barcelona'. The chips are due for launch in the middle of this year. Despite using less power than their predecessors, they will be 40 per cent faster than current Intel quad cores, AMD claimed at the International Solid State Circuits Conference in San Francisco.

AMD's Powernow energy management will be upgraded to allow the clocking of each core to be adjusted to the needs of the task in hand; it will also maintain power for the memory controller while reducing the processor consumption. In addition, parts of each core will power down when not in use.

New Level 3 will increase performance for applications such as web hosting, databases and email servers.

Intel is currently ahead of AMD in chip performance. But AMD is expected to take back the lead with its new quad cores because their monolithic design is more efficient than Intel's current products, which pack two twin cores in one package.

AMD is not focusing only on server chips. Last month it launched two new low-drain single-core Athlon 64s, 3500+ and 3800+, a high-performance dual-core Athlon 64 X2 called the 6000+ for gaming and other high-performance tasks. *Tom Sanders*

First integrated graphics chipsets

AMD has launched its first chipsets with integrated graphics using technology acquired with its takeover of graphics hardware specialist ATI. It will ship 34 different value and mainstream AM2 socket motherboards initially.

The 690G packs an ATI Radeon X1250 with HDMI/DVI support and is the first integrated graphics chipset with two digital outputs. On 690G boards only one HDMI port is surface mounted; the other is on a card occupying a single PCI-Express slot. The 690V uses a Radeon X1200, which has a single analogue output. *Emil Larsen*

Intel builds superfast 80-core processor

Researchers at Intel have crafted a prototype 80-core processor as part of a project to build a superfast parallel computer.

The processor packs 100 million transistors into just 275 square millimetres (about the same size as a current Xeon) and can process 1.8 trillion floating point operations (teraflops) per second.

Each core is designed as a separate tile that includes a networking router which connects it to four adjacent tiles in a 'componentised' structure. This structure facilitates technology swap-ins. Each core in future designs will have its own cache memory to speed up data transfers.

Tiles are divided into 21 separate regions, each of which can be powered down when not needed.

The first teraflop chips are expected to ship between 2010 to 2015. Intel plans to develop special cores for tasks such as cryptography or virtualisation.

Software developers will need to hone their techniques for programs to function optimally.

Gerry Bautista, Intel's director of terascale research, said these chips could also benefit home users. It could enable a powerful search facility that could identify, for example, images of people smiling.

"This requires a level of artificial intelligence in the analysis that is well beyond simple image recognition today," said Bautista. *Tom Sanders*

Cool cluster for businesses

Via's low-drain C7 processors and small Epia EN15000 mainboards (left) are making high-performance cluster computing relatively affordable for small businesses, according to a start-up called Ainkaboot.

One of its compact, cool Octimod MPC7-1500 cluster modules packs eight boards onto a 4U rack – or 16, with two modules stacked back to back. Prices start at around £10,000, including installation, and if you need more capacity you can simply attach another module.

→ **http://ainkaboot.co.uk**

New fab could cut chip prices

Intel is to open a fourth 45nm plant in New Mexico by converting its 90nm Rio Rancho fab. Work will start in the second half of 2008.

A fab at Hillsboro, Oregon, and a new one at Chandler, Arizona, are expected to start producing 45nm chips this year. Another new fab at Kiryat, Israel, will begin production in the first half of 2008.

Jim McGregor of analyst firm In-Stat said Intel typically has three live production facilities shortly after introducing a new technology, with a fourth coming online later.

Intel's rival AMD claims that it will start shipping 45nm chips by 2008. It is expected to have two 45nm production facilities live by the end of this year.

"That is a scary amount of capacity for the x86 market," said McGregor.

It could escalate the price war between Intel and AMD.

No 3G support for Santa Rosa

Intel will not add 3G wireless connectivity to the next version of its Centrino platform, Santa Rosa.

The company had planned to embed Nokia networking cards in notebooks to deliver High Speed Downlink Packet Access (HSDPA). But now it says this will not provide a sufficient return on investment.

Users will still be able to buy HSDPA cards, already bundled with many notebooks.

Chip promises frugal standby

A new chip could significantly cut the power drawn by power adapters when they are left in standby mode.

The Greenchip III from Philips' semiconductor spin-off, NXP, draws 200mw to 300mw on standby, compared to 500mw with conventional chips.

Britain's Energy Saving Trust estimates standby power costs the country £1bn a year.

IP, IP, hooray...fibre's on the way

Clive Akass, at a communications forum at Evian, France, gets a snapshot of a world moving to Internet Protocol (and Ethernet) over optical links. But it will be a while before they reach your home

Some day the world will be connected by fibre with virtually unlimited bandwidth – but most of us are going to be stuck with copper for a long time.

For all but very large organisations, next-generation networks will remain a hybrid of the old and new: DSL piggy-backing old steam voice lines; or cable broadband using fibre to street cabinets, and then coax them into homes and offices.

But much is changing at carrier level. British Telecom is leading the world with its 21st-century Network project, which aims to transform its entire infrastructure to packet-switching, using Internet Protocol (IP), as does the web. Not only does this make more efficient use of lines, but a single system avoids bottlenecks at gateways between the multiple technologies currently in use.

Experts at last week's NetEvents forum in Evian, France, viewed this exercise with a mix of admiration that BT was doing it at all, and scepticism that the company would manage to go all-IP. One told me: "The standards are not in place, so BT will have to create its own."

He said BT is big enough to take the world with it, when others start following its lead. But, of course, the world could also wait to learn from BT's mistakes.

A big market at the moment is in 'midband' links connecting a fixed set of sites, such as dispersed company premises, at between 2Mbits/sec and 45Mbits/sec, using leased lines connected to optical metropolitan networks. These links can be end-to-end Ethernet, so connected sites are essentially sitting on the same local network.

For capacities above 20Mbits/sec it is economical to install new fibre to premises; below that the game is to cram more data down the copper, according to Gary Bolton, vice president of product marketing at Hatteras Networks.

His company produces boxes that allow a two-wire E1 leased line rated at 2Mbits/sec to provide a two-way link with a capacity of up to 5.7Mbits/sec. Higher capacities are achieved by aggregating more wire pairs.

Circuit-switched calls on the old steam phone system moved on a fixed link like a train; packet-switched IP traffic on BT's 21st-Century network moves like cars, taking any available route. But most of us will be stuck on side roads for a while

Rival Actelis, which supplies Britain's Easynet, claims to have an edge in that it supports repeaters on leased lines, extending the reach of copper.

"This is particularly good for educational establishments because they tend to be situated well away from metropolitan centres where the core network is," said Craig Easley, vice president of marketing.

Also interested are mobile-phone companies, who are running out of capacity on lines running from mobile masts, because they can increase bandwidth without laying down new lines.

But the emerging next-generation networks are not all about IP, which is not good at delivering data in the timely fashion required by some applications, because packets take any available route and don't necessarily arrive in step with how they left.

Resolute Networks claims to have the answer with a range of modules that create within an IP link a 'pseudowire' that behaves like an old circuit-switched line and can deliver timely data. A common use is on the feed lines for cellular base stations.

Pseudowires are also used for services such as credit card transactions to shield a datastream from the network operator, says Resolute's Daniel Bar-Lev.

Technology is not the only thing to change in this new packet-switched world. Voice over IP, having turned telco economics upside down, is changing business practices, according to enterprise communications specialist Avaya.

Chris Barrow, senior manager of analyst relationships, says integrated communications systems can reduce what he calls "human latency".

"If you get an email copied to five other people that needs action, you could send out an email to all of them and wait for their reply. Or you could click on the other five recipients and our system could set up a conference call."

And some things never change. Barrow says: "Voice will always be the killer application. People will always want to talk to each other."

• A version of this story at **www.pcw.co.uk/2184381** includes links to the companies mentioned.

Websites of major companies fail the 'five nines' test

Twenty-first-century technology has yet to give websites the 'five nines' (99.999 per cent) reliability of the old telephone network, the Netevents Forum was told. Steve Broadhead of Broadband Testing said he was "genuinely shocked" by the downtime on the websites of major companies he tested.

Paul di Leo, chief executive of Zeus, which sells software and appliances that optimises traffic to networked applications, said websites go down because companies don't put any redundancy into the system to provide a fallback.

There's more on this, including a link to a free site-monitoring tool, at **www.pcw.co.uk/2184162**.

Roger Ward, of BT's office of the chief technology officer, president of the Multiservice Forum, told of the efforts to get global IP Multimedia Subsystem (IMS) services to work together – **see www.pcw.co.uk/2184069**.

Alireza Mahmoodshahi, chief technology officer at Colt, warned that telcos could waste billions if they do not settle standards and interoperability issues. See **www.pcw.co.uk/2184114**.

Avaya announced a new software module for Symbian-based Wifi-enabled phones that will switch seamlessly between Wifi and GSM. See **www.pcw.co.uk/2184005**.

Dean Bubley, founder of Disruptive Analysis, suggested the niche for emerging wireless technologies such as Wimax could be a fallback web-access link. See **http://tinyurl.com/28ofym**

Joel Stradling, a senior analyst at Current Analysis, predicted that per-second billing for mobile voice and data will be superseded by all-you-can-eat fixed-price packages. See **www.pcw.co.uk/2183946**.

There were conflicting views on how to tackle the security problem highlighted by the Nationwide Building Society's loss of a laptop with the personal details of 11 million customers. See **www.pcw.co.uk/2183991**.

And Ian Keene, research vice president at analyst Gartner, said billions of pounds are being squandered globally by businesses buying IT equipment and services they do not need. See **www.pcw.co.uk/2184224**.

Shooting fibre to the stars

Optical-networking pioneer Tenvera has unveiled a new version of its shoot-'em-up system for distributing fibre around the house or office.

The system (pictured) connects up to eight fibre reels to a network switch and will fit into the hollow of a stud wall, according to UK chief operating officer Ken Weller.

As we explained in a previous issue (*PCW*, March, page 20), first install ducting around the home, which is tricky in old houses but easy during building or renovation when the interior walls have yet to be boarded in.

Then use a special gun to fire into a duct a ferrule attached to the fibre on one of the reels. The ferrule can form an optical port at a terminal box, which can be fitted with a choice of connection modules, such as an Ethernet jack.

Unused fibre remains on the reel, avoiding the tricky business of terminating it.

Tenvera sales engineer Kurt Lundell shows how the company's latest unit can fit within the frame of a stud wall

A firm called Sound Environment is using the system to future-proof the network at the Royal Astronomical Society's London HQ.

Director Rufus Greenway says one advantage is that you can just leave the ducting empty and fit the fibre when you need to. The RAS building is old, with plaster skirting boards, so recabling is something you do only when you have to.

"We're not sure whether to fit fibre now or wait until there is a need to start throwing high-definition video around," he said.

The cost of fitting the ducting and switch box is about that of rewiring a house, but the wall modules and fibre will cost more.

The potential market for such systems is huge, with the Government planning to build 200,000 in the south-east alone. There is, as far as we know, no defined best practice for future-proofing homes for networking; Intel and BT have tried in the past to pretend that overstretched Wifi will do the job.

Clive Akass

→ **www.soundenvironment.co.uk**
→ **www.futurereadyhomes.co.uk**

Half of home nets wide open

One in two home networks are vulnerable to a 'drive-by pharming' attack that gleans information to access bank accounts, according to research by the Indiana University School of Informatics (IUSI).

Pharming works by redirecting traffic from a legitimate site to a rogue copy to gain log-on information. This is done by hacking a home router to change the default DNS server – the machine that translates text addresses into the numerical ones used for routing.

The IUSI says 50 per cent of home routers are vulnerable because they use default passwords well-known to hackers.

Professor Markus Jakobsson of the IUSI said the attack highlights the importance of the human factor in security. "Deceit is not new to humankind, but it is only recently that security researchers have started to take it seriously," he said.

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Factions delay IEEE standards

America's IEEE standards process is getting bogged down in spats between vendors and politicking, critics warn.

Best known is the delay over the 802.11n standard for next-generation Wifi, which is still only in draft form and is not expected to be endorsed until September of next year. It was originally scheduled for 2006.

This has brought the industry close to farce, with the policing Wifi Alliance having to institute tests to certify that 'draft N' devices of different makes work with each other.

Last November a group that had been working for four years on an 802.20 standard for high-speed mobile access was broken up as it could not reach an agreement.

Critics spoke of "vendor dominance" and possible irregularities, according to the US magazine *Network World*.

The 802.20 committee was reformed, but one trying to agree a standard for Ultrawideband links gave up last year after nearly three years of argument. It was split into two main factions, and the industry seems to have plumped for technology backed by the one led by Intel and the Wimedia Alliance.

One problem is that standards committees have swelled to as many as 500 members. Another is that big money is at stake.

Steve Mills, chairman of the IEEE Standards Board, told *Network World*: "The higher the economic stakes, the more vested people become, and that makes the goal of consensus in a standard a little tougher to achieve."

But he added that very few IEEE standards projects hit trouble.

Voice of Doom

A new £10 software utility called Scramby enables you to change the sound of your voice using 30 pre-set effects when using Voice over Internet Protocol (VoIP) phone links while playing games online. For more on this, see **www.pcw.co.uk/2184818**.

Data-over-mains costs slashed

A UK-designed chip costing less than $5 (£2.40) will enable a device to use mains wiring as a data link, the developers say.

The Poem chip, from Swindon-based Siconnect, connects at only 14Mbits/sec compared with claims of up to 200Mbits/sec for some rival products.

But Robert Stead, vice president of marketing, says the company cites only real data throughput: "If we were to use the same ratings as our competitors we would be talking about 90Mbits/sec."

Stead said speeds of future Poem chips will be higher but that the current chips were well up to transmitting a standard video stream.

PCW tests have indeed found real speeds of some data-over-mains products to be a fraction of their rated speeds.

At least three other technologies are competing in this arena, including one from Panasonic that it plans to implement directly in consumer-electronics devices. The advantage is that a TV, say, can be networked simply by plugging it in.

This is the market being targeted by Siconnect, though its links are not restricted to Ethernet: it can, for instance, implement a USB link of the mains.

But Stead says its modulation system is very different from rivals and is better able to cope with interference from domestic appliances and to guarantee bandwidth for data streams. It has 16 mechanisms to manage quality of service and prioritise streaming.

Poem chips are also different in that they form a mesh network – if data is blocked along one path, they can pass along another.

There are fears that widespread use of data-over-mains in cities could cause interference problems, particularly with aircraft communications. All the competing technologies can "notch out" frequencies used by radio amateurs, who have complained that they could be squeezed out of the airwaves.

But Stead claimed the power levels are too low to be a problem.

→ **www.siconnect.com**

11n won't jam airwaves, says Broadcom

Wifi specialist Broadcom demonstrated video streaming using its latest draft 11n chips this month and said it was confident that technology will scale to mass use without jamming city airwaves.

The company, which makes the Wifi chips used in many wireless routers, showed two HD video streams using the same single 11n channel in the 5GHz band. A number of peripheral devices simultaneously connected using the more crowded spectrum at 2.4GHz.

One video stream was running at 10Mbits/sec and the other at around 16Mbits/sec in the demonstration at the IPTV forum in London. The demo did not use controversial channel-bonding, which doubles bandwidth by grabbing twice as much spectrum.

There are only three non-overlapping 20MHz channels at 2.4GHz and up to 12 in the less-crowded 5GHz band. Bonding increases the bandwidth to 40MHz but halves the number of free channels. Wifi cells commonly overlap in cities, and there are fears that the resulting contention will worsen with the increased effective range and anticipated heavy-duty use of 11n.

Business development manager Clint Brown said he was sure this would not be a problem and the demo showed there was a lot of spare bandwidth. He was confident that different makes of draft 11n products would also interoperate.

Channel bonding is on by default at 5GHz, but at 2.4GHz can be set to revert to a single channel if there are other networks within range. But it is up to the device manufacturer whether or not this option is implemented.

£300 for safer listening

These latest noise-cancelling headphones from Sennheiser cost a cool £300 a pair – but they could be worth it if you are one of the iPod generation blasting yourself to future deafness.

You may keep the volume down to protect your ears but there is a tendency to turn it up when there is a lot of noise around you – if you are in a train, for instance. But Sennheiser's PXC 450 Noisegard 2.0 headphones will, the company claims, envelop the listener in a 'cloak of silence' by excluding 90 per cent of external noise.

A Talkthrough feature enables you to hear conversations or announcements without removing the headphones and there is no sound leakage, which should help keep fellow travellers happy. Talkthrough is activated by a single tap of a button.

The PXC 450 Noisegard 2.0 headphones will ship in April.

See link at **www.pcw.co.uk/2184529** for details of ear risk.

→ **www.sennheiser.co.uk**

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INTERACTIVE

LETTERS

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LETTER OF THE MONTH

School's out? No it's not!

I read with extreme interest the Letter of the Month, 'School's out', in *PCW*'s April's issue, before becoming rather annoyed.

I'm beginning to discover how ICT in schools is being destroyed by people such as the writer, who believe that the internet and computers in general are just being used as an extension of students' personal lives. I'm sorry, but this simply isn't true.

Computers, contrary to popular belief, are extremely useful in enhancing education. For example, I run the Moodle VLE (virtual learning environment) system in my free time to help others. Myself and another pupil run the server, import pupils' content and upload our own, as well as the teacher's notes that she made in the lesson, using her Tablet PCs. And why do we do this? So that the pupils in our class learn more, get help with homework when they need it and can achieve better GCSE results. And do you know what? We do. In the recent mock examinations the classes using the Moodle system obtained a grade higher than those without its benefit.

There will always be some who will use the internet to access personal sites such as Bebo, but why spoil it for everyone else who uses the internet for research and to improve their learning? Now my rant is over, I'll get back to running my own VLE that the staff couldn't do...

Thomas Llewellyn (16)

DON'T BAN INTERNET TEACHING

Your anonymous writer has opened a can of worms in April's Letter of the Month, but a can that can easily be kept shut or even better, opened properly.

As a director of ICT in a South London school I (with my network manager and the help of staff) have set up a system in school whereby no pupil can access any website that I do not want them to, any email that I do not want them to, or any chat area that I do not want them to. OK, so we use a proprietary system, but this is actually a front end for a number of programs that are available commercially.

All the pupils know that this happens and we explain why we limit access as much as we do. Very few complain as with a good explanation all becomes obvious. Our system allows pupils to access their work from home and we have a programme in school of e-safety education to back this up and train pupils to use the internet wisely and safely – whether at home or at school.

It will always be possible to break such a system and I would be wrong to say this has never happened, but we usually find out very quickly.

The role of the teacher in the ICT suites is to ensure that their pupils are 'on task' and not doing things they should not be. Being on the internet when they should not be is no different to talking or doodling on paper. Making sure this does not happen is one of the reasons why teachers are in the room.

I am far more worried by the changes in government thinking at the present time. Downgrading the importance of ICT teaching (and the use of ICT) to the lowest priority and at the same time changing the online ICT tests from mandatory to recommended, having spent millions of pounds on them.

The internet and computers are probably the finest tools with which to reach school pupils. And like all tools they need to be honed and used correctly.

Mark S P Davis

WHAT A RIP OFF...

I was considering replacing my current computer and thinking of buying a new one with Vista Home Premium.

When I bought my current computer with Windows XP, some time ago, my scanner wouldn't work as no XP drivers were available. So I bought an HP Scanjet 4470c and new HP Photosmart 1000 printer.

I decided to check the HP website to see if drivers for Vista were available only to find that they weren't. It appeared that HP had no intention of providing any, stating that some of these products were more than seven years old, although mine are certainly not that old.

The obvious result will mean that I won't buy a new computer to avoid having to buy the extra

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Unless otherwise stated, letters sent to the Editor, PCW team or contributors will be considered for publication. Letters may be edited for clarity or length.

replacement hardware. As you will be aware this has a knock-on effect – the computer manufacturer loses a sale and so on down the line. Perhaps this could even go further, to the extent of no longer using a computer, despite never being without one since I bought my first one, a ZX81, and therefore not needing to buy computer magazines any more.

A cousin of mine, deciding to drag himself into the 21st century, bought a new computer a few months ago. Just a couple of weeks ago he bought Windows Vista Home Premium and asked the shop where he bought the computer to install it for him. Naturally he couldn't get his Mustek scanner to work due to lack of a driver.

During this period he has had nothing but problems with his computer. It got so bad he took the computer back to the shop and got them to re-install Windows XP – as he said, he wants the computer to give him pleasure, not headaches.

The chap at the shop said that one customer had been back 10 times due to problems with Vista and he advised my cousin to continue to use XP until Microsoft brings out a service pack to sort out these problems.

I think it's only fair to warn others thinking of changing over to Vista of the problems they might encounter.

JE Jones

29 YEARS YOUNG

The editorial column in the April issue interested me because I have been a reader since issue No. 1. Actually, the first issue I purchased was No. 2, but I was so impressed that I wrote to the *PCW* office asking if I could buy the first issue. Unfortunately it was sold out. However, some kind soul very kindly sent me a photocopy of the complete first edition, every page, and I have bought it ever since, first from the newsagent but for years now by subscription.

For a time I hoarded every issue, but the stacks grew so large (I remember the monster

Days of yore: computing has come a long way in 29 years

editions) that I had to dispose of them for lack of space.

My first computer was a Commodore Pet with – wait for it – 8KB of Ram. Hard to believe it was possible to write simple programs in Basic, even with that tiny amount of memory.

My current computer is an Evesham PC with 512MB of Ram and a 100GB hard drive, but as it is seven years old I am nervously contemplating an upgrade of both computer and operating system.

I am now 75 years old and all I have learned about computing I have learned from the pages of *PCW*.

Many thanks for 29 years of enjoyment and instruction.

Stanley Jebb

Kelvyn Taylor replies: We're actually looking for a copy of the first issue of PCW *to help complete our archives. So, if any readers have one in good condition that they would be prepared to part with, please get in touch via letters@pcw.co.uk.*

3G CURES BROADBAND BLACK HOLE

I live within a 10-mile radius of three cities – Wakefield, Huddersfield and Barnsley – but I live in a broadband black hole. The reason given by BT is a long line, much of which is overhead cables, notorious for signal loss. I live 6.5km from my DSL-enabled exchange as the crow flies, but almost double that as the line runs. There's no cable TV here, either.

Increasingly, it feels like people in my situation are a forgotten minority. I recently received this message from a broadband availability checker page:

"Congratulations. Our tests show that your telephone line will support a broadband speed of up to 0Kbps".

This just shows that many providers don't even consider the possibility that ADSL might not be available on some lines – they didn't even bother to change the message to "sorry but...".

A Google search brings up endless pages of people complaining about being unable to get 8Mbits/sec broadband and having to make do with 2Mbits/sec – well for me, the chance would be a fine thing.

But I'm not stuck with dial-up. I found a solution, which may be of interest to other readers in the same situation. It's slower and more expensive than DSL, but it's still a huge improvement. The ingredients are: a 3G data card, a good quality external antenna and a wireless router with a slot for the data card. In my case, the data card came from Vodafone, the antenna from Panorama and the WRT54G3G router from Linksys, but other combinations may be available. I get a theoretical 384Kbits/sec downstream and 64Kbits/sec upstream, never quite achieved in practice, but 10 times faster than the 33Kbits/sec I used to get with my old modem.

The Linksys WRT54G3G router lets you use a 3G data link

The external antenna is a must. According to Vodafone, I should not be able to get a 3G signal at all. If I unplug it, I lose the signal straight away and the data card reverts to GPRS, which is equivalent to dial-up speeds. For readers with only a single laptop in the home, the router won't be strictly necessary, but perhaps a worthwhile convenience.

The bad points are the equipment costs, a 1GB per month download limit, over-compressed pictures on web pages and a monthly bill that would pay for two DSL connections, but beggars can't be choosers, and for now I'm reasonably happy.

One day soon I hope HSPDA will cover my area and I'll get another significant speed boost, although the data card will need an upgrade. I hope this helps a few other readers.

Paul Beard

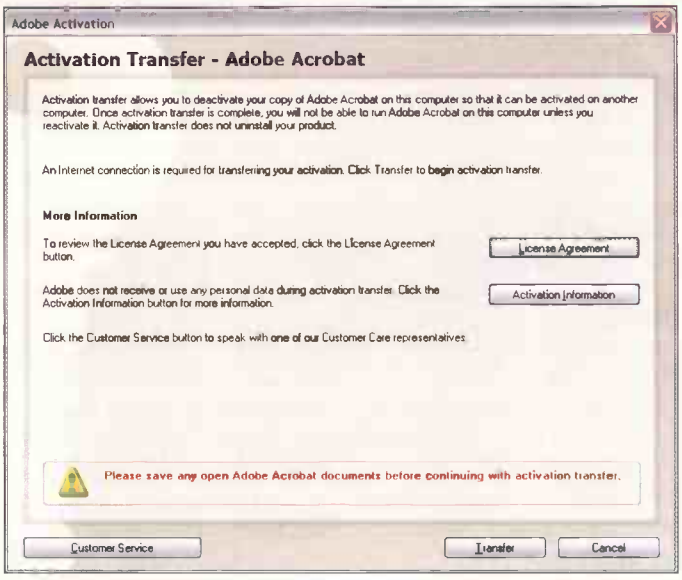
Kelvyn Taylor replies: In our broadband update feature on page 36, we also look at the alternatives for readers in a similar situation.

DON'T BUY SECURITY SOFTWARE

There's rarely a month goes by when at least one of the UK computer magazines is not reviewing internet security products. All new PCs, broadband ISP installation disks or magazine cover discs inevitably now come with a free version only to sting you a few months later with an online subscription.

I know there are differences in the packages and that it is interesting to regularly compare their capabilities. However, I never see any mention in any of the articles that for a significant proportion of broadband users in the UK, they already have access to free internet security packages. I'm not talking about navigating round the AVG website looking for their free version or the basic Zone Alarm that nags you to upgrade.

Its a pet rant of mine but we



Adobe has a system that allows users to transfer activation to different PCs

keep getting ripped off in UK yet we never look carefully to ensure we are maximising our purchases.

In the case of BT Total Broadband and Virgin Media's (previously Telewest, NTL and Virgin.net) packages, all include free protection for Windows users as follows:
BT/Yahoo Total Broadband Options 2 & 3: Free Norton security suite, BT Yahoo Online Protection suite (**http://www.bt.yahoo.com/pcsecurity**)
Virgin Media: Free PC Guard security suite for all customers – anti-virus, pop-up blocker, firewall and privacy manager (**http://www.virginmedia.com/customers/**)

Mac and Linux users unfortunately have to look elsewhere, but for the sad many on MS Windows, why pay twice?
Dave Meadmore

Kelvyn Taylor replies: Thanks for the reminder – it's well worth checking what your ISP has on offer, especially if you've been with them for a long time, they're always changing the customer benefits but don't often notify you.

LICENCE TO FLEECE

In its fight against piracy the software industry currently uses a one-installation on one-computer system, which for most end users is fair and satisfactory. At home I use numerous different PCs for different purposes, and the current system requires me to obtain (and usually pay for) a new licence for each installation, even though I am the sole 'end user' and only use one PC at a time.

With prices now in the hundreds for some software packages, I'm as anxious as the next man to ensure that my money goes to the right people so they can improve and develop their software. But I feel there should be a significantly different safeguard against piracy, which allows me to use the paid-for software on whatever computer I happen to be using at the time, and which also prevents other people from using it after I've finished. For example, appropriate activation information can be stored in a file (encrypted if necessary, or otherwise keyed to a single person), which can be carried on a USB Flash drive, thus temporarily activating an installation, and deactivating it after use.

How much simpler life would be if I could edit a few digital photos on site, rather than having to bring them home to work on them before taking them out again, simply because the terms of the software licence enforce this restriction.

The same thinking ought to apply to Windows Vista – I've paid for it and should be able to use it on whichever PC I'm using at the time. It simply can't be justified in any anti-piracy sense that I have to pay again for every PC I use it on. I am, legally, the end user, and the breathtaking price of most leading software titles ought to cover its use, by me the end user, wherever I happen to be and whichever computer happens to be most convenient for me to use it on.

Piracy is an issue that won't go away and even a system such as this would be open to abuse, but the abuse would be no different to any methods currently employed and would actually make us all feel better about forking out for software.

This feel-good factor would encourage me to buy more titles and upgrade more often, so the industry would actually benefit. Why isn't such a system in place right now?
Ben Ghallis

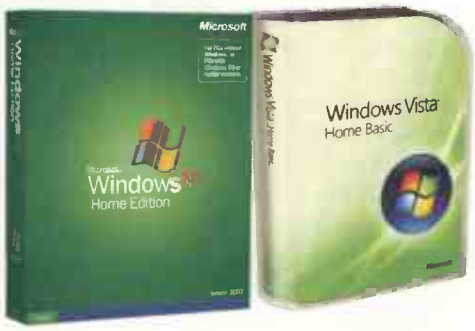
Kelvyn Taylor replies: Adobe Acrobat 7 has a system similar to this that lets you transfer and re-transfer activation to another installation at will, but this is the exception. The only other approach is volume or bulk licensing, but that's not usually an option for non-business users.

CLEAR VISTA

In your Vista feature (*PCW*, April 2007, page 58) you recommend "installing Vista in conjunction with XP to start with, to ensure your eventual changeover is as smooth as possible...".

I have no doubt this is prudent advice, but it goes to the heart of what's wrong with Vista, and while I'm at it, Office 2007. In today's user-friendly age, your average computer users don't want to set-up a dual-boot system in order to ensure a stable operating system. Neither do they want to use an office suite whose default document format cannot be opened by any other software package on the market.

I'm not a Microsoft-basher by nature and I also understand the need for progress. But if Microsoft wants to know why sales have not met expectations, the answer to me is pretty clear.
Robert Shooter



Microsoft users "don't want to set up a dual-boot system to ensure stability"

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Custom PC magazine, March 2007

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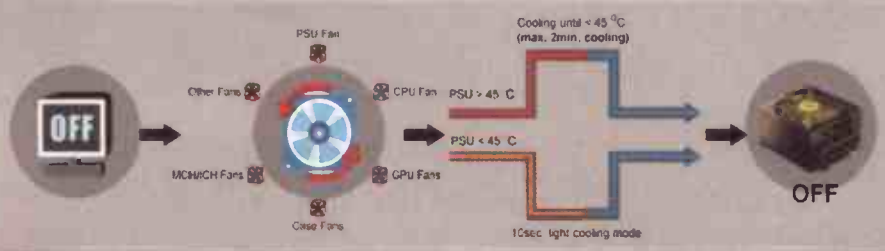

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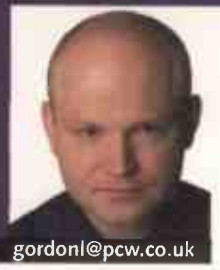


gordonl@pcw.co.uk

Microsoft is watching your backup

Windows Home Server may be one answer to the ever-growing amounts of valuable digital data stored on your home network

Microsoft reckons there are 40 million broadband-equipped households worldwide with multiple PCs, and it's fair to say that many are generating terrifying amounts of data through growing photo, music and video collections. It's these households that Microsoft's targeting with its forthcoming Windows Home Server (WHS).

The major concerns for increasingly data-jammed households are storage and backup. In terms of storage, we can never have enough of it yet expansion can be tricky. And as for backup, well, few of us actually get round to it.

In our defence, backing up has simply become unmanageable. These days you're talking about tens or even hundreds of gigabytes and ever-growing media collections. Few of us have the time or the spare capacity to back up one machine, let alone multiple systems regularly.

'WHS exploits available storage to back up every system in your home every night'

Then there's the threat of viruses or other nasties which can render a PC unusable. System Restore can help, but only if the restoration files themselves haven't been corrupted. It's a wonder any of us can sleep at night.

WHS is Microsoft's answer. It has, in effect, adapted core bits of the tough and capable Windows Server 2003 operating system for the needs of the home user. Like all servers, WHS is primarily designed to house and share information, but rather than worrying about drive letters or locations, the storage is presented as a central area where everyone can store their data.

You can expand the available capacity at any time by connecting additional disks, internal or external, and WHS will simply add them to the main pool, without the confusion of extra drive letters. Multiple disks also allow WHS to deliver redundancy, although not with the restrictions of Raid, which demands identical disk capacities.

WHS exploits the available storage to back up automatically every Vista or XP system in your home every single night. If the same file exists on more than one PC, it'll only be stored once to save space. Then, in the event of disaster, any PC can be rewound to a point when it was working properly.

Being a home server, WHS is also happy to stream content to devices supporting Windows Media Connect, such as the Xbox 360, or other Windows PCs, while an included Windows Live address allows you to upload and download files remotely. Handy if you're securing or freeing up the contents of a camera memory card while on holiday, or just wanting to access your emails or documents on the road.

Is WHS the solution for your home? Despite the inevitable bias to Microsoft products, WHS is still compelling. The automatic backup and restoration of multiple systems is sufficient to sell it alone, before even considering the remote access and easy storage expansion.

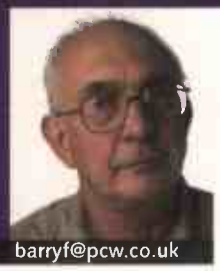
Probably the biggest issue though is delivery. I'm hearing conflicting reports, but I believe WHS may initially only be sold pre-installed on dedicated new PCs. While these will provide the easiest user experience, enthusiasts may not be able to get hold of the software alone. The initial ETA of autumn 2007 is for North America, so we may not see it here for a while.

This reminds me exactly of how Microsoft originally pitched Windows XP Media Center, which initially was only sold pre-installed on new hardware. If the WHS software isn't sold as an official retail package, then I hope a relatively accessible OEM version becomes available soon.

While on the subject of Media Center, I also believe Microsoft has missed a trick by not allowing WHS to record TV. Microsoft says WHS is designed for storing and sharing, not acquisition. Maybe the underlying Server 2003 architecture simply can't do it, but since WHS can stream existing content direct to non-PC devices such as Xboxes, it's a shame you'll need an additional PC just to record TV.

Even with the caveats, Windows Home Server sounds like a great product. So long as it works as promised and enthusiasts are able to install it on their own hardware, I reckon WHS could be a valuable addition to any modern home. See next month's *PCW* for details on setting up your own 21st century modern digital home. **PCW**

Barry Fox



barryf@pcw.co.uk

Give us the whole truth

When electronics that carry bugs are shipped to customers, it is the manufacturer's duty to tell us

At the Consumer Electronics Show (CES) in Las Vegas in January, print journalists were complaining that bloggers were clogging the press conferences. Some bloggers were plainly freeloaders, but others were walking the show and posting stories for print journalists round the world to steal. It was a blogger who recently revealed Dutch company Tom Tom has been shipping consumer sat navs with malware on the hard drive.

Davey Winder of **www.happygeek.com** heard from an IT consultant who had bought a factory-fresh Tom Tom Go 910, connected it to his PC and immediately got two anti-virus software alerts. The win32.Perlovga.A Trojan and TR/Drop.Small.qp were sitting inside the sat nav, within the copy.exe and host.exe files.

The IT consultant contacted the Tom Tom support line, and was told the intruders were "not dangerous". He then tried to alert Tom Tom's HQ in Holland, but got the runaround.

'It was a blogger who revealed Tom Tom had been shipping sat navs with malware'

Tom Tom gave Winder's blog a statement with no hint of apology: "It has come to our attention that a small, isolated number of Tom Tom Go 910s, produced between September and November 2006, may be infected with a virus. The virus is qualified as low risk and can be removed safely with virus-scanning software.

"Tom Tom highly recommends all Tom Tom Go 910 customers update their virus-scanning software, and if a virus is detected, allow the virus-scanning software to remove the 'host.exe' file, 'copy.exe' file or any other variants.

"The above identified files or any variants can safely be removed from the device with virus-scanning software, and are *not* to be removed manually, as they are not part of the standard installed software on a Go 910."

UK security company Sophos then sent out a press release to journalists, crediting Winder's blog as the source and reminding us that, although Tom Tom sat-nav devices are Linux-based and cannot suffer from the infection they carry, Windows users who connect to the device via their USB port risk infecting their PCs.

"What's worrying," said Graham Cluley of Sophos, "is there may be many consumers out there who are unaware they have passed an infection onto their Windows PC."

Finally, a note appeared on Tom Tom's website saying much the same as it had told the blog.

I gave Tom Tom the chance to comment and explain how the virus was not caught by its factory's anti-virus traps. After some parcel-passing between the US, Holland and the UK, a spokesman phoned me.

"It was a batch from a week between September and November 2006. We can't say which week," he admitted. "Posting information on our website is the best way to alert consumers. We didn't tell the media. We didn't send out a press release. There has been no proactive communication. This is a very sensitive issue. The story would have been 'virus found in Tom Toms'. Would you expect Microsoft to send out press releases when a virus is found in Windows?"

Windows is a computer system that warns users to install virus protection and downloads security patches. Sat navs are consumer devices that come without virus warnings.

The clean-up advice given by Tom Tom's website is bewildering. What is meant by "any other variants" and if they can safely be removed from the device with virus-scanning software, why are they "Not to be removed manually"?

"I don't know what is meant by that," admitted Tom Tom's spokesman. Neither do I.

The spokesman later called to tell me that anyone who registered their devices had been sent a warning in a newsletter. I have two devices registered, and have seen no such warning.

Sophos reminds that some iPods shipped with the Troj/Bdoor-DIJ Trojan horse and the Japanese subsidiary of McDonald's is recalling 10,000 mp3 players after finding a spyware Trojan on them.

So, yes, these things do happen and they will go on happening, as hackers try to make them happen. But when they do happen it is the duty of the manufacturer to tell us – not wait to for bloggers and journalists to shame them into grudgingly half-telling. **PCW**

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Guy Kewney

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One step forward, two steps back

With Expresscards and Vista arriving at once, this is the worst time to be buying a notebook. Time for a stretch in techno-limbo

I wish PC manufacturers lived a bit more in the past; it isn't all that long ago, and most PC users are stuck there. Specifically, we live in a world where, if you want to add a new component to your laptop, you stick a card in the side. Now, suddenly, everybody expects you to squeeze your old PC Card modem into a slot designed for Expresscards.

Most of the news about the Expresscard format is good. First, it really is simpler and faster. When the first PCMCIA Card Type I slots (the cards were later renamed PC Cards) appeared, they were actually a lot quicker than the system bus used in those days. Modern notebooks, though, have a connection into the PCI or USB systems which is nearly two orders of magnitude quicker.

'Resign yourself to wandering around in the land that time forgot for another 12 months'

According to the PCMCIA (Personal Computer Memory Card International Association): "PCMCIA's Expresscard technology builds upon and improves the ease-of-use model well established by PCMCIA's PC Card technology. Expresscard slots utilise the native hot-pluggable PCI Express and USB buses... they do not require the expensive controller or cumbersome software stack found on the PC Card interface."

It's true. Now, imagine you're a software developer. You're pumping out daily beta versions of some miraculous Web 2.0 application that will transform the planet by linking all notebook users wirelessly to their videoblogs, say, and managing the copyright issues simultaneously, so that if an earthquake happens on the next block, your customer's webcam will automatically negotiate syndication rights with CNN. (You get 20 per cent, of course...)

Pretty much any software designed to interface across the PCI bus, or talk to USB devices, will work with Expresscard devices. A few tweaks is all they need – none of those wretched "expensive controllers or cumbersome software stacks" for you to support.

Meanwhile, out in the real world, 90 per cent of notebooks are still using PC Card devices. Do they work? Maybe. If they don't, who fixes them? "We're aware of the issues," you instruct your web designer to say, "and once we get to General Availability..."

And what else do you do? Well, nothing. Get on with making sure the Mac version works, perhaps. By the time you've sussed out the support issues under Windows XP and Cardbus, most people with older machines will have walked away from the problem. They won't even try to download a version that supports them on the grounds that the last one didn't work, so why would they expect a new version to succeed? So you focus on the people with new hardware.

New hardware? Does that support the old PCMCIA Card formats? Well, not physically, as the new card is half the width. But "adapters are available", and indeed they are. Plug in the adapter, and your PC Card now sticks out a mile, is perfectly simple to smash accidentally, very prone to electrical disconnection and noise, and... does it work? "We're aware of the issues..."

Irritatingly, this is probably the worst possible time to have to buy a new laptop. You will now find it almost impossible to buy a new PC that will run Windows Vista but also accommodate all your old expansion cards – and even if you have a dual-slot system, the chances that all the old cards will work flawlessly, will have proper signed drivers, and won't crash the system are pretty slight. But are all the cards available in Expresscard format? I'm sure the card manufacturers are aware of the issues.

My newest PC is a notebook. It's a lovely thing, less than six months old, dual-core, 64-bit Asus motherboard and it has a PC Card slot. No way does it need replacing, and so I'm not going to join the Expresscard club for another year at least, and probably, neither are you.

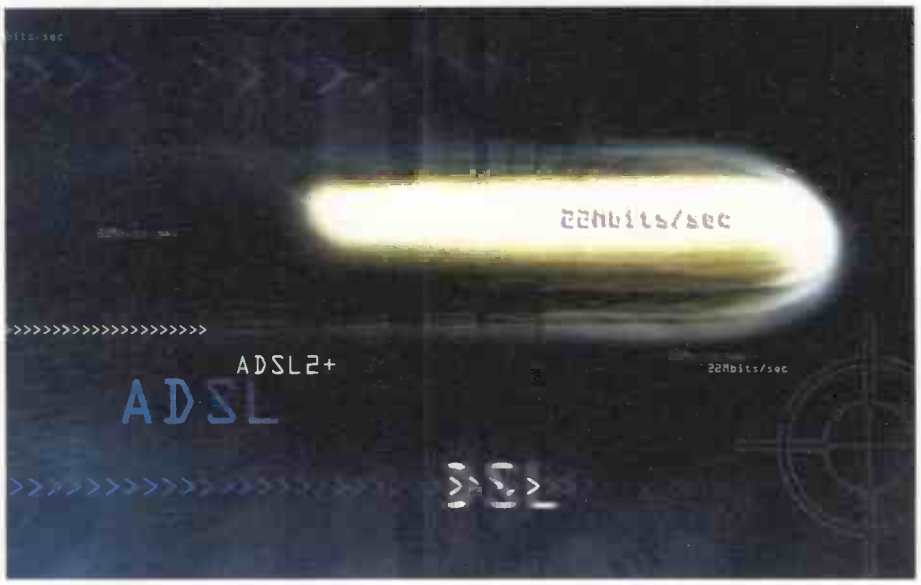
Resign yourself to wandering around in the land that time forgot, like a ghost from the past, for another 12 months. Buy me a pint if you meet me there, will you? One thing you can be sure of: we won't meet any PC notebook makers in that strange, limbo-like world. They've all moved to 2008. **PCW**

Next-generation broadband

With 24Mbits/sec connections, digital TV and a whole new phone network on the way, broadband is changing fast in 2007, says Nigel Whitfield

There's little doubt that 2006 was the year of the broadband bundle and 'free' broadband offers. Carphone Warehouse fired the first shot, offering a free service to those who took out its phone package, swiftly followed by offerings from Orange, Sky and others, all keen to provide a group of services with one bill. It was also the year – for some – of 8Mbits/sec broadband, of failed ISPs and of migration nightmares.

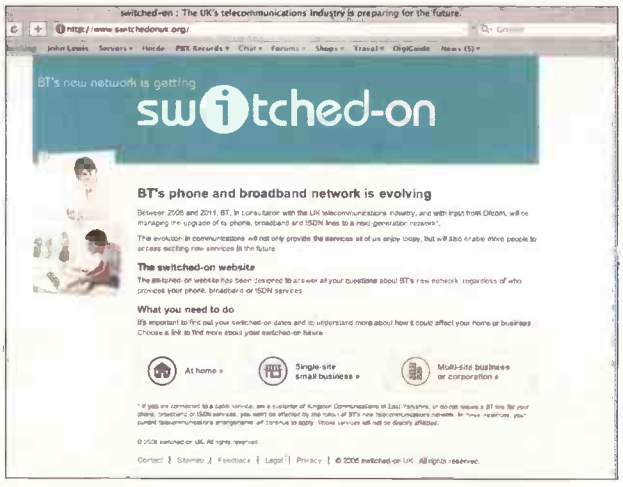
So, what does 2007 and beyond hold for the broadband user? More special deals? Faster speeds? Less confusion when you want to switch? Or will there be another surprise announcement to shake things up as much as the 'free' offers did last year? Here we will take a look at the technologies and companies that are likely to be shaping the course of UK broadband over the coming months and years. And on page 38, you'll find our regular summary of the type of deals currently on offer from the top providers.



Up, up and away

A theme of our last look at broadband (*PCW*, October 2006) was the higher speeds on offer to more and more users, thanks to Local Loop Unbundling (LLU). While BT's 'Colossus' network, which provides the backbone for many of the UK's ISPs, only managed a maximum of 2Mbits/sec, other companies were busy installing their own equipment in telephone exchanges, providing us with the opportunity of moving to a broadband service that didn't rely on BT's connectivity. With claims of 'up to 8Mbits/sec' many users were easily tempted away – and many were disappointed to find that the emphasis was far more on the 'up to' than on the '8Mbits/sec'. Whatever the marketing claims, it's still an unavoidable basic fact of DSL technology that to perform at its best, you need a good-quality phone line that's not too long – so the further away from the exchange you are, the less likely it is you'll reliably receive the top speeds. Even those who think they're close enough can find that the cables are routed the long way round, or have so many joins, or sections made of aluminium rather than copper, that the maximum speed is seldom likely to appear. And, to confuse us even more, while the headline figure in some of the adverts was 8Mbits/sec, it was only available from an exchange in which LLU equipment had been installed; you could sign up with a company and find that you'd be connected via BT's network, until they found time and/or money to equip your local exchange.

Things have, however, improved – and they're set to get better yet. Most broadband users in the UK can now have 'DSL Max' following BT's rollout of the technology. Using rate-adaptive DSL – where the system continually monitors the line and adjusts for the best possible speed – download speeds of up to 8Mbits/sec and upload speeds of about 400Kbits/sec for home users, and twice that for business users, are possible. Every broadband ISP that



BT's website will tell you when your phone line will transfer to the 21st century Network

The back of beyond

Cable and DSL broadband have certainly brought faster net access to many – but there's still a large number of people in the UK who are beyond the reach of the cable networks and DSL services, let alone the latest high-speed ones.

If you're in one of these black holes, what are your options if you want something better than dialup? While there's been much talk of wireless broadband over the years, there's little to show in terms of services beyond the usual hotspots.

Wimax still has yet to move much beyond the trial phase – Pipex should have a trial in the Warwick area around the time you read this – with widescale deployment unlikely to be available until later this year, or sometime in 2008. Meanwhile, satellite broadband has failed to take off, and the past couple of years have seen services closing, rather than launching.

For those who really need something a little faster than dialup – although despite the hype, it's often not that much faster – the best bet is probably 3G mobile networks. While coverage has been patchy, it's improving, even outside cities, and some readers have reported to *PCW* that they can now receive 3G, even though they can't get DSL. It's a situation that should be helped by moves such as Vodafone and Orange sharing 3G sites, allowing them both to benefit from better coverage. And the rollout of HSDPA (high-speed downlink packet access) means that, provided you have a suitable card for your laptop and good coverage, you can access the internet at 1.8Mbits/sec, with higher speeds to follow.

The fly in the ointment, as ever, is download limits and pricing. While T-Mobile's Web-n-Walk service is, for example, one of the most attractive for those who want to access lots of data, despite the word 'unlimited' on the main web pages, there's actually a 10GB fair-use limit on its £44 a month 'Max' plan, and only 3GB for £29, so it's still a pricey alternative, compared with DSL broadband.

With an HSDPA card, T-Mobile's Web-n-Walk service is one of the best-value 3G options, but it's still pricier than DSL or cable

Geography, of course, plays a vital role in determining how easily you can access broadband, but not always in the way you might think. The wildest parts of the UK may never be within reach of 3G mobile phone coverage, but they could still benefit from broadband, thanks to public funding – an area in which Scotland has done much work, first via the Highland and Islands Telecommunications Initiative in the 1990s, which brought ISDN to many places. Much work is now being done by the Scottish Executive, working in partnership with European Regional Development Funding, to investigate broadband rollout. This includes helping to fund broadband enabling of otherwise unprofitable exchanges. Around the time this issue of *PCW* appears, an announcement on the first areas to be connected as a result of the initiative should appear. A report commissioned by the Executive, *Broadband Reach Report*, also provides an excellent overview of current technologies and their limitations, at **www.scotland.gov.uk/Publications/2006/12/20130045/0**.

ALTERNATIVE HIGH-SPEED OPTIONS

		MONTHLY FEE	CARD COST	MAX SPEED	INCLUSIVE DATA	CONTRACT LENGTH	SERVICES BUNDLED
Web and office 1GB	www.three.co.uk	£45	Free	384Kbits/sec	1GB	12 months	None
Data Max 1024	www.o2.co.uk	£52.88	£141.00	384Kbits/sec	1GB	12 months	None
Business Everywhere Max	www.orange.co.uk	£45	Free	384Kbits/sec (1.8Mbits/sec due 2007)	1GB (*)	12 months	None
3G Broadband Data Unlimited	www.vodafone.co.uk	£52.88	£57.58	1.4Mbits/sec	1GB	12 months	None
Web-n-Walk Max	www.t-mobile.co.uk	£44	Free	1.8Mbits/sec	10GB	12 months	Hotspot Wifi pass

(*) Usage charged per MB, based on monthly fee allowance; 4.5p/MB 3G, 7p/min Wifi; Some services may only be available to business customers

resells BT's service should be able to provide a Max-based DSL line to customers.

Of course, while Max brings the same speeds to most people that the LLU providers were boasting about last year, the competition hasn't been standing still either, and providers such as O2-owned Be (**www.bethere.com**) are now offering three times the maximum speed of BT's DSL, using ADSL2+, the latest generation of the technology, in its LLU equipment.

Be isn't the only company offering these super-fast speeds; UK Online has a 22Mbits/sec service, while Bulldog and Sky are offering 16Mbits/sec – and there are other providers listed in our table. But, just as with last year's 'free' offers, there can be catches beyond the fact that you'll only get the top speed on a good line. Sky's best prices, for example, rely on you having a subscription to its satellite TV service, and for many of the best deals, you'll be locked into a contract for at least 12 months – possibly longer. And, for many people, the best speed you'll get is still up to 8Mbits/sec.

Into the 21st century

While there's, arguably, never a good time to be tied into a long contract in a fast-changing world such as technology, there's every indication that BT is starting to move somewhat faster than it has in the past, when it comes to providing better network services across the country.

That's due in no small part to the 21CN, or 21st Century Network. It's a massive project to replace BT's core network infrastructure with one that relies on IP (internet protocol) technologies, making it easier to move all sorts of data across a unified network, instead of having different systems for voice calls, broadband data and so on. The first customers – in the Cardiff area – have already been switched over to the network, and over the next few years, the rest of the country will be migrated to the system. You can find out roughly when your phone exchange will switch over at **www.switchedonuk.org**. ↘

FIND YOUR CHEAPEST ISP Go to www.pcw.co.uk/uswitch

However, the site neglects to mention one of the most useful benefits for many broadband users – as a result of 21CN, broadband speeds of 24Mbits/sec should be available to anyone connected to BT's network, or at least the new parts of it. The target date for providing the wholesale service that will enable other ISPs to resell this service is January 2008. So, if you're not desperate for the speed right now, you may prefer to wait until then, rather than be locked into a long contract with one of the companies providing LLU broadband.

For more useful technical information about the project, check www.btplc.com/21CN. Technically, with everything using IP, there will be far fewer different systems for BT to manage, instead of different networks for data and voice traffic. It should also make it simpler to introduce new services, and hopefully avoid the need for extra equipment in exchanges to host new technologies. Today's DSL requires lines to be linked to a Dslam (digital subscriber line access multiplexer) as well as to the main exchange, while in the 21CN, a new device called an MSAN (Multi Service Access Node), will provide all the services, with everything passed back to the rest of the network as IP packets.

Despite all the talk of moving to an IP-based network, however, one thing that 21CN won't be doing is providing an IP-based link direct to your home. While the network will be based on IP, the local loop (the cable between your home and the local exchange) will work in the same way as before, so existing analogue and ISDN phone equipment, and even broadband routers won't need to be replaced.

Whither wireless

Broadband doesn't just come via DSL of course, although for most people in the UK it's the most sensible solution. The cable networks only reach about half the homes in the country. And even though they're talking of expanding, their aim is to use DSL and provide a limited TV service, rather than spend more money on digging up streets.

Satellite and wireless broadband are often touted as solutions for people beyond the reach of cable and DSL, although neither has fulfilled its potential. The past year has seen satellite providers such as Aramiska and Ouranous cut off and, with other alternatives such as 3G and the wider availability of ADSL, the market for wireless broadband is smaller than ever – especially when services can cost upwards of £60 a month for a download speed of only 512Kbits/sec (see box 'The back of beyond').

Next moves

So, what does the future hold for most broadband users? It's unlikely there will be anything to upset the apple cart as much as last year's 'free broadband' offers – but equally, there will be fierce competition. Prominent will be the publicity hungry Virgin Media trying to extend the reach of its network using television via IP. It is already fighting with Sky over channels on cable and satellite, and broadband is likely to be another area in which the two will spar, with Sky's online services providing access to selected TV content too.

Add the launch of the BBC's iPlayer, BT's Vision, and a wider rollout of the old Homechoice service (now owned by major player Tiscali), and this could well be the year when more people see video arriving via a broadband connection – whether it's a full

ISP highlights

ISP	PACKAGE	URL	PHONE	MONTHLY FEE	LINE RENTAL	SETUP FEE
HIGH-SPEED PACKAGES (OVER 8MBITS/SEC)						
Be	Be unlimited	www.bethere.co.uk	0808 234 8566	£24	£11 (1)	£24.00
Bulldog	Unlimited Plus	www.bt.com/broadband	0800 389 8714	£24.50 (3)	£10.50	£30.00
Sky Broadband	Broadband Max	http://broadband.sky.com	08705 515 515	£10 (4)	£11 (1)	Free
UK Online	Up to 22MB Broadband	www.ukonline.net	0800 053 0606	£29.99	£11 (1)	£25 (5)
Virgin Media	Broadband Size:XL	www.virginmedia.com	0845 840 7777	£35	None - cable	£25.00
MAJOR BUNDLES AND 'FREE BROADBAND' OFFERS						
BT	Total Broadband Option 3	www.bt.com/broadband	0800 389 8714	£26.99	£11 (1)	Free
Eclipse	Home Broadband option 4, TalkMore 3	www.eclipse.net.uk	0845 1224 111	£29.99	£11 (1)	Free
Orange	Free broadband	http://freebb.orange.co.uk/offerinfo	N/A	£5 (7)	£11 (1)	Free
Pipex	Pipex Max Broadband and Anytime calls	www.pipex.net	0845 077 2537	£27.49	£11 (1)	Free
TalkTalk	Talk 3 International	www.talktalk.co.uk	0870 444 1820	£8.99	£11	Free
Tiscali	Anytime Talk	www.tiscali.co.uk	0800 107 9000	£17.99	£11 (1)	Free
Vodafone	Vodafone at Home	www.vodafone.co.uk	08700 700 191	£25 (9)	Included	Free

1 Standard BT line rental; BT line required; 2 Unspecified limit, 'excessive use' not permitted; 3 19.50 for the first two months; 4 A subscription to Sky TV is also required; 5 Purchase of wireless router at £79.99 is mandatory; 6 22.99 for first three mo

A new Vista?

Microsoft's new operating system has received plenty of coverage in *PCW*, but it's still worth a mention in a broadband feature, especially for those who have been connected to DSL for a few years. If you're one of the early adopters of UK broadband, there's a good chance you'll have a USB-connected ADSL modem. Even if you've connected fairly recently, the free broadband kit offered by some ISPs still connects via USB.

And that could be a potential problem when you're updating to Windows Vista. It's vitally important to make sure there are Vista drivers available, and to download them before you do the upgrade – especially if your ISP provided you with a proprietary software utility to set up your connection. If there are no drivers or software available, then you could be stuck without an internet connection, with no way to download any fixes.

In fact, if you have a USB device linking you to the internet, notwithstanding the improved security in Windows Vista, you should consider upgrading it to a combined broadband modem/router (sometimes called an ADSL router or gateway) that connects to your PC via Ethernet. You'll be able to share the connection easily, and most include a Nat firewall that can offer additional protection for your computers. You can pick one up for less than £30, and connecting via Ethernet means you don't have to worry about drivers. Of course, you will need an Ethernet network card in your PC, but unless your PC is very old, it will likely already have one built in. If not, they're cheap and easy to install – about £8-£10 for desktop (PCI) or laptop (PC Card) models.

If you're still using a USB ADSL modem, a switch to Vista might be the right time to swap it for an Ethernet model to avoid driver problems

service from the likes of Virgin and Tiscali, or highlights to play back from the BBC, Channel Four and Sky.

While other companies join the game with package deals such as Vodafone's 'At Home' service, and some invest in the fastest ADSL2+ technologies, we think the time when broadband will be really interesting is next year, rather than this. In 2008, Wimax should finally be more widely available, BT's 21CN will start to make high-speed broadband generally available, and more mobile networks should have high-speed downlink packet access (HSDPA) services running – hopefully at more sensible prices than today.

With some of the UK's biggest brands involved in a fight for your money, packaging together TV, internet and telephony, there are plenty of new products and services poised to break into the mainstream. Unless you really need the fastest speeds right now, we think it's worth pulling up a ringside seat and watching to see who's going to pack the biggest punch. **PCW**

MAX SPEED (MBITS/SEC)	MONTHLY CAP	SUPPORT HOURS/COST	CONTRACT LENGTH (MONTHS)	EQUIPMENT INCLUDED	SERVICES BUNDLED	COST OF CALL OPTION	INCLUSIVE CALLS
24	Unlimited (2)	24-hour, Free	3	Wireless router	None	N/A	N/A
16	Unlimited	9am-8pm, Free	12	Modem	LLU telephone	£12 for UK unlimited	To Bulldog customers
16	Unlimited (2)	24-hour, 0870	12	Wireless router	None	N/A	N/A
22	Unlimited (2)	24-hour, 0845	12	Wireless router (5)	None	N/A	N/A
10	Unlimited	24-hour, 0845	12	Modem	None	N/A	N/A
8	Unlimited	24-hour, 0845	12	Wireless router, VoIP handset	Wifi roaming, VoIP telephony		UK off-peak
8	40GB	8am-8pm, 0845	12	Wireless router	CPS telephony	£5.99	UK geographic
8	Unlimited (2)	24-hours, 0870	18	Wireless router	Mobile, VoIP telephony	Included (8)	National and international landlines
8	Unlimited	9am-8pm, 0845	12	Modem	CPS telephony	Included	UK geographic
8	40GB	8am-9pm, 0871	18	None	CPS telephony	Included	UK geographic, certain international destinations
8	Unlimited	8am-midnight, 0870	12	Modem	CPS telephony	Included	UK geographic
8	Unlimited	24-hour, 0870	18	Router	CPS telephony	Included	UK geographic

7 An Orange mobile subscription of at least £30 per month is also required; 8 Inclusive calls are via VoIP, not mobile; 9 Vodafone mobile contract required

Capped, unlimited and in perfect shape

With more and more video content available online, traffic shaping and download limits could hit an increasing number of broadband users

For the bulk of internet users, the caps and limits imposed by ISPs aren't too much of a concern. You choose a package you think will fit your requirements, and hope to stay within them. But what of those who don't? Is there such a thing as unlimited broadband?

Some providers say so – but it's always worth checking the small print. Every broadband line has a physical limit – the amount of data you could theoretically download if you ran the line all day, every day. And you might think that's what is meant by an 'unlimited' broadband service. You'd be wrong. All too often unlimited really means "subject to fair use" and that, in turn, can mean "there is a limit, but we're not going to tell you until you hit it". If a provider won't give you some clarity on just what it means by fair use – and give it in writing – then you may be better off with one that has a specified limit. That way, at least you'll know where you stand.

One of the bonuses that the cable networks – now unified under the Virgin Media brand – have claimed is their unlimited broadband, which, at 10Mbits/sec, is also faster than most ADSL-based services.

But over the past year, customers in some areas have found they are not receiving quite what they thought they were paying for, thanks to a traffic-shaping trial. Users who appear to be using much more than the average amount of capacity find the speed of their connection is throttled down. The reason is simple – everyone competes for capacity on a network, so a few heavy users can potentially eat up capacity that other users would have. You can see the same at home if you share a broadband link between a few PCs. Start downloading a huge file from a fast website on one machine and it will suck up lots of your bandwidth, affecting the speed on other PCs.

Unfortunately, such bandwidth contention is a fact of life and no consumer ISP will buy enough capacity to ensure that all its customers can connect to websites at the maximum speed all the time – they simply couldn't afford it. And in the absence of download limits, traffic-shaping is likely to become more widespread. It may become a little more sophisticated however, for example, restricting users only at certain times of day, or only certain types of traffic.

To an extent, traffic-shaping is very similar to the 'net neutrality' that we investigated last time we looked at broadband in the UK, but on a smaller scale. BT's broadband, for example, includes download quotas on some packages, but for those customers who have their BT Vision broadband television service, the TV data doesn't count towards the data limits. Try out Joost (**www.joost.com**) – the new broadband TV system from the inventors of Skype – and you'll quickly use up your allowances.

As more people use the internet to download video content, whether it's from sources such as iTunes, BitTorrent sites, or IP television, such as Channel Four's 4OD and the BBC iPlayer, internet providers and their customers will struggle to find ways to pay for the bandwidth and provide those using video services with a good experience.

Switching simplified

The most common type of complaint we receive about broadband at *PCW* is about switching ISPs. When we last investigated the topic, Ofcom had accepted that the industry couldn't simply be left alone to manage things itself – too many customers were forced to pay for the MAC codes necessary to enable a smooth switch between ISPs. Some found it virtually impossible to obtain these from their ISP, even if they had no outstanding bills.

From 14 February 2007, Ofcom's new rules state that customers have to be given their MAC code, and they can't be charged for it. On the face of it, this should make things much simpler, but there are still flaws in the system. For example, it's focused on providers that buy services from other wholesale broadband suppliers, such as BT and Tiscali, so may not necessarily cover everyone who has a service provided by an ISP that uses Local Loop Unbundling (LLU).

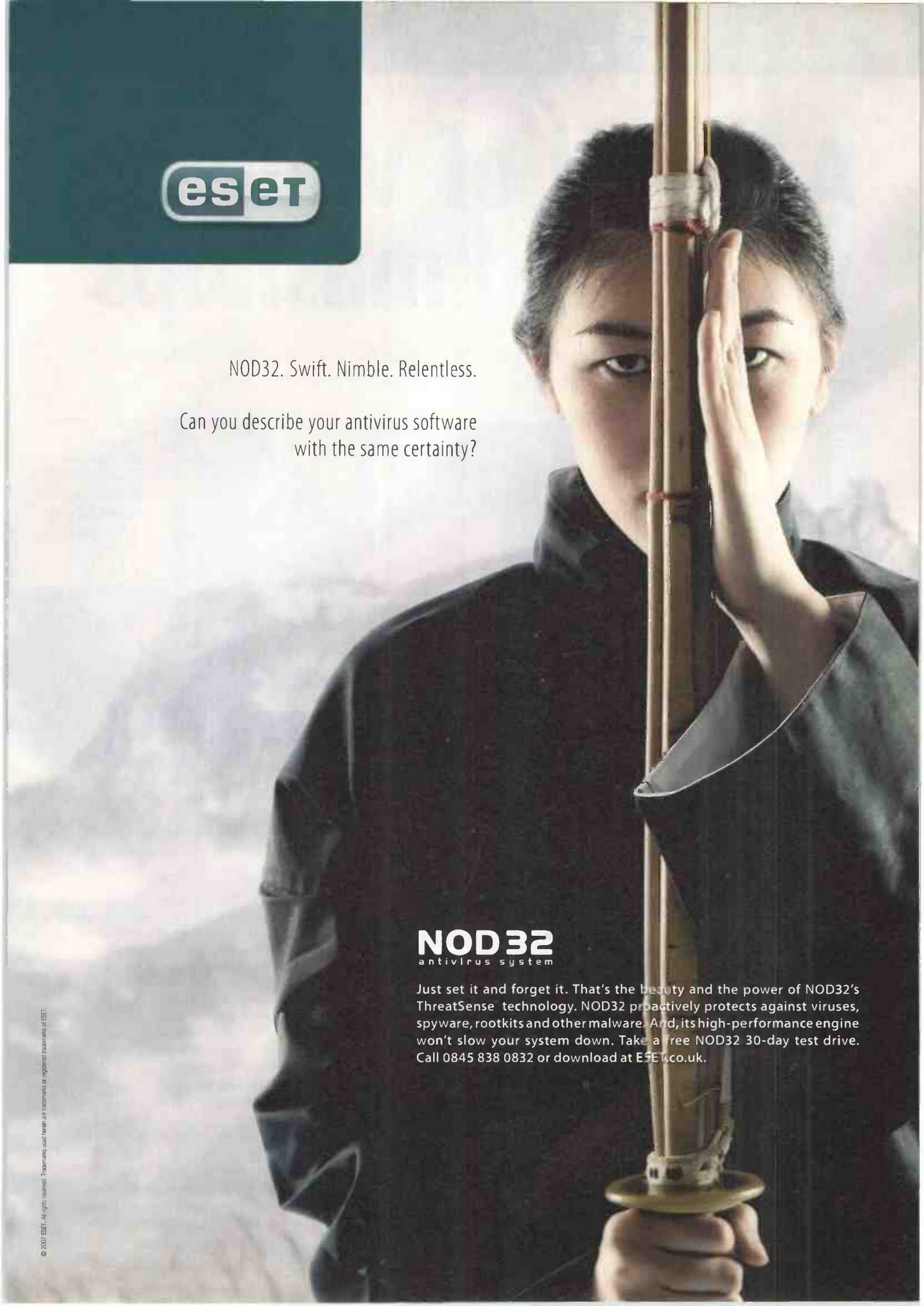
Additionally, though there is a requirement that wholesale providers give their customers MAC codes when requested, the customer isn't the end user – it's the smaller ISP that is reselling the broadband service. And there's still no requirement for those codes to be made available to the end user directly. That may sound like a minor technical point, but as the failure of some smaller ISPs showed last year, it can prove a major sticking point.

If you're a customer of a small ISP that ceases trading, you could find you have two choices – take the service offered to you by the people who provided your ISP with their broadband network, or cancel and endure a couple of weeks without broadband until your line is finally free and you can make your own choice. It's an area Ofcom will look at this year but, in *PCW*'s view, it should have been included in the regulations that came into force in February.

At the time this article was written, the new rules on MAC codes had only been in force for a short time – too short to see how well they work in practice, and whether or not the potential problems and loopholes are affecting many readers.

So, if you have tried to switch broadband providers since February, we'd like to hear from you – whether your experience was good or bad.

Ofcom's new rules for switching broadband providers are supposed to solve problems. Let us know your experiences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NOD32
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Just set it and forget it. That's the beauty and the power of NOD32's ThreatSense technology. NOD32 proactively protects against viruses, spyware, rootkits and other malware. And, its high-performance engine won't slow your system down. Take a free NOD32 30-day test drive. Call 0845 838 0832 or download at ESET.co.uk.
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A world of widgets, wikis and mashups

The web has evolved from a way of reading information into an interactive, personalised, programmable medium. Tim Anderson investigates how to benefit from Web 2.0

The next-generation internet, sometimes called Web 2.0 or even Web 3.0, is a slippery concept, perhaps because it is both a technological and a social phenomenon. The technology is easier to explain. The advent of fast internet connections at home, work and from mobile devices, means that personal computing is no longer just about a beige box on a desk.

Today, it is about being able to access your data from anywhere, and perform tasks such as writing documents or analysing figures, without caring where the application you're using is running. It's also about harnessing the vast array of internet resources in ways that are useful. The company that has done most to enable this revolution is Google, whose clever algorithms and seemingly inexhaustible scalability enable it to answer many of our questions nearly instantly. If the internet is the computer, Google is its user interface.

In this new era, the data is in the internet 'cloud' and the user is on the move. Software needs to be highly adaptable, preferably working across multiple devices with minimal installation hassles. To help this happen, software architects have come up with the notion of 'software as a service'. Applications run on the web server, and the client is a web browser, or an automatically installed applet embedded in a web page, or a desktop application, all accessing the server in the same way. It's all glued together using XML or JSON (Javascript Object Notation), so that the services can be made available – or 'published' – in a platform-independent way. Where once it was assumed that web applications were a poor, clunky second-cousin to smooth, slick desktop software, Web 2.0 technologies such as Ajax and Flash have changed all that, bringing the richness of the desktop to the browser.

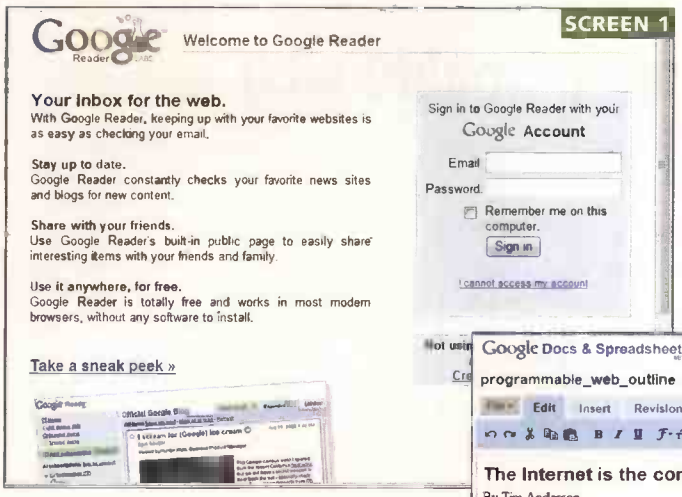
One of the benefits of this service-based approach is that separate services can be mixed together to create a new application category called a 'mashup'. The concept is similar to the long-established practice of building software from components, except that in this case the components are all services with their own data streams. Sites such as Netvibes or Windows Live Spaces allow users to construct personal portals, assembling data from multiple sources into a single personalised website.

So much for the technology; but what about the social aspect? A key factor in the growth of such systems is that authoring web content is no longer technically demanding. The web has become participative, just as its inventor Tim Berners-Lee originally envisaged. The implications are far-reaching. Publisher and web guru Tim O'Reilly observed in an article that Web 1.0 was the era of Britannica Online, and Web 2.0 the era of Wikipedia. The public relations industry is in a spin trying to figure out how to manage business publicity in a world of 70 million blogs, where purchasing decisions are now based more on user reviews than vendor blurbs. Web 2.0 is also about collaboration, from open-source projects to virtual meetings.

To put all this into context, let's look at six key ways to take advantage of the next-generation internet.

RSS

RSS (Rich Site Summary, or Really Simple Syndication) is just a simple XML schema suitable for publishing news feeds, with elements including title, author, content description, and a link back to the source web page. The simplicity of RSS makes it easy both to generate and consume. In its early days it was used for aggregating news feeds. People then used it to create their own personal news feeds and called them blogs. With a little adaption RSS became a vehicle for personal broadcasting, in the form of podcasts – multimedia content that you can download to a PC or portable player. Now RSS is moving on again. Most blog feeds have a single URL, but some websites have realised that by appending arguments to that URL they can use RSS to deliver a simple form of software



Left: Google Reader is a popular online blog aggregator

Below: Doing Office 2.0 with Google's Docs & Spreadsheets

as a service. The Ebay RSS API is an example, letting you use RSS to track auction listings that interest you (see box below). Yahoo is now taking RSS into mashup territory with Yahoo Pipes – see page 45. Despite its simplicity, RSS is showing no sign of running out of steam.

Most people are aware they can easily author a blog by signing up for one of the free services, such as Google's Blogger (**www.blogger.com**) or Microsoft's Live Spaces (**http://spaces.live.com**). In addition, some have discovered that the most advanced blogging systems are effective content management tools, allowing users to manage an entire website. Wordpress (**www.wordpress.org**) is a good example. By installing this free software on your own website, you can author hierarchically linked pages as well as traditional blog entries, and apply themes so that your site looks different from all the other Wordpress sites out there.

The other key feature of RSS is the number of different ways you can receive feeds. Anyone with the latest Internet Explorer or Firefox already has a blog reader. In IE7 they are called feeds, and in Firefox live bookmarks. There are also some excellent online blog aggregators, so called because they bring numerous feeds together in one place. Online aggregators work from anywhere with an internet connection, and don't suffer the synchronisation issues that afflict users with more than one computer. Two good ones are bloglines (**www.bloglines.com**) and Google Reader (see screen 1) (**www.google.com/reader**).

Ajax and Office 2.0

Ajax (Asynchronous Javascript and XML) is a technique for retrieving web content in the background and feeding the data into an existing web page, instead of navigating to a new one. That's the technology; the result for users is smoother, richer browser applications. The classic example is Google Maps (**http://maps.google.com**). You can click on a map and drag it around with the mouse without any irritating page refreshes. The significance of Ajax is that it suddenly dawned on developers that Javascript running in the browser is a potent programming platform, with the benefit of zero deployment for the user. The downside is the extra effort it takes to code Javascript to work in all the leading browsers. Fortunately, new code libraries for PHP, ASP.Net and Java hide most of these problems. As these libraries mature, users benefit from browser-based applications that are richer and more usable. Ajax is therefore one of the drivers of 'Office 2.0', the appearance of online productivity applications that are an alternative to desktop suites, such as Microsoft Office or Open Office.

Currently, online applications such as Google's Documents and Spreadsheets (see screen 2) remain, functionally, short of traditional Office applications. On the other hand, they are improving rapidly, enough to make their inherent advantages compelling. The beauty of Office 2.0 applications is that your data is always available, and sharing a document with others just needs a change of permissions. If you've ever lost data to hard drive corruption, or left a document you need on your desktop when out with a laptop, you'll appreciate these services even more.

Widgets

Widgets are the user interface components of Web 2.0. They are small applications, usually written in Javascript, that sit on your desktop or in a personalised web page, with each one dedicated to a single narrow purpose, such as delivering weather forecasts, stock updates, or connecting to RSS feeds. Windows Vista comes with the new Sidebar (see screen 3), in essence, a container for widgets (Microsoft calls them gadgets); the Mac has a similar feature called the Dashboard, and third-party

RSS in action: Bag an Ebay bargain

Ebay's auction site is great for common items, but what about those rare collectibles that don't often appear for sale? Making a daily search is tedious, and you could still miss a 'Buy it now' posting that gets snapped up. Here's how you can use the RSS API to maintain a running query for the item you want.

The first step is to head over to **www.ebay.co.uk** and click Advanced Search. In this example, we're looking for an iRiver H140 mp3 player, still sought after for its microphone input, digital I/O and other features. Enter the values you want and click Search. When the results come up, scroll down towards the bottom of the page and click the orange button labelled RSS. This asks Ebay to give you the search results as XML, in the RSS format. Now you can click Subscribe to this feed, in Internet Explorer 7, or Subscribe Now in Firefox. These browsers will repeat the search at an interval, by default every four hours in IE7, enabling you to track new postings.

You can further improve this technique by copying the URL of the feed to the clipboard and examining it in a text editor, such as Notepad. For example, the Advanced Search page on Ebay only gives the high-level categories; in this case, 'Consumer Electronics'. Yet the items we require are in the subcategory 'mp3 players'. You can narrow the category used by amending the URL argument '&sacat=293' to the more specific '&sacat=73839'. Now that you have the URL, you can plug the feed into other feed readers, such as desktop widgets, or online portals such as Netvibes. Ebay also has an advanced developer API you can use for more complex searches and postings. Details are at **http://developer.ebay.com**.

Ebay's RSS API lets you track auction postings without needing to repeatedly search the site

Platform choices on the programmable web

Vendors and open-source advocates are jostling for position as the programmable web grows in importance. On the server, there are three main contenders.

Sun's Java Enterprise Edition (JEE) is a specification built on the Java programming language and virtual machine. JEE is implemented by several vendors including Sun, Oracle and IBM, and is particularly strong among large businesses.

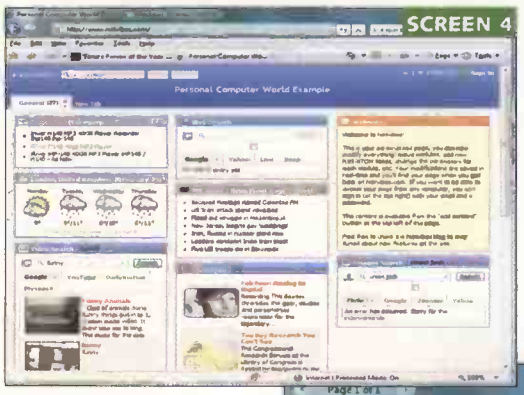
By contrast, many of the pure internet companies such as Google, Flickr, Digg and Youtube (now owned by Google) have bypassed JEE, preferring open-source tools such as PHP and Python running on the Apache web server. The open-source platform is loosely described as Lamp (Linux, Apache, MySQL and Perl, PHP or Python), though there are many variations. These are among the most heavily used sites on the internet, disproving any notion that these open-source technologies do not scale.

The third major server platform is Microsoft's .Net: the IIS web server running on Windows and supporting applications written in C# or Visual Basic .Net.

The New York Times Reader is an outstanding WPF application which blends the internet and the desktop

Another battle is being waged on the client, where the client is either a web browser, an application hosted within the browser, or a desktop application that draws its data from the internet. Browser-only applications are written in Javascript, which is proving very capable (see this month's Visual Programming column, page 144). Applications hosted in the browser might use Adobe Flash, the Java runtime, or the emerging Windows Presentation Foundation (WPF) from Microsoft. Flash is on the ascendant, with its simple deployment and strong multimedia features. The language of Flash is another variant of Javascript. Microsoft's WPF has the advantage of DirectX graphics for compelling multimedia, but is held back by its large runtime requirements and Windows-only status, though a slimmed-down and cross-platform implementation called WPF/Everywhere is in preparation. As for internet-connected desktop applications, these can be written in almost any language, but the most interesting developments are again from Adobe, with an adapted version of Flash called Apollo, and from Microsoft with .Net and WPF.

products such as Yahoo's Konfabulator and Google Desktop address the same need. The user's desktop is the most valuable space on the internet, which is why Google, Yahoo, Microsoft and others are so keen to persuade you to install their toolbars and other utilities. These become a channel through which companies can sell services and direct your internet activity. That said, there is also great value for the user in widgets that update automatically and don't require a web browser, giving instant access to the local train station information, for example. Similar concepts apply to online virtual desktops and portals. For example, Netvibes (**www.netvibes.com**) lets you assemble a home page by combining your favourite feeds and other widgets (see screen 4). Gadgets and widgets make better business sense for service providers than pure XML services, since they allow branding and possibly advertising to appear alongside the data you want. This is most likely why Google discontinued its search web service in favour of a Javascript widget. You can see the same logic in the way Yahoo handles its Babelfish service, which does automatic language translation. Yahoo is happy to let you place a Babelfish script on your website to let users translate the page, but does not publish a Babelfish API so that you can do this translation in code. All these factors mean that widgets will be increasingly common, both on the web and on your desktop.



Above: Assemble widgets online at Netvibes

Right: Add gadgets to Vista's sidebar with this gallery, or browse online for more

Wikis

The wiki concept is simple. It's a web page that users can edit. Some wikis are open so that any anonymous user can edit the page, while others control access through registration or moderation. You might think that wikis would soon become unusable thanks to spammers and advertisers. This is a problem, but mitigated by the online community correcting such things. A key feature of every wiki is that it tracks changes, making it easy to fix spoiled pages by reverting to an earlier version. The online encyclopaedia Wikipedia (**www.wikipedia.org**) is proof that the wiki concept works (see screen 5). It is flawed and vulnerable to manipulation, yet it is both useful and extremely popular. Wikipedia answers its critics by inviting them to make corrections.

Wikis more generally have a great deal of unrealised potential. In business, a wiki is ideal for brainstorming and collaborative authoring, drawing on the resources of many experts rather than a single writer. Wikis also have a place on personal websites, provided users have a little time available to supervise them. If you have an interest that would benefit from collaborative writing, consider installing Mediawiki (**www.mediawiki.org**), the software that powers Wikipedia, or a simpler alternative such as Docuwiki (**www.docuwiki.org**). You will need full access to PHP and MySQL on your website; check with your ISP whether or not this is available.

Wikipedia's remarkable growth is driven by user-generated content

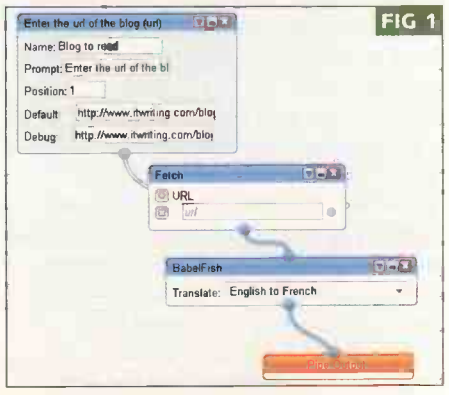
Mashups

A mashup is an application that combines data from multiple sources. The classic examples bring together mapping services, such as Google Maps, with data that has a geographical aspect, such as classified advertisements or restaurant guides (see screen 6). Mashups become even more interesting when they reveal new patterns or insights by bringing together data that is otherwise difficult to combine. The Programmable Web site (**www.programmableweb.com**) tracks and lists new mashups, making it easy to see what is publicly available. The potential of mashups is exciting, though there is an abundance of tie-ups with a few large sites such as Google, Amazon, Ebay and Flickr, and a shortage of more imaginative examples.

Still, there are some recent developments that combine the mashup concept with other themes such as RSS. Yahoo Pipes (**http://pipes.yahoo.com**) is a prototype of a visual mashup designer (see figure 1). Imagine you wanted to publish a web feed translated into French. Using Yahoo Pipes, you can assemble components representing the URL of your English web feed, the Yahoo Babelfish translation service, and the output of the transformed feed. Next, you can drag connectors from the URL to the translator, and another from the translator to the output. Save the pipe, and the resulting URL is a dynamic translation of the original feed. This is a simple example, with other modules allowing aggregation, filtering, sorting and services. A question mark hanging over Yahoo Pipes is how anyone will make money from such services, but if it proves genuinely valuable no doubt someone will find a way.

Rich internet applications

Historically, the user has been forced to make an uncomfortable choice between web applications, with all the advantages of online storage and access from anywhere,



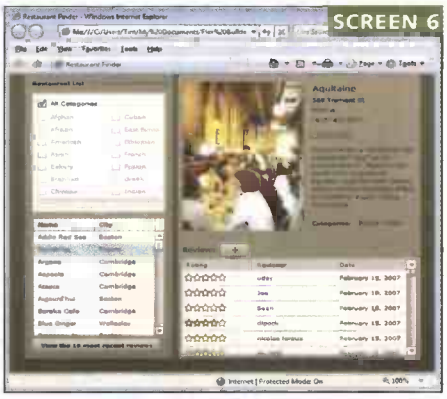
Constructing a mashup with Yahoo Pipes

and local applications, with better performance, a richer and more powerful user interface, and functionality that continues when the internet is not available, such as when you are sitting on a train or cut off temporarily by your ISP. This is the cue for a new breed of applications that combines the best of both worlds. An example is Apple's iTunes, which runs locally, allows you to play music even when offline, but connects seamlessly to the iTunes music store, or to retrieve cover art and CD information when you rip some music.

Users don't think of iTunes as an internet application, but it is. There are several reasons applications that work in this seamless fashion will become more common. One is the growth in software as a service, making it easier to supply data to such applications. Another is the arrival of rapid application development (Rad) tools optimised for this way of working. Two obvious examples are Adobe's Apollo, and Microsoft's Windows Presentation Foundation (see box on previous page). That said, a rich internet-connected application can be written in any programming language. As these hybrid applications evolve, users will no longer need to decide whether to run desktop or internet software; the same programs will fulfil both roles.

The internet rules

Today's internet offers numerous opportunities for both individuals and businesses. The main themes are online services and storage, collaboration and the re-orientation of personal computing from the desktop to the cloud. On a technical level, RSS is still growing in importance, Javascript is the up-and-coming language of client computing, and a new generation of internet-connected applications will blur the boundaries between the desktop and the web. "The best web applications are yet to come," said Web 2.0 veteran Mike Arrington of Techcrunch at Carson's recent London conference on the future of web applications. Predictions are dangerous, but it's safe to say that the disruptive power of the internet is only just beginning to make itself felt. **PCW**



This Adobe Flex application runs within a browser on the Flash virtual machine

Web 2.0 speed bumps

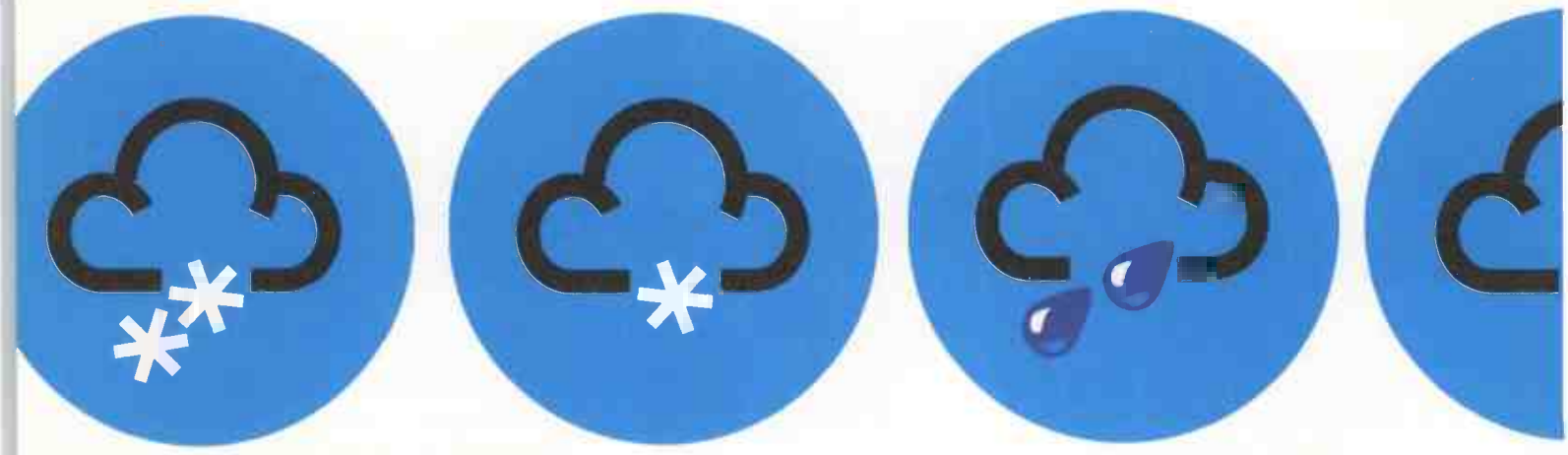
Despite the rapid growth in internet technology, there are some areas of concern with Web 2.0, which the industry has not yet fully addressed.

Security – Internet threats abound, with nonsecure machines hijacked to form 'botnets' that send out spam and viruses. Windows is part of the problem, but other OSes also have security bugs. Another issue is flaws in web applications that leave them vulnerable to attacks.

Identity – Experts agree that usernames and passwords are a poor way to protect our digital assets, yet they remain in wide use. Schemes such as OpenID and Windows Cardspace are beginning to improve matters, though they can still be password-based, and single sign-on raises the worry about protecting all your online property with a single key.

Privacy – Most internet activity leaves digital traces, and companies such as Google specialise in keeping track of your web browsing to improve contextual advertising and personalise search results. Despite privacy policies, these mountains of personal data have insufficient protection.

Business model – Some of the mistakes of the 'dot-bomb' 1990s are being repeated, with web start-ups appearing without any clear business model. Advertising income has worked for Google, but not every kind of internet service will be able to rely on it.



Weather report

You need never be caught without your umbrella again because it's easy to monitor the weather with your PC. Mark Whitehorn looks at the kit available to amateur weathermen

The British have long been obsessed with the weather: it's our national pastime. The Meteorological Office has records of UK weather for every day since the first of January 1869, but amateurs have been collecting data since time immemorial. Technological advances mean that we no longer have to take manual observations once a day, every day, come rain or shine. For about £200 you can equip yourself with wireless sensors and PC compatibility – sampling the weather thousands of times a day, manipulating the data on your computer and even publishing it on your web page.

Projects based on gathering weather data have great educational and practical potential. They can be used for local forecasting; many localities have unique micro-climates that aren't covered by the general forecast. In addition, anyone whose activities are affected by the weather might want to collate weather data for themselves. Finally, it's fun, so why not give it a go?

The kit

Weather stations typically come as a base station (often called a console), which lives indoors and displays the data gathered by the sensors. One or more peripheral sensors are supplied, usually with an option to add more if required. Wireless communication between console and sensors is the norm these days. The console is usually mains powered while the external sensors typically run on batteries, although at the higher priced end of the market, they can be solar powered.

The range of weather monitoring and gathering equipment is huge, and in this brief survey we've divided the kit into four broad categories by price. All prices are approximate: as ever, it pays to shop around. Functionality increases with price, so in most cases the features described for less expensive options will be available for the more expensive ones. Always check the specifications for any must-have feature: information on resellers' websites can be sketchy, so visit the manufacturers' sites too.

Simple and fun: under £50

The first group of kit in our round-up provides an always-on weather forecast with limited data gathering, but without the ability to link to a PC.

Having said that, the functionality offered by even the cheapest weather stations is impressive, such as that of La Crosse's Wireless Weather Forecaster WS7014 at about £28. It measures barometric pressure, can indicate the pressure trend and displays forecasting icons for the next 12 or 24 hours. It also measures indoor temperature and humidity and, from a remote wireless sensor with a 25m range, the outdoor temperature. Maximum and minimum temperatures can be stored with timestamps. It's also a radio-controlled clock and calendar and another two sensors can be added if required.

'For £200 you can get wireless weather sensors and PC compatibility'

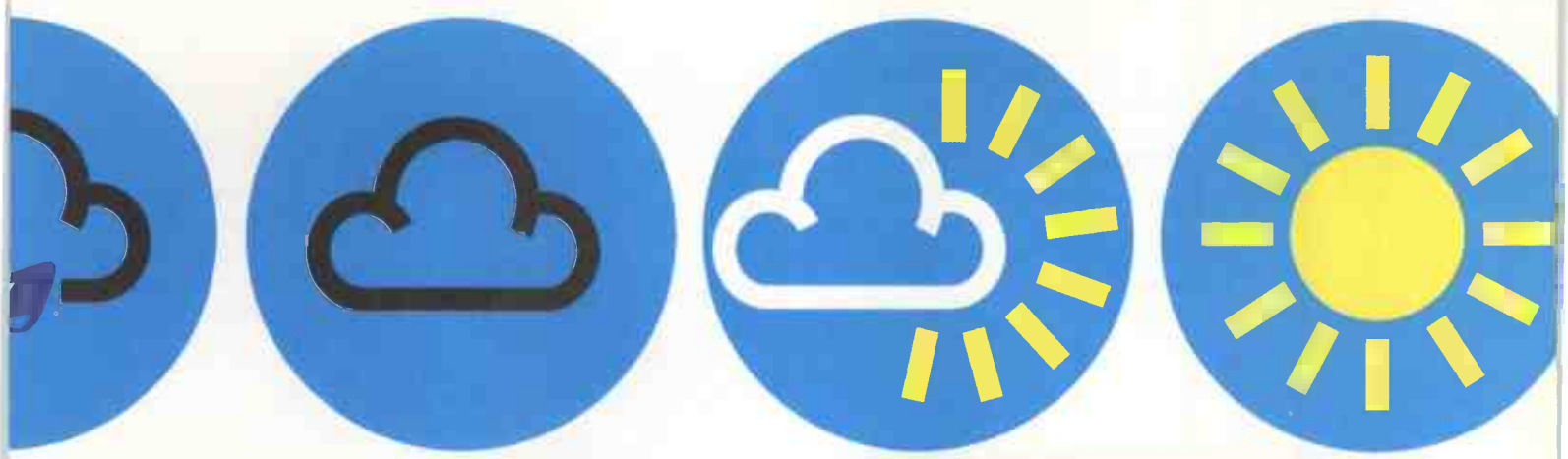
Oregon Scientific's Wireless Weather Forecaster RMR683HG – about £35 – offers very similar features plus an ice alert, an alarm on reaching high or low values for temperature or humidity, temperature trend and phase-of-the-moon displays.

More functionality: £70-£170

More money equals increased functionality and multiple outside sensors, but not necessarily PC connectivity. Notice, however, the price overlap between this band and the next.

An indication of what you'll get in this price band is La Crosse's Anemometer Weather Station WS9035: at about £80 it looks good and has both an anemometer, which measures wind speed, (with 10m cable to console) and a wireless temperature and humidity sensor, also known as a thermo/hygrometer. Displays include a weather tendency indicator, dew point and moon phases, and the anemometer and weather vane provide, as well as wind speed and direction, gust measurement, wind chill and a graph showing wind strength on the Beaufort scale.

Davis Instruments is a Silicon Valley-based manufacturer of professional equipment, which tends towards the accurate and expensive. The Weather Wizard III sounds cool, and at around £170 comes with outside temperature monitor and an anemometer, and can calculate wind chill with an alarm. The console looks solid, respectable but not, sadly, very exciting: it appears to sacrifice stylish design for confidence in manufacturing standards and after-sales



Installing wireless weather sensors

Wireless installations need to take account of distance and any unavoidable obstructions (see Wireless working on page 48).

Base stations are not usually weatherproofed and should be located inside.

Ideally, an anemometer should be sited as high up as possible (10m is recommended but rarely achievable) and away from buildings, trees or other obstructions to the wind. If mounted on a roof, it should be 2-3m above the apex.

Robust, weatherproof pole-mounted sensors, the anemometer at the top with thermo/hygrometer and solar panels below

Thermometer/hygrometers should be sited about 1.2m above the ground, again in open space for good air circulation. It should also be positioned over the ground, not over concrete, paving slabs, tarmac and the like. If the sensor is not shaded – and many of the less expensive ones don't have radiation shields – site it in shade so temperature readings are not artificially high.

The Oregon Scientific WMR928NX touchscreen base station shows current readings from sensors

We used a 3m-long steel tube (3.5cm external diameter), which cost £9.50 from a metal fabricator, to make an ideal mounting for the anemometer and thermo/hygrometer.

A rain gauge also needs an open area (no vegetation or buildings) at about the 1.2m height. If it's mounted higher up, readings are likely to be affected by wind.

Barometric pressure is usually read at the console or by the internal sensor as it is constant at a particular height above sea level.

Given the limitations of the average garden, meeting the criteria for placing sensors can be difficult. However, the data you collect will still reflect what's happening at your site.

support (a full two-year return-to-base warranty). It does, however, win points for an imaginative name.

PC connectivity: £100-£250

This sort of money puts you firmly in reach of that desirable PC connectivity. Surprisingly, some kit only supports a serial connection – not only can these be painful to set up, if you use a modern laptop or even PC, you may search in vain for a serial port. Check the specifications carefully to ensure USB support if you need it, or put aside some money for a serial-to-USB converter. In this price range you can also expect an extra sensor – usually a rain gauge: self-emptying rain gauges are particularly good (the collecting vessel tips automatically).

A typical offering is the Professional Weather Station WRM100 from Oregon Scientific (about £170), which has USB connectivity. It boasts a rain gauge and an Integrated Sensor Tower, a 2m mast with stays and securing pegs for mounting the thermo/hygrometers and anemometer (you can also wall mount them). The wireless console has a 'rotary dial interface', a large rotating disk with which to select settings, and can receive wireless data from another nine thermo/hygrometer sensors, each up to 100m away. A UV sensor is an optional extra.

Also within this range, La Crosse has the Touch Screen Weather Station WS3600 (about £210) with a serial cable connection. It comes with a wireless thermometer/hygrometer, and an anemometer and rain gauge, which are wired to the thermo/hygrometer. The rain gauge readings can be shown as rainfall over one hour, 24 hours, one week and total rainfall in millimetres or inches. There are programmable alarms for many high/low values, wind direction and storm warning. The touch-activated screen displays a great deal of data in bands across the LCD screen. You also get Heavyweather software, which records and displays data on the PC.

Irox's Professional X Weather Station – around £235 – has USB connectivity, bundled software, and the usual anemometer and rain gauge. Its unusual components are an ultra-violet (UV) sensor and an infrared remote control that can operate all the functions of the console.

If the Weather Wizard's robust charm has appeal, you can add connectivity with a Windows-compatible Davis Weatherlink datalogger (which stores data until you transfer it to your computer), software and serial cable for a very steep £160.

Feature overload: over £250

Given the abilities of the kit already described, there isn't very much else out there to measure, so what do you get for the extra cash? For a start, you usually get a very ↘

Common measurements

Wind direction is measured with a wind vane, which is often combined with an anemometer that measures wind speed. An anemometer typically has little cups which catch the wind and spin, and the rotational speed is proportional to the wind speed. Speed can be measured as metres/second, miles/hour, kilometres/hour, knots and/or by its strength on the Beaufort scale.

Temperature is measured with a thermometer. Most equipment lets you see values in centigrade or fahrenheit.

Rainfall is (surprisingly) measured with a rain gauge – a calibrated container that collects rain. Rainfall can be displayed as millimetres/hour and/or inches/hour, and as a cumulative value since the last reset, rainfall over the past hour or 24 hours.

Air pressure, also called atmospheric or barometric pressure, is measured with a barometer. It can be quoted as Mb/hPa (millibars or hectopascals: the value is the same in both units), inHg (inches of mercury) and/or mmHg (millimetres of mercury). Pressure changes indicate fluctuations in weather conditions: broadly speaking, low pressure (below 29.92inHg/1013Mb) is usually accompanied by cloudy conditions and rain, and high pressure (above 29.92inHg/1013Mb) by fair weather.

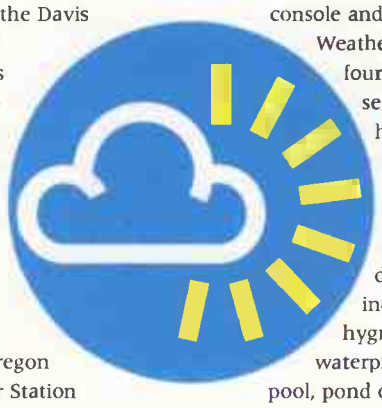
Humidity – that is the amount of water vapour in the air – is measured with a hygrometer. It's usually quoted as an RH value (for relative humidity). Hygrometers take readings from two thermometers, one kept dry and the other wet: a value for relative humidity is calculated from the two values.

The anemometer has spinning cups to measure wind speed. The vane on top shows wind direction

The rain gauge has a self-tipping mechanism so you don't have to remember to do it yourself

stylish display console. You can also get more accurate sensors and solar panels to power the remote sensors.

Accuracy is a tricky one. Those companies which supply professional-level equipment (such as Davis) tend to quote accuracy figures; those aiming at the hobbyist market usually don't. For example, the Davis Vantage Pro 2 kit (described below) cites accuracy figures for humidity of plus or minus three per cent in the range 0 to 90 per cent relative humidity (see the Common measurements box above), and of four per cent between 90 to 100 per cent relative humidity.



So what's out there for those with deep pockets? Oregon Scientific's Wireless Weather Station WMR928NX comes in at around £400 and is a comprehensive package with serial cable. It has a very fetching 16x8.5cm touchscreen display, three wireless outdoor sensors (anemometer, rain gauge and thermo/hygrometer) and an indoor battery-powered wireless barometer/thermo/hygrometer. Each outdoor sensor is powered by a small solar panel, though AA batteries are recommended for sub-zero weather conditions. Three further sensors (thermometers or thermo/hygrometers) can also be attached. The 'Base Edition' of Ambient Weather's Virtual Weather Station software is included (see the Resources box on page 49). The console itself has no datalogging facility – although it can report some past readings, such as pressure for each hour for the last 24 hours – so it must be connected to a PC to gather data over time.

The La Crosse Complete Weather Station WS2500 costs about £325 and has a stylish console and a serial cable with basic Weather Station software. It has four wireless solar-powered sensors: a thermo/hygrometer, anemometer and rain gauge and, unusually, a lux light sensor to record the hours of sunshine each day. Add-ons include indoor or outdoor thermo/hygrometers, and a waterproofed cable probe for pool, pond or ground temperature. A wireless repeater is also available to extend the range of the sensors or for use in difficult site conditions.

The Davis Vantage Pro 2 costs around £900 with a datalogger and Windows software, available with serial or USB connection. This weather station uses advanced radio technology to increase the wireless range between console and sensors to an impressive 300m. Sensors come as a combined package of anemometer, rain gauge and thermo/hygrometer, the latter protected by a radiation shield to improve the accuracy of readings. All are powered by a solar panel. The Pro 2 Plus version (an extra £130) gives you UV and solar radiation sensors as well. More specialised sensors and repeaters are available.

'Companies aiming at hobbyists usually don't quote accuracy figures'

Wireless working

All the kit we've described above uses wireless technology to communicate between the case station and the remote sensors. It's much easier and quicker to set up the equipment (no wires, drilling holes in walls and so on) though there are limitations.

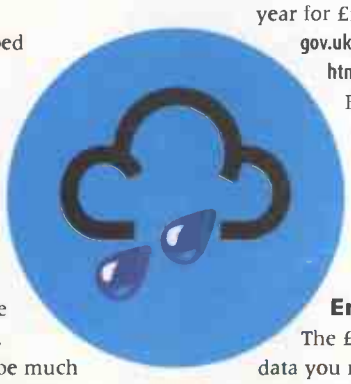
Most importantly, check the distance over which wireless communication will work and consider where you could site the sensors. The range can be as little as 25m or up to 100m or more with professional kit, and is always quoted as line-of-sight. If you have walls, trees or shrubbery between sensor and receiver, you can't rely on using the full distance. Some manufacturers offer wireless repeaters to act as staging posts for the signal: a repeater can extend the range between console and sensor, and in difficult sites can compensate for obstacles in the line of sight.

Placing the console next to a window is advisable, so the console can 'see' the sensors. This usually works well, although high-tech coatings on glass can reduce signal strength. Any wall will reduce the signal: how much depends on wall thickness and

material. Foil-backed insulation panels in modern walls may block it completely. If the signal must pass through a wall, align the sensor at right angles to give the shortest path through the obstruction.

Software

Most of the consoles described here show the current weather state and offer some, very limited, historical data. If you link your weather station to a PC you get three huge advantages. First, the PC can log the data so you can see trends over time (see the DIY forecasting box, below). Second, the PC display can be much more elaborate than even the most advanced consoles. Finally, it makes publishing to the web a possibility.



Weather Display – from Brian Hamilton in New Zealand – is a fabulous package for displaying weather data graphically. It supports all the PC-compatible weather stations described above (and many others), and runs under Windows 95/98/2000/ME/XP, NT4 and Linux. The software is packed with features, including real-time, auto-scale and graph-history graphing, FTP of weather data to your web page and calculators for sun and moon rise/set and moon phase. It is constantly updated: by the 25th of January there had been 12 version builds in 2007. Weather Display costs a mere $US70 (£36) from Brian's site (see Resources box, right).

Virtual Weather Station is another option for viewing weather station data on your PC and runs on all Windows 32-bit operating systems. The Base edition costs £27 from Meteorologica (see Resources box).

Putting it all together

We set up the Oregon Scientific Wireless Weather Station WMR928NX and were very impressed: the kit is excellent quality and everything worked perfectly from the start. The documentation, however, leaves much unsaid. For instance, to plug the sensors into their solar panels you have to unscrew the panel backs, plug in the cable and then fit the waterproofing grommet. Why not tell us?

Setting up communication between console and PC was straightforward, but serial communication can be tricky. Re-acquaintance with baud rates, stop bits and parity settings reinforced our enthusiasm for USB connectivity.

For the software we used Weather Display, which was incredibly easy to set up, worked first time and had every feature we could possibly imagine. It is an excellent example of software developed by an enthusiast for enthusiasts.

Data feeds

Weather data is available from varying sources, many of which can be accessed as data feeds. These range from the expensive and specialised – the Met Office will supply the shipping forecast four times daily for a year for £515 ex Vat (**www.metoffice.gov.uk/newmedia/datafeed/catalogue.html**) – to the free, such as the BBC weather forecast for your postcode area (**www.bbc.co.uk/weather**). Metcheck (**http://labs.metcheck.com**) supplies data from various countries for £5-£10 a month.

End notes

The £100-£250 kits collect all the data you need for forecasting. If you intend to use software on the PC to collect and display the data, this is probably the best compromise. Spending more gets you a nicer console, more accurate sensors and solar power. But the console is immaterial if you have a PC display; the variation in accuracy is only likely to worry professionals and you can buy a large number of AA batteries with the difference.

Finally, a brief mention for the Colour Changing Weather Clock from Oregon Scientific. This is a sphere that changes colour depending on the pressure: red for sunny, blue for rainy and so on. Not very scientific perhaps, but very entertaining, and yours for just £30.

While we were putting this article together it snowed. Even though we hadn't finished configuring the software, the traces displayed by Weather Display show clearly that at about 2.30am the humidity shot up, the temperature dipped slightly and the dew point rose slightly, marking the start of the snowfall. This illustrates why connectivity to the PC is such fun. Seeing this pattern developing is fascinating and with more data, you're likely to find many patterns in your local conditions. **PCW**

Resources

Manufacturers:
www.weather-display.com – Excellent software for visualising data
www.heavyweather.info – Heavyweather data visualisation software
www.oregonscientific.co.uk – Manufacturer of weather stations and other kit
www.davisnet.com/weather – Another manufacturer of weather stations

Online stores:
www.ukweathershop.co.uk
www.ambientweather.com
www.meteorologica.co.uk
www.weatherstations.co.uk

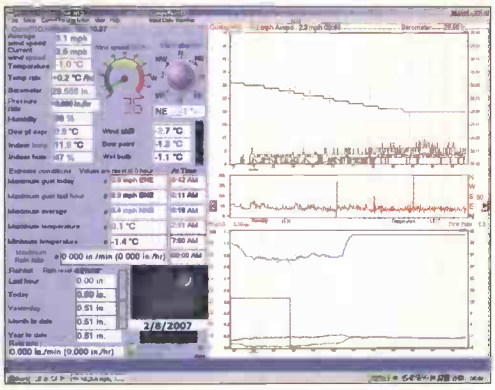
DIY forecasting

Forecasting is a tricky business: even the mighty Meteorological Office, with access to many sources of data, including that from weather satellites, isn't always spot on.

You can collect data over time with your own equipment and look for repeating patterns.

This could form the basis of local forecasting if you live in an area with distinctive weather characteristics; say, the east coast of Scotland with its haar (sea fog) or a sheltered cove. You can also compare your readings with weather forecasts and perhaps identify local variations: if your location is sheltered, you may receive less rain than the forecast suggests, or winds may be less strong.

You could join the Metlinkinternational programme and share your data. This site is part of the Royal Meteorological Society's educational programme and encourages participants worldwide to exchange weather observations taken with even the simplest equipment. For more information go to the Metlinkinternational website at **www.metlink.org**.



Weather Display software is comprehensive and you can spend hours tweaking its operation

Gathering weather data needn't be high tech: a WWII altimeter for pressure and a couple of temperature gauges work perfectly

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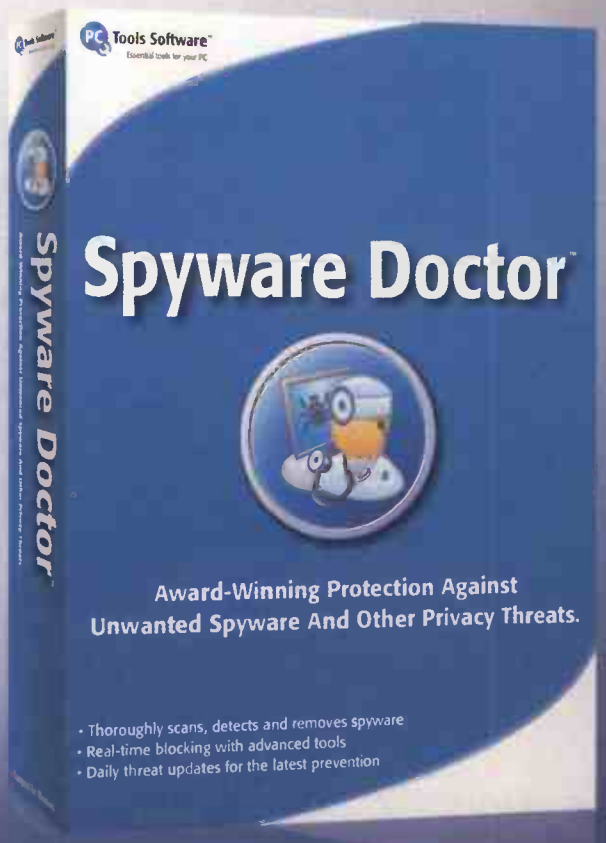

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EDITOR'S CHOICE Windows — Spyware Doctor 4.0, November 2006

Plus Editor's Choice — Spyware Doctor 3.2, Issue 237, December 2005

PCAnswers EDITOR'S PCA CHOICE — Spyware Doctor 3.5, Issue 157, April 2006

RECOMMENDED PCUtilities — Spyware Doctor 3.2, Issue 71, 2006

2006 WebUser GOLD AWARD — Spyware Doctor 3.8, Issue 139, July 2006

PC PRO RECOMMENDED — Spyware Doctor 3.8, August 2006

PC PRO LABS — Spyware Doctor 3.2, September 2005

PC PRO A LIST — Spyware Doctor 3.8, August 2006

PC ADVISOR GOLD — Spyware Doctor 3.5, May 2006

Digitise your vinyl

Converting your prized LPs and tapes so that you can listen to them at the click of a mouse is easier than you think. Niall Magennis shows you how

Ion's turntable comes with a USB cable attached

As anyone who has been subjected to an hour of listening to commercial radio can confirm, good music is a precious resource that doesn't come along that often. If you grew up in the pre-digital era of vinyl and cassette tapes, then the chances are you have many classic pieces of music lying around gathering dust. You've probably leafed through these recordings from time to time and promised yourself that one day you'd convert them into CD or mp3 format.

Converting your old albums and tapes into digital form has many advantages. You'll no longer have to worry about accidentally damaging your precious vinyl records or fret about your tapes disintegrating over time. Instead you can preserve your music in its current condition and sometimes even improve on it by removing hiss, hum, clicks and pops.

Converting your music can seem like a daunting process, but it's not that difficult to do, as there are numerous hardware and software options you can use to help make the process much easier.

Hardware

Once you've decided to embark on a digital conversion spree, you'll find that you're already likely to have most of the basic hardware you'll need.

For converting vinyl the most important piece of kit is, of course, the record deck (turntable). However, most record decks can't just be connected directly to a computer. This is because of the way audio is stamped onto records (see box 'What is attenuation', below). Instead, your deck's output first needs to be run through a piece of circuitry known as a phono pre-amp, which amplifies the audio and changes its equalisation (equalisation describes the relationship between volume and frequency). The stereo amplifier you normally use with your turntable will have this circuitry built in, so one approach is to connect your hifi's amp directly to your computer.

However, this may be a bit awkward if you own a desktop PC that is in a different room from your hifi. In this scenario, it may be more sensible to buy a small phono pre-amp for your PC to use with your turntable. There are several on the market, but the best one is probably Terratec's Phonopreamp iVinyl (**www.terratec.com**), which costs about £90, complete with software, and connects to your computer via USB.

For those who don't already own a record deck, or simply want to cut down on the hassle of using a pre-amp, a company called Ion has developed a decent-quality turntable that connects directly to your PC via a USB cable. So not only do you not need a pre-amp, but you don't even need a soundcard input either. It's available in the UK from gadget site Firebox (**www.firebox.com**) for £120.

If you're converting from tape you don't have to worry about using a pre-amp. Most tape decks have a headphone socket on the front that can be connected directly to the

Illustration: Steiner Lund

What is attenuation?

If you try to connect a record deck directly to your PC without a pre-amp you'll find the results sound awful. The signal will be ridiculously low in volume and almost totally devoid of bass.

The grooves stamped in a record are analogue representations of the frequencies produced by playing a piece of music. However, if lower frequencies were etched onto a disc without first being processed they would run the risk of literally popping the needle out of the groove. To avoid this bass frequencies are attenuated, or reduced in intensity, before the record is pressed. But there is also another trick used. To help reduce high-frequency noise such as hiss, the high frequencies of the recorded audio are boosted before they are committed to the record.

When it comes to playback this leaves two problems. The first is that the bass frequencies need to be boosted and the second is that the high frequencies need to be reduced. Both of these roles are taken care of by a piece of circuitry called a pre-amp and this is why it's a crucial component for those planning to use their PC to digitise their record collection. As well as equalising the high and low frequencies, it boosts the very low-level audio signal to the standard line-level. This scheme of equalisation was standardised in 1954 for the recording and playback of vinyl recordings by the RIAA (Recording Industry Association of America) and is often known simply as 'RIAA EQ'. Any pre-amp you use should specify that it uses this standard.

http://en.wikipedia.org/wiki/RIAA_equalization

Noise removal

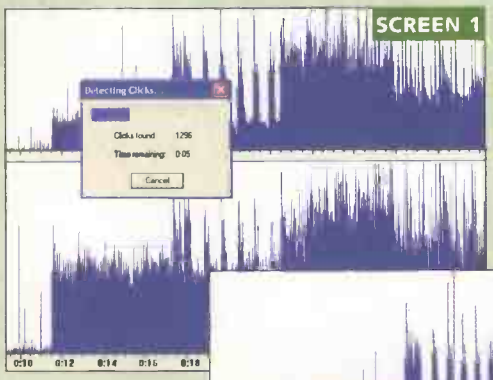
Unfortunately, noise reduction software can't perform miracles – the process of removing noise from a recording will always affect the sound quality of the initial recording in some way.

This is why you should always try to make the best possible recordings in the first place. If you're recording from vinyl this means making sure that your records are clean and that your needle is free of dirt and junk. Alternatively, if you're recording from tape you should use the best-quality tape deck you have available and pay close attention to your recording levels so as not to introduce any extra hiss.

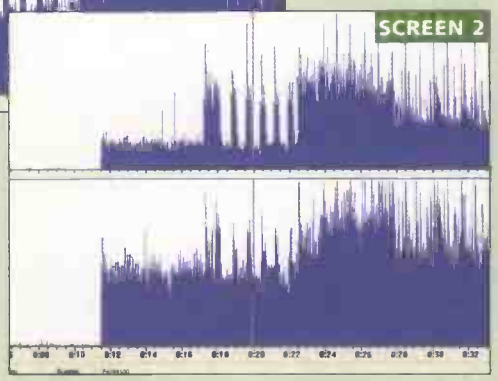
Nevertheless, there are times when the original source is of such poor quality that it will need to be put through the digital audio wringer in some way. There are many programs around that can perform noise removal, but one of the best is Groove Mechanic from Coyote Software. It costs $39 (about £20), but you can download a fully functional 15-day demo to try it out from www.coyotes.bc.ca. The benefit of Groove Mechanic is that its noise reduction tools have been developed specifically for use with recordings of vinyl and tapes.

Removing clicks and rumble using Groove Mechanic is straightforward. You simply load your audio file into the package, click on the Repair menu and select Analyze Clicks and Rumble (see screen 1). The software then scans your file to build up a profile of the type of noise it contains. You can then choose to either just remove Clicks and Thumps or just remove Rumble, according to whichever is the major annoyance in your file. Of course, you can also apply both processes if you need to.

Groove Mechanic generally does a very good job of removing crackle and pops on the lead-in and lead-out of a track, but it isn't always as effective at removing pops that appear in the middle of a piece of music. It can minimise them, but we found that it didn't totally eliminate them (see screen 2).



Left: Groove Mechanic analyses your audio file to build up a profile of the noise it contains



Below: Groove Mechanic does a good job of fixing click, but don't expect miracles

Hiss removal is handled in a slightly different way. When you want to remove hiss from a recording you first need to point Groove Mechanic towards an area of the file that contains pretty much just the background hiss. The best way to do this is to place the cursor at the gaps between two songs, then click on the Repair menu, select Hiss and then choose Get Noise Base at Playback Cursor (see screen 3). Once the software has analysed the file you can go back to the Repair Menu, Select Hiss and choose the Fix Hiss option. The results from the hiss removal were generally pretty good all the way through a track.

You can tweak the click and hiss removal settings using the Options menu. For example, you can set the Hiss removal to work harder on the file or tweak the click removal tool so it becomes more sensitive. However, the more aggressive you are with the settings, the more likely it is your tracks will start to sound processed.

The hiss removal works by sampling the noise at a particular location and then applying the correction throughout the entire file

The Plus Deck Cassette Converter can be slotted into a PC's drive bay to deliver audio

line-in socket on your soundcard. However, some also have an auxiliary out socket on the rear and using this is a better option. It outputs a signal at a fixed level, so you won't have to worry about setting the volume level on your stereo system.

Firebox also sells a tape player called the Plus Deck Cassette Converter, available for £100, that can be fitted inside a PC. The main tape mechanism slots into a spare 5.25in drive bay and feeds the audio out to a blanking plate that you fit to the rear of your PC. This then needs to be cabled up to the line-in socket on your soundcard. However, we don't think it offers much benefit over a normal external tape deck – except that it's in a handy location.

Connections

Once you've got all the kit ready, you'll need to turn your attention to how you connect your sound source to your PC.

The easiest way to hook up a hifi, tape deck or ghetto blaster to your computer is to make a connection from the auxiliary line outputs on the rear of the stereo system to the line-in socket on your soundcard.

Since 1999, most soundcards come with colour-coded connectors, so the line-in socket should be coloured blue. If your soundcard's connections aren't colour-coded check your manual to find the correct socket. Copies of manuals are often available on

'Converting your vinyl to digital can seem daunting, but it's not that difficult'

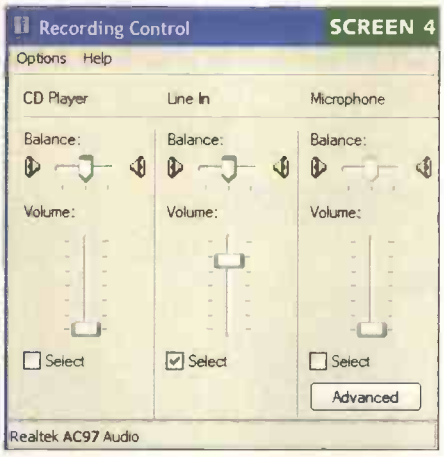
your soundcard manufacturer's website in pdf format if you've mislaid your original.

The auxiliary outputs (also sometimes called line-out) on the rear of your stereo system are usually provided as a pair of phono sockets. To connect these to your soundcard you'll need a stereo phono to 3.5mm mini-jack lead. These leads are readily available from electronics shops such as Maplin, Curry's or Dixons.

If your stereo system doesn't have an auxiliary output on the rear, you can use the headphone socket instead. There are two standard sizes of headphones socket – 3.5mm jack and 0.25in jack. Either way, you'll be able to find a lead at your local electronics store to hook it up to your soundcard's blue line-in socket.

Unlike the auxiliary sockets on a hifi, the level of the headphone output is normally governed by the volume dial so you'll need to be careful not to accidentally adjust the volume and overload your soundcard's inputs when recording.

As we've already discussed, if you want to connect a record deck to your PC you need to use a pre-amp in between. Connecting a turntable to a pre-amp is pretty straightforward. For example, with Terratec's phono pre-amp just connect the deck's phono sockets to the phono inputs on the pre-amp and then hook up the deck's earth wire to the pre-amp's earth thumbscrew. Then load the drivers for the pre-amp and hook up the USB cable.



You should set your soundcard's line-in input at about the two-thirds mark

Naturally, if you're using a USB record deck you don't have to worry about audio connections or a pre-amp. Instead, load the drivers for the turntable on your PC and then connect it up to your computer's USB port.

Soundcard setup

Once you have your tape player or record deck connected to your computer, the next step is to optimise your soundcard's input for recording. Thankfully, this is very easy to do.

Open your soundcard's volume control applet. If the speaker icon isn't on the taskbar, just click on the Start button, select All Programs, Accessories, Entertainment and then Volume control.

Once the Volume control applet appears, click on the Options menu and select Properties. Tick the radio button marked Recording, make sure the box for Line-in is ticked and then click OK. The fader control for the line-in port will appear. Make sure it's marked 'Select' or something similar and then set the volume slider to about the two-thirds mark (see screen 4).

On some soundcards the setup can be a little bit trickier because the line-in socket may be configured to work as an extra audio output for surround sound. This can usually be reconfigured using the advanced settings in the soundcard's software control panel. However, different cards need to be reconfigured in different ways, so if you're having problems it's best to check your soundcard's manual to find out how to reconfigure this port. Now you're ready to follow the two step-by-step workshops on the following pages. Happy Listening!

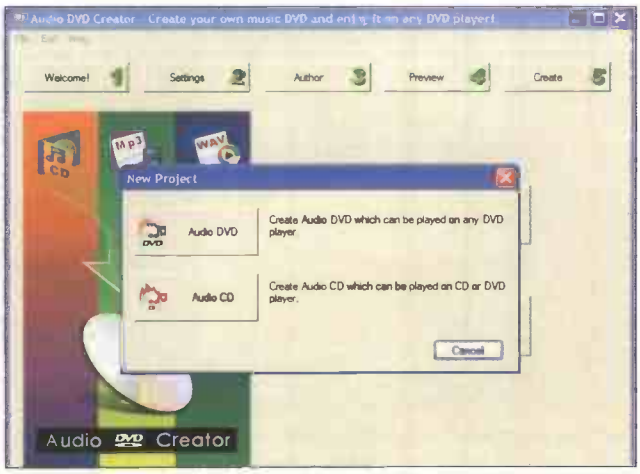
How to create music DVDs

Once your music is digitised you can choose to store it in many different ways. One of the options open to you is to take advantage of the extra capacity offered by DVD discs. You can fit tons of music on a DVD, especially if it's in a compressed form.

As you're no doubt aware, DVDs can be created using either a data format or movie format. If you burn your music to DVD in data format you'll be able to read it on your PC, but the music may not be accessible using a standard DVD player. This is one of the reasons you may want to investigate burning tracks to DVD in movie format. In this way you can have an interactive video menu and all the other features supported by the DVD-Video standard.

If you're feeling adventurous and already have DVD authoring tools, you can attempt to create a DVD-Video disc manually, but it's quite cumbersome. Instead we'd recommend using a bit of software called Audio DVD creator. It's available for $40 (about £20) from **www.audio-dvd-creator.com** and is very easy to use (see screen). When you start up the software, you're presented with a wizard that guides you through the process of adding your tracks to a disc, creating the video menu and then burning the results to DVD. You can even preview your discs using a software DVD player before you start the burn process. It also supports 5.1 surround sound (AC3) input and can add multichannel effects to stereo audio using its Matrix Mixer feature.

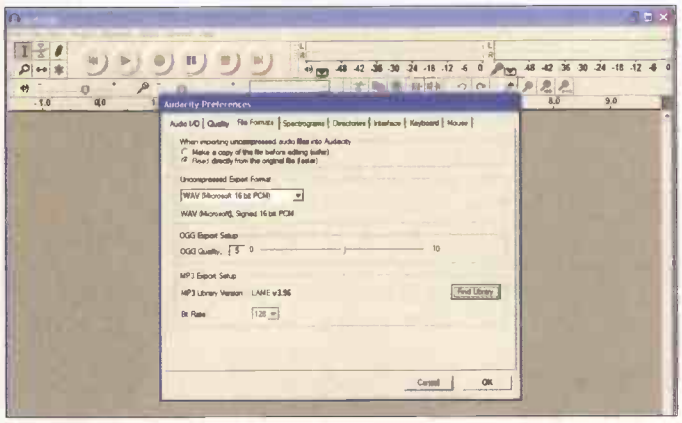
There are other alternatives, of course. Ulead's Burn now costs £19.99 to download (**www.ulead.co.uk**) and gives you similar functions to Audio DVD Creator, but adds the capability to create discs in the DVD-Audio format – this is only useful if you have a player that supports DVD-Audio, however. DVD-Audio supports high-quality uncompressed multichannel sound and video, but it's not a popular standard in the UK. For maximum compatibility, we'd recommend you stick with DVD-Video for your music.



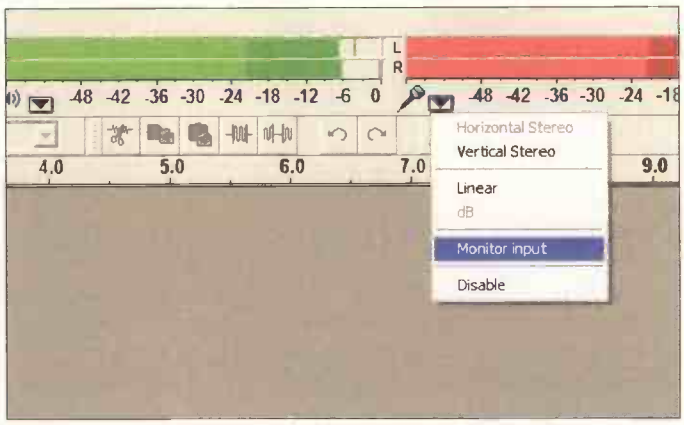
Audio DVD Creator allows you to burn DVDs of music that can be used on any standard DVD player

Using Audacity to convert tapes and vinyl to mp3

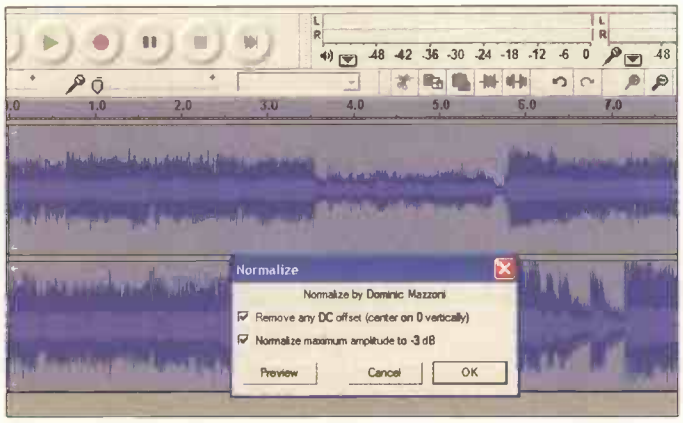
Audacity is an excellent free tool for recording from tape or vinyl and converting the results into mp3 files. Go to **http://audacity.sourceforge.net** to download the latest version. While in the downloads section, click on the link to take you to the page where you can download the Lame mp3 encoder.



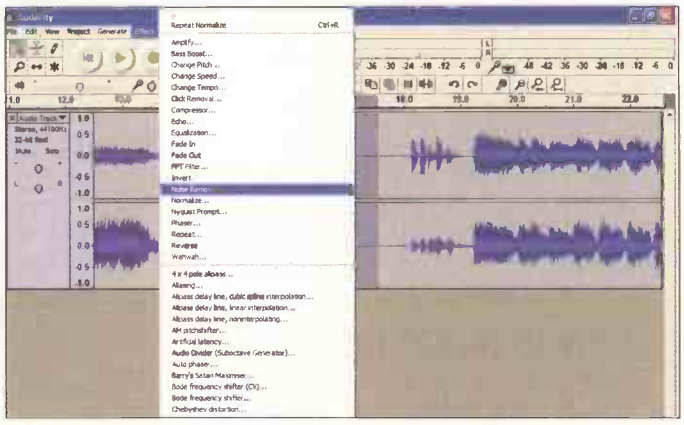
1 Install Audacity and unzip the Lame files into your Audacity folder. Start Audacity and press Ctrl & P to bring up Preferences. Select the file formats tab and click on Find Library. Point the file browser at the lame_enc.dll file and click OK. Select 192Kbits/sec in the Mp3 Export Setup bit rate box. Click on the Audio I/O tab and make sure Software Playthrough is ticked. Click OK to save.



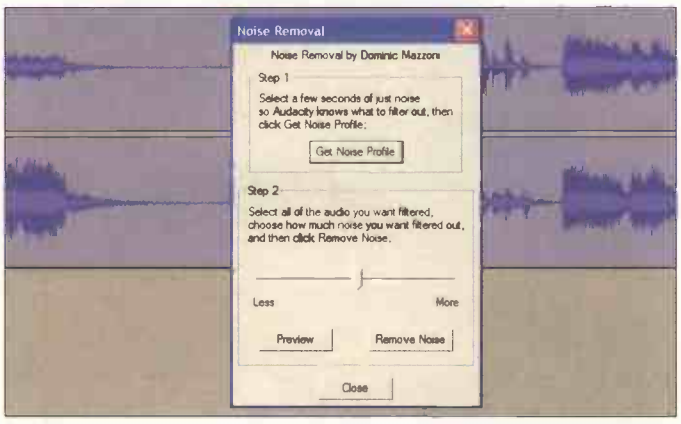
2 Connect your record or tape deck to the line-in socket on your soundcard and select Line-in as the input source in the Audacity toolbar. Click on the dropdown box next to the microphone icon and select Monitor Input to listen to the Line-in input through your speakers. Use the microphone slider to set the input volume at the highest level without introducing audible distortion.



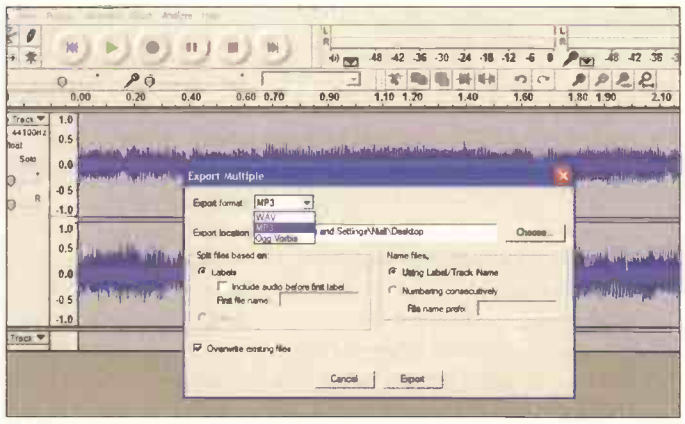
3 Cue up your record or tape, hit the Record button in Audacity and then play the music. You can press Pause when you need to change sides. Hit Pause again to continue recording. Once you've recorded the album, press Stop. Hit Ctrl & A to select the entire audio file and then click on the Effect menu and select Normalise. Click OK.



4 Now let's try removing some noise from the recording. We're going to try to eliminate some background hiss and rumble. Find the blank section between two tracks and use the cursor to select it. Click on the Effect Menu and choose Noise Removal. We've already highlighted the area we want to use for the noise profile, so click on the Get Noise Profile button.



5 The noise reduction plug-in will disappear so you can select the area of the file you want to process. Hit Ctrl & A to select the whole file, click on the Effects menu and Noise Removal. Move the slider to the right and click Preview to hear the results. Keep doing this until you've found a setting that removes noise but doesn't leave the recording sounding artificial. Click OK.

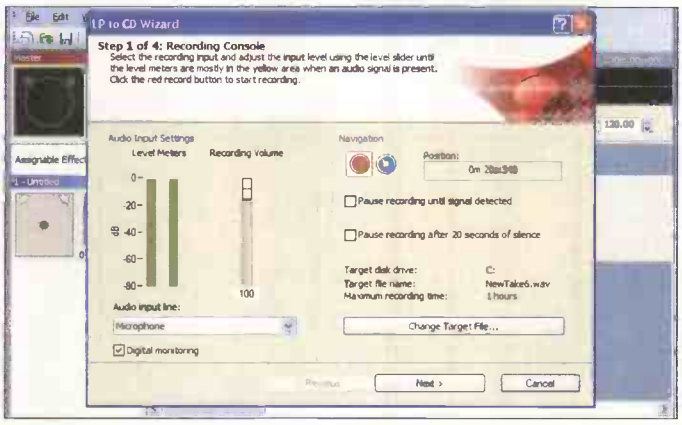


6 To split the audio into individual tracks, click in the audio and place the cursor at the start of the first song. Choose Add Label at Selection from the Tracks menu. Enter the song title as the title of the label. Repeat for each track. When you've labelled the tracks click on the file menu and select 'Export Multiple'. Choose mp3 as the format and click Export. Click Done to save.

How to use Nero to convert tapes and vinyl to CD

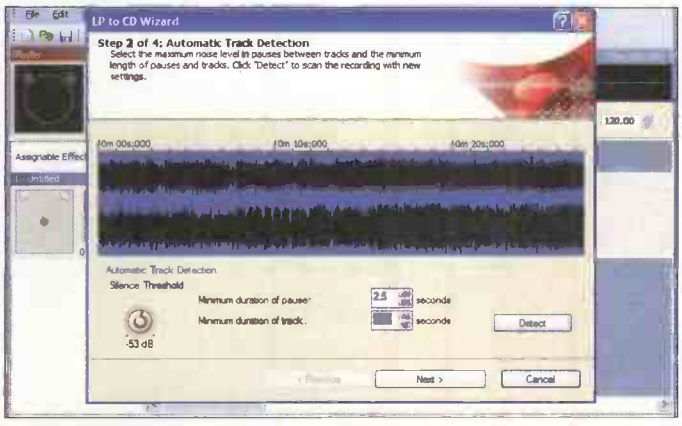
Nero 7 Premium comes with Soundtrax2, which records music from tapes or vinyl and then copies the results to CD. Before you start, connect your tape or record player to the line-in socket on your soundcard and enable the Line-in port in the recording screen of your soundcard's mixer applet.

1 When you start Soundtrax2, click the Wizards button in the opening screen. This will give you the option of choosing between the wizard to record an LP to CD or a tape to CD. If this screen doesn't appear, you can call up the wizards by going to the Tools menu and then choosing Wizards. We're going to use the LP to CD wizard, but the steps are very similar for both tasks.

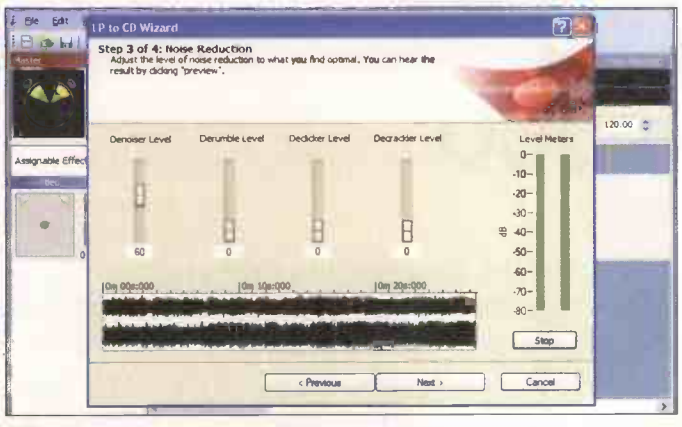


2 Click on Audio Input Line and select the correct input. This will usually be labelled Line-in. Adjust the volume until the level meters peak towards the top of the yellow area, cue up the start of your album and click on the Record button to record it to your hard drive. Press Stop to pause when you need to swap sides. When the album has been recorded, press Stop and then Next.

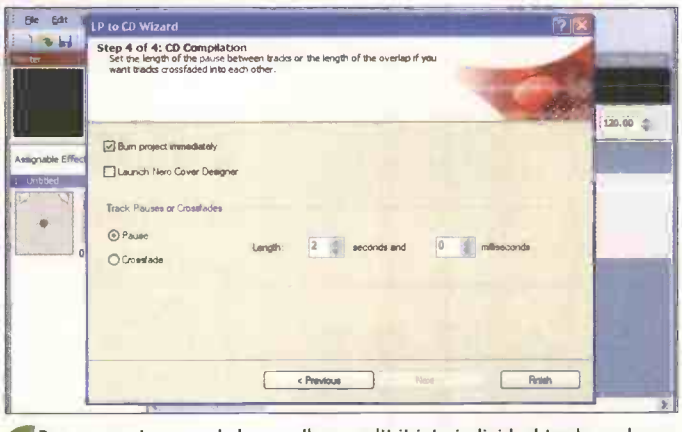
3 Soundtrax2 has a Track Detection feature that can automatically split your recording into individual tracks by spotting the pauses between songs. For this to work, you have to use the Silence Threshold dial to set the maximum noise level of the pauses. Try setting the level to 53db. You may have to change this for different records, according to the amount of background noise.



4 You can make sure Soundtrax doesn't treat short pauses in the middle of songs as a break between tracks by setting the minimum allowable length for a pause before it inserts a track break. To be doubly sure, you can also set the minimum track length. Once you're happy with the settings, click on Detect to split the recording into individual tracks. Click on Next to move on.



5 You might want to get rid of some pops, clicks and hiss. Soundtrax has four noise removal tools to get the best sound: Denoiser, Derumble, Declicker and Decrackler, each with their own slider control. The more noise removal you use, the less natural the results will sound, so try to find a good balance. Use Preview to hear the results. Once you're happy, click on Next.



6 By now you've recorded your album, split it into individual tracks and may also have cleaned up the results using the noise reduction tools. All that's left is to copy the results to a CD. Put a blank CD in your drive and tick the box labelled 'Burn project immediately' and then click on the Finish button to call up the CD copying screen. Click on Burn to write the tracks to a new CD.

360 your memories.

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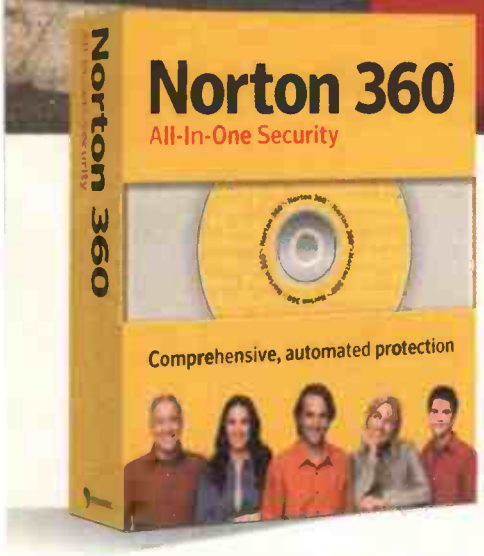

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EDITED BY
WILL STAPLEY

REVIEWS

A SMALL WONDER

Early last year, Samsung released the first miniature computer with Microsoft's UMPC (ultra-mobile PC) design, namely the Q1 (you can read what we thought of it at **www.pcw.co.uk/2155011**). Now Sony has released its latest UMPC, the Vaio VGN-UX1.

With a good dose of Sony style, it certainly looks the business, and despite running off a low-power processor it manages to cope with Vista reasonably well. Slide up the screen and a small Qwerty keyboard is revealed, complete with a smart blue backlight. Unfortunately, small dimensions often go hand in hand with poor usability. Indeed, the small screen on the UX1 isn't great for heavy-duty use, and neither is the miniature keyboard. But UMPCs are still in their infancy: in a few years we expect popularity will grow as they benefit from enhanced battery life and thinner designs.

Alternatively, if fiddling around with a small portable PC isn't your thing, check out this month's quad-core desktop PC group test on page 97.

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OUR SCORING

Excellent ★★★★★ Very good ★★★★☆ Good ★★★☆☆ Below average ★★☆☆☆ Poor ★☆☆☆☆

OUR AWARDS

Editor's Choice: The best product in a comparative group test. Anything that wins this award is of better quality than its competitors.
Recommended: A product that combines great features, usability and value for money.
Great Value: Not the best in class, but a product that has superior features and performance for the price.

Personal Computer World EDITOR'S CHOICE — Editor's Choice
Personal Computer World RECOMMENDED — Recommended
Personal Computer World GREAT VALUE — Great Value

'With the complexity of hardware inside, the Chillblast Fusion Tornado has to be big'
Read the review on page 98

ULTRA-MOBILE PC

Sony Vaio VGN-UX1

Windows Vista in the palm of your hand

With a strong background in ultraportable notebooks, Sony has been pretty busy in the UMPC (ultra-mobile PC) market of late. The Vaio VGN-UX1 is its latest device, following in the footsteps of the UX50 and UX90 models.

The UX1 is Sony's first UMPC to run Windows Vista – the Business edition, to be more precise. The basic components consist of a 1.3GHz Intel Core Solo U1500 processor, 1GB of Ram and a 32GB hard drive.

Stylistically, Sony has done an excellent job with the UX1. The front is home to the 4.5in touchscreen display, a fingerprint reader, six buttons (three of which can be customised), a wireless on/off switch, a small joystick pad to control the pointer, and the power switch. One of the device's two cameras also sits just above the display.

The UX1 feels very comfortable when held with both hands; the mouse buttons and joystick pad fall under the thumbs making it very easy to get to grips with. Weighing in at just under 500g, it's also easy to hold for extended periods of time.

Slide the screen upwards and a Qwerty keyboard is revealed, complete with classy blue backlight. Whether the sliding mechanism would survive regular rough treatment is debatable, but it certainly feels solid and won't slide without a firm push.

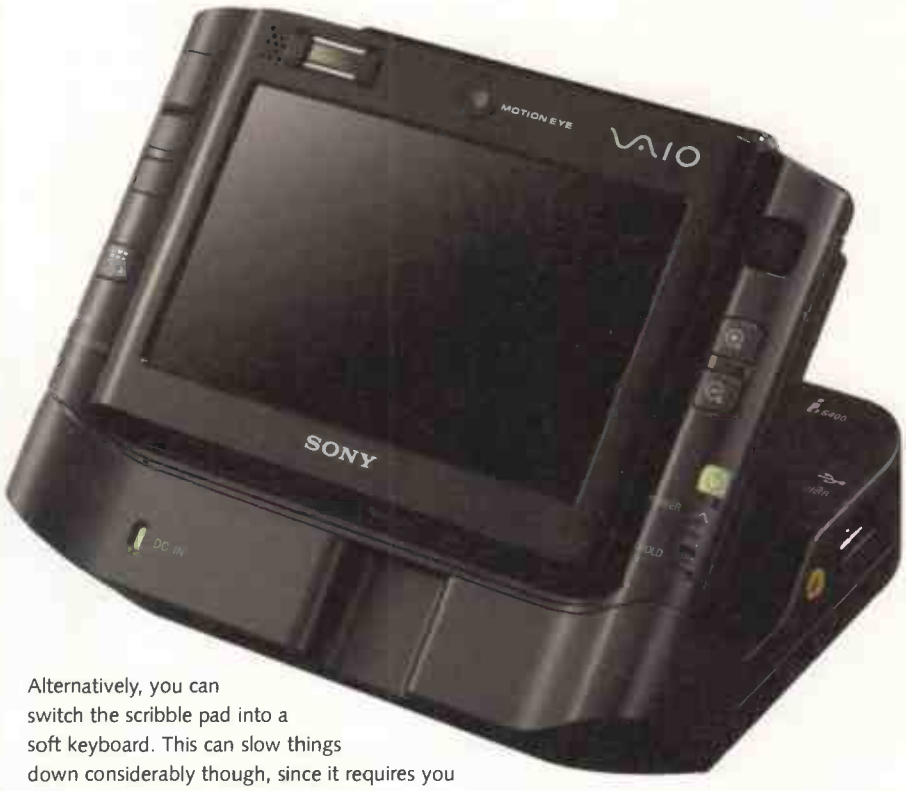
The 4.5in screen is much smaller than the 7in version seen on Samsung's Q1. In order to increase the amount of available desktop space, Sony has opted for a 1,024x600 widescreen resolution, which can be reduced to 800x600 if required, though this 4:3 aspect ratio doesn't use the full display area.

The included stylus is passive, which means it relies on the touch-sensitive nature of the screen. It's therefore possible to use your fingers to navigate around the Vista interface. For certain tasks this works well, but attempting to select the correct link in a web page, for example, can be very tricky. Indeed, even with the stylus this can prove a difficult task.

It's possible to zoom in on the display, but this then involves scrolling around the desktop, which isn't a perfect solution.

Text can be entered using the Qwerty keyboard, the stylus or Vista's Tablet handwriting-recognition feature. Due to the small keys, it's not possible to use your fingers on the keyboard – instead, you must use your thumbs in an SMS text message fashion. We managed to achieve about 25wpm (words per minute) after only a short time with the UX1 and would expect this to improve over time.

Handwriting recognition in the Tablet Edition of Windows XP never failed to impress us, and the same functionality is included in all but the Home Basic version of Vista. Due to the small screen size, it's only good for writing relatively short passages of text, but many will prefer it to the miniature keyboard.



Alternatively, you can switch the scribble pad into a soft keyboard. This can slow things down considerably though, since it requires you to point to individual letters to spell out words. Sadly, the small size of the screen doesn't allow for the Dialkeys soft keyboard, as demonstrated on the Samsung Q1.

To maximise battery life, Sony has gone for an ultra-low voltage Intel Core Solo U1500 processor running at 1.3GHz. This is supplied with 1GB of 533MHz DDR2 Ram. If you feel this isn't enough, you'll be disappointed to hear it's non-expandable.

'It's possible to use your fingers to navigate around the Windows Vista interface'

With such a slow processor, applications do take time to load. Indeed, the CPU and memory usage dials seen on Vista's Sidebar often teeter near 100 per cent and indicate just how much stress the UX1 is frequently under.

During general usage, the UX1 does slow down at times – it took more than 15 seconds to load Vista's Control Panel at one point, although other applications were running in the background. You won't notice it too much when web browsing or editing documents, but fire up a photo editor and the processor will start to struggle.

However, the UX1's performance is boosted by the inclusion of a solid-state hard drive, which is much faster than a standard disk drive. Conventional hard

drives are also far more susceptible to damage when in transit, and since the UX1 is designed to be carried around this can only be a good thing.

Two cameras are situated on the body. The one at the front houses a 0.3megapixel CCD and, in conjunction with the inbuilt microphone, is designed for video conversations. The second camera, a 1.3megapixel model, sits at the rear of the display. But with no flash, indoor shots often end up blurred and unusable. Outdoor shots come out better, but many camera phones will beat the UX1 on image quality.

Sony has furnished the UX1 with Wifi and Bluetooth, but omitted infrared. With infrared included, the UX1 could have been put to good use as a universal remote control for a home cinema.

The UX1 also comes with a docking station that houses a VGA output so you can hook it up to a nearby external screen. The dock also provides an Ethernet socket, three USB2 ports and a single Firewire port. Since you're unlikely to carry the docking station around with you at all times, Sony also includes a small dongle that attaches to the docking station socket on the UX1 – this provides VGA-out and an Ethernet port.

The battery that ships as standard with the UX1 has a maximum life of two hours, 40 minutes. Considering the portable nature of the device, we were hoping for much longer. When used for general web surfing, document editing and other relatively undemanding tasks, it kept going for just over two hours. However, if you're planning to watch video and listen to music, this will drop quite considerably; playing constant video, it lasted one and a half hours.

To extend battery life, the UX1 will accept Sony's VGP-BPL6 battery. This offers about double the capacity of the standard model, but it will also jut out from the right side of the casing.

The Sony's UX1 will only appeal to a niche market – its £1,999 price tag also helping to limit its appeal. Someone who simply wants to surf the web would be better off with a PDA or smartphone, while those wanting to watch video or listen to music will find plenty of portable media players with far longer battery life and smaller dimensions.

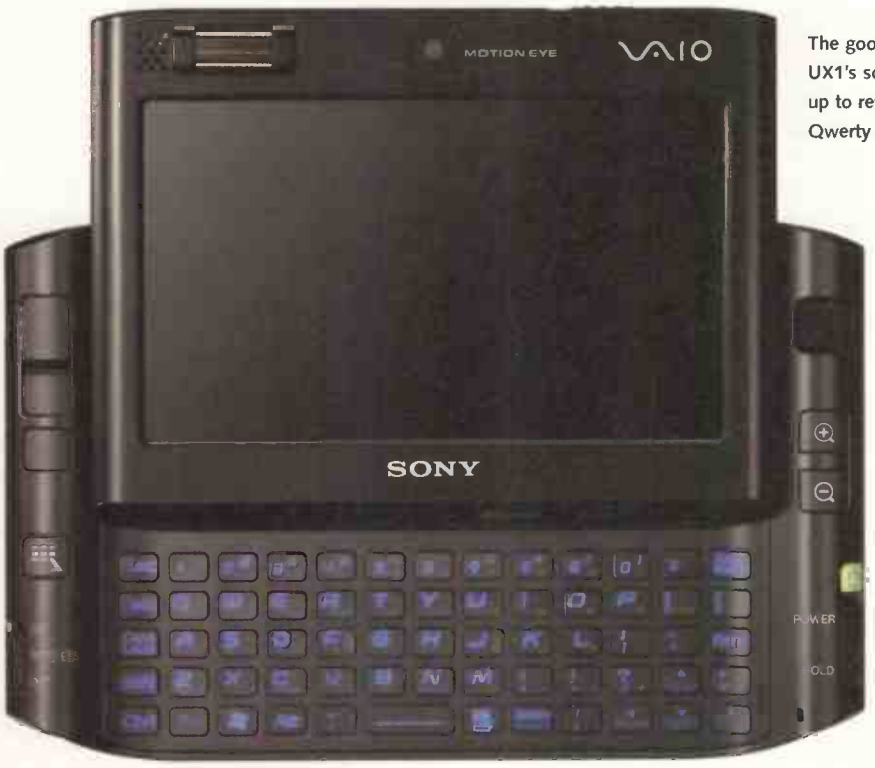
However, if you want everything Vista has to offer in the palm of your hand, Sony's UX1 certainly delivers the goods. Despite the slow processor, it handles Vista's Aero effects with aplomb and works well as a web browser, video player and document editor. But for a device that's meant to be carried around throughout the day, the poor battery life will put off many.

We can see why Sony decided to include a keyboard, and we like the sliding screen method of revealing it, but with such small keys it's very hard to type for extended periods. And while the display has been limited to 4.5in to lessen the UX1's dimensions, the relatively high WSXGA resolution means it's hard to navigate Windows and read what's on screen.

Sony might have been better off accepting a slightly larger-sized chassis in return for a 6in or possibly even 7in display. This would have improved navigation and general usability, and possibly even allowed for a larger battery. Of course, this would also make it heavier and more expensive, while the larger screen would be more of a drain on the battery.

At present, UMPCs are still in their infancy, but with the likes of Samsung, Sony and others developing new models such as this, it won't be long before the right balance of portability and usability is struck. *Will Stapley*

The UX1 comes with a docking station that houses a VGA output, Ethernet and Firewire sockets and three USB ports; a small dongle provides a more portable alternative



The good-looking UX1's screen slides up to reveal a Qwerty keyboard

Details

Price £1,999
Best price www.pcw.co.uk/bestprices
Contact Sony www.sony.co.uk
Specifications Intel Core Solo ULV U1500 (1.3GHz) • 1GB Ram • 4.5in screen (1,024x600) • 32GB flash memory • Intel GMA950 integrated graphics • 2 cameras • 1 USB2 • 802.11a/b/g Wifi • Bluetooth • Stylus • Battery: 2hr 40min (max) • Fingerprint reader • Docking station (VGA-out, 3 USB2, 1 Firewire, Ethernet) • Windows Vista Business • 150x38x95mm (wxdxh) • 532g

Verdict

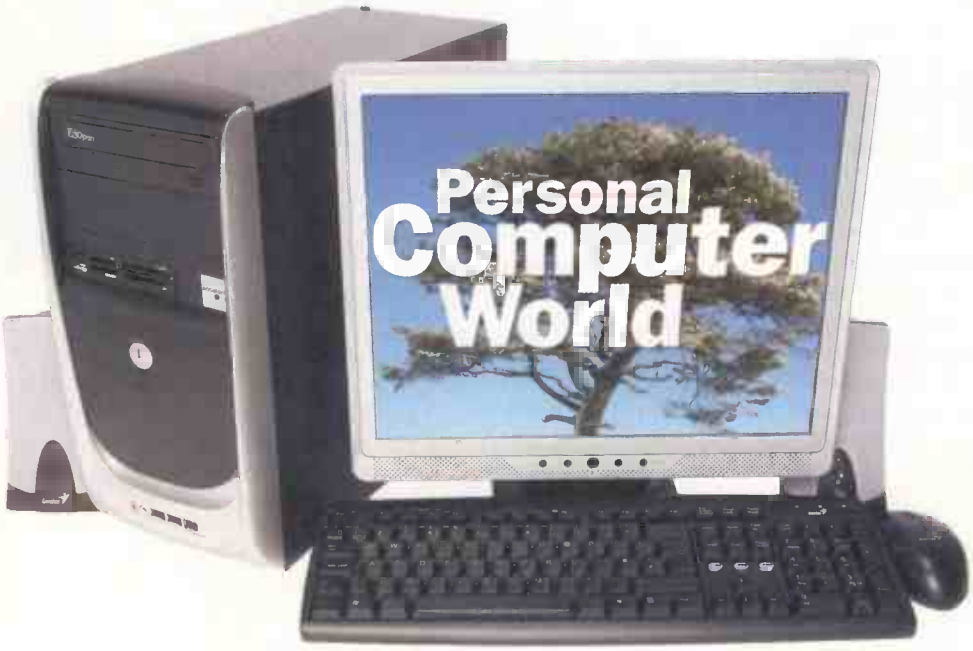
Pros Light; comfortable design; stylish
Cons Battery life; keyboard takes getting used to; small screen
Features ★★★★☆
Performance ★★★★☆
Value for money ★☆☆☆☆

Overall The UX1 looks good and handles Vista well, but the keyboard is too small for typing at length and battery life is disappointing
★★★☆☆

DESKTOP COMPUTER

PC Nextday Zoostorm 2-3305

Vista Home Premium for under £500



It takes a pretty expensive PC to run Vista with the full visual effects, surely? Not according to PC Nextday, which is selling a Zoostorm PC for less than £500 that, it claims, can run the full version of Vista – Home Premium – with the Aero visual effects.

The computer comes with a Pentium D 820 processor clocked at 2.8GHz. The Pentium D is not a recent processor and, while dual core, is nowhere near as powerful or efficient as the latest processors carrying Intel's Core 2 Duo branding. A Core 2 Duo chip clocked at a lower speed will easily outperform the 2.8GHz Pentium D in this Zoostorm PC.

That's borne out by the test results: it managed 4,117 in PCmark05, which is reasonable, if unspectacular, and pretty much where we would expect to find a PC with this CPU. The 1GB of memory is small and, although it doesn't appear to present a significant bottleneck, you'd be likely to increase performance a fair bit by adding another gigabyte. However, the two memory slots on the motherboard are already taken, so it will be a case of throwing away (or selling) some Ram in order to upgrade.

Where it really falls down is on graphics. The graphics card – an Nvidia Geforce 7600 GS with 256MB of Ram – is reasonable enough, but it's a generation down from the top of the range, which means it struggles to cope with recent games at high resolution and detail settings. We'd have expected slightly better graphics performance from such a card, but it came out with an extremely low score of just 2,322 in 3Dmark05. This is well below most of the PCs we've looked at recently, but it's fair to say that no-one buying a £500 PC should expect it to be a gaming powerhouse.

That said, this PC Nextday desktop is perfectly capable of dealing with Aero, Vista's fancy 3D display system. Even with the visual effects turned on, the Vista desktop was smooth and fluid and exhibited none of the performance problems we've seen on some lower-spec machines.

Otherwise, this PC is well stocked. It comes with a 250GB Western Digital hard disk (serial ATA, naturally) and a 16x DVD writer. There's the obligatory memory card reader which, although useful, takes up the only external 3.5in drive bay. That leaves one internal 3.5in bay free for another hard disk, as well as a spare 5.25in bay below the DVD drive. There's only one free PCI slot, and only one free serial ATA socket on the motherboard. A single spare IDE socket sits on the motherboard should you want to fill that spare larger bay with another DVD drive or even a Blu-ray or HD-DVD device.

It comes with 802.11g support built in and an Ethernet port. The package includes a budget, but decent performing, 17in AOC LM-765 LCD monitor (which PC Nextday sells for £111) and a pair of stereo speakers, although the latter are not up to much. The keyboard and mouse, while perfectly usable, are also not particularly pleasant for long-term use, and it might be worth picking up a decent Logitech or Microsoft set.

Overall, the Nextday Zoostorm 2-3305 Versatile PC is a reasonable choice for an average home user, but while it's capable of dealing with office tasks, light gaming and general Vista usage, any recent game on high-quality settings will tax it. However, if you're after a Vista machine and are on a budget, you should certainly consider this model. *Anthony Dhanendran*

Details

Price £499
Best price www.pcw.co.uk/bestprices
Contact PC Nextday www.pcnextday.co.uk
Specifications Intel Pentium D 820 2.8GHz • 1GB DDR2 553 Ram • 17in AOC LM-765 LCD Monitor (8ms) • Nvidia Geforce 7600GS (256MB) • 16x DVD writer • 250GB hard drive • Card reader • 802.11g • Genius Comfy KB-06X Black PS/2 Keyboard • X-Scroll PS/2 Black Optical Mouse • Genius SP-Q06S stereo speakers • Windows Vista Home Premium • One-year on-site warranty

Verdict

Pros Runs Vista smoothly; decent storage space
Cons Little room for expansion; poor graphics performance

Features	★★★☆☆
Performance	★★★☆☆
Value for money	★★★★☆

Overall It does what it claims to do – run the full Home Premium version of Vista. But the processor and graphics card will struggle when it comes to gaming and intensive applications such as video editing

★★★☆☆

VISTA NOTEBOOK

Gateway MT6825b

Personal Computer World RECOMMENDED

Well put together and good value for money, but not one for gamers

Gateway has released some pretty impressive value-for-money systems recently, and its latest product, the MT6825b Vista notebook, doesn't buck the trend.

The notebook is well constructed and feels durable. A brushed aluminium panel sits below the keyboard, which Gateway proudly claims is of aircraft quality. While this offers little purposeful benefit, it does make the laptop feel a lot more expensive than it actually is. The grey and black colour scheme is also a classy touch.

A low-end Core 2 Duo T5200 powers the system. This runs at 1.6GHz and, although based on the Merom core with 64-bit extensions, it only has 2MB of L2 cache instead of the 4MB cache present in the high-end T7200, T7400 and T7600 models.

The processor also has a slower front side bus (FSB) than these processors, running at 133MHz (effective 533MHz), instead of 166MHz (667MHz effective).

This FSB is matched to 1GB of DDR2-533MHz Ram. The Ram comes on two 512MB sticks taking up both slots, which means that should you want to upgrade – as we'd recommend since Vista really needs 2GB Ram to run smoothly – you'll have to remove the Ram already in the system.

In PCmark05 the notebook scored 2,993, which is what a Core Duo T2400 would have scored (based on the Yonah core from a year ago). The score of 506 in 3Dmark05 means this system is next to useless for even the most basic of gaming. The reason for this is down to the graphics being handled by an integrated Intel chip, the GMA 950, which is very poor compared with all other chips currently on the market. It doesn't have any of its own memory and dynamically steals up to 224MB of the system's Ram when needed.

The 15.4in widescreen LCD has a resolution of 1,280x800, which is at the lower end of pixel counts, but the screen is uniformly bright and fine for watching films. In our DVD run-down test, the machine lasted a decent 1hr 59 minutes – just long enough to watch most movies.

Considering the low price, Gateway has done well to ship this notebook with a sizeable 100GB hard drive, although being a 5,400rpm model, it doesn't perform as well as more expensive 7,200rpm versions.

Four USB2 ports line the right-hand side of the chassis, although there is unused space next to them, which could have been allowed for several more. The headphone and microphone jacks are appropriately fitted to the front of the device, with the speakers also located on the front of the laptop, pointing forward. They are adequately loud and produce a crisp sound.

VGA and S-video monitor outputs, 4-pin Firewire and a 4-in-1 card reader complete the connectivity list, and Microsoft Works 8.5 is included on the software front. The notebook weighs 3.30kg including power supply, which is average for a 15.4in laptop.

The chassis is better than most, especially those in the same league as HP and Sony's cheaper offerings. But the MT6825b doesn't do anything special and is missing some features; for example, a built-in webcam. However, it gets all the basics right and, at less than £500, comes highly recommended for those wanting a basic yet well-designed Vista notebook. The MT6825b can be purchased direct from Tesco (**www.tesco.com**).

Emil Larsen

Performance

PCmark05 **2,993**

3Dmark05* **506**

*Tested at 1,024x768 in 32-bit colour

Details

Price £499
Best price www.pcw.co.uk/bestprices
Contact Gateway www.gateway.com/uk
Specifications Core 2 Duo T5200 1.6GHz • Intel 945GM Chipset • 1GB DDR2 553MHz Ram (2 x 512MB) • 15.4in widescreen (1,280x768) • Intel GMA 950 integrated graphics • 100GB hard disk • 8x DVD writer • 4-in-1 card reader • Four USB2, 1 Firewire • 802.11a/b/g • 358x264x36mm (wxdxh) • 2.83kg

Verdict

Pros Well constructed; good office performance; bright screen
Cons Poor graphics; no Ram upgrade path; one-year warranty

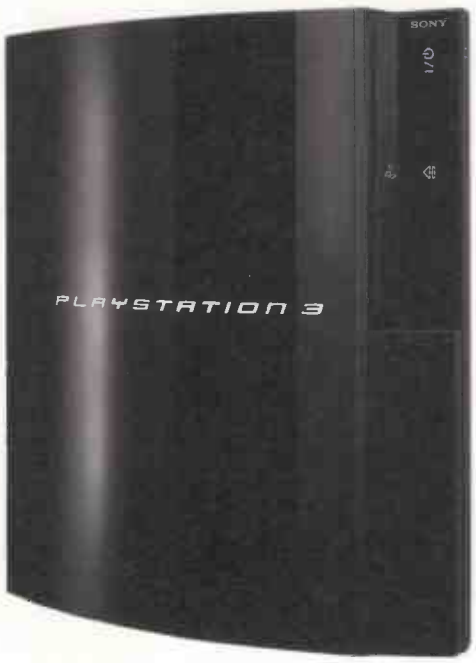
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★★

Overall It's not for gaming, but offers great features for the price ★★★★☆

GAMES CONSOLE

Sony Playstation 3

Will the PS3 be crowned king of gaming?



The big black box includes a Blu-ray drive and full 1080p HD output, and there are some promising exclusive games releases scheduled for it too

It has been a long wait but the Playstation 3 (PS3) is set to arrive in the UK on 23 March 2007, almost a year after it was first scheduled for release and more than four months after its Japanese and US launch.

We tested a US PS3. This was to be almost identical to the UK version, but Sony recently removed the chip that provides backward compatibility with PS2 games. But it has stated that emulation software will ensure compatibility with at least 1,000 PS2 titles at launch.

There's a lot of up-to-date technology packed into the big black box, including a Blu-ray drive and full 1080p HD output. Interestingly, while buyers are being offered two slightly different editions of the console in other territories, the Euro-PS3 will only be available in its slightly more expensive form.

In many ways this is good news, as it means desperate gamers won't wind up settling for the cut-down version of the console (which only has a 20GB hard disk and doesn't feature built-in Wifi or memory card slots) when the inevitable stock shortages kick in. The cost is not so rosy; the full console's £425 official UK price tag makes it one expensive gaming machine.

The larger 60GB internal hard drive will come in handy, since the extended media centre functions of the PS3 make it the perfect repository for ripped music files, photos for slideshows and downloadable content.

The internal hard disk is upgradeable. An access panel on the side allows you to remove the existing disk, and instructions on replacing it are included in the manual (at least they are in the US manual). It's also possible to play back and store media on external USB drives, so storage need never be an issue.

The new control pad is called the Sixaxis, since it features motion sensing on six axes. In one of the games we tried out, we were able to use the Sixaxis as a steering wheel to drive a car, but we've yet to see any software that takes advantage of the technology in quite the same way as the similarly motion-sensing Nintendo Wii Remote.

The PS3 is an impressive system on paper. It features the much-vaunted IBM/Toshiba/Sony-developed Cell processor, and Sony is more than happy to tell you about the 1.8 teraflops floating point performance of its RSX GPU or the 25.6Gbytes/sec bandwidth of its system Ram.

In practice, the console comes off looking like a slightly less accomplished Xbox 360. The interface is pretty straightforward but nowhere near as intuitive as the 360's dashboard. Other aspects of the console, from the instant access PS button in the middle of the controller to Sony's online services, seem to imitate Microsoft's 15-month-old console.

It won't even upscale DVD movies in the way that many of the better standalone DVD players will do. Upscaling is well within the powers of the Cell processor, so perhaps issues such as these will be addressed in forthcoming software updates. As a Blu-ray player, on the other hand, we were impressed, but until the outcome of the current HD movie format wars has been decided, the real benefit of having Blu-ray on board will remain a moot point.

As always, it's the games that will make or break the system. And, while the launch titles are unlikely to blow you away, the Playstation 3 has a release schedule that both Nintendo and Microsoft would be envious of, with key exclusive titles such as Metal Gear Solid 4 and Gran Turismo HD looking particularly promising.

Jonathan Parkyn

Details

Price £425
Best price www.pcw.co.uk/bestprices
Contact Sony www.sony.co.uk
Specifications Cell Processor • Nvidia RSX 550MHz graphics • 256MB Ram • 60GB Serial ATA hard disk • Blu-ray drive • Four USB ports • Ethernet socket • Wifi • Bluetooth 2.0 • Wireless (Bluetooth) controller • HDMI • Analogue AV multi-out • Digital (optical) audio output • 325x98x274mm (wxdxh) • 5kg

Verdict

Pros Excellent Blu-ray performance; 1080p HD output; motion sensor controllers; Wifi-ready; upgradeable hard disk
Cons Expensive; can't upscale games or DVDs; no HD cable included; underwhelming selection of launch software

Features ★★★★☆
Performance ★★★☆☆
Value for money ★★★★☆

Overall The power of the PS3 will have hardcore gamers frothing at the mouths but, while the PS3 is relatively cheap as a Blu-ray player, it's an unquestionably expensive games machine
★★★★☆

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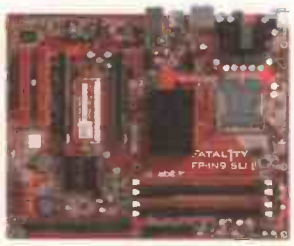

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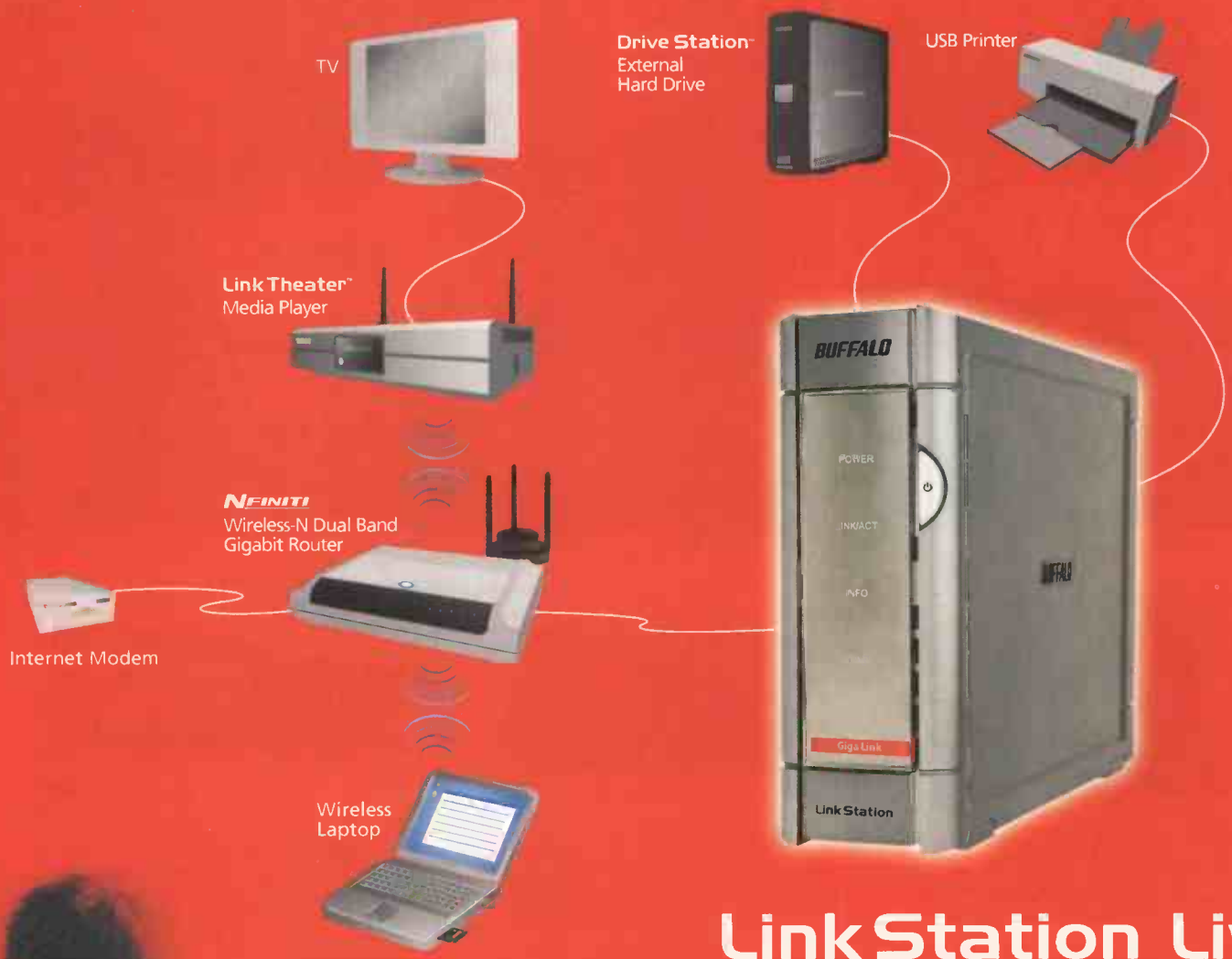

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WEB TABLET

Nokia N800

Open-source all-rounder has potential – it's just a shame about the price

Nokia's N800 is a revamped version of the N770 web tablet we reviewed last year (**www.pcw.co.uk/2163772**) and it is good to see the company persevering with the format.

The most notable addition is a neat web camera that pops out from the left-hand side of the screen and transforms the device into an IP videophone. The camera swivels to point forwards or backwards, enabling 'see-what-I-see' operation.

Also new is a small pull-out stand that enables the N800 to be perched on its side for viewing. This is particularly useful when combined with a Bluetooth keyboard because it allows you to do heavy work, notebook style.

The stand doubles as a cover for a USB port and one of two SD card slots – the other is inside the case, next to the battery. These slots give you the option of up to 8GB storage with the newly launched 4GB memory cards. The storage is needed because the N800 can also be used as a video or mp3 player. It is not a cellular phone; although it will link to one via Bluetooth to give you wide-area access when you are out of Wifi range.

The N800's physical controls are similar to those of its predecessor but it has been extensively restyled with a matt-black case and steel-effect facia. The underside has a curved ridge, giving it a slight upward tilt when laid flat.

On the top edge are the power button and three zoom buttons: two for zooming in and out, and one in the middle for returning to full screen. These are essential for viewing documents and websites on such a small screen and they work well, though not as easily as we would have wished.

At 75mm wide, 18mm deep and 144mm tall, and weighing just 206g, it is easily pocketable without weighing you down. The 4.1in screen has a full 800x400 VGA resolution, which is more than adequate; Apple's vaunted, yet-to-be released iPhone boasts a resolution of just 320x480 on a screen of much the same size.

There are three methods of entering text into the N800: handwriting recognition, which is barely usable without a lot of practice and care; and a choice of two soft keyboards, one for use with a stylus and the other for thumb or finger input. If you tap a text box, the web tablet cleverly registers which method you are using and throws up the appropriate keyboard.

Nokia says the upgraded processor in the N800 is twice as fast on some tasks as the N770 and it certainly gives a crisper response.

The software is a little on the sparse side; there's a media player, an RSS feed, an Opera 7 browser, and a notepad. But the N800 is intended to be used as a connected device and can be used to take advantage of web-based applications suites such as Google Apps.

It lacks the tight integration of, say, a Windows Mobile device and tasks such as setting up an internet radio link can be fiddly. On the other hand it can be just as good as a standalone web radio when plugged into your home stereo and does not cost a great deal more, at least at the US price of $399 (£204) – Nokia pretends the dollar is worth the same as the Euro, which is not as bad as Vista giving it parity with the pound, but annoying nevertheless.

The operating system is Linux-based and there is a developer site where applications can be downloaded. Other third-party applications include a satellite-navigation suite. Nokia certainly missed a trick by not including an infra-red port on the device, allowing it to be used as a universal remote control.

The most serious criticism is that the N800 is simply too small; navigating web pages is very awkward, even though the N800 does as much as it can to help you. However, it is a good platform for specialist web-based applications designed for small screens, particularly because sensitive data can be retained on remote servers rather than left on a small device that might be lost or stolen.

But in its own way this is a revolutionary device. For a start it makes audio or video calls by bypassing the mobile operators who are Nokia's biggest customers. And it is an open platform: an open source-based tablet heading the same way as the ultra-mobile PC (UMPC), but coming from the mobile-phone world rather than the computer industry. It should be encouraged, if only to stop Microsoft making all the running in this most exciting of design spaces.

Clive Akass

Details

Price £269
Best price www.pcw.co.uk/bestprices
Contact Nokia www.nokia.co.uk
Specifications 4.1in display (800x480) • Opera 8 web browser • Built-in webcam • Wifi • Bluetooth • USB2 • 144x13x75x13mm (wxdxh) • 206g

Verdict

Pros Very portable; versatile
Cons Too small for comfortable heavy-duty use (unless using a Bluetooth keyboard); software flaky in parts; costly at Euro pricing

Features ★★★★☆
Performance ★★★☆☆
Value for money ★☆☆☆☆

Overall The N800 has a lot of potential but is too small for comfortable web browsing ★★★☆☆

SMARTPHONE

RIM Blackberry 8800

Personal Computer World RECOMMENDED

The stylish sophistication of the Pearl with built-in GPS

RIM's last launch, the Pearl 8100, was aimed at the consumer and was designed for those who wanted to carry a regular phone-sized device but also wanted access to email on the move.

Creating a device that's both small enough to appeal to the average phone user and sleek enough not to look out of place in the fiercely competitive handset market is no easy task, but the Pearl largely pulled it off.

With a slick design and some new toys, it was only a matter of time before elements of the Pearl cropped up in other models in RIM's line-up.

The 8800 takes the styling and roller-ball navigation of the Pearl and packages it for the traditional Blackberry user who wants a full keyboard and a large display.

One of the major criticisms of the Pearl was its keyboard, which combines letters two-to-a-key and uses predictive text-like software to guess what you're trying to write. Getting to grips with its nuances can be a frustrating process and it takes time before you're fully up to speed with the system.

With the 8800, however, there's no learning curve – assuming you've used a Qwerty keyboard before. The keys on the left-hand side double up as numbers, while those on the right can also be used for symbols; but for straight typing every letter is directly accessible.

The 2.4in display is also wider than that of the Pearl – it stretches to 320x240 pixels – so you can see more information without having to scroll.

As you would expect from a Blackberry, setting up email is extremely simple: just enter your mailbox details via the website and new mail will be automatically pushed to your device when it arrives.

There's no built-in camera, though for corporate users this may be a good thing; some businesses don't allow cameras on their premises so bundling one would mean having to check the 8800 at the door.

In its place, however, is something more interesting: built-in GPS. This combines with the bundled Maps application so you can find your location no matter where you are in the world.

Maps works in a similar fashion to Google Maps – rather than store the map data on the device it downloads the information it needs one bit at a time. This can make scrolling around a slow process, as you wait for the new data to load.

It's also not the best piece of route-planning software ever made and you can't search by postcode, making finding locations frustrating. It's also a little slow to register your movements when you're out and about; you can be halfway down a street before it has noticed you've moved and updated the display. Furthermore, there doesn't seem to be a way to make it say the directions out loud, so you have to either look at the route plan or switch back and forth between the directions list and the map view.

Despite losing the camera, the 8800 retains a media player so it can play back video and audio, and the built-in speaker is pretty good. If you run out of storage, you can also expand it via the MicroSD slot – this is accessible without having to remove the battery, unlike with the Pearl.

If you like the idea of the Pearl, but prefer a full keyboard, then the 8800 is the device for you. It's bigger and lacks the camera, but it does have a larger screen and built-in GPS, so at least you'll never get lost.

Will Head

Details

Price From free with contract
Best price www.pcw.co.uk/bestprices
Contact RIM www.rim.net
Specifications 320x240 pixel screen • 64MB Ram • Qwerty keyboard • Bluetooth 2.0 • MicroSD slot • Quad band • GPS • 528 hours standby • 5 hours talktime • 66x114x14mm (wxdxh) • 134g

Verdict

Pros Pearl styling; full keyboard; built-in GPS
Cons Larger than a regular phone
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★★

Overall If you want a full keyboard, but like the styling of the Pearl, the Blackberry 8800 supplies both

★★★★☆

3D CONTROLLER

Logitech 3D Connexion Space Navigator

Ingenious mouse for CAD and other types of 3D software

Logitech is one of the world's leading manufacturers of mice, and it recently bought up a company called 3DConnexion, which makes a type of 3D mouse called the Space Navigator.

The Space Navigator is primarily designed for use with 3D modelling programs such as Maya, or the free Sketchup program that you can download from Google. However, it can also be used with more recreational programs such as the aerial maps on Google Earth.

Unlike a conventional mouse, which is essentially limited to two-dimensional movement, Space Navigator allows you to navigate through 3D space on your computer screen. However, rather than replacing your ordinary mouse, the Space Navigator is actually meant to be used in conjunction with a mouse. So, if you're a Maya designer, you'll use the Space Navigator with one hand to control your movement within the 3D workspace, while also using the buttons on your ordinary mouse to select menu commands and manipulate the 3D objects that you're working on.

In some ways, though, the Space Navigator is actually more like a joystick than a mouse. It looks fairly straightforward – essentially a big stick with a metal base to hold it steady. However, the stick part works very much like a joystick – albeit with a little more precision and control.

Press straight down on the stick when you're using Google Earth and you'll plunge straight down to the ground below. Pull upwards and you'll rise straight up again. An ordinary joystick only allows you to tilt forwards and backwards, or side-to-side, but the Space Navigator is more versatile than that. As well as tilting, you can also skim forwards and backwards, or pan (strafe) from side to side just by nudging the stick in the appropriate direction.

There are two buttons on the base of the unit. The right-hand button simply opens the Control Panel for the 3DConnexion software; this allows you to adjust the way the Space Navigator works, adjusting settings such as the device's sensitivity, and direction for pan and zoom controls. By default, the left button simply resets your view to whatever corresponds to north within the program that you're currently using. However, it can also be set to perform other tasks, such as saving the current document or pressing the Alt or Space keys.

The Space Navigator works well, and we soon found ourselves skimming merrily around the world in Google Earth. The only real problem with it is the virtually non-existent documentation. The printed manual does little more than tell you to plug the device into a USB port, while the online Help files aren't much better.

The manual doesn't mention details such as this, nor does it explain that some programs require you to specifically activate the Space Navigator by selecting the Start Driver option from the 3DConnexion entry in the main Windows Start Menu.

We also couldn't get the Space Navigator to work with Sketchup until we stumbled across the option almost by accident.

Still, those niggles aside, the Space Navigator is an ingenious way of providing 3D navigational tools for your flat 2D computer screen. It's a niche tool for specialised 3D designers, but will earn its keep if you do a lot of work with 3D software. *Cliff Joseph*

Details

Price £81 (£39 for educational users)
Best price www.pcw.co.uk/bestprices
Contact Logitech 3DConnexion www.3dconnexion.com
Specifications 3D controller with USB interface • Tilt, roll, spin, pan and zoom controls • One programmable function button • 3Dx software includes drivers for popular CAD software

Verdict

Pros Versatile control device for CAD and 3D graphics software
Cons Poor documentation; needs a driver for each program you use it with

Features ★★★☆☆
Performance ★★★★☆
Value for money ★★★☆☆

Overall A good tool for 3D designers, marred only by poor documentation
★★★★☆

GRAPHICS CARD

EVGA E-Geforce 8800GTX KO ACS3 Edn

An overclocked beast of a graphics card

No stranger to overclocking, EVGA has unleashed its latest monster – the 8800GTX ACS3 Edition. It's based on Nvidia's Geforce 8800GTX, which is an already blisteringly fast GPU.

EVGA has upped both the core and memory speeds and added a quiet cooler. The matt black ACS3 (asymmetric cooling system 3) heat sink and fan make a huge card bigger, giving the 8800GTX ACS a brutal appearance. The card is 275mm long, so it's worth checking your case's dimensions before purchase.

The cooler covers the whole of the board, but access to the two PCI Express power connectors hasn't been restricted. Another large heat sink sits on the rear of the card.

The core clock of the 8800GTX runs at 575MHz, but EVGA has upped this to 626MHz. The 768MB of GDDR3 memory runs at 1GHz (2GHz effective) instead of the default 900MHz (1.8GHz effective).

In 3Dmark05, this EVGA card mustered up an impressive score of 17,027 at the standard resolution of 1,024x768. At the same resolution, Far Cry ticked along quite happily at 126.53fps (frames per second).

If you're going to buying a card of this calibre, you're not going to waste time at low resolutions, but even when we pushed the resolution right up to 1,600x1,200 (the native resolution of most 20in TFTs), it still managed an excellent 14,677 in 3Dmark05, while Far Cry ran just a smidgen slower at 126.44fps.

Finally, it's good to see a graphics card that comes in a sensibly sized box – unlike some manufacturers which like to stick their cards in boxes that almost take two hands to carry.

The card can be bought for a whopping £469.99 – but at least EVGA's 10-year limited warranty comes as standard at that price. *Simon Crisp*

Performance

3Dmark05* 17,027

Far Cry* (fps) 126.53

*Tested at 1,024x768in 32-bit colour

Details

Price £469.99
Best price www.pcw.co.uk/bestprices
Contact EVGA www.evga.com
Specifications Nvidia Geforce 8800GTX chipset • 768MB Ram • 630MHz core • 2GHz memory • Shader Model 4.0 • Silent cooling system • 275mm length

Verdict

Pros Fastest GPU card we've tested
Cons Expensive; needs lots of room
Features ★★★★☆
Performance ★★★★★
Value for money ★★★☆☆

Overall A monster of a card with amazing performance, but it comes at a price
★★★★½

PORTABLE MUSIC PLAYER

Samsung YP-T9

A strong rival for the Nano, with Bluetooth, radio and video

If imitation is the sincerest form of flattery, then Apple will be pretty pleased by Samsung's YP-T9. The slimline design of this mp3 player bears obvious similarities to Apple's iPod Nano – even the packaging follows the simple fold-out design used by Apple.

Samsung's Media Studio software also takes its lead from iTunes, complete with its own online store.

The YP-T9 lacks the minimalist elegance of the Nano. It's festooned with a series of buttons rather than the iPod's simple scroll-wheel control system. However, it does boast a few features the Nano lacks. The YP-T9 has Bluetooth capability, which allows you to do away with cables and listen to your music on wireless Bluetooth headsets. It can also play video and has a built-in FM radio tuner.

The 1.8in screen has only a 176x144 resolution, but image quality is surprisingly good. The Media Studio software works well here; just right-click on a video file in the Media Studio library list and you can convert it automatically into a format suitable for the YP-T9 and then download it onto the player.

The Bluetooth features push the price up a bit, though. The YP-T9 costs £89 for a 1GB model, £119 for 2GB, and £149 for 4GB, which is £20 more expensive than a comparable iPod Nano. You'll also have to pay extra for the Bluetooth headset, as the YP-T9 includes only an ordinary set of wired headphones. However, if you don't need the Bluetooth features then there's a non-Bluetooth model called the K3, which is £30 cheaper (making it £10 cheaper than a comparable iPod Nano).

The YP-T9 can't match the iPod's elegant design, but it works well and its extra features arguably make it better value for money than its rival. *Cliff Joseph*

Details

Price £89 (1GB), £119 (2GB), £149 (4GB)
Best price www.pcw.co.uk/bestprices
Contact Samsung www.samsung.co.uk
Specifications 1.8in screen • FM radio • File support: mp3, wma, Mpeg4, Jpeg • 30-hour battery life (max) • 2.6x11x83mm (wxdxh) • 49g

Verdict

Pros Bluetooth support; video playback; FM radio; good-quality screen
Cons Expensive; doesn't include Bluetooth headset
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★☆☆

Overall The Samsung YP-T9 is a well designed mp3 player, but the lack of a Bluetooth headset makes it a bit pricey
★★★★½

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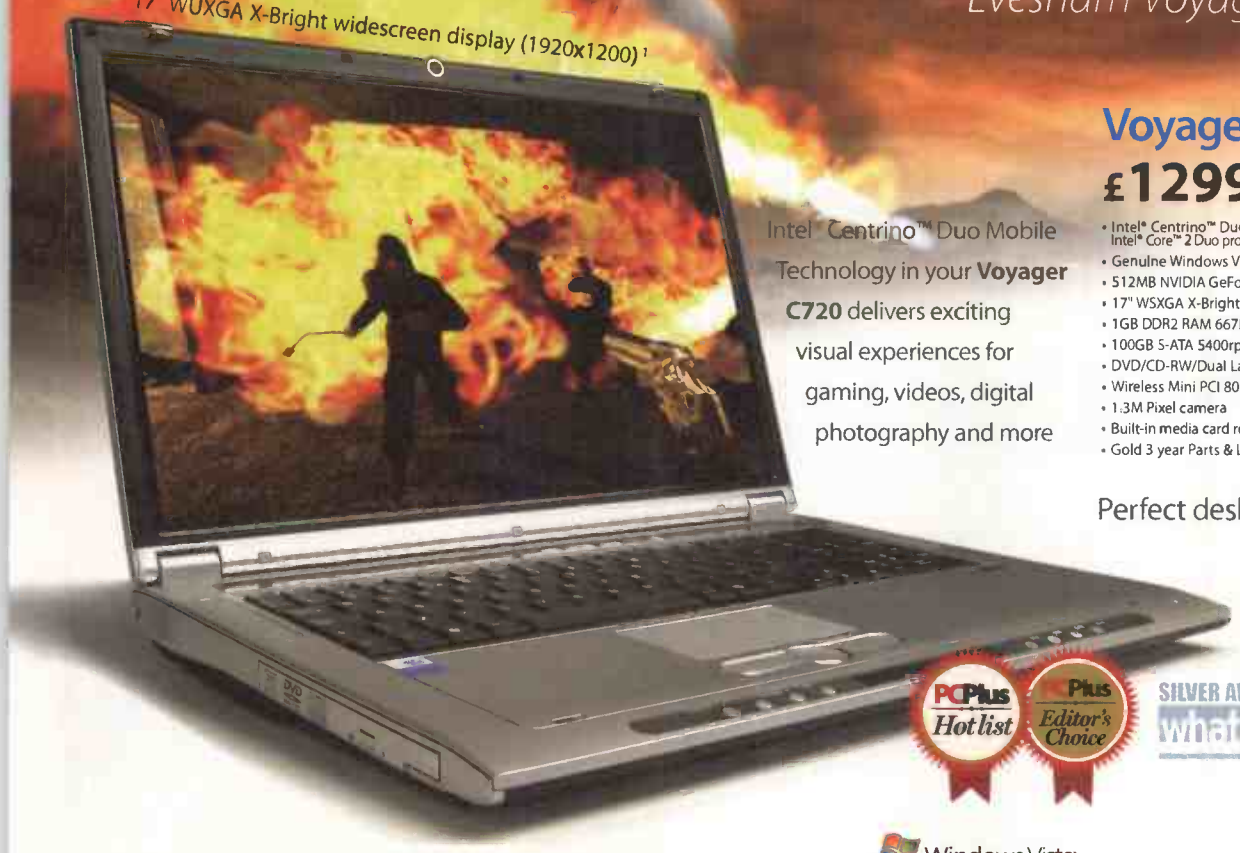

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FUJITSU SIEMENS	★★★★★☆	★★★★★☆	★★★★★☆	★★★★★☆
HP	★★★★★☆	★★★★★☆	★★★★★★	★★★★★☆
LENOVO	★★★★★☆	★★★★★★	★★★★★☆	★★★★★☆
MEDION	★★★★★☆	★★★★★☆	★★★★★★	★★★★★☆
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Computer Buyer, 2006

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- 1GB DDR II RAM, 667MHz (2x512MB)
- 80GB SATA 5400rpm hard drive
- DVD/CD-RW/Dual Layer DVD-RW drive
- Wireless Mini PCI 802.11bg (54Mbps) LAN
- 1.3M Pixel camera with rotation
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- 6 cell Li-Ion battery (life up to 3 hrs approx)
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- Silver 3 year warranty

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- Wireless Mini PCI 802.11bg (54Mbps) LAN
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What Laptop, Dec 06
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- 256MB ATI Radeon X1600 graphics
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- 1GB DDR2 RAM 667MHz (2x512MB)
- 100GB 5400rpm Serial ATA hard drive
- DVD/CD-RW/Dual Layer DVD-RW drive
- Wireless Mini PCIe 802.11abg (54Mbps) LAN
- 6 cell Li-Ion battery (life up to 3hrs approx)
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- Silver 3 year warranty

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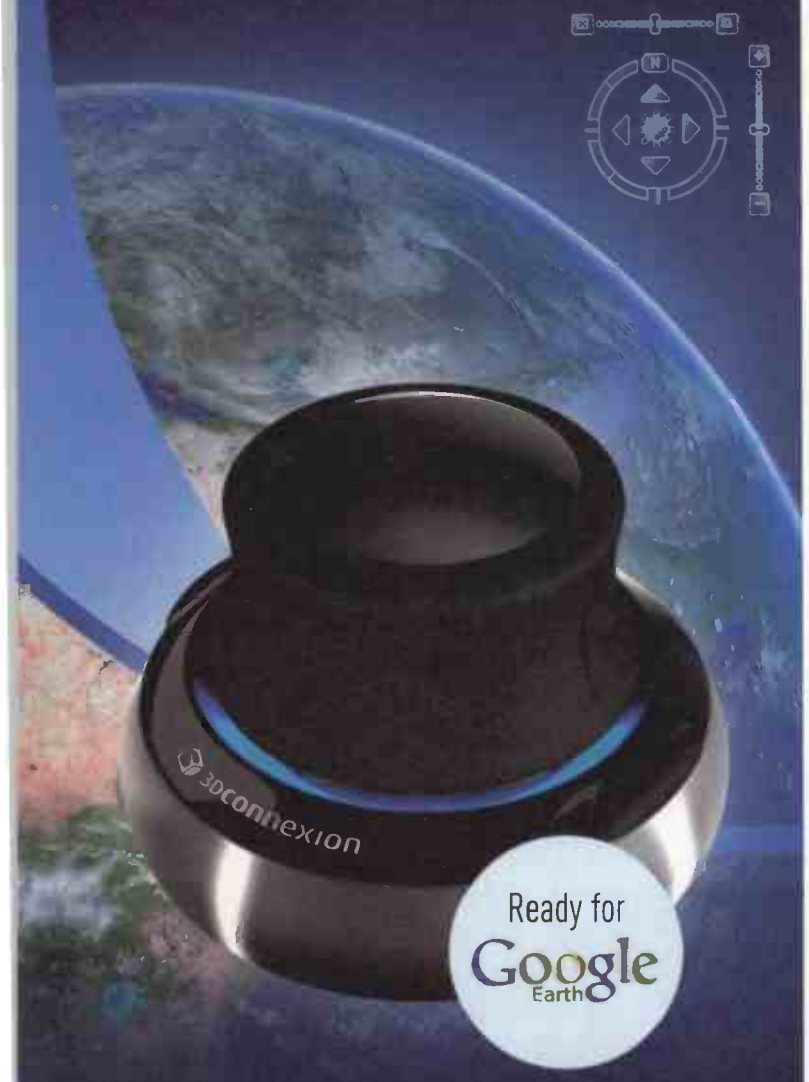

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GRAPHICS CARD

Leadtek Winfast A7300

Budget AGP graphics, but faster cards are available

The new Winfast A7300 GT TDH from Leadtek is aimed at those looking for a budget graphics card for their pre-PCI Express computer. It's bland looking and won't do anything to enhance cases with see-through panels. It's also not silent, although the small GPU fan only makes a slight hum.

The Leadtek card features eight pixel pipelines ticking over at 400MHz and 256MB of 700MHz DDR2 Ram. A dual-link DVI-I port allows for resolutions up to 2,560x1,600, and sits alongside a single VGA and an S-video port.

On our test system (3.73GHz Pentium 4 Extreme Edition, 1GB Ram), it scored 3,135 in 3Dmark05. This is fractionally below what a 7300GT using the PCI Express bus would achieve and is similar to ATI Radeon X700 and X800GT cards we've tested, but higher than what a Radeon X600 and Nvidia Geforce 6600 (not GT variants) are capable of.

In real world game tests we measured 65fps (frames per second) in Far Cry and Doom3, while Unreal Tournament 2004 ticked away at 135fps. Turning on 4x anti-aliasing (AA) to smooth out edges saw performance drop to 43fps in Far Cry, 39fps in Doom3 and 117fps in Unreal Tournament 2004.

This is a good card for those who regularly run games at 1,024x768. However, it's worth bearing in mind that Leadtek's AGP 7600GS card, with 12 pixel pipelines instead of the eight on this model, will be able to handle 1,280x1,024 resolutions more comfortably and can be bought for just £10 more. *Emil Larsen*

Performance

*Tested at 1,024 x 768 in 32bit colour

Details

Price £65
Best price www.pcw.co.uk/bestprices
Contact Leadtek www.leadtek.co.uk
Specifications Nvidia Geforce 7300GT • AGP 8x • 256MB DDR2 (700MHz) • 400MHz core clock • Eight pixel plpelines • Shader model 3.0 support • Dual-link DVI • VGA • S-video

Verdict

Pros Good frame rates at low resolutions; quiet
Cons Overpriced considering better performing cards are only fractionally more expensive

Features ★★★★☆
Performance ★★★★★
Value for money ★★★★☆

Overall Performs well at lower resolutions, but there are better options available for just a small price increase

★★★★★

MP3 PLAYER

Microsoft Zune

A fresh attempt at displacing Apple, but the UK launch date remains a mystery

Microsoft has dabbled in the mp3 player market before, but it's now jumping in feet first with the Zune. So, after years of dominance, has Apple met its match?

Oddly, Microsoft hasn't named a UK launch date for the Zune yet, despite it being available in the US. However, those eager to purchase will find plentiful supplies on sites such as Ebay.

One thing Microsoft has got right is the screen – it's big at 3in and fills a large proportion of the front. You have to turn the unit 90 degrees to watch video, but this means that widescreen content can be shown full screen, which looks great.

Another distinguishing feature is wireless music sharing, which allows you to beam songs to a fellow Zuner via the built-in Wifi. Transfer is quick (about 10 seconds per track), and you can even share some DRM-protected tracks.

The interface is very reminiscent of Portable Media Center, which Microsoft released in 2004. The menu allows you to go left and right, as well as up and down. So if you're browsing the list of artists, you can just click left for albums rather than have to go up a menu level and back down again.

Audio quality is great – even through the bundled headphones which provide adequate, though not excessive, bass.

Zune Marketplace is Microsoft's online music store, though it's only available in the US at the moment. In addition to individual tracks, there's also a subscription service which costs $14.99 (approx £7) a month. Single tracks cost $0.99 but have to be bought using Microsoft points – the same as for the Xbox Live.

The Zune is indeed impressive, but it's unlikely to give Apple sleepless nights just yet. *Will Head*

Details

Price TBC (approx £130)
Best price www.pcw.co.uk/bestprices
Contact www.zune.net
Specifications 3in screen • 14hrs max battery life (4hrs video) • Audio: wma, mp3, aac • Video: wmv • USB2 • 61x15x112mm (wxdxh) • 159g

Verdict

Pros Wireless music sharing; large screen; good features
Cons Restrictions on beamed music
Features ★★★★★
Performance ★★★★☆
Value for money ★★★☆☆

Overall The Zune is well thought out and has some nifty features, but it's unlikely to displace the iPod just yet
★★★★☆

POCKET PC

Acer C510

A user-friendly GPS device in the guise of a portable PC

Personal Computer World RECOMMENDED

The Acer C510 is a fully functional Windows Mobile Pocket PC with full GPS functionality. With an enclosed antenna, it's a pretty compact device and at 122g is deceptively light, which led us to wonder if Acer could have slimmed it down a little by cramming the components closer together.

Like the rest of the C500 series, the C510 runs on Microsoft Windows Mobile 5.0 and comes preloaded with a complete suite of Office applications.

You'll find a comparatively mid-range 300MHz CPU keeping things ticking over, along with 64MB of Ram, built-in Bluetooth and a Sirf III chipset for GPS. An SD/MMC slot is on hand to expand on the internal capacity but is also required to run the Copilot 6 software, supplied in the box on a separate card. You also get full European maps in the box, although you'll need to buy an SD/MMC card to install these.

The C510 performs admirably as an in-car navigation device or to help out with more pedestrian pursuits when in Walking mode. A range of navigation options include full seven-digit postcode support and a full Poi (point of interest) database.

Trips are fully customisable, including instant detours, individual road avoidance and route editing, and you'll find safety camera warnings and TMC information built in, all of which works seamlessly with the navigation data provided.

If there is a drawback to the C510 as a GPS device it is that the on-screen controls, while large enough to be operated by finger touch if you're careful, are more effective if you use the provided stylus. This can be a little tricky to operate on the move. Also, the physical menu buttons on the device aren't picked up by the Copilot software, meaning nearly all adjustments need to be made on screen.

Despite these issues, Acer has produced a great handheld GPS in the C510 that will put you in total control on the move. *Paul Lester*

Details

Price £279
Best price www.pcw.co.uk/bestprices
Contact Acer www.acer.co.uk
Specifications 2.8in display • 300MHz CPU • 64MB Ram • 128MB Rom • Sirf III GPA chipset • UK and Ireland maps on SD card, European maps provided on CD • Copilot 6 navigation software • 108x16.8x58mm (wxdxh) • 122g

Verdict

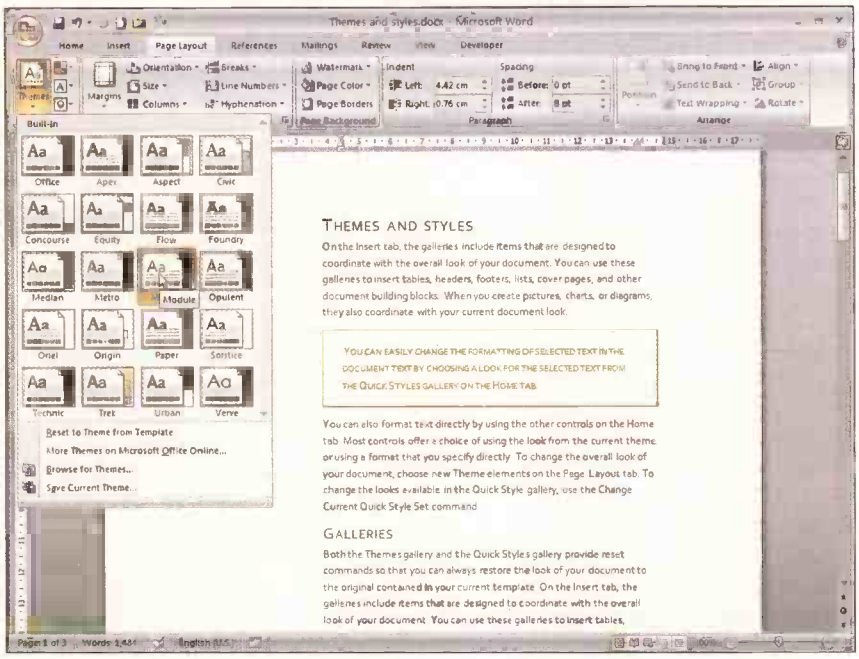
Pros Light and portable; decent-quality screen; accurate; user-friendly; highly customisable GPS navigation
Cons Feels a little cheap and the styling may not appeal to all
Features ★★★★☆
Performance ★★★★☆
Value for money ★★★★☆

Overall Not the most powerful handheld PC, but this mid-range device has good GPS capabilities
★★★★☆

OFFICE SUITE

Microsoft Office 2007

New file formats and a clutter-free interface introduced



The text labels at the top of the new Office 2007 interface reveal ribbons of tools below to simplify use

The new version of Microsoft Office has been available to corporate clients since November 2006, but retail customers had to wait until January 2007. As ever, it is available in a variety of configurations and prices, from the Student/Home edition at £90 to the Ultimate edition at £487.

The version supplied for review, Professional, includes Word, Excel, Powerpoint, Access, Outlook with Business Contact Manager and Publisher. The best price we could find was £357 for the full version or £235 for an upgrade. To qualify for an upgrade you need any Office 2000 (or later) suite or program, or Works 6.0 or later.

The two big changes are in the file formats and the interface. The proprietary binary file formats – Doc, Xls and Ppt – have been supplanted by Office Open XML (OOXML), with the DocX, XlsX and PptX extensions. These combine Zip technology (to reduce file size) and XML. The latter isn't new to Office but the new formats are claimed to "enable rapid creation of documents from disparate data sources, accelerating document assembly, data mining, and content reuse".

As the name implies, OOXML is open-standard, but is not the same as the XML-based Open Document Format used by Openoffice. The latter already has ISO ratification, but at the time of writing Microsoft was encountering obstacles in fast-track ISO approval.

This may cause the company to lose government contracts, but end users have little to fear since the new formats are not compulsory, and you can continue to use the former Doc, Xls and Ppt formats as default. What's more, Microsoft has made available converter packs, via Office Update, that will let 2000 and 2003 users open and save files in the new formats.

The other big change is to the interface. The familiar menus and toolbars that have graced Word and Excel since 1990 are gone. Previous alterations – the irritating Office Assistant, space-hogging task pane and infuriating 'adaptive' menus – have not proved popular. So, the new ribbon interface is welcome.

The text labels at the top of the screen may look like menus but they are really tabs; each revealing a different ribbon of tools below. Word, for example, has a Home ribbon containing formatting, clipboard and search tools, and other task-oriented ribbons for Page Layout, Mailing, and so on. Other ribbons – such as Excel's Chart Design – don't have a permanent tab but appear when needed. Whichever tab is open you can still edit text, numbers and formulae. Keyboard shortcuts also work, irrespective of the current ribbon.

Customisation has all but been excised. Although custom keystrokes are still permitted, the ribbons are set in stone – only the Quick Access Toolbar can have commands or macros added.

Is it worth upgrading? For home and small business users, the new file formats bring little benefit. XML is largely irrelevant and if file size is still an issue, then XP and Vista users already have methods of file compression. It isn't cheap, and UK consumers have to pay 40 per cent more than their US counterparts. And elegant though the new interface is, upgraders will still have to devote time and effort to learning it.

For new buyers, who can do without Access or Outlook, the sub-£100 Home and Student edition is an enticing proposition. You can read reviews of Word 2007, Excel 2007 and Outlook 2007 online at **www.pcw.co.uk**.

Tim Nott

Details

Price £357 (Office 2007 Professional), £286 (Office Standard), £90 (upgrade)
Best price www.pcw.co.uk/bestprices
Contact Microsoft www.microsoft.com
System requirements 500MHz processor • 256MB Ram • 2GB hard disk space • Windows XP (SP2) or later

Verdict

Pros New look; easier to create great-looking documents; easier for support staff; XML for those that need it; no more Office Assistant
Cons Will take some learning; UK pricing 40 per cent more than US; Onenote not included in the mid-range versions; limited opportunity for customisation enthusiasts

Features ★★★★★
Ease of use ★★★★½
Value for money ★★★☆☆

Overall The new interface is something you'll either like or loathe – we like it, but upgrading comes at a price, both in cash and in effort
★★★★½

VIDEO EDITING

Cyberlink Powerdirector 6

Capture and edit digital video, upload to video-sharing websites and create DVDs

The Powerdirector workspace is well designed, enabling you to find your way around without needing to refer to the Help file

Cyberlink Powerdirector 6 is a video-editing and production suite aimed at the home video market. It's easy to use and supports capture, editing and export of high-definition video formats.

As with all video-editing programs, Powerdirector 6 divides the whole process into chronologically ordered tasks and provides the necessary tools for each. Four buttons across the top of the screen provide everything you need to capture and edit video footage, produce video files for distribution and create video DVDs.

Most of the action occurs in the edit module, which is well designed, enabling you to easily find your way around without needing to refer to the Help option. There's a choice of storyboard or timeline layout, the latter providing a master video track, effects track, picture-in-picture overlay track, a titling track and voiceover and music audio tracks.

If the effort of arranging clips and applying transitions is all too much, Powerdirector's Magic Movie Wizard will do it all for you, but don't expect miracles. We were a little disappointed with the pedestrian array of templates on offer and the wizard's inability to cut clips to the beat of the music backing produced stilted, disjointed results.

In addition to new effects, transitions and titles, the PiP (picture in picture) Object Room provides a library of overlay graphics that includes frames and clipart, which can be anlmated using keyframed motion paths.

Voiceover recording exemplifies the program's straightforward approach. All you need to do is position the play head in the timeline where you want to begin your voiceover and press the record button. You can elect to set a time limit and add fade-in and fade-out, but that's as complicated as it gets.

The Produce button opens a production wizard which provides file output options including write back to DV or HDV tape and upload to Youtube and Mediamax sharing websites. Windows Media Video, Realvideo and Quicktime streaming are also supported.

Before pressing the Create Disc button you need to edit your footage and add the chapter markers that are used to create a DVD menu. Once again, this is made easy in the Chapter Room, where chapters can be created automatically at the start of each clip, or added manually. You can now also name chapters.

Powerdirector's DVD authoring takes footage from the storyboard or timeline, automatically creating a chapter-based menu. We've criticised previous versions of the program for lacking menu customisation and Cyberlink has addressed this by introducing a Menu Designer which enables users to change the background image, rearrange the layout, add buttons and change their appearance.

The supplied style templates are a bit cheesy, but there's a good range and each offers several layout options, so you can organise movies with lots of chapters onto menu pages with multiple buttons. You can't redirect menu buttons, for example to go to sub-menus, or to return to the top menu after playing a scene, so this isn't the application to use for kiosk-style DVD presentations.

This version of Powerdirector is a significant improvement on version 5. While it lacks some of the advanced features of competitors such as Adobe Premiere Elements, for home users who just want to make a movie and upload it to Youtube, or create a holiday DVD its budget price and supreme ease of use make it well worth considering. *Ken McMahon*

Details

Price £49.99
Best price www.pcw.co.uk/bestprices
Contact Cyberlink
www.cyberlink.com
System requirements 2.2GHz processor • 256MB Ram • 5GB free disk space • Windows XP (SP2 required for HDV capture)

Verdict

Pros Inexpensive; very easy to use
Cons Poor Magic movie wizard; cheesy style templates

Features	★★★★☆
Ease of use	★★★★☆
Value for money	★★★★☆

Overall Powerdirector 6's low price tag and easy-to-use nature will appeal to video editing newcomers
★★★★☆

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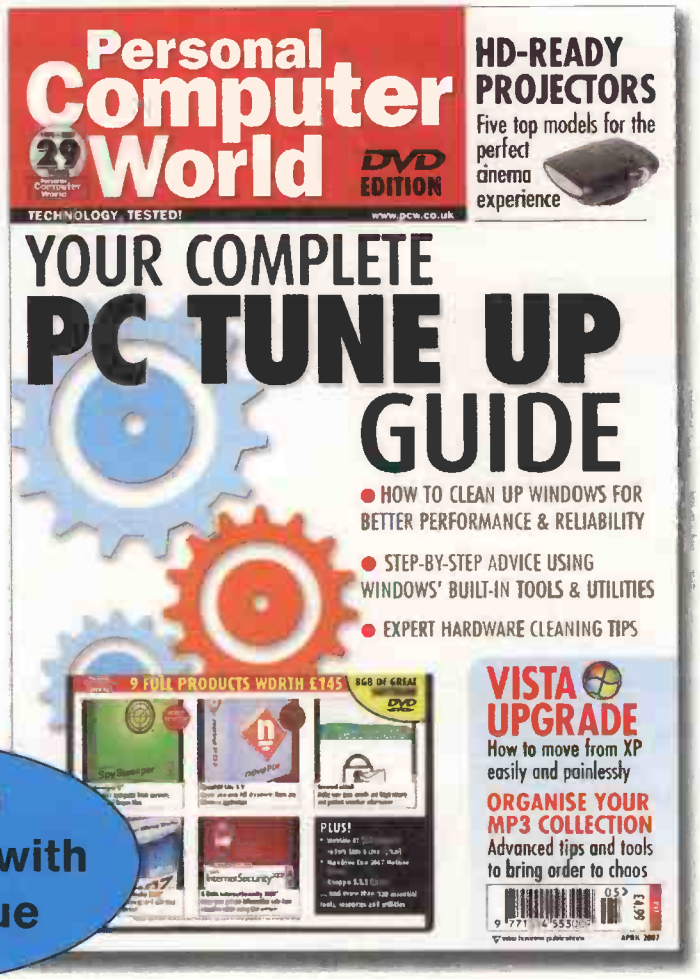

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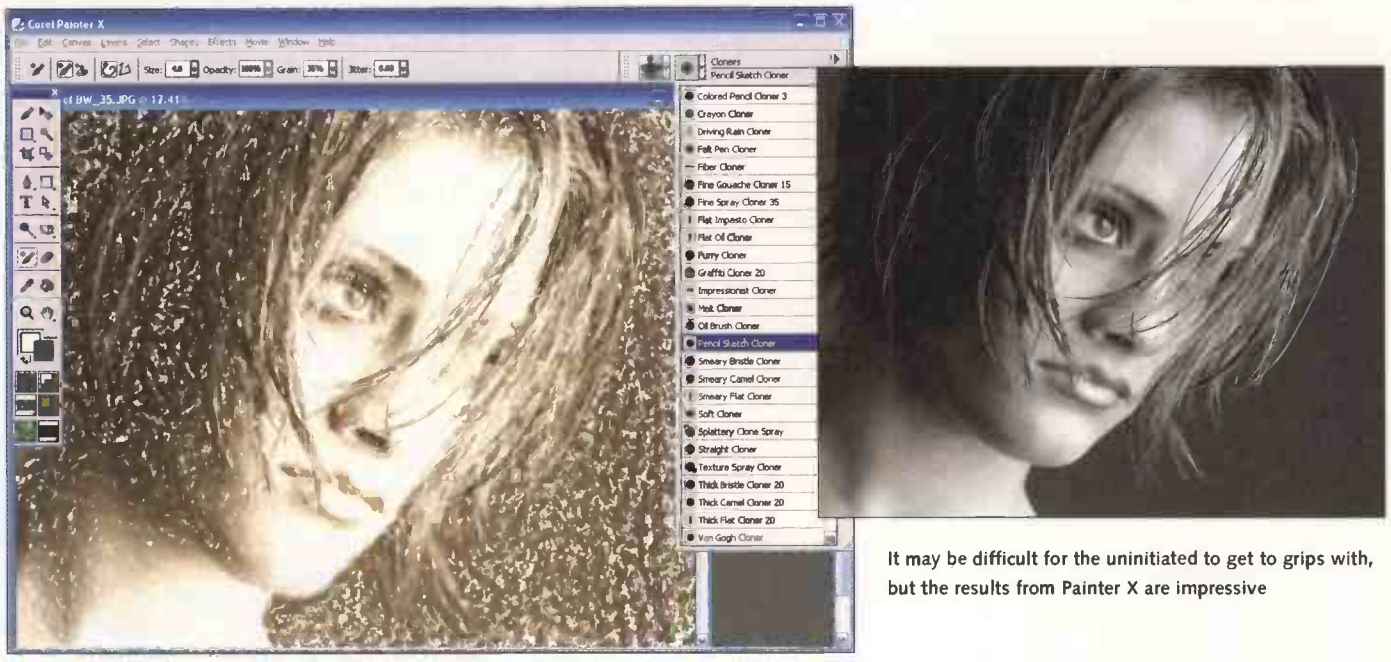
PAINTING SOFTWARE

Corel Painter X

Versatile but complex art package



It may be difficult for the uninitiated to get to grips with, but the results from Painter X are impressive

Painter is an amazing piece of graphics software and provides a vast range of tools for simulating the appearance of natural painting materials, such as watercolours and oil paints. However, it's also vastly complex, with an endless array of menus and palettes, and it's not easy for people who don't have a fair degree of art training to master the program.

Painter X – the follow-up to Corel's bizarrely named Painter IX.5 – doesn't change this. The new features work well, and will certainly appeal to experienced existing users, but the program doesn't make much effort to tone down its steep learning curve.

If you have the skill to produce your own artwork – and a pressure-sensitive graphics tablet – you'll probably love the new Realbristle brushes. These behave like real brushes, with bristles that splay apart as you press down on them, or taper together as you ease off the pressure on the brush. They certainly provide greater control when painting by hand, and the mixer palette has been improved as well, making it easier to select and combine colours as you go along.

If you're interested in classical composition techniques you can use the new layout tools to follow guidelines such as the Divine Proportion – the 3:5 aspect ratio classical artists identified as being particularly pleasing to the eye. Followers of more modern photographic techniques may prefer to opt for the new layout grid that can be used to apply the rule of thirds, which divides your canvas into a 3x3 grid.

Photography is a particular focus for this upgrade; or rather, the process of transforming photographs so they look like traditional sketches or paintings. Again, this is an area where you'll get best results if you have the confidence to paint over your photographs by hand. However, Painter X also includes some new auto-painting controls that attempt to automate this process for you.

In previous versions of Painter, the auto-painting features simply didn't work very well. They would apply brush strokes on top of a photo in such a random fashion that you just ended up with a blotchy mess. So, in this version, Painter includes a new Smart Stroke option; this uses brush strokes that more closely follow the lines and shapes found in the original photo. We found that this produced better results than the last version of Painter, although the results could be rather unpredictable at times.

In addition to the Smart Stroke option, there's also a Smart Settings control that, according to the manual, "can be used to preserve detail from the source photo". In practice, though, this option just seems to quickly slap brush strokes over the image without affecting the detail in the final painting. And for some reason when you select this option, Painter often switches to a completely different type of brush – for example, switching from a watercolour brush to an oil paint brush – forcing you to go back and re-select your original brush once more.

To be fair, Corel does seem to recognise that Painter's sheer complexity is a problem for beginners, so it includes an improved manual and a series of video tutorials with this version. However, we can't help thinking that what Painter really needs is a bit of an interface makeover to try and streamline its endless list of palettes and settings.

While this upgrade will certainly appeal to existing users, Painter X could still do a lot more to appeal to new users.

Cliff Joseph

Details

Price £270 (£140 upgrade)
Best price www.pcw.co.uk/bestprices
Contact Corel www.corel.co.uk
System requirements 1GHz processor • 512MB Ram • 360MB hard disk space • Graphics tablet recommended • Windows 2000/XP/Vista

Verdict

Pros Versatile; realistic natural media paint tools
Cons Complex and cluttered interface

Features ★★★★★
Ease of use ★★★★☆
Value for money ★★★★★

Overall It's unrivalled for creating natural media artwork, but Painter's complexity means that it's not for beginners ★★★★☆

ROLE-PLAYING GAME

World of Warcraft: The Burning Crusade

Will this multiplayer RPG expansion pack inflame fans?

Personal Computer World RECOMMENDED

Even though the graphics are starting to show their age, The Burning Crusade has plenty to excite Azeroth fans

When an expansion pack hits the shelves it's often a sign that the software publisher is trying to squeeze a little more juice out of a fading licence by releasing a budget-priced rehash of the original title with a handful of slightly different missions and an extra weapon or two. Traditionally speaking, the expansion pack is very much an afterthought and, quite often, a prime example of the law of diminishing returns.

Which is why, to the uninitiated, it may seem faintly absurd that the launch of an expansion pack like The Burning Crusade should have been greeted with such widespread publicity and general hullabaloo.

But The Burning Crusade is no ordinary expansion. It's the first official add-on pack for what is arguably the definitive massively-multiplayer online role-playing game (MMORPG) – World of Warcraft. With more than eight million players worldwide, World of Warcraft (WoW to its friends) is more of a phenomenon than a game and, as such, Burning Crusade is probably one of the most eagerly anticipated expansion packs in history.

It would have been easy for Blizzard to trot out a flimsy token effort to cash in on the game's astonishing popularity. But instead it seems that WoW's developers have been listening carefully to their customers and have released a well thought-through set of additions and improvements, almost by way of a reward for the loyalty of Warcraft's many fans.

Among the most significant features that Burning Crusade brings to the table are two new playable races – the Blood Elves and the Draenei. There are also hundreds of new quests, scores of new creatures and items, and whole new locations to explore, including several new dungeons, three new cities and an entirely new continent – Outland – accessed via the rather convenient Dark Portal. The other aspect that will be of major importance to hardened adventurers is the fact that Burning Crusade raises the bar in terms of how much you can level up a character. Determined players can now scale their virtual personalities up to the dizzy heights of level 70, should they so wish.

This 'reward' comes at a price, however. Burning Crusade costs nearly £30, which is much more than most expansion packs. You'll also need a full copy of the original game to run it, so new players will have an even more expensive initial outlay. And, of course, the ongoing, online nature of MMORPGs means that there are subscription fees into the bargain. And these aren't cheap; about £9 per month to be precise.

Graphically, the game is beginning to show its age. Environments are colourful and imaginatively designed – especially the new ones – but textures can be a little on the bland side, while some models feel a bit simplistic by modern standards. The upside to this is that the original game and its expansion pack will run on older and lower-spec hardware. In addition, it's one of the few games to come in dual PC/Mac format.

If you're not into MMORPGs, then this expansion probably won't persuade you to spend weeks of your life online, questing your way through a fantasy land with a band of virtual chums. For dedicated WoW players though, Burning Crusade represents a lot of worthwhile WoW content and is an absolute must-have. Erstwhile adventurers and lapsed Warcraft subscribers, meanwhile, may also find that Burning Crusade's new features are just what they need to reignite their passion for the game. *Jonathan Parkyn*

Details

Price £29.99
Best price www.pcw.co.uk/bestprices
Contact Blizzard
www.worldofwarcraft.com
System requirements 800MHz processor • 512MB Ram • 10GB hard disk space • World of Warcraft (full original version) • Windows XP/2000, Mac OS X 10.3.9

Verdict

Overall Beginners might be baffled, but there's a ton of stuff to get excited about if you're already an avid Azeroth fan – more than enough to warrant the asking price

★★★★☆

REAL-TIME STRATEGY

Supreme Commander

Successor to Total Annihilation promises strategic combat on a supremely large scale

Strategy gamers have had it pretty good over the past few months. They've enjoyed one of the best-ever World War II strategy games (Company of Heroes) and one of the best-ever historical strategy games (Medieval II: Total War). And now the lucky blighters have got one of the best-ever science fiction strategy games to sink their teeth into.

Supreme Commander's creator, Chris Taylor, has long promised us real-time strategy (RTS) on a massive scale, and the finished product genuinely appears to deliver on this front. Either played alone, with others online or over a Lan, it offers epic battles between thousands of land, sea and air units across vast maps.

There's a surprisingly convoluted back story involving bio-mechanical brain transplants, misplaced religious fundamentalism and imperialistic space colonisation, but it's all basically an excuse for three factions to enjoy an inter-galactic scrap.

In fact, Supreme Commander's revelation is not that it does anything new, but that it streamlines the whole RTS experience and makes it a lot more fun. Resource-gathering tasks, for example, can be queued up so that you can concentrate on something more interesting. Advancing through the technology tree, too, becomes less of a chore and more of a thrill, particularly as the eventual reward is a range of colossal combat units.

On a technical level, Supreme Commander doesn't look massively different to other titles of its type. Graphics are pretty good and stand up fairly well when zoomed right up close. It's only when you zoom back out again, however, that it starts to become clear what sets this game apart from the rest – its size.

DirectX 10 support and the ability to use two monitors are really just the icing on an already very tasty and large cake. *Jonathan Parkyn*

Details

Price £34.99
Best price www.pcw.co.uk/bestprices
Contact THQ
www.supremecommander.com
System requirements 1.8GHz processor • 512MB Ram • 8GB hard disk space • DVD-Rom drive • Windows XP/Vista

Verdict

Overall It's not the easiest game in the world, but Supreme Commander is an excellent strategy game and a fine example of what happens when a games developer takes the time to get it right

★★★★★

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STRATEGY/ACTION GAME

Battlestations: Midway

Eidos goes in for a spot of genre bending with its latest WWII game

Ever played a strategy game and wished you could jump inside one of the tiny vehicles under your command and get stuck into the action yourself? If you have, then Battlestations: Midway could well be the game for you. It is a clear attempt to blend the more tactical gameplay of a straightforward strategy title with the full-on, front-line vehicular combat of something like Star Wars: Battlegrounds.

You start the game as US Naval Officer Henry Walker, who finds himself stationed at a base called Pearl Harbor in 1941. Before long, young Henry finds himself playing a starring role in World War II's Pacific Theater. The single-player game follows Walker's career as he ascends the ranks and takes on the enemy in a number of semi-historical battles.

If you can put up with the occasional poorly scripted, badly animated cutscene, then the single-player aspect is fairly good fun. The initial emphasis on action gradually gives way to more tactical gameplay as your command increases. At virtually any point, however, you can take the helm, throttle or gun emplacement of a number of combat vehicles, from fighter planes to massive aircraft carriers.

Played alone, Battlestations: Midway feels like an uncomfortable mash-up of genres. Die-hard strategy fans may well find its lack of depth frustrating, while those looking for some instant action could be easily annoyed when the game snaps back to a more strategic overview of the combat.

Battlestations only really comes into its own when you play it online against real, live opponents, with up to eight players teaming up to blow each other out of the water. At this point, the game turns into a gigantic, high-tech version of Computer Battleships and it can be quite an exhilarating experience. *Jonathan Parkyn*

Details

Price £29.99
Best price www.pcw.co.uk/bestprices
Contact Eidos
www.battlestations.net
System requirements 2GHz processor • 512MB Ram • 6GB hard disk space • DVD-Rom drive • Windows XP/Vista

Verdict

Overall **Battlestations: Midway is not entirely successful in its mixture of gaming styles, but the online multiplayer is excellent and Eidos should at least be applauded for the game's originality**

★★★★☆

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Personal Computer World

vnu labs

How we test

Performance testing is an important part of PCW's reviewing process and to obtain our authoritative results we use the UK's best PC testing resource – VNU Labs. Here we explain why you can trust our results and give you a tour of our most frequently used benchmark programs.

One of the main reasons people upgrade their PCs is because their old model seems 'too slow'. But how do you tell whether the one you're going to replace it with is any faster? At *PCW* we take PC testing very seriously and we have the UK's best PC testing labs – VNU Labs – on tap to help us give you reliable, authoritative performance figures, to help you with your purchasing decisions.

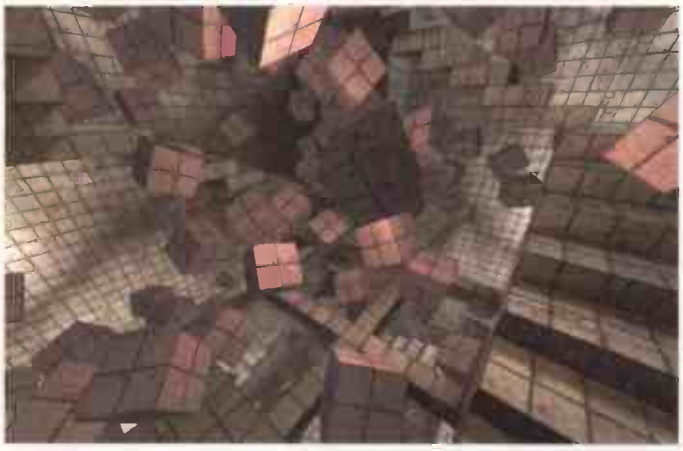
It's true that speed isn't everything, but it's an important part of the buying equation, especially when there are so many components out there. As many of our PC group tests are based on price bands, checking the performance is even more important – if the core system is underperforming, you need to know before you part with your hard-earned cash.

In VNU's UK Labs, which is part of the European VNU Labs network, our staff have over 20 years of combined testing experience. We know all the perils and pitfalls of practical benchmarking and we contribute to the development of industry-standard benchmarks through our full membership of Bapco (www.bapco.com), the non-profit benchmark consortium. We are also a media member of the Futuremark Benchmark Development Program (www.futuremark.com). Listed below are the main benchmarks we use for testing PC systems and components.

- Bapco Sysmark 2004 SE – an application-based benchmark that tests real-world system performance.
- Futuremark 3Dmark03 – a 3D graphics benchmark designed to test the performance of DirectX 8 graphics cards.
- Futuremark 3Dmark05 – the latest version of 3Dmark that tests DirectX 9 3D graphics performance.
- Ubisoft Far Cry – we use the Fort level timedemo to see how graphics cards perform in a real DirectX 9 game.
- Futuremark PCmark05 – a synthetic benchmark used to test the performance of a PC's major subsystems.
- Bapco Mobilemark 2005 – used to assess the battery life of notebooks using real-world applications and usage scenarios.
- Test beds – we use standardised AMD and Intel-based test rigs to test components and peripherals.

There's more information about our testing procedures and benchmarks on our Labs site at www.reportlabs.com/testbed/bguides/benchmarks.php.

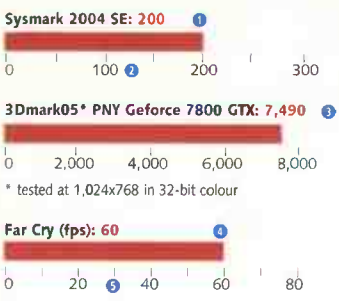
Far Cry is a real-world DirectX 9 test



PCmark05 measures memory, processor, graphics and hard drive performance

3Dmark05 pushes modern graphics cards to their limits

Performance



1. A score of 200 indicates that the system is twice as fast as the reference PC
2. The reference PC (2GHz P4 512MB of Ram) scores 100
3. A Geforce 7800 GTX would score in the region of 7,490
4. A score of 60fps (frames per second) or higher is most desirable
5. A result of 30fps or above means the machine can produce playable frame rates at the tested resolution

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CISCO

Lightning reflexes

DSLRs have come down in price. Paul Monckton puts us in the picture

The best of today's compact digital cameras are capable of taking excellent photos. Some even have enthusiast-level manual and creative controls. But to get the very best quality and flexibility, you'll need to step up to a digital SLR (DSLR).

Until recently, those who wanted DSLRs usually had to wait until older models were discounted. Now manufacturers are releasing brand new models, costing around £400-£700 (with lens), aimed at those who are just ready to dip their toes in the DSLR market. These are the models we've reviewed here.

DSLRs often have larger image sensors than compacts and can therefore shoot good-quality pictures in much poorer light conditions. There's also the benefit of interchangeable lenses.

Those of you with tighter budgets will be restricted to the six-megapixel models, but these can still produce excellent results. They require far less processing power and storage space on your PC, and files can be transferred faster. It's not always the case that a 10-megapixel camera will give more detail than a 6-megapixel one: the Nikon D40 is very good at dealing with image noise at higher ISO settings, while the Pentax K100D has anti-shake technology, so you shouldn't need to set the ISO so high.

Of the 10-megapixel models you can opt for compact size, professional-level features or a balance of the two.

It's worth noting that Pentax and Samsung SLRs are based on the same core products, but with different firmware and therefore different image-processing algorithms and menus.

The five DSLRs we tested are very good. All have minor flaws, but each has something unique to offer depending on your needs.

ON TEST

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'Manufacturers are now releasing brand new DSLRs aimed at those just ready to dip their toes in the market'

Canon EOS 400D

Personal Computer World EDITOR'S CHOICE

Price £719.99 **Contact** www.canon.co.uk

Canon's latest entry-level digital SLR offers a 10-megapixel sensor, excellent image quality and a good balance of features, suitable for novice and advanced photographers, in a compact body.

The EOS 400D is easy to use as a point-and-shoot camera, with all the usual automatic and scene modes, but enter the custom menus and you'll discover a whole world of tweakery you never knew you wanted.

These aren't the kind of functions you'll change often, but they enable you to configure the camera to work exactly the way you want it to. If you change your settings using a custom function, 'C.Fn' is shown in the display window as a reminder.

When using scene modes, it's usual for a digital camera to make adjustments to its image-processing parameters. For example, portrait mode may make adjustments to improve the appearance of skin tone, and landscape modes may enhance blues and greens. Canon's Picture Styles system gives you a selection of presets, determining contrast, sharpness, saturation and hue, which you can adjust to your own preferences and save into user memories. This makes it easy to select a particular look you want, although we feel it's better to make this sort of adjustment later in image-processing software where you can see, and undo, the effects of such changes more easily. The rather scary-looking matrix of numbers presented in the user interface may also put off novice users.

The EOS 400D continues the trend among compact digital SLRs to forego the top-mounted LCD status readout. Where previous budget models from Canon provided a separate status readout to the rear of the camera, the EOS 400D has removed it altogether, opting instead for a single, much larger 2.5in colour TFT screen that folds the duties of the status readout into the main camera display.

When conveying status information, the display turns black and white, mimicking the old segmented LCD it replaces and providing a readout that's easy on the eye. Of course, it's also illuminated and, thanks to a sensor below the eyepiece, it will turn itself off automatically when you look through the viewfinder.

The user interface itself isn't the prettiest or friendliest we've seen – that honour goes to Nikon's D40 – but Canon has speeded up menu access by keeping each menu page within one screen size, meaning you can see all the available options without having to scroll the menu. This can really speed up things when you're trying to find something in a rush.

Both the Nikon D40 and the Olympus E-400 may be smaller and lighter, but the EOS 400D is still a very compact camera. Even so, unlike the E-400 it has a useful hand-grip, backed by a rubber thumb rest at the rear. The overall build quality is also excellent.

Unlike many of the newer budget digital SLRs, the EOS 400D uses the physically larger and more capacious Compact Flash memory cards.

Because the EOS 400D doesn't have an anti-shake mechanism like the Pentax and Samsung cameras, it can't draft this into action to help keep the sensor clean. Instead it vibrates the low-pass filter in front of the sensor and uses anti-static coatings to make sure that nothing sticks where it shouldn't. Should any foreign bodies remain, you can take a reference image of the marks for later removal in software.

The EOS 400D comes with an excellent software bundle, including full Raw conversion – not just the simple 'convert to jpeg' options usually supplied.

Verdict

Pros Superb image quality; good software bundle; fast continuous shooting

Cons No spot metering; no dedicated autofocus lamp; no separate status LCD

Features ★★★★☆

Performance ★★★★★

Value for money ★★★★☆

Overall An outstanding camera for novices and advanced users alike. Custom settings and picture styles let you choose punchy or neutral images and the comprehensive software bundle provides full Raw processing capabilities

★★★★★

Nikon D40

Price £449.99 **Contact** www.nikon.co.uk

Personal Computer World RECOMMENDED

The newest camera in this group test is Nikon's latest entry-level model, the D40. It also does more than any SLR we've seen to date to make itself accessible to novice users and those who may have perceived SLRs as more difficult than fun.

The D40 is fractionally smaller and lighter than Canon's EOS 400D, and considerably less bulky than the D50 it replaces. In common with most compact SLRs, there's no top-mounted LCD status panel, but the main LCD is a large, bright 2.5in TFT display with a radically revamped user interface. You can tell that a lot of work has gone into its design; recent Nikon control menus have been very easy to read, but this is without doubt the prettiest we've seen so far on an SLR.

Resembling the interface found on Nikon's Coolpix range of consumer compacts, this graphical display comes complete with touches, such as an animated iris that expands and contracts according to your selected aperture. The built-in help system means you'll never need to refer to the manual when out and about. It even offers the equivalent of desktop wallpaper.

We're pleased to see there's plenty of substance to all this style. As with the Olympus E-400, the D40's status display is interactive, meaning you can navigate through it with the cursor keys and change settings quickly without having to enter the full menu system.

While composing your shot, if the camera thinks your picture will be incorrectly exposed a small question mark flashes. If you know what you're doing, it's easy to ignore, but pressing a button marked with a question mark will give you more information about the possible problem. This will take the form of a clearly worded description, such as 'Subject is too dark; cannot adjust exposure. Use the flash'.

One of the biggest differences between the D40 and the rest of Nikon's SLR range is that it has no autofocus motor in the camera body, relying instead on a rather small selection of motorised lenses. While this may be a drawback for owners of existing Nikon optics, we're not expecting it to be a problem for the vast majority of D40 customers. Of course, the supplied kit lens works just fine with the D40's autofocus system. Compatible vibration-reducing lenses are also available – the D40 has no anti-shake technology in the camera body.

Also internal to the camera is a selection of image-processing functions such as 'D-Lighting', which can help correct poorly exposed images and software-based red-eye removal.

Image quality from the D40 is very impressive. It produces sharp, detailed photos with very low image noise, right up to ISO 1,600 where many cameras visibly struggle. Don't be put off by the 6-megapixel sensor: the D40's internal processing is capable of producing cleaner images at higher ISO settings than some of the 10-megapixel models.

In use, the D40 is quick and responsive. There are no obvious delays anywhere in its operation and it can maintain its maximum shooting speed of 2.5fps (frames per second) until your SD or SDHC card has been filled.

The D40 manages to combine the expected sophistication of an SLR with the consumer-friendly ease of use of a compact. Considering its entry-level status, it's packed with features that are very well matched to its intended customers. However, more advanced photographers may bemoan the lack of sophisticated Raw processing software, which must be purchased separately.

Verdict

Pros Great image quality; superb usability; in-camera retouching
Cons No autofocus motor; no status LCD panel; no depth of field preview

Features ★★★★☆
Performance ★★★★★
Value for money ★★★★★

Overall An excellent first-time SLR with plenty of functionality, yet very easy to use thanks to built-in help and a superb user interface. Image quality is also superb

★★★★☆

Olympus E-400

Price £700 **Contact** www.olympus.co.uk

The Olympus E-400 is remarkable due to its size, or lack of it. Compared with any other digital SLR it's tiny – but if you remember Olympus' equally tiny OM-1 film SLR of years ago, perhaps it's not so surprising. Pick it up and you'll notice something else – it's extremely light. You'd scarcely believe there was room inside for a fully specified 10-megapixel digital SLR, but that's exactly what you're getting.

The E-400's lack of size is partly due to its lack of a hand grip, which makes it feel not quite as secure in the hands as other models. It may be small, but there's still room for a full-size 2.5in TFT LCD, which uses Olympus' now-standard system for making quick adjustments to camera settings without having to enter the menu system.

Like the Canon EOS 400D and the Nikon D40, status readout duties are taken over entirely by the rear TFT panel. On the E-400, there simply isn't room for an additional status panel on top of the camera.

Pressing the OK button enables you to navigate the status information using the cursor control and make adjustments as you go. Two levels of status information are available, one containing basic information and the other more advanced, including options such as colour-space modes, hue, contrast and sharpness adjustments.

To the left of the LCD, four large thumb buttons enable you to select the main operating modes. All other controls, including the mode dial, cursor control and a quick-access function button sit to the right.

The lightweight construction of the E-400 has forced no compromises when it comes to build quality: it looks heavier than it feels and is pleasantly sturdy.

Olympus' 'Super Sonic Wave Filter' activates each time the camera is turned on. This vibrates, causing dust particles to fall away from the sensor. It also adds a slight delay to the time to first shot.

Many digital SLRs shoot photos in a 3:2 aspect ratio, matching the familiar 6x4in print. Olympus uses the 'Four Thirds' system, meaning that a full frame is the same shape as a standard 4:3 TV or PC monitor display. You can opt to shoot in 3:2 mode, but you won't then be using the full 10 megapixels. Because the image is 'squarer', the viewfinder image appears rather small and distant compared with the other cameras in this round-up, which feel more panoramic.

One advantage of the Four Thirds system is that compatible lenses are available from manufacturers other than Olympus. SLR cameras from Panasonic and Leica use the same system and a Leica-branded zoom lens with optical image stabilisation is available. The E-400 does not have anti-shake technology built into the camera body.

The camera is available as a kit with either one or two standard lenses. Both of these have been specially designed with the E-400 in mind and are correspondingly small and light, much lighter than the lenses previously available at the same focal lengths. At the time of writing the twin-lens kit is much easier to find on sale than the single-lens one.

Cutting down on size certainly doesn't mean cutting down on quality. At lower ISO settings, the E-400 produces very detailed, noise-free images. But, push the sensitivity up to ISO 1,600, and it doesn't do as good a job as Nikon's D40 at keeping images clean, despite that camera's lower-resolution 6-megapixel sensor. If you use Raw mode, you can achieve better results from the E-400 by processing higher ISO images on your PC rather than in the camera.

Verdict

Pros Ultra-compact size; very light; image quality
Cons No hand grip; slow USB image transfer

Features ★★★★☆
Performance ★★★★☆
Value for money ★★★☆☆

Overall The E-400 and its kit lenses are much smaller and lighter than the competition, yet with no compromises in image quality or features. The interactive status display makes adjusting settings quick and easy

★★★★☆

Pentax K100D

Price £399.99 **Contact** www.pentax.co.uk

Many of the user-friendly aspects of Pentax's compacts are retained in the K100D. The Auto pict mode selects automatically from four basic scene modes – Portrait, Landscape, Close-up and Sports – by analysing the view through the lens and deciding which would be most appropriate.

In addition, you have the usual program, aperture priority, shutter priority and manual configurations, along with further selectable scene modes designed for more specific shooting situations.

Choosing one of the scene modes presents you with a small example picture on the main display along with a brief description. Sometimes additional options are available by sliding the main thumb dial. In Pet mode for example, you can choose between Cat and Dog mode, although we don't think most of you would bother.

This level of interface design would once have been impressive, but has since been overtaken by the competition. The Canon EOS 400D uses a similar menu layout, but it has been organised so that no menu page requires you to scroll to read all the options. Nikon's D40 and the Olympus E-400 also have user interfaces that are far more advanced and easier to navigate.

A useful feature, often missing from entry-level cameras, is a depth-of-field preview. The K100D has two. The standard method of stopping down the iris is supported, but it's not the default option. Instead it's accomplished by simply taking a photograph and displaying it on the LCD, complete with a little iris logo – presumably to remind you that should this turn out to be the photograph showing the first aliens landing on Earth, you won't now be able to save it.

Despite these quibbles, the K100D is a great choice for absolute beginners or those who don't want the added complexity that goes hand-in-hand with the wealth of features offered by the likes of the EOS 400D and the GX-10. The basic functions can be accessed quickly without having to enter the menu system and we certainly have no complaints when it comes to image quality, although the D40 did produce a much cleaner image when pushed up to ISO 1,600.

The K100D is also keenly priced: in terms of list price, it will cost you less than any other camera in this feature, although we struggled to find any major discounting online.

With the exception of the Samsung GX-10, the K100D is a little larger but a lot heavier than the competition, and the difference is really quite noticeable. It's also unique in this round-up in its use of four standard AA batteries. This can be convenient if you're caught short while you're out, but you'll have to pay for your own batteries and charger – items that are included in the price of rival cameras. Furthermore, with the Nikon D40 available for less in some outlets, the K100D is facing some stiff competition; its user interface is nowhere near as polished as the D40's, although it does retain a top-mounted LCD status readout which will be familiar to many users of film SLRs. It's just a pity it isn't illuminated.

The K100D also has in-camera image stabilisation, something the D40 can only achieve with the addition of relatively expensive VR lenses. It's also free of the restricted choice of lenses open to D40 users who want autofocus operation. Alternatively, you can forego shake reduction and buy the lower-priced K110D, which is identical in all other respects.

Verdict

Pros Good help for beginners; spot metering; status panel

Cons Bulky; heavy; slow continuous shooting mode; no battery charger or rechargeable batteries supplied

Features ★★★☆☆

Performance ★★★☆☆

Value for money ★★★★☆

Overall A sensible, rather than sexy camera, which gets the job done at an attractive price. Images are punchy and consumer-friendly

★★★☆☆

Samsung GX-10

Price £549 **Contact** www.samsungcamera.co.uk

There are many things that are unique about Samsung's GX-10. Despite an entry-level price, it's certainly not an entry-level camera. Indeed, it has many features you'd expect to find a little higher up the ladder, climbing into the semi-pro market.

It's contained within a fully splash- and dust-proofed shell, and you can see the seals around the edges of each little door and flap. Unlike Olympus' tiny E-400, it's fitted with a sturdy grip, suitable for those with larger hands. The bigger body makes space for bigger buttons and the whole camera has a more functional, perhaps more professional look at the expense of some designer 'cuteness'. There's room for a big TFT display as well as an illuminated top-mounted LCD status read-out.

It's how SLRs used to be. To some, an Olympus E-400 or an Canon EOS 400D may seem like a cut-down miniature SLR, but the GX-10 feels like the real thing. It also has a bright pentaprism viewfinder with an image that's noticeably larger than the other cameras.

Its peers feel as though they belong to a different class of camera altogether – one where size and weight is of somewhat greater importance than ruggedness and flexibility of function.

The GX-10 has scene modes and automatic functions aplenty, but it also offers some unique options aimed squarely at making life easier for more advanced photographers. On the GX-10, Program mode becomes 'Hyper-program' mode. Hyper-program lets you switch seamless from fully automatic exposure to shutter or aperture priority by allowing you to adjust either parameter with the corresponding dial. A conveniently placed green button can then snap you back into automatic mode if you wish.

Manual mode is similarly known as Hyper-manual mode. You can make metered adjustments to both aperture and shutter speed, always with the option of hitting the green button should you need an automatic exposure quickly.

Hyper-program mode itself has custom settings which allow you to select high-shutter-speed-priority, depth-of-field-priority or MTF-priority (which aims to keep the lens aperture as close to that which will produce maximum sharpness). These custom options are great, but unfortunately there's no obvious way of seeing which priority mode the Hyper-program is using without delving into the custom menu to check.

Other new modes are Sensitivity priority and combined Shutter/Aperture priority. These are modes that only make sense on a digital camera. The first lets you adjust the ISO setting with a thumb dial, leaving the camera to adjust shutter speed and aperture. The second lets you set both the shutter speed and aperture, while the camera automatically chooses an ISO setting that will achieve the correct exposure.

For the best image quality, and for those who want to take high dynamic range (HDR) photos, Raw photography is the answer. The GX-10 supports two different types of Raw mode and has a dedicated button that enables you to quickly take a Raw shot without having to delve into the menus. It's also nice to see plenty of in-camera Raw processing options which allow you to convert Raw files to jpeg with a wide selection of processing parameters, including white balance and exposure compensation.

The GX-10 may have the highest street price of the bunch, but it's an advanced camera that offers tremendous value for money.

Verdict

Pros Illuminated LCD status display; compatible with Pentax lenses; value for money; weather-sealed body; sophisticated shooting modes
Cons Very bulky; lack of scene modes; a little pricey

Features ★★★★★
Performance ★★★★☆
Value for money ★★★★☆

Overall The Samsung GX-10 is aimed at the serious photographer rather than the novice. Novel features enable experienced users to express their creativity quickly and easily, while the weatherproof seal allows for more adventurous shooting locations ★★★★☆

Lab results

The more expensive DSLRs proved their quality in the main, while the more affordable Nikon D40 punched above its weight in all but one of the categories

ISO 12,233 noise

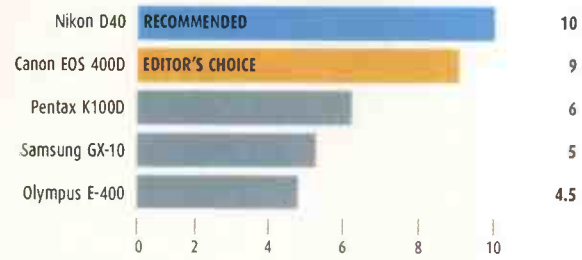
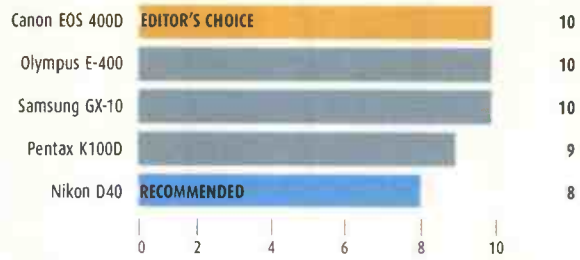
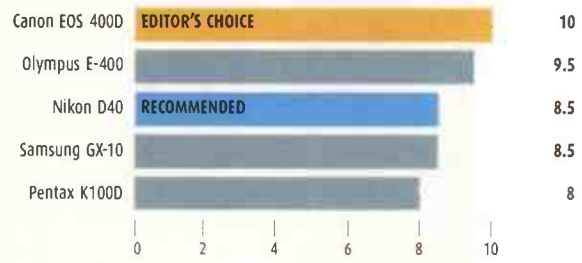


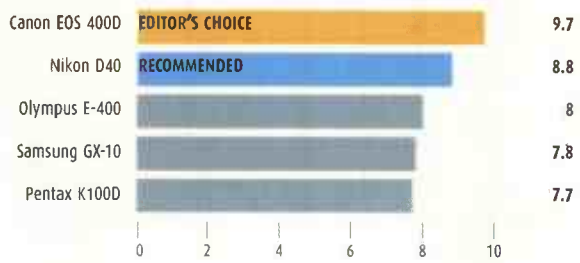
Image quality



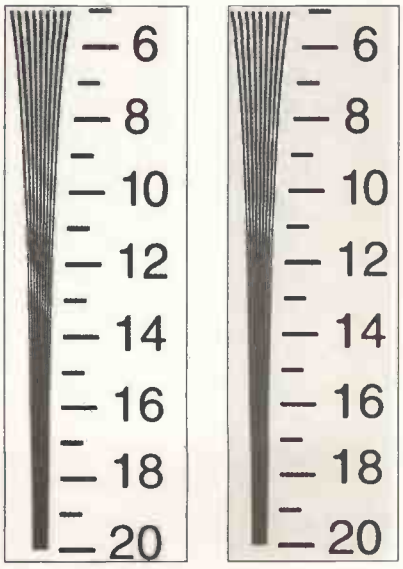
Sharpness



Overall performance score



How we test digital SLR cameras



Far left: This an example of a good result from the ISO 12,233 test

Left: In this poorer result, the camera isn't able to resolve the fine detail at the bottom of the picture

In addition to various sample shots taken during general evaluation, we set up four test shots in our labs using simulated daylight illumination.

The first test we perform evaluates a shot of our ISO 12,233 test chart. With this chart we can determine the limits of the detail each camera can capture. We can see where the narrowing lines start to become blurred or where artefacts such as noise, moiré or false colours start to appear (see the two screens above for examples of good and bad results).

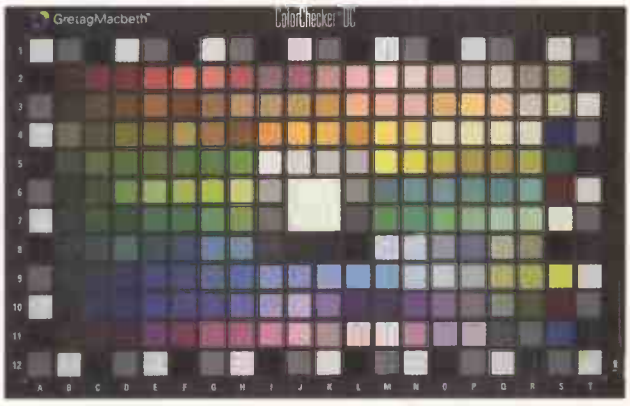
To evaluate colour reproduction, we take a shot of a Gretag MacBeth Colourchecker DC chart (see right). This chart, designed specifically for digital camera use, comprises squares with specifically and accurately chosen colours that mimic those found in nature, such as foliage, sky and skin tones.

We haven't scored this result as the reproduction of colours is largely a matter of personal preference, but we've included it on the cover disc so that you can make your own assessment.

We then construct a still-life scene from various objects, both natural and man-made. We shoot this scene once at the lowest supported ISO setting and then again at ISO 1600 to evaluate sensor noise.

All the scores are averages based on marks out of 10 awarded by our *PCW* editorial viewing panel.

You can find sample images of each of the three tests from each of the five cameras on the cover disc in the Hands On/Photos sub-directory.



This test target is used to assess colour reproduction

Digital SLRs

MANUFACTURER	CANON	NIKON	OLYMPUS	PENTAX	SAMSUNG
	Personal Computer World EDITOR'S CHOICE	Personal Computer World RECOMMENDED			
Model name	EOS 400D	D40	E-400	K100D	GX-10
Price (with lens kit)	£719.99	£449.99	£700	£399.99	£549
URL	www.canon.co.uk	www.nikon.co.uk	www.olympus.co.uk	www.pentax.co.uk	www.samsungcamera.co.uk
SPECIFICATIONS					
Megapixels (total/effective)	10.5/10.1	6.2/6.1	10.8/10	6.3/6.1	10.75/10.2
Max resolution	3,888x2,592	3,008x2,000	3,648x2,736	3,008x2,008	3,872x2,592
Sensor type	CMOS	CCD	CCD	CCD	CCD
Sensor size	22.2x14.8	23.7x15.6mm	17.3x13.0mm	23.5x15.7	23.5x15.7
Shutter speeds	30-1/4,000	30-1/4,000	60-1/4,000	30-1/4,000	30-1/4,000
Max flash sync speed	1/200	1/500	1/180	1/180	1/180
Viewfinder	Pentamirror 0.8	Pentamirror 0.8	Pentamirror 0.92	Pentamirror 0.85	Pentaprism 0.95
Continuous shooting speed (jpeg) (speed / number)	3/27	2.5/unlimited	3/unlimited	2.8/5	3/unlimited
Continuous shooting speed (Raw)	3/10	2.5/9	3/5	Not specified	3/9
Autofocus	9 point TTL	3 area TTL	3 point TTL	11 area TTL	11 area TTL
Manual ISO settings	100-1,600	200-3,200	100-1,600	200-3,200	100-1,600
Built-in flash	✔	✔	✔	✔	✔
Focus illuminator	✘	✔	✘	✘	✘
Auto bracketing	✔	✘	✔	✔	✔
35mm equivalency factor	1.6x	1.5x	2x	1.5x	1.5x
Lens mount	Canon mount	ikon F mount	Four Thirds	Pentax mount	Pentax mount
Aspect ratio	3:2	3:2	4:3	3:2	3:2
SUPPLIED LENS					
Focal length (mm)	18-55	18-55	14-42	18-55	18-55
Max aperture (wide-angle/telephoto)	f3.5-f5.6	f3.5-f5.6	f3.5-f5.6	f3.5-f5.6	f3.5-f5.6
OTHER FEATURES					
Memory card format	CF	SD/SDHC	CF/xD	SD	SD/SDHC
Weatherproof seal	✘	✘	✘	✘	✔
Raw mode	✔	✔	✔	✔	✔
Raw + jpeg mode	✔	✔ (basic quality jpeg)	✔	✘	✔
Raw mode software provided	✔	Basic	✔	✔	Basic
Colour spaces	sRGB, Adobe	sRGB x2, Adobe	sRGB, Adobe	sRGB, Adobe	sRGB, Adobe
Anti-shake stabiliser	✘	✘	✘	✔	✔
Active dust removal	✔	✘	✔	✔	✔
Screen size (in)/pixels	2.5/230,000	2.5/230,000	2.5 / 215,000	2.5/210,000	2.5/210,000
LCD status panel	✘	✘	✘	✔	✔
Self-timer	2, 10	2,5,10,20	2,12	2, 12	2, 12
Orientation sensor	✔	✔	✔	✘	✔
Battery type	Li-Ion	Li-Ion	Li-Ion	AA x 4	Li-Ion
AC adapter included	✘	✘	✘	✘	✘
Depth of field preview	✔	✘	✔	✔	✔
PC interface type	USB2 Hi-speed	USB2 Hi-speed	USB2	USB2 Hi-speed	USB2 Hi-speed
Histogram	✔	✔	✔	✔	✔
Blinking highlight exposure warning	✔	✔	✔	✔	✔
Shooting modes	Auto, Program, Shutter, Aperture, Manual, Auto depth-of-field	Auto, Program, Shutter, Aperture, Manual	Program, Aperture priority, Shutter priority, Manual	Auto, Program, Shutter, Aperture, Manual	Auto, Program, Sensitivity, Shutter, Priority, Manual
Program shift	✔	✔	✔	✘	✔
No of scene modes	5	5	20	13	0
Metering modes	35-zone, Centre weighted	3D Matrix metering II, Centre weighted, spot	Digital ESP, Centre weighted, Spot	Multi-segment, Centre weighted, Spot	Multi-segment, Centre weighted, Spot
Dimensions wxdxh in mm (body only)	127x65x94	126x64x94	130x53x91	129x70x93	142x70x101
Weight in g	556	522	420	660	793
SCORES					
Features	★★★★☆	★★★★☆	★★★★☆	★★★☆☆	★★★★★
Performance	★★★★★	★★★★★	★★★★☆	★★★☆☆	★★★★☆
Value for money	★★★★☆	★★★★★	★★★☆☆	★★★★☆	★★★★☆
OVERALL	★★★★★	★★★★★	★★★★☆	★★★☆☆	★★★★☆

The benefits of upgrading a camera's firmware

Image quality isn't all about the quality of your camera's hardware. As the sophistication of in-camera processing increases, so does the quality of the images produced. We've seen cameras based on identical hardware produce noticeably different results because of differences in the firmware installed in the camera.

This most often happens when different manufacturers take the same basic camera body and design and install their own firmware. Examples are strikingly similar models from Panasonic and Leica as well as DSLR cameras from Pentax and Samsung, both of which are represented in this group test.

Why upgrade my camera's firmware?

We're used to the idea of upgrading firmware, such as the PC Bios, in order to fix bugs and add compatibility for new hardware and operating systems. These same reasons hold true for cameras. Cameras are not immune from the occasional bug, and keeping your firmware up to date can protect you from annoyances, such as camera lock-ups or even disasters such as data corruption.

It's not usually necessary to upgrade your PC's Bios unless you have a specific problem, but camera manufacturers also occasionally add significant new features. For example, Olympus has been known to add new shooting modes and Nikon's latest firmware for the D40 adds Windows Vista certification. Pentax's latest firmware for the K100D enables the use of high-capacity SDHC memory cards.

Your camera's lens and sensor are not the only factors contributing to image quality. The camera must process the raw sensor data into jpeg files. To do this, it must analyse the data and perform a multitude of operations to generate a pleasing image in a short period of time.

Just as you may be able to produce better-looking pictures by using advanced image-processing software on your PC, firmware updates can dramatically improve the appearance of the jpeg files emerging from your camera. This could be through better noise reduction or better processing of colours.

Of course, this won't improve the quality of photographs you've already taken, which is why we recommend shooting your most important photographs in unprocessed Raw mode. These images retain all the original captured data, allowing you to reprocess them as and when improved conversion software becomes available.

How to install camera firmware

Some manufacturers, such as Nikon, include easy firmware-updating functions in their PC companion software. If you're one of those photographers who never bothers to use the supplied software, it's worth checking.

If your supplied software doesn't support firmware updates, then you'll have to check the manufacturer's website periodically to see if any updates have become available. These can usually be installed by downloading a small file, which you copy directly to your Flash memory card while it is connected to your PC. The firmware can then usually be installed by inserting the card into the camera and turning it on while holding down a special button combination, which will be described in the firmware update instructions.

We wouldn't recommend you update firmware just for the sake of it, but only if the manufacturer recommends it for your model because it fixes problems or adds features. And definitely don't download firmware from anywhere except the manufacturer's website.

Editor's Choice

Editor's Choice Canon EOS 400D
Recommended Nikon D40

Canon EOS 400D

Nikon D40

More than ever before, we are seeing SLR cameras targeted at specific audiences. No longer are the entry-level products simply cut-down versions of their pro and semi-pro counterparts.

Nikon's D40, winner of our Recommended award, is the first SLR with a user interface that's as user-friendly as the best point-and-shoot cameras. It offers excellent image quality, with default settings designed to deliver punch but that can easily be changed to produce more neutral images, suitable for processing on a PC. However, it's not perfect. The choice of lenses supporting autofocus is limited and Nikon's full Raw image development software costs extra.

If you want a compact, lightweight camera, nothing comes close to the Olympus E-400; it's highly usable, well built and delivers great image quality. But, sadly, we can't give awards to everyone.

The Pentax K100D, too, is very good. It produces attractive photographs without the need for a lot of post-processing, has anti-shake built in and is keenly priced.

Samsung's GX-10 is considerably larger and heavier than any other we reviewed, but gives you several useful features worthy of more expensive cameras. The full dust- and splash-proof case is a bonus, it has anti-shake and is compatible with a large selection of Pentax lenses. But street prices are still about £100 higher than for the Canon and the Olympus.

Our Editor's Choice, the Canon EOS 400D, is the most expensive of all if you go by list price, but street prices are much lower. We found it on sale for about £500 (**www.pcw.co.uk/bestprices**). In our tests, it just edged ahead of the Olympus, producing very neutral images – perfect for image processing on your PC – but the built-in Picture Styles function lets you take photos that are as punchy or as muted as you like, straight from the camera. It also has a very good software bundle, including full Raw processing software and the backup of a large selection of Canon lenses. It's not necessarily the best camera for everyone, but if you plump for one of these you're unlikely to be disappointed. **PCW**

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ON TEST

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'Intel's quad-core processors are currently the most powerful consumer CPUs money can buy'

Hard core quad core

The future of PC technology is here. Forget dual core, Luke Peters tests four quad-core PCs that will make light work of the latest software – and all for less than £2,500

There is no doubt that if one is good, two are better, and dual-everything seems to be the watchword these days. Graphics cards, processors and TV tuners have all doubled up, promising more and more performance and features in our PCs. However, this is the 21st Century we're talking about, where things go out of fashion quicker than a Sinclair C5, so move along dual-tech and make way for quad core.

Intel's quad-core processors are currently the most powerful consumer CPUs money can buy. And with Windows Vista now filling shop shelves, quad-core computing in the home is a reality for those with deep pockets.

With this in mind, we want to see just how quick these cutting-edge computers are. We contacted a range of companies with a simple request; build us the best quad-core computer system you can for an upper price limit of about £2,500. Four well-known PC manufacturers took up our challenge and found themselves in this month's group test. We didn't specify the operating system, but three of the four came with Vista Ultimate and the fourth came with XP Professional.

Obviously, these hard-core systems are aimed at PC enthusiasts, or anyone who wants the latest technology available; although such is the pace of progress that systems such as these will no doubt be regarded as pedestrian in a year's time. But if you want to buy a piece of the future right now, or simply glimpse it, read on.

Chillblast Fusion Tornado Quadro Q6700

Personal Computer World EDITOR'S CHOICE

Price £2,450 **Contact** www.chillblast.com

Technology may be improving, but the need to cool blisteringly fast components is well demonstrated by Chillblast's enormous aluminium Coolmaster chassis. To call it big would be an understatement, but with the complexity of the hardware inside, it needs to be.

The 2.66GHz Intel Core 2 Quad Extreme QX6700 has been overclocked to 3GHz and a brace of 1GB DDR2-800 Ram modules use two of the four slots on the BFG Nvidia Nforce 680i SLI motherboard. The Chillblast has a high-performance 74GB Sata II 10,000rpm hard disk, which is used as the main system disk to give the fastest boot up and application load times. With this in place, it booted in seconds. A second 500GB Sata II hard disk is at hand to store files and documents, as is the multiformat DVD writer.

With all this top-end hardware, its benchmark results were hardly surprising. A score of 9,857 in PCmark05 and a Windows Experience Index of 5.2 set a high standard.

Its graphical aptitude didn't falter either, notching up 12,620 in 3Dmark06 and a lightning-fast average of 204fps in Fear. However, when a computer such as this has a pair of 768MB Nvidia Geforce 8800 GTX graphics cards, we don't expect anything less.

There is a generous 20in widescreen Samsung Syncmaster 206BW TFT monitor, and sound is pumped through Creative's latest Soundblaster X-Fi Extreme Music card. Complementing the audio setup is a set of Creative Inspire T7900 7.1 speakers.

Chillblast has also thrown in a hybrid digital/analogue TV tuner card, a Logitech Easycall Speakerphone Keyboard and mouse, plus a selection of Vista-compatible software. Thankfully, everything is powered by a beefy 600W power supply.

If you're still not happy and want to upgrade with some extra components, there are also four free 5.25in drive bays, a couple of 3.5in internal bays, two PCI Express slots and two empty PCI slots.

Verdict

Pros Blisteringly fast; great sound card; excellent monitor
Cons Large chassis; overclocked processor

Features	★★★★★
Performance	★★★★★
Value for money	★★★★☆

Overall Like most things, if you want the best, you have to pay for it and the Chillblast Tornado Quadro Q6700 certainly delivers ★★★★★

Evesham Solar Quattro G8

Price £2,199 **Contact** www.evesham.com

Evesham has gone for the same tack as Chillblast by using the same Coolermaster chassis (but this time in black aluminium) and throwing in hyper-fast hardware components in a case that's big and airy enough to cool them all down.

The Quattro G8 uses an Intel Core 2 Quad Extreme QX6700 but runs at its factory default of 2.66GHz. There are also two 1GB DDR2-667 Ram modules plugged into an Nforce 680i motherboard – one of the limited number of models that support quad-core CPUs.

Unlike the Chillblast, Evesham has opted for a single 500GB Sata II hard disk to do all the booting and storing work. Running at 7,200rpm, it's not slow, but for this price we'd have liked to have seen at least a secondary hard disk to boost overall storage capacity.

Nevertheless, its results are not to be sniffed at. A score of 8,907 in PCmark05 and comparable results to its peers in our other tests suggests this desktop will do everything you want it to.

Flip open the front of the case and a couple of optical drives smile back at you. An 18-speed DVD writer and a DVD-Rom drive take up two of the six 5.25in internal drive bays. A handy panel of I/O ports adorns the top part of the case, too.

Evesham has plumped for a single 768MB Leadtek PX8800GTX graphics card, which has two DVI sockets for hooking up a couple of monitors. Regrettably, only one display is supplied – a 20in Viewsonic TFT.

Its graphics scores weren't the best on test, but any computer that can churn out a 3Dmark06 score of 11,402 and an average 3D frame rate of 179fps will make any next-generation console gamer envious.

Other tick boxes include Creative's Inspire T7900 7.1 speakers (although there's only an integrated multichannel soundcard), a Logitech Black Internet Pro Cordless Desktop (to match the chassis), and Evesham's generous software offering that includes Roxio DVD Media Creator and Microsoft Works 8.5.

Verdict

Pros Fast processor; decent monitor; good value
Cons Large chassis; no dedicated soundcard; single graphics card

Features	★★★★☆
Performance	★★★★☆
Value for money	★★★★★

Overall Good performance and quality components, but even at this price, you don't get everything ★★★★☆

HP xw6400

Price £2,426.14 **Contact** www.hp.com/uk

Hewlett Packard was the only manufacturer to supply us with a quad-core PC not running Vista Ultimate, instead opting for Windows XP Professional. However, it's Vista-capable, so if you want to upgrade, everything's in place to make it happen.

It's a rather different beast from the rest of the PCs here, being designed as a professional graphics workstation rather than a domestic PC. What that means is you get a well-built and supported system, but at a premium cost considering its spec.

The xw6400 uses an entry-level Intel Xeon 5310 quad-core processor that runs at a clock speed of 1.6GHz and has a total of 8MB of L2 cache. This is bolstered by two modules of 2GB DDR2-667 Ram, giving a total of 4GB to play with.

But, with this slower quad core, its benchmark results took a hit. Racking up 5,475 in PCmark05, or almost half that of the Chillblast, is largely a result of the CPU's slower clock speed. We ran Sysmark 2004SE (this runs on XP but not Vista), which generated a score of 243 – a mid-range score for a desktop PC.

Graphics-wise, the HP didn't fare well because it's optimised for OpenGL applications, whereas most of our graphics benchmarks are DirectX. So the 3Dmark06 score of 3,562 and average frame rate of 66 in Fear were unavoidable, despite the expensive 256MB Nvidia Quadro FX1500 graphics card with twin DVI ports. In our Cinebench hardware-assisted OpenGL tests, though, it stormed to the top of the pack.

The chassis is the most compact here, but inside the case is also the busiest. Just one 5.25in and two 3.5in drive bays are up for grabs. There is a trio of PCI Express slots and two PCI slots, though. Two 250GB Sata hard disks offer 500GB of storage space, while a multiformat Lightscribe DVD writer sits in one of the drive bays.

The xw6400 also comes with a 20in TFT HP monitor and HP-branded USB mouse and keyboard, giving a suitably professional feel to this competent, yet rather specialised system.

Verdict

Pros Great build quality and design; superb OpenGL graphics performance
Cons Limited expansion space; a bit pricey

Features	★★★☆☆
Performance	★★★☆☆
Value for money	★★★☆☆

Overall Not ideal for home users, but a competent workstation aimed at the professional

★★★☆☆

Mesh QX G80 Ultima

Price £2,499 **Contact** www.meshcomputers.com

One of the long-time stalwarts of the UK PC market, it's good to see that Mesh is still capable of churning out some enviable top-end computers.

The QX G80 Ultima is a sleek-looking system, but its beauty isn't just skin deep. The black aluminium Coolermaster ATX Midi tower has a front-mounted door concealing some of the best hardware in this group test. Open it up and you'll find a Creative Soundblaster X-Fi Fatal1ty Edition soundcard, Lightscribe DVD writer, a second multiformat DVD writer, memory card reader and, looking rather forlorn in this company, a floppy disk drive. There's still a free 5.25in drive bay for you to add in another device at a later date.

Open up the quick-release chassis and inside you'll find an Intel Core 2 Extreme QX6700 quad-core processor running at 2.66GHz and boasting 8MB of L2 cache and a 1,066MHz front-side bus. There are twin 1GB modules of DDR2-900 Ram and two free expansion slots in the N680i SLI motherboard. Add a total of 1TB (terabyte) of Sata hard disk space and it's fair to say this PC is bursting with power.

PCmark05 rated the Mesh at 8,702 overall, while Vista's Windows Experience Index was off the scale at 5.3, with subscores of 5.9 in the CPU, graphics and gaming graphics sections.

Speaking of which, the 768MB Nvdia Geforce 8800 GTX racked up an impressive 12,202 points in 3Dmark06 and an average of 165fps in the Fear game benchmark. Even so, it still couldn't keep up with the SLI-equipped Chillblast. However, with the 22in Iiyama TFT display, which has a 5ms response rate, games still look great.

Other notable features include a set of Creative Inspire T7900 7.1 speakers, Logitech's Internet 1500 Laser Cordless Desktop keyboard and mouse set, a beefy 1,000W power supply and a three-year, on-site parts and labour warranty.

Verdict

Pros Impressive feature set; 1TB hard disk; large power supply
Cons Single graphics card

Features	★★★★★
Performance	★★★★☆
Value for money	★★★★☆

Overall An outstanding choice for the power-hungry enthusiast

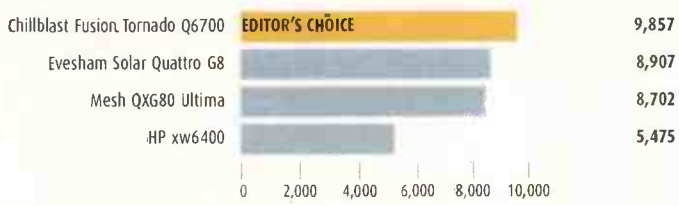
★★★★☆

Lab results

We challenged a range of PC makers to build the best quad-core computer they could – without exceeding a £2,500 price point. Here's how they fared

PCmark05 (overall)

Bigger is better

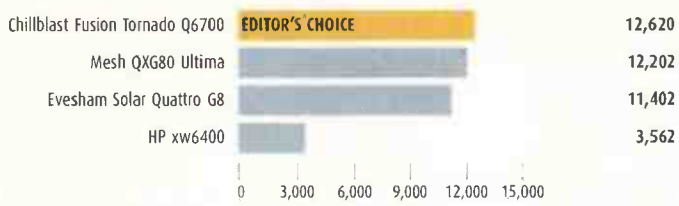


3Dmark05 (1,024x768 in 32-bit colour)

Bigger is better

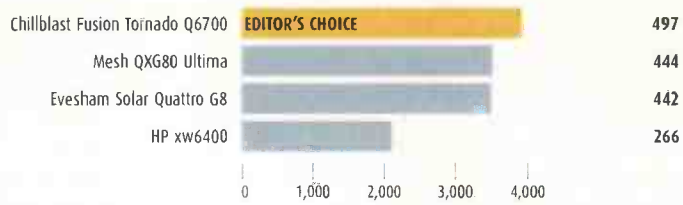
3Dmark06 (1,024x768 in 32-bit colour)

Bigger is better



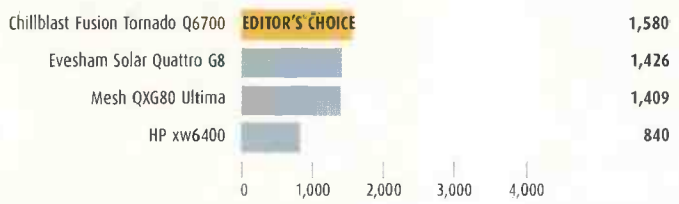
Cinebench (single CPU)

Bigger is better



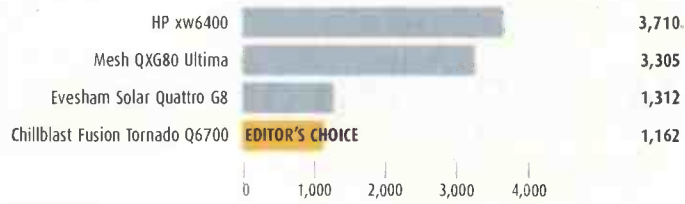
Cinebench (multiple CPUs)

Bigger is better



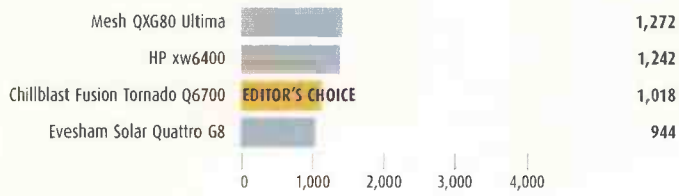
Cinebench OpenGL (hardware rendering)

Bigger is better



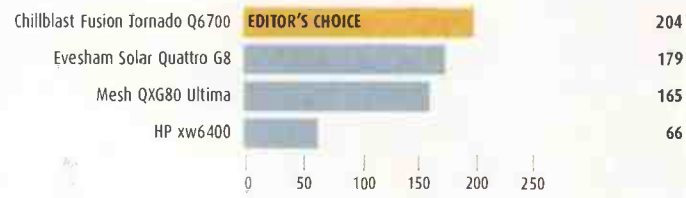
Cinebench OpenGL (software rendering)

Bigger is better



Fear (fps 1,024x768 in 32-bit colour)

Bigger is better



Where have Sysmark and Far Cry gone?

You'll notice from the graphs above that this month we haven't run our normal suite of benchmarks, with Sysmark 2004 SE and Far Cry both missing.

The reason for omitting Sysmark 2004 SE is that it doesn't run on Windows Vista, although the next version (due out very soon) will. We've used Fear as it's a much more graphically demanding game than Far Cry and more suited to these high-end PCs. We've added 3Dmark06 to our suite of tests as this also runs on Vista, but we're expecting a new DirectX 10-enabled version of this to appear soon as well.

We've also expanded the Cinebench tests to show the OpenGL rendering performance results in addition to the normal single and multiple CPU tests. The multiple CPU tests use all available CPUs for the tests and the graphs show how much performance improvement this makes over a single CPU.

Kelvyn Taylor

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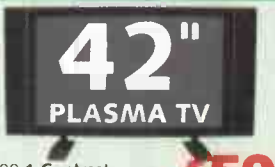

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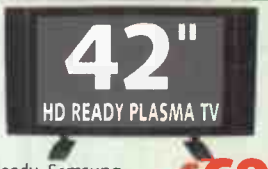

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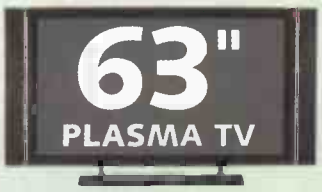

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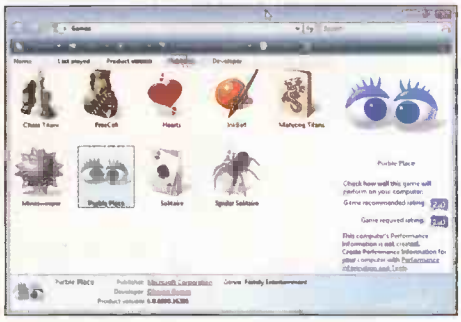
What is the WEI?

You'll notice in our features table that for Windows Vista systems we've added in the various performance scores generated internally by Vista's Winsat (Windows System Assessment Tool) benchmarking application. These scores are used by Vista to generate an overall performance score known as the Windows Experience Index (WEI). You can find your own system's scores by searching for the Performance and Information Tools from the Search bar.

The WEI score is an open-ended scale starting at 1.0 and currently ending officially at 5.0. According to Microsoft, this is the level of the fastest desktop PCs available when Vista was released to manufacturing at the end of 2006. It's calculated from sub-scores for CPU, memory, graphics, gaming graphics and hard disk. Microsoft doesn't publish the details of how the tests are done, but there are some general details on one of its Vista Team blogs at **http://windowsvistablog.com/blogs/windowsvista/pages/458117.aspx**.



Vista's built-in games have a WEI minimum rating

At first glance, this looks like a neat way around the conundrum facing many PC buyers: how to compare the actual performance of PCs, as opposed to simply looking at the specs of the components. Real-world benchmarks such as Bapco's Sysmark, used by *PCW*, are fine but you won't find these scores for PCs or configurations that we haven't reviewed.

The idea of the WEI is that you can use it to see which components you need to upgrade for particular tasks, games or other applications. If you add a new component, you can run the WEI process again to see what effect it has had.

Vista's built-in games already display a WEI minimum rating (see screen above), and it's Microsoft's hope that third-party games will have the same, rather than the confusing 'minimum' and 'recommended' requirements as at present. Whether or not this will happen depends on how reliable game developers believe the scoring system is.

In our view, the WEI is an interesting idea, but it's no substitute for a proper set of independent benchmarks, which is what we'll continue to provide to readers. *Kelvyn Taylor*

Quad-core PCs

Personal Computer World EDITOR'S CHOICE

MANUFACTURER	CHILLBLAST
Model name	Fusion Tornado Quadro Q6700
Price	£2,450
Sales telephone	0845 456 7830
URL	www.chillblast.com
HARDWARE	
Processor	Intel Core 2 Extreme QX6700 (OC to 3GHz)
Motherboard	BFG Nforce 680i SLI
Chipset	Nvidia Nforce 680i SLI
Available memory/type	2GB PC2-6400 DDR2
Occupied/spare memory slots	2/2
Max memory supported by motherboard	8GB
Hard disk manufacturer and model	Western Digital WD740 (75GB)
Secondary hard drive	Western Digital WD500KS (500GB)
Total storage space	575GB
EXPANSION AND I/O	
No of 3.5/5.25in bays	3/6
No of free 3.5/5.25in bays	2/4
No of PCI/PCI-x16/PCI-x4/PCI-x1 ports	2/3/0/1
No of free PCI/PCI-x16/PCI-x4/PCI-x1 ports	1/2/0/1
No of USB2/Firewire ports	10/2
No of serial/parallel/PS/2 ports	0/0/2
MULTIMEDIA	
Primary optical drive	Samsung SH-S183A
Optical drive formats and DVD write speed (Max)	18x DVD, 18x DVD+/-R, 8x DVD+RW, 6x DVD-RW, 8x DVD +/- R DL, 12x DVD-Ram
Secondary optical drive	None
Optical drive formats and DVD write speed (Max)	N/A
Soundcard	Creative Soundblaster X-Fi Xtreme
Speakers	Creative Labs Inspire T7900/7.1
Graphics type/memory	Nvidia Geforce 8800GTX/768MB
Screen type, size and (maximum resolution)	TFT, 20in, 1,680x1,050
OTHER INFORMATION	
Modem/other hardware	Logitech Easycall Speakerphone keyboard & mouse, floppy drive/card reader combo, Coolermaster Stacker 830 case, 600W PSU
Network	2x Gigabit Ethernet
Operating system	Microsoft Windows Vista Ultimate Edition
Bundled software	Ulead Videostudio 9 SE DVD, Ghost Recon: Avanced Warfighter, Avast Antivirus
Standard warranty*	2yrs C&R
VISTA WINDOWS EXPERIENCE INDEX SCORES	
Overall Windows Experience Index (WEI)	5.2
CPU	5.9
Memory	5.2
Graphics	5.9
Gaming graphics	5.9
Hard disk	5.9
SCORES	
Features	★★★★★
Performance	★★★★★
Value for money	★★★★☆
OVERALL	★★★★★

* RTB = return to base, C&R= collect and return)

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EVGA Nforce 6800i SLI	HP E93839	Nvidia N680i SLI
Nvidia Nforce 680i SLI	Intel 5000X/6321ESB	Nvidia Nforce 680i SLI
2GB PC2-5300 DDR2	4GB PC2-5300 ECC DDR2	2GB PC2-7200 DDR2
2/2	2/2	2/2
8GB	16GB	8GB
Western Digital WD5000KS (500GB)	Seagate ST350624AS (250GB)	Seagate ST3500630A (500GB)
None	Seagate ST350624AS (250GB)	Seagate ST3500630A (500GB)
500GB	500GB	1,000GB
3/6	4/2	6/4
2/4	2/1	2/1
2/3/0/1	2/2/1/0	3/2/0/1
2/2/0/1	2/1/1/0	1/2/0/1
10/2	7/0	9/2
0/0/2	1/1/2	0/0/2
Sony AW-G170A	LG GSA-H21L Lightscribe	Sony AW-G170A
18x DVD, 18x DVD+/-R, 8x DVD+RW, 6x DVD-RW, 8x DVD +/- R DL, 12x DVD-Ram	16x DVD, 16x DVD+/-R, 8x DVD+RW, 6x DVD-RW, 8x DVD +R DL, 4x DVD -R DL, 5x DVD-Ram	18x DVD, 18x DVD+/-R, 8x DVD+RW, 6x DVD-RW, 8x DVD +/- R DL, 12x DVD-Ram
Sony DDU1615	None	Sony DW-G121A
16x DVD	N/A	16x DVD, 16x DVD+/-R, 8x DVD+RW, 6x DVD-RW, 8x DVD +R DL, 4x DVD -R DL,5x DVD-Ram
Integrated Realtek	Integrated AC97	Creative Soundblaster Soundblaster X-Fi
Creative Labs Inspire T7900/7.1	None	Creative Labs Inspire T7900/7.1
Nvidia Geforce 8800GTX/768MB	Nvidia Quadro FX 1500/256MB	Nvidia Geforce 8800GTX/768MB
TFT, 20in, 1,680x1,050	TFT 20in, 1,680x1,050	TFT, 22in, 1,680x1,050
Logitech Internet Pro cordless keyboard & mouse, Coolermaster Stacker 830 case, 850W PSU	HP keyboard/mouse	Logitech Internet 15000 Laser cordless keyboard & mouse, 33-in-1 card reader, floppy drive,1,000W PSU
2x Gigabit Ethernet	Gigabit Ethernet	2x Gigabit Ethernet
Microsoft Windows Vista Ultimate Edition	Microsoft Windows XP Pro SP2	Microsoft Windows Vista Ultimate Edition
Microsoft Works 8.5, Bullguard Security Suite 7, Roxio DVD Media Creator	None	Microsoft Works 8.5, Bullguard Security Suite 7, Roxio DVD Media Creator
2yrs on site, 1-yr RTB	2yrs C&R	3yrs on site
5	N/A	5.3
5	N/A	5.9
5.9	N/A	5.3
5.9	N/A	5.9
5.9	N/A	5.9
5.5	N/A	5.6
★★★★☆	★★★☆☆	
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Games console or PC?

The PC-versus-games console debate has been running at least since 1994, when Sony launched the original Playstation. It was a time when PC gaming began to dip its toes into the mainstream – thanks to advances in graphics card technology – and consoles were revered by couch potatoes, proud of the powerful graphics their turbo-charged Pong-playing machine offered.

Regardless of game quality, the technology has improved year on year, and today we see two of the most mouth-watering games consoles doing battle with not only each other, but an army of PC-based graphics powerhouses, too.

However, the technological line between both parties is thinning. Gone are the days of PCs being the only source of 32x anti-aliasing and eye-popping texture mapping. The Sony Playstation 3 and Microsoft Xbox 360 are packed with high-end custom hardware components that can deliver some truly impressive eye candy.

At the heart of the Playstation 3 is a 3.2GHz 'Cell' PowerPC core processor developed by Sony, Toshiba and IBM. Similar to those found on an Apple G5, it has 512KB of L2 cache but, in practice, the Cell serves as 'supervising processor', commanding eight other individual processors on the chip. Combine this with a GPU using 256MB of Rambus XDR D-Ram, 256MB GDDR3 700MHz video memory, a Sata hard disk and HDMI output capable of displaying 1080p HD resolution, and you get the idea of its graphical aptitude.

Can a games console like Sony's Playstation or Microsoft's Xbox match up to a quad-core PC?

The Xbox 360 can also output graphics in 1,080p resolutions and it too has a custom-built IBM PowerPC processor – but with 1MB of L2 cache and three symmetrical cores running at 3.2GHz each. The graphics processor has 10MB of embedded D-Ram, shader architecture that can deliver 48 billion operations per second and it can shift 500 million triangles per second – that's an awful lot of polygons. There's also 512MB of 700MHz GDDR3 video Ram.

The visual results of each can be extraordinary, but can you get the same experience on a PC? Well, we'd argue yes. The Chillblast in this group test, which houses two 768MB Nvidia Geforce 8800 GTX graphics cards, a quad-core processor and 2GB of fast system Ram, is about as powerful as they come and easily comparable to a next-generation games console – plus you can do your accounts on it.

Let's put things into perspective, though. A quad-core, dual-graphics PC costs more than £2,000. An Xbox 360 costs about £200 and a Playstation 3 will set you back £425, making it a no-brainer for those without big City bonuses.

However, PC gaming has one of the most loyal followings in the computer sector and the constant need for more speed is unlikely to waver any time soon. *Luke Peters*

Editor's Choice

Editor's Choice Chillblast Fusion Tornado Quadro 6700

Chillblast Fusion Tornado Quadro 6700

Whether or not you believe that four cores are necessarily better than two, it's always fascinating to peer into the future and see what mainstream PCs will look like in a year or two. But at present, the price premium means they will only appeal to those with very deep pockets and the greatest enthusiasm. No matter which way you look at it, £2,500 is a lot of money. For most users, there's little pressing need for the horsepower available in these machines. A top-notch dual-core for half the price would make more sense in the real world.

But *PCW* readers always want to stay that little bit ahead of the game. And if money is no object, or the sort of things you get up to with your PC demand extraordinary computing power, or there's any other way you can justify the expenditure, then three of the four PCs on show here are worthy of your consideration.

Evesham's Solar Quattro G8 is the cheapest desktop that ships with Vista Ultimate, but its performance is still notable. However, match up the feature set to the Chillblast and Mesh and you'll see where the savings have been made. Speaking of which, the Mesh QX G80 Ultima impressed us greatly. Not only was the case smaller and sleeker than the other Vista quad cores, but it boasted a terabyte of hard disk space, a superb special edition Creative X-Fi soundcard and some speedy system benchmarks to boot. The lack of twin graphics cards was a shame, as was the dedicated hard disk for loading Vista in super-quick time. But, as an all-round package, it's impressive.

But the top system in our eyes, and our worthy Editor's Choice, is the Chillblast Fusion Tornado Quadro Q6700. The Evesham is cheaper, but if you're going to spend that much on a state-of-the-art computer, you might as well do it properly. Not only has Chillblast fitted a Core 2 Extreme QX6700 processor, it has also squeezed even more out of it by overclocking too. Mix this with 2GB of DDR2-800 Ram, an intelligently designed hard disk configuration and two of the fastest graphics cards on the market, and you've got a PC that epitomises the zenith of today's personal computing. The price tag might put off many, but one thing is certain, you shouldn't need to worry about upgrading it any time soon. **PCW**

'With all this top-end hardware, its benchmark results weren't surprising'

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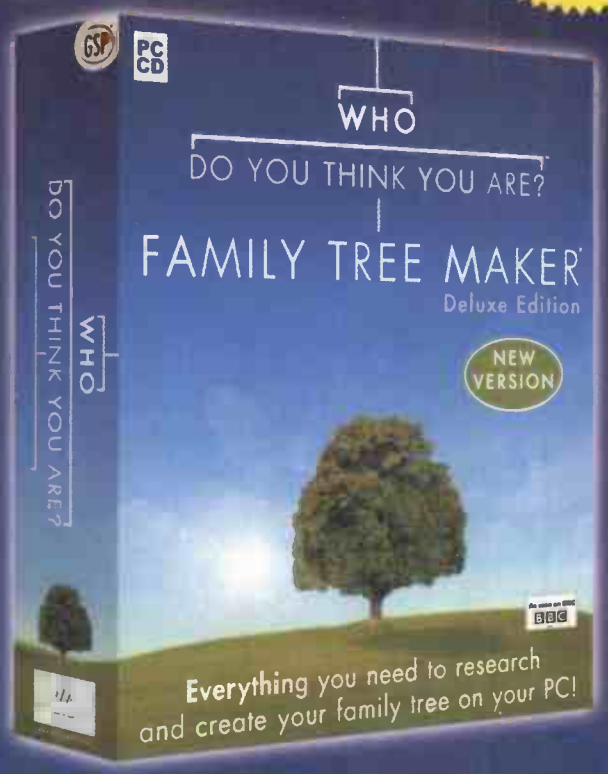

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BUSINESS

GREEN CREDENTIALS

Many of us try to be as green as possible at home – recycling where we can, turning off unwanted lights and so on. But at work, where a lot of the decisions are made for you, it's not so easy. In this month's business section, we look at how small business managers can make it easier for users to get on with their jobs while doing their bit to save the planet.

We've also been busy looking at new products, to bring you one of the first reviews of Xenserver for Windows, a new open source virtualisation product. Plus, we look at what the latest update to the Windows Small Business Server has to offer and test a new HP notebook with an array of integrated wireless and security features.

Elsewhere we've reviews of a business class colour laser from Kyocera and a unique removable disk backup solution from Tandberg, plus a lot more besides.

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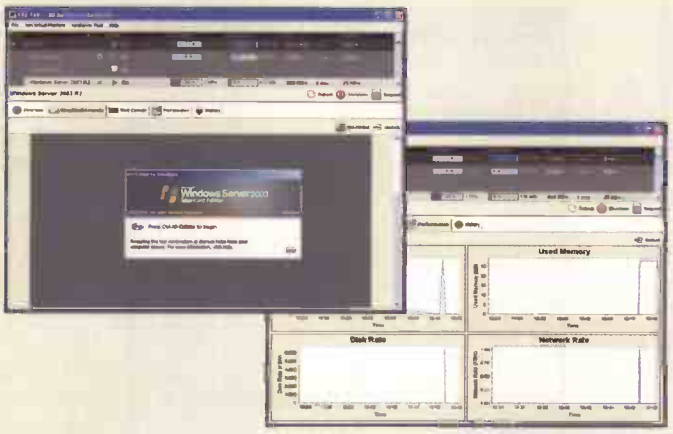


OUR SCORING

Excellent ★★★★★ Very good ★★★★☆ Good ★★★☆☆ Below average ★★☆☆☆ Poor ★☆☆☆☆

OUR AWARDS

Editor's Choice: The best product in a comparative group test. Anything that wins this award is of better quality than its competitors.
Recommended: A product that combines great features, usability and value for money.
Great Value: Not the best in class, but a product that has superior features and performance for the price.

Personal Computer World BUSINESS EDITOR'S CHOICE — Editor's Choice Business

Personal Computer World BUSINESS RECOMMENDED — Recommended Business

Personal Computer World BUSINESS GREAT VALUE — Great Value Business

The business awards are used for products that are more suited to home offices or small businesses.

'Save on both power and cooling bills by consolidating multiple servers onto one, more powerful device'

Read the feature on page 108

How green is your business?

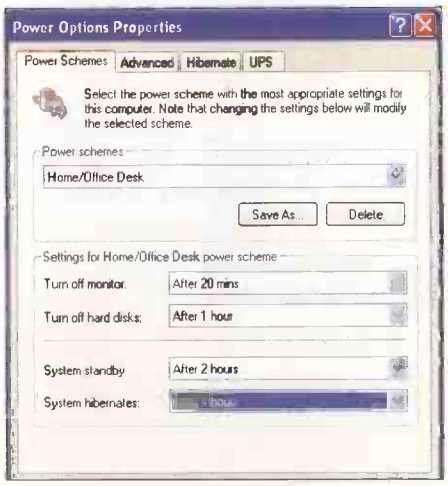
Go green with your office IT equipment. Alan Stevens explains

With wildly fluctuating energy prices, not to mention concerns over landfill, carbon emissions and global warming, it pays – literally – to be as green as possible these days. And not just at home – businesses need to play their part, too. So in this month's business section we look at what you can do to enhance the green credentials of your company.

There are two main drivers here. One is altruistic, whereby you want to reduce the impact that your business has on the environment, while the other is purely financial, with big savings to be had, especially when it comes to energy consumption.

Taking charge of power

Walk past most offices when most workers have left for the evening or at weekends and you'll see and hear PCs, printers and other office devices all humming away, doing nothing more than consuming power and generating heat.



When looking to reduce the amount of energy you use, the power-saving settings in Windows are a good starting point

Estimates of the amount of energy wasted vary wildly, but according to a 2006 report from the National Energy Foundation, UK businesses could be using up to 1.5 billion kWh of energy per year more than they need to. In monetary terms, that's about £115m or, in carbon emissions, the equivalent of running a typical gas-fired power station for a year – and all because users can't be bothered to switch off their PCs.

But, short of throwing the mains switch every evening, how can you minimise the amount of power used by your business?

Unfortunately there are no easy answers and the first thing to understand is that, no matter what they might say, most people will simply ignore any instructions you give them to switch off equipment. A few will fall into line but for the majority of workers you'll need to do the thinking for them and configure their systems to be as energy efficient as possible.

That means, for example, making sure that every piece of office IT equipment you buy is Energy Star rated, especially the big consumers of electricity, such as monitors. You should also make sure that any energy-saving features are activated as, surprisingly, this often isn't the case.

Obey the law when disposing of IT kit

There are two pieces of European legislation, now law in the UK, which affect the building, use and disposal of not just computers, but all electronic equipment. The first is the WEEE (Waste Electrical and Electronic Equipment) directive. The second is 'The directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment', or RoHS for short.

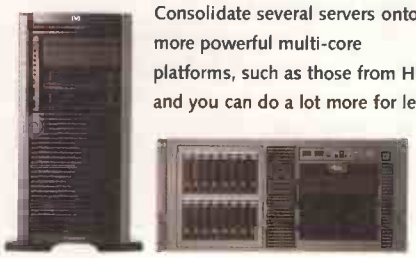
The WEEE directive makes the manufacturers of electrical equipment responsible for safe recycling and disposal of old products. However, business customers may also be liable, depending on when the original purchase was made and what's being bought.

Where the original purchase was before 13 August 2005, for example, the seller of replacement goods must finance recycling and disposal – whether or not they supplied the equipment in the first place. But, if it's not a like-for-like replacement (which can be hard to define) the customer could be responsible. Manufacturers are also responsible for recycling products sold after 13 August 2005, but they are allowed to negotiate with customers who will pay for it.

According to the Environment Agency, the cost of WEEE to small businesses should be minimal, but companies managing WEEE are obliged to report the process and use registered recyclers.

Fortunately, the RoHS directive only really affects the manufacturers of electronic equipment. However, distributors and resellers of non-compliant products can also be affected and may have to consider writing off old stock to avoid prosecution.

Sources of information on both directives and their implications for small business are:
Federation of Small Business
www.fsb.org.uk
Department of Trade and Industry
www.dti.gov.uk
Defra
www.defra.gov.uk
WEEE Directory
www.weeedirectory.com



Consolidate several servers onto more powerful multi-core platforms, such as those from HP and you can do a lot more for less

Power-saving steps

Windows has lots of power-saving options, but you should choose them carefully. For example, you'll make far bigger savings if you opt to automatically switch monitors into standby mode rather than just running a screensaver when there's no activity. Remember, however, that unless it's physically turned off a monitor, or any other device left in standby mode, will still consume some power.

Another, often overlooked, option is hibernation. Here the status of the PC, its memory and video contents are saved to disk when the PC is switched off. When it's turned on again those settings are automatically restored and you can carry on exactly where you left off. It's not quite as convenient as sitting down at a PC that's been left on, but is much quicker than booting from scratch. Moreover, virtually all modern PCs and laptops now support this option, along with the ability to enforce hibernation whenever the on/off button is pressed.

> 'Ensure that every piece of office IT equipment you buy is Energy Star rated'

Enforcement is the biggest issue. In a small company you can simply go round to each PC making sure it's set up to save power the way you want. However, in larger organisations you'll need to look at managing power settings centrally. Unfortunately, Windows group policy can't be used (because of the way the power settings are stored), but there are lots of tools available to help. For example, Nightwatchman from 1E Software (**www.1E.com**) loads a small power management agent onto every PC and server you want to manage. This can then be instructed to power down PCs when out of hours and, just as importantly, power them back up again to enable software updates and other changes to be made.

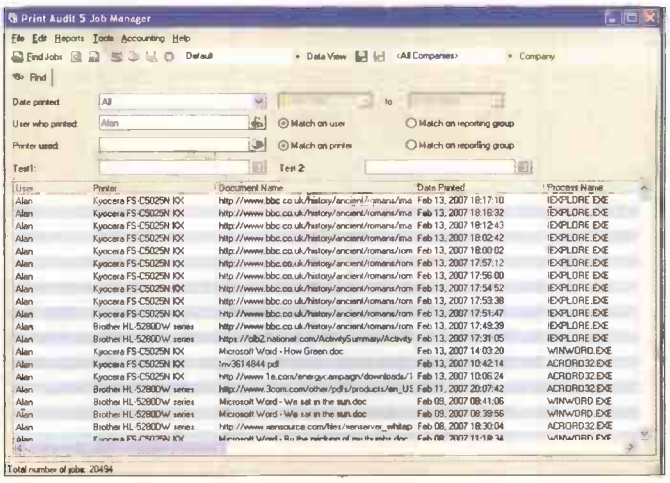
Do more with less

Other things to consider when trying to save energy centre around doing more with less. For example, you can save on both power and cooling bills by consolidating multiple servers onto one, more powerful device. The latest multi-core servers offer levels of performance far above that available even a couple of years ago and are much more power efficient. Add server virtualisation tools for extra flexibility and you can do a great deal more with less hardware and save money, too.

You may also want to look at thin-client computing, where desktop PCs are replaced by simpler terminals and applications are run on remote shared servers. Mainly sold as a way of enhancing security and providing greater control over the computing environment, thin terminals require a lot less power than a standard PC and can also help with your efforts to go green.

Don't forget printing

And then there's printing. Even the smallest of companies will still get through reams of paper a day, not to mention all those expensive and environmentally unfriendly ink and toner cartridges, developer, optical drums and the like. Simply looking carefully



Before helping you decide how best to make savings, a tool such as Print Audit 5 can show you who's printing what and how much it's costing

Don't bin IT, recycle IT

Given the rapid rate of development in the computer industry it's no wonder we get through so many PCs, screens, printers and other devices. Today's state-of-the-art hardware is tomorrow's old dinosaur, but it is possible to do something about it.

When disposing of kit, for example, it doesn't necessarily have to be binned. Indeed there are now strict European regulations governing how computer and telecommunications waste should be dealt with (see boxout 'Obey the law when disposing of IT kit') and who can do it. But there are other alternatives.

You could sell it on Ebay, although you're unlikely to get much unless the hardware is fairly recent, and then there's the hassle of advertising the items, monitoring the auctions, arranging transport and so on. Plus, as a business you could be liable both for data inadvertently left on hard disks and products that don't work as they should.

An alternative is to consider using a specialist company to recycle your old PC and telecoms equipment. Some companies charge for this service, but others will do it for free. Apple, Dell and HP all have recycling schemes, and there are lots of others you might like to consider – see the URLs at the end of this box.

Some of these are also non-profit making organisations, often with the aim of providing training and employment to disadvantaged workers while at the same time supplying PC equipment at low cost to developing countries, charitable organisations and the like.

On the downside you need to be confident that any recycling company will remove all the data from your hard disks, or make sure that you do it yourself before handing the kit over. You'll also want the recycler to indemnify you against any defects, software licensing issues and so on, which could come back to haunt you if you're not careful.

You might also want to consider buying recycled hardware. However, you need to take into consideration the fact that it's likely to be last year's technology, so performance could be an issue and running costs may be higher compared with buying new equipment. You also need to think carefully about licensing, maintenance and support, all of which tend to come packaged as part of a new IT purchase.

Ereco **www.ereco.co.uk**
PC-Recycling.co.uk **www.pc-recycling.co.uk**
Recycle IT **www.recycle-it.ltd.uk**

Multifunction printer/copiers such as the Samsung 5530FN are more cost-effective and easier on the environment than smaller desktop devices

at printing can have a big impact on your bottom line and help you do your bit for the environment.

First, establish what printers you have and what they're being used for. In a small firm this could just be a matter of a physical audit, but for larger organisations this could be time-consuming. In this case specialist print-auditing tools will do the job. Some printer vendors offer their own, but independent products are also available, such as Print Audit 5 (**www.printaudit.com**), for example, or Pcounter (**www.andtechnologies.com**).

By using tools such as these it's possible to collect data about who's printing what and to which printer. From this information you can establish just how much it is costing and where savings can be made. The same tools can also be used to continue monitoring and, in some cases, reduce costs by redirecting users to the most efficient devices and by billing customers for work done.

Don't buy cheap

As far as the printers themselves are concerned, it's a good idea to avoid cheap personal desktop products and deploy more capable network devices. They may be expensive to buy but in the long run will work out more economical because the cost per page is dramatically lower, on both black and white and colour documents.

Network printers also last longer, reducing maintenance overheads, and they tend to be quicker. If you buy or lease photocopiers, extra savings are gained by opting for multifunction printer/copiers, many of which now also include network scanning, email and faxing as standard.

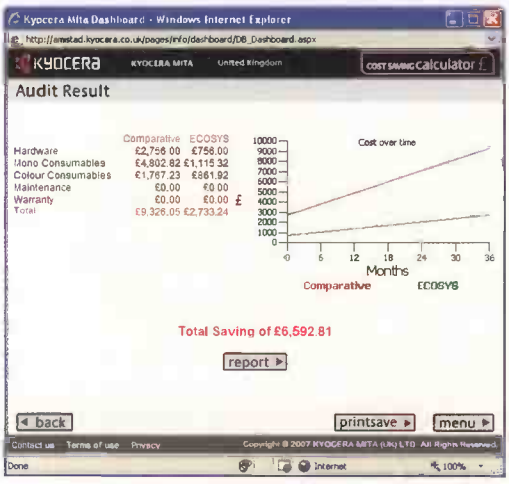
Finally, when looking at printing it's important to take into consideration the running costs over the whole life of a printer, not just how much the hardware costs to buy. Laser printers from Kyocera, for example, potentially have very low running costs compared with most others because the only consumable that needs to be changed on a regular basis is toner. In comparison, for HP, Lexmark and other makes of printer, the toner cartridges also contain the optical drum and other components making the consumables much more expensive – not to mention the fact that every time you change the toner you could be throwing away the optical components before they actually need to be replaced.

Calculating costs

A good way of working out how much a printer will cost to run is by using the cost-saving calculator tool on Kyocera's website (**www.kyocera.co.uk**).

Using this tool for example, we were able to compare the Kyocera FS-C5025N colour laser (reviewed on page 116) with a similarly specified HP colour Laserjet. We compared the cost of printing 5,000 pages/month (10 per cent in colour) over three years. The difference is huge – an estimated £6,592.81. OK, it's a Kyocera tool and bound to favour its own products, but even taking this into account the savings are significant.

Of course, there's a lot more you can do than we have space to cover here. You might, for example, want to investigate so-called 'carbon neutral' PC products, buy from developing countries, use suppliers who recycle packaging and so on. But whatever you do, there's never been a more appropriate time to start to save money and do your bit to save the planet. **PCW**



Although clearly aimed at encouraging you to buy its printers, the Kyocera cost-saving calculator gives you a good insight into how much printers cost to own

How to manage power more efficiently

Although they have a lower profile compared to vendors of PC hardware and software, there are lots of companies that specialise in power management. Many will have started as simple UPS (uninterruptible power supply) vendors, but most have moved on to offer additional hardware and software to manage the delivery of that power too.

Companies worth investigating include APC (**www.apc.com**) and Belkin (**www.belkin.com**), both of which have products aimed at the small business. Equipment to look for includes UPS devices themselves and products to remotely turn power on and off (power cycling in the jargon of the trade), mainly to servers but also to other hardware, such as communications devices and printers.

You might also want to consider employing the latest Power over Ethernet (PoE) technology. The most talked about benefit of this is convenience, most notably that of using a single cable to transmit both power and data to network devices. However, PoE can also help you use power in a more controllable manner and reduce your energy bills.

First, PoE does away with all those inefficient AC adapters otherwise needed to power webcams, wireless access points, IP phones and so on. Typically, those adapters tend to be left on 24 hours a day. In addition, however, PoE lets you manage power to network devices centrally. Software to do this is relatively new but is being introduced both by vendors of PoE supply equipment and as part of more general network management packages. Using this, devices can be switched on and off according to a predetermined schedule, and you can always shut off ports manually using the management console of most PoE hubs.

Switches that support Power over Ethernet can be used to centrally manage power delivery to network devices, such as IP phones and wireless access points

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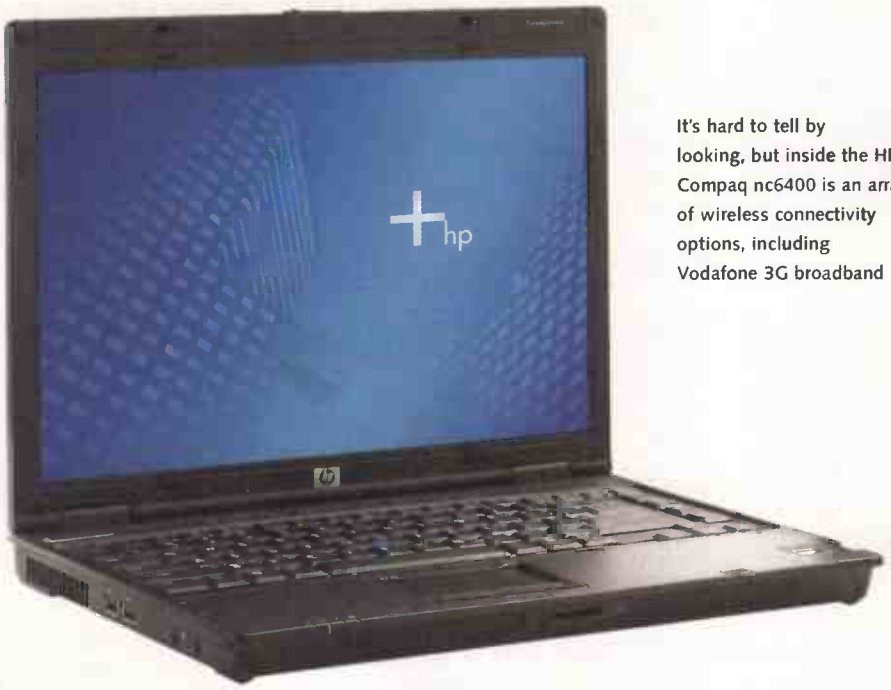
BUSINESS NOTEBOOK

HP Compaq nc6400

Personal Computer World BUSINESS RECOMMENDED

Excellent wireless connectivity features, plus a fingerprint reader, and more



It's hard to tell by looking, but inside the HP Compaq nc6400 is an array of wireless connectivity options, including Vodafone 3G broadband

With the introduction of the Compaq nc6400, HP has followed other leading vendors by teaming up with Vodafone to offer business users a powerful notebook with wireless broadband no matter where they happen to be.

Weighing in at just over 2kg and built to the usual HP high standards, the Compaq nc6400 is an impressive and well-specified notebook. The casing is reinforced magnesium, there's a 14.1in widescreen TFT display, as well as a progressive full-size keyboard, and both a pointing stick and scrolling touchpad mouse.

The model we looked at had an Intel Core 2 Duo processor, clocked at 1.83GHz, plus a generous 1GB of DDR2 memory, upgradeable to 4GB using industry standard SO-Dimm modules. An 80GB Sata hard disk also comes as standard, plus a combination DVD/CD-RW optical drive, a PC Card slot for expansion and another for SD/MMC memory cards.

What really makes the nc6400 stand out is its array of built-in connectivity options starting with both a modem and wired Ethernet port. Bluetooth is built in, plus an 802.11a/b/g Wifi adapter for connection to a local wireless Lan or Wifi hotspot. A Vodafone 3G wireless broadband interface is tucked away inside with no protruding cards or antennas as on notebooks fitted with a plug-in card.

Although it can be used with other networks, the default Vodafone 3G service offers a maximum download speed of 1.8Mbits/sec using high-speed downlink packet access (HSDPA) technology. No real setup is required – just phone up to activate the pre-installed Sim card, click on the Vodafone Connection Manager icon and you're away, surfing the net, sending and receiving email, SMS messages and so on.

On the downside, 3G coverage is patchy outside major cities and where a signal can't be found, GPRS is used instead, which is slower (about 50Kbits/sec), although it does allow you to get connected almost anywhere without having to subscribe to a hotspot.

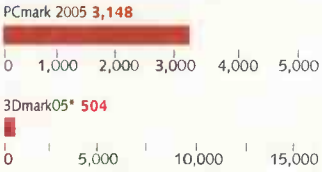
Of course, you have to pay for the service and 3G subscription rates apply no matter what speed you connect at. Price plans start at a reasonable £25 ex Vat for 250MB per month, with unlimited plans (effectively limited to 1Gbyte/month fair usage) starting at £45 ex Vat. International roaming use costs extra.

Equally impressive are the security features built into the new HP notebook, including an integral fingerprint scanner and a Smart Card reader. These can be managed using the HP Protect Tools Security Manager software provided along with the Trusted Platform Module (TPM) security chip embedded onto the motherboard, with automated single sign-on another key feature.

With its dual-core processor, the nc6400 is pretty quick – certainly more than fast enough for most business applications. The graphics controller and screen, however, aren't quite in the same league, with the Intel Graphics Media Accelerator 950 coming in well below average on our 3D benchmarks. We also found the screen a little washed out, although on a business notebook, neither really matters unless you're a keen game player in your spare time.

Lastly, with a six-cell Li-ion battery, the nc6400 is very portable. In our tests, we managed about five hours between top-ups, although this drops off rapidly when you start to do real work. The AC adapter is small, too, but you'll need to buy your own case to carry both it and the notebook about. *Alan Stevens*

Performance



*Tested at 1,024 x 768 in 32bit colour

Details

Price £1,056 (£899 ex Vat)
Best price www.pcw.co.uk/bestprices
Contact www.hp.com
Specifications 1.83MHz T5600 Intel Core 2 Duo processor • 1GB DDR2 SD Ram • 80GB Sata hard disk • DVD/CD-RW optical drive • 14.1in widescreen display • Integrated 802.11 a/b/g Wifi, Bluetooth and Vodafone 3G broadband wireless • Smart Card and SD/MMC readers
Pros Bluetooth, Wifi and Vodafone 3G wireless broadband connectivity as standard; integrated fingerprint and smart card security
Cons Poor graphics performance; washed-out display

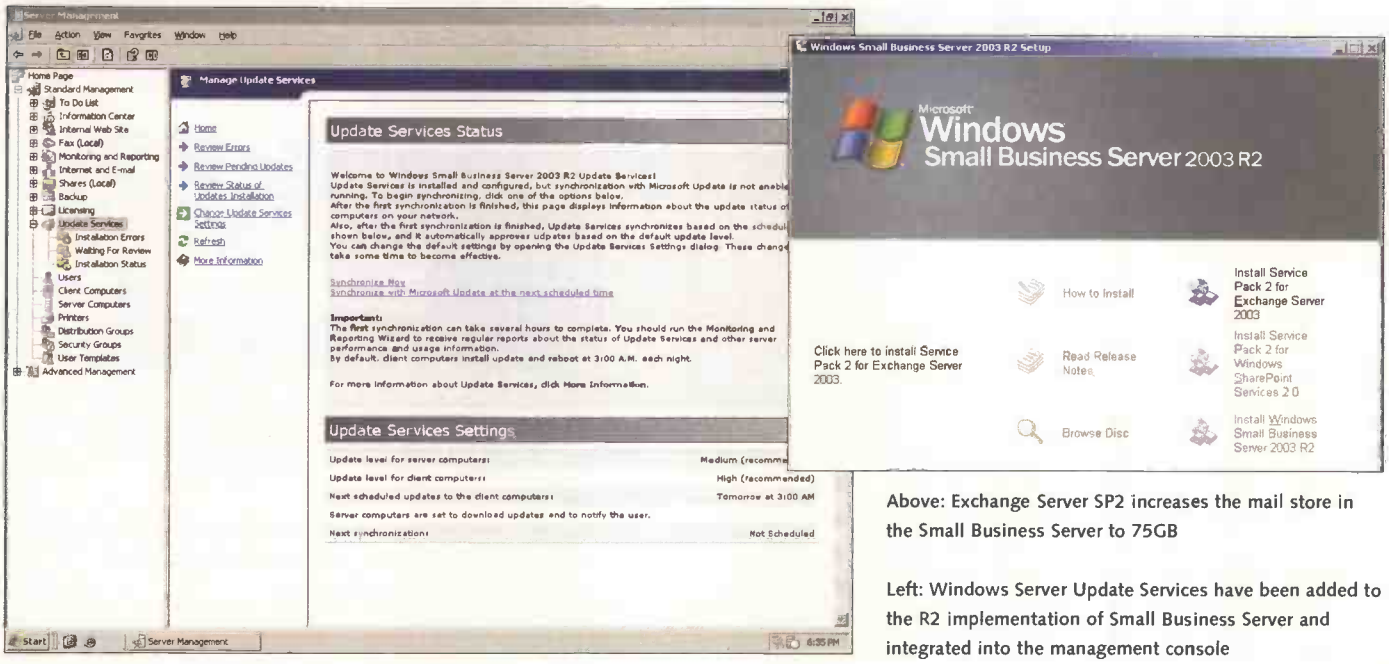
Features ★★★★★
Performance ★★★☆☆
Value for money ★★★★☆

Overall Connectivity and security features make this business notebook stand out ★★★★☆

SMALL-BUSINESS SERVER SOFTWARE

Windows SBS 2003 R2

Still a great small-business bundle, but not an obvious upgrade



Above: Exchange Server SP2 increases the mail store in the Small Business Server to 75GB

Left: Windows Server Update Services have been added to the R2 implementation of Small Business Server and integrated into the management console

You may or may not have noticed, but at the end of 2006 Microsoft revamped its small-business server bundle, adding an R2 on the end of the name. However, unlike other R2 updates, there isn't a huge amount that's new and existing customers should think carefully before upgrading.

To recap, Windows Small Business Server (SBS) is effectively the Windows Server 2003 operating system with a lot of reworking and extra tools intended to make it easier for 'technologically challenged' small-business users to install and manage. It makes setting up a domain, managing users and sharing resources, for example, a doddle, with wizards and task-based management tools to help you on your way. It also comes with a full version of Exchange Server, complete with Outlook Web Access (OWA), again with tools to make the popular email and collaboration server easier to set up and run compared with the standard package.

So what's new in the R2 version? For a start, not the full R2 version of Windows Server 2003 – mainly because most of the changes in that were aimed at large enterprise users. However, there are some new tools worth having, including Windows Server Update Services (WSUS), which can be used to automate the download and release of Windows and Office patches to both network servers and desktop PCs.

You can get WSUS for free, but the implementation in SBS 2003 R2 is, again, wrapped inside a much simpler interface, making it more user-friendly.

Exchange has also been beefed up. You're still limited to a maximum of 75 users, the same as for the SBS package as a whole. However, the total mail store has been increased from 16GB to 75GB, thanks to the inclusion of Exchange Server SP2, which also provides improved mobile email services and better protection against spam.

Another significant change applies if you go for the more expensive Premium edition (£770 ex Vat for five users). This includes a bundled copy of Microsoft's SQL Server database, as well as its Internet Security and Acceleration (ISA) firewall and Office Frontpage technologies. Here, SQL Server 2000 Advanced is replaced by SQL Server 2005 Workgroup Edition, based on the latest, much improved implementation of the Microsoft database technology.

Finally, there's a subtle but significant change in the way the client access licence (CAL) is worded, which doesn't affect how the software works but does have legal implications. Previously, each client PC required a CAL to access the SBS 2003 server, which also allowed for connections to other Windows servers, but not those running Exchange or SQL Server. With the new CAL, no additional licences are required to legitimise access to such systems.

Whether SBS 2003 R2 is worth considering depends on what you have already. For those who are looking to deploy a Windows server for the first time, it's a no-brainer, providing everything needed in one easy-to-use package. Moreover, it's what most server vendors will pre-install.

If you already have SBS 2003, upgrading is less clear cut. It's not difficult, shouldn't cause a huge amount of disruption and you could qualify for a free upgrade. However, restrictions apply (check the Microsoft website for details) and it all takes time and effort. So if you don't need the new features, you might want to stay as you are until a more significant release comes along.

Alan Stevens

Details

Price £363.08 (£309 ex Vat) for five-user Standard Edition
Best price www.pcw.co.uk/bestprices
Contact Microsoft 0870 601 0100 www.microsoft.com
System requirements Server with 750MHz processor (1GHz or above recommended) • Minimum 512MB Ram (1GB recommended, up to 4GB Ram supported) • 16GB available disk space • Ethernet network interface • CD-Rom drivetext

Verdict

Pros Makes installing and running a small-business server much easier; bundled update services; Exchange mail store limit raised to 75GB; SQL Server 2005 now included in Premium edition
Cons Not based on latest Windows Server 2003 R2 code; no significant changes to performance or the way the package is installed or run

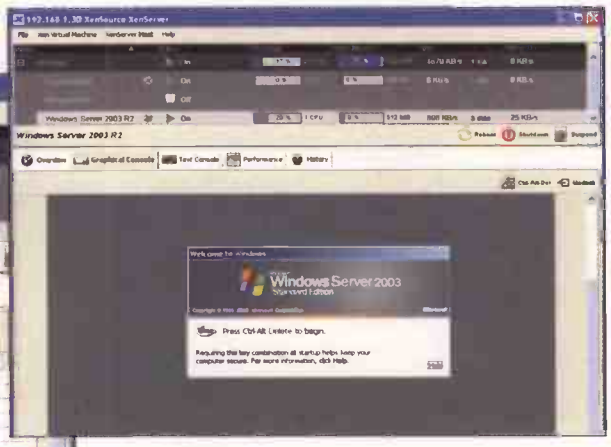
Features ★★★★☆
Ease of use ★★★☆☆
Value for money ★★★☆☆

Overall An obvious choice for first-time small-business server buyers, but not so clear cut as an upgrade
★★★☆☆

SERVER VIRTUALISATION

Xensource Xenserver for Windows

Xen and the art of server virtualisation



Above: Xenserver can host WIndows as well as Linux virtual machines, but processors with hardware virtualisation are required for Windows

Left: VNC is used to connect to the console of each virtual machine, with support also for Remote Desktop on Windows VMs

It has taken a while, but open-source Xen virtualisation technology is now available as a ready-to-run package that can be used to host Windows as well as Linux virtual machines. As such, it could be considered alongside more established virtualisation products from Microsoft and market leader VMWare. However, the new Xenserver is quite different and, on this first showing, nowhere near as capable or polished as the competition.

You can't just order a copy of Xenserver. It must be downloaded from the Xensource website and it's pretty massive – 650MB. That's because it comes in the form of a CD-Rom image which, once downloaded, needs to be burned to a bootable installation CD or copied to a TFTP server for network deployment.

You then have to install the main Xenserver Host component, but unlike VMWare or Microsoft's Virtual Server, Xenserver doesn't run as an application under an existing host OS. It has to be installed from scratch onto a bare system. The Xen Hypervisor then runs natively to provide, supposedly, better performance and flexibility than hosted solutions.

The install procedure is semi-automated and much like installing Linux, mostly because that's what you're doing: installing a modified Debian Linux (used for its driver support) plus the Xen Hypervisor. Most industry-standard processors, storage subsystems and network adapters will be identified and configured automatically, although compatibility isn't guaranteed and problems could arise on older platforms.

We used a Dell Poweredge server with an Intel Xeon processor, but AMD is also supported. Another major difference from other virtualisation products is the need for processors with support for Intel VT or AMD-V hardware virtualisation technologies. Other applications will use this if they can, and Xenserver will get by without if you only want to run Linux, but it's essential for Windows virtual machines.

Xenserver is also very particular when it comes to the versions of Windows it will host. The only choices are Windows XP with SP2 or Windows Server 2003, although this can be either the Standard or Enterprise edition with support for SP1 and R2 implementations. Only 32-bit Windows can be used and, at present, there's a limit of one virtual processor and 2GB of memory per VM. You're also limited to eight concurrent virtual machines. Guest operating systems are installed in the same way as on a physical server and the same licensing restrictions apply.

To manage Xenserver, you have to install a Java-based management console on another network PC. You must then connect to the remote server to create new virtual machines, start and stop them and so on. You can tweak allocated resources (the virtual machine has to be stopped), check performance and connect to the remote console via an integrated VNC tool or, on Windows guests, Remote Desktop. Tools to convert existing physical servers into virtual machines are provided.

We had no real problems with Xenserver, but we didn't find it as easy to configure or manage as rival products, such as VMWare Server. Neither did we see a huge benefit in terms of performance, getting similar results with the benchmarks we ran.

It also requires a fair amount of technical expertise and, in its current format, is not likely to threaten VMWare or Microsoft alternatives, especially as a small-business solution.

Alan Stevens

Details

Price $99 (about £50) a year
Best price www.pcw.co.uk/bestprices
Contact Xensource
+1 650 798 5900
www.xensource.com
System requirements x86 server with Intel or AMD processors • Intel VT or AMD-V hardware virtualisation is required to run Windows VMstext

Verdict

Pros Windows and Linux guests; hypervisor-based virtualisation technology for enhanced performance; physical to virtual server conversion tool; remote management
Cons Requires processors with hardware virtualisation; Windows VMs limited to one processor and 2GB Ram; 32-bit Windows only

Features ★★☆☆☆
Ease of use ★★★☆☆
Value for money ★★☆☆☆

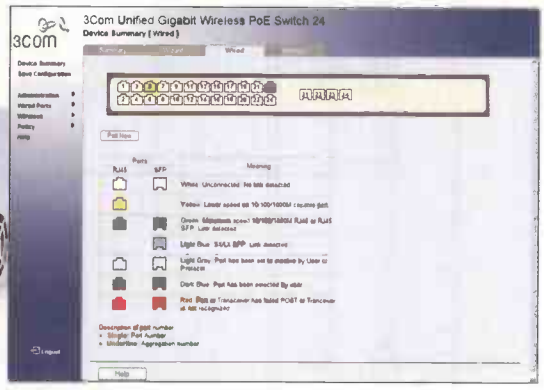
Overall An interesting alternative to more established server virtualisation tools but needs more work
★★☆☆☆

NETWORK SWITCH

3Com 3CRUS2475

A switch that can be all things to all networks

The Unified Gigabit Wireless PoE Switch 24 combines a 24-port Gigabit switch, PoE hub and wireless controller in one box



Management is via a simple web interface, but a lot of technical knowledge is assumed

It may be a bit of a mouthful, but the 3CRUS2475's full name, Unified Gigabit Wireless PoE Switch 24, tells you more or less all you need to know about 3Com's latest small-business networking product.

Aimed at companies with five to 250 users, the idea is to provide a unified infrastructure for both wired and wireless networking, starting with a Gigabit Ethernet switch. This comes in a large 1U rackmount casing with 24 auto-sensing 10/100/1,000Mbits/sec UTP ports at the front. Four SFP (small form factor pluggable) slots are also on the front panel which, with suitable SFP modules fitted, allow the switch to be connected to others via a backbone fibre network.

So far, so good, but it's quite expensive for a switch. So in addition, you get support for 802.3af Power over Ethernet (PoE) to power items such as wireless access points and IP phones over the Lan.

Unlike a lot of small-business PoE switches, the 3Com Unified Switch can deliver the full 15.4W of power allowed for by the IEEE standard to all 24 ports simultaneously. So there's no management involved – just plug in an 802.3af device and it can get as much power as it needs.

The only real issue is the reliance on a single power supply with no means of plugging in a backup supply to maintain power to attached devices in the event of a failure. Most users will also want to add a UPS (uninterruptible power supply) to provide centralised protection against power cuts.

The most interesting feature of the 3CRUS2475, and the reason it's expensive for a Layer 2 device, is its integrated wireless controller. It features circuitry that can auto-detect and manage up to 24 wireless access points, and apply standard security polices, for example, detect and deal with rogue access points and so on.

On the downside, you have to use 3Com access points, and not just any old access points, either. The only supported models are the 3Com Wireless 7760 11a/b/g PoE Access Point (about £98 ex Vat) and its big brother the 8760 (about £152 ex Vat) – effectively the same device, but with dual radios for simultaneous 802.11b/g and 802.11a operation.

These access points are well specified and can be used standalone, just like any other. However, when connected to the Unified Switch, they can be quickly reconfigured for so-called 'fit', rather than 'fat' operation, whereby their setup and operation is all managed centrally. That means being able to enable and disable the radios and specify the SSID, as well as the encryption and other security settings to apply, with support for WPA/WPA2 Personal and Enterprise, as well as basic Wep encryption.

Management of both the wired and wireless features is via a browser interface, which is easy enough to understand, although a lot of technical knowledge is assumed. Wizards are on hand to help with the initial setup, but to get the best out of this product, a small business will probably require help with installation.

In its favour, 802.1x user authentication, dynamic load balancing and automatic prioritisation of voice traffic using VLans also come as standard, making the Unified Switch a good choice for companies looking to build a secure converged infrastructure. But it's not cheap and you will need other 3Com components to take full advantage of what's on offer, making it likely to appeal mainly to larger organisations that are better able to spread the cost.

Alan Stevens

Details

Price £1,384.15 (£1,178 ex Vat)
Best price www.pcw.co.uk/bestprices
Contact 3Com 01442 438 000 www.3com.com
Specifications 1U rackmount Layer 2 network switch • 24 10/100/1,000Mbits/sec UTP ports • Four shared SFP slots for SX/LX fibre transceivers • 802.3af PoE with 15.4W available on all 24 ports • Embedded wireless access point controller • Up to 24 802.11a/b/g wireless access points • 30 users per access point • 250 wireless users per switch • 802.1x authentication • Rogue AP detection/mitigation • 802.1p class of server and automatic VoIP prioritisation

Verdict

Pros Integrated wireless controller; auto-discovery and setup of wireless access points; PoE support with 15.4W of power on each port
Cons Single power supply; requires specific 3Com wireless access points

Features ★★★★☆
Performance ★★★☆☆
Value for money ★★★☆☆

Overall Crams a lot into one box, but you will need to buy additional 3Com products to complete the solution ★★★☆☆

NETWORK COLOUR LASER

Kyocera FS-C5025N

Add colour to your documents and still save money

Above: Toners are the only consumable that need to be changed on a regular basis

Left: It may not win awards for design, but the Kyocera FS-C5025N is a capable and affordable network colour laser

Touted as offering rock-bottom cost of ownership, Kyocera's FS-C5025N is a 20ppm (pages per minute) colour laser with an 85,000 page per month duty cycle, which is beefy enough to be used as a small company or workgroup laser.

USB and Ethernet interfaces come as standard, with the usual multiprotocol print server emulations, together with web and SNMP management.

Paper is fed from a 500-sheet A4 drawer with a fold-out multipurpose tray to handle transparencies, card and other awkward materials. A further three trays can then be added underneath (£188 ex Vat each), bringing the printer's capacity up to 2,000 sheets altogether. Other optional extras include a duplexer (£215 ex Vat) and a powered envelope feeder (£189 ex Vat).

All this makes for an impressive printer – although nothing outstanding, with lots of alternatives available capable of matching or exceeding what the FS-C5025N has to offer. However, few can match the low cost of ownership, with toner being the only consumable required in day-to-day operation.

Four cartridges are involved (cyan, yellow, magenta and black), each clicking quickly into place under the lift-up top. The original starter cartridges are good for about 4,000 pages (at five per cent coverage), but replacements can cope with double that.

The £300 ex Vat price tag may seem a little hefty but, unlike most other colour lasers, there's nothing else to buy, other than a maintenance kit to service the long-life optical drum every 200,000 prints or so (£450 ex Vat). Added to this, the toner that needs to be replenished most often (black) sells for just £53.88 ex Vat – less than on some mono lasers.

According to Kyocera, taking this approach can drastically reduce running costs, especially if you cost it over three to five years (the typical life of this kind of printer). Indeed, if you believe the comparison tools on the Kyocera website, you could save hundreds of pounds compared with the leading brands, even when you factor in the cost of the hardware and warranty terms.

On the downside, the print quality – although good – is far from exceptional. Designers and other graphics professionals will soon find faults, especially with the resolution, but then they are not the printer's target market. This is a general-purpose laser printer and for printing general-purpose documents, it's more than adequate.

The FS-C5025N is also pretty quick to print, taking about 13 seconds to eject the first page of any document sent its way and printing boring old text at a rapid rate. More complex pages naturally take a lot longer, but the PowerPC-based controller coped well, even when we tried the booklet printing and watermark options.

We liked this machine a lot and we also appreciated the way it looks. Design, of course, will always be a matter of taste, but to our eyes the FS-C5025N is one of the neatest looking network lasers around. This is mainly because Kyocera has eschewed fancy plastic mouldings in favour of a no-nonsense cube, which simply gets on with the job. A clear operator display is another plus, accompanied by large, easy-to-understand control buttons.

OK, it may not get the pulse racing, but it works and if it lives up to Kyocera's claims, it could save you a packet of money to boot. *Alan Stevens*

Details

Price £888.30 (£756 ex Vat)
Best price www.pcw.co.uk/bestprices
Contact Kyocera Mita 0845 456 0456 www.kyoceramita.co.uk
Specifications 20 pages per minute single-pass colour laser • 600x600dpi • 85,000 pages/month duty cycle • 500MHz PowerPC controller • 128MB Ram (upgradeable to 640MB) • PCL6 and Postscript Level 3 compatible • Direct Pdf printing • USB and 10/100Mbits/sec network interfaces • 500-sheet A4 paper tray • 100-sheet multipurpose tray • Optional duplexer and additional paper trays

Verdict

Pros Low cost of ownership; easy-to-change toners; flexible paper-handling options; compact format; integrated networking and management; long-life drum
Cons Duplexer not included as standard; 600dpi output; no support for A3 printing

Features ★★★☆☆
Performance ★★★☆☆
Value for money ★★★★☆

Overall A top contender for small businesses looking for a flexible, yet affordable colour laser ★★★☆☆

REMOVABLE HARD DISK

Tandberg RDX Quikstor

Speed up your backups with this removable hard disk solution

Personal Computer World BUSINESS RECOMMENDED

The removable cartridges used by the RDX QuikStor contain a complete 2.5in Sata disk mechanism

Although increasingly popular as a backup medium, there aren't many removable hard disk solutions around. Tandberg Data is looking to fill the gap with the RDX Quikstor, which can handle up to 120GB of data with Sata Interface speeds.

The hardware comes in two parts – a chassis designed to fit a standard PC or server storage bay, plus removable cartridges, each containing a complete 3.5in Sata disk mechanism. The starter kit we were sent came with a 40GB cartridge (£67 ex Vat if bought separately) with 80GB and 120GB cartridges also available at £100 and £160 ex Vat respectively. All the cables required are also included.

Installation is a screwdriver job, but easy if you know what you're doing. There's an external USB version (£190 ex VAT), but this won't be quite as fast.

The cartridges are quite chunky, but they don't look as robust as those used by the Storcase Data Express for Backup, which we reviewed in the October 2006 issue of *PCW* (**www.pcw.co.uk/2161969**). However, according to Tandberg, they have been tested by dropping them from over a metre without sustaining any damage and are also dustproof. We were not able to check out these claims for ourselves.

Because it presents as an ordinary Sata hard disk, the RDX Quikstor can be used with the most recent operating systems, including most versions of Windows and Linux. Windows, however, doesn't expect Sata disks to be removable, so you do have to load up a small utility to enable the cartridges to be ejected and swapped. Using this, we were able to dismount and eject the cartridge without losing any data, either under software control (just like a CD-Rom) or by pressing the Eject button on the drive itself.

One of the big advantages of disk-based backup is that it's a lot quicker than most tape solutions, especially those designed to compete in the small-business market. However, performance will depend on the host configuration and software used. We tested using a Dell Poweredge server fitted with a 3GHz Intel Xeon processor, 1GB of Ram and a Sata 150 disk array running Windows Server 2003 R2. On this, the RDX Quikstor cartridge was mounted and assigned a drive letter like any other disk, and we were able to drag files to it or use the drive as a target from a backup application.

Almost any backup program can be used as most now let you take backups to hard disk, as well as tape. However, some won't let backups span more than one disk cartridge and there are known issues with some products, making it worth checking the Tandberg Data website before buying.

A copy of Symantec Backup Exec was included as part of the bundle we tried. Using this, we recorded a transfer rate of just under 25Mbytes/sec while taking a full backup of the boot partition – about 10GB. We saw similar results when restoring the data again – results that compare well against tape-based alternatives and other removable disk products

The RDX also compares well on price. At just £160, it undercuts most SME tape drives by quite a margin, even when you factor in the purchase of additional cartridges. It's also cheaper than the Storcase Express and the popular Iomega REV drive. The 35GB REV cartridges, which only contain disk platters, are marginally cheaper, but if you have a lot of data to protect, the RDX Quikstor is a better and more cost-effective solution.

Alan Stevens

Details

Price From £188 (£160 ex Vat)
Best price www.pcw.co.uk/bestprices
Contact Tandberg Data 0845 070 6916 www.tandbergdata.com
Specifications Removable Sata 150 hard disk • 3.5in half-height internal drive • 15ms average access time • 30Mbytes/sec average sustained transfer rate • 40GB, 80GB and 120GB cartridges available • 40GB cartridge included • Sata interface and power cables supplied • Bundled Symantec Backup Exec software

Verdict

Pros Sata disk transfer rates; choice of cartridge capacities; compatible with Windows and Linux; bundled Symantec Backup Exec software
Cons Host system needs to be opened to install internal drive chassis; cartridges fairly bulky; some backup programs can't span multiple disks

Features ★★★☆☆
Performance ★★★★☆
Value for money ★★★★☆

Overall A fast and affordable alternative to tape for small-business server and desktop backup
★★★★☆

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Practical advice from the industry's experts

EDITED BY NIGEL WHITFIELD

HANDS ON

HASTA LA VISTA TO XP?

By the time this issue of *PCW* hits the streets, Microsoft's Windows Vista will have been shipping for a while, but there's still plenty to learn about the new operating system, and how you can make the best use of it.

Our Hands on experts will be bringing you tips and tricks, and this month Ken McMahon takes a look at some of the new imaging functions in Vista. Meanwhile, in Hardware, Gordon Laing discovers that, while Vista may no longer force you to use a floppy drive to supply drivers during installation, it manages to introduce another 'gotcha' for the unwary. Keeping with new technology, in Performance, you can find out how to use the Xbox HD-DVD drive with your Windows PC.

But don't think this means we're going to forget about XP: far from it. Hands on is here to help you with real-life computing, and in real life XP is going to be with us for a long time yet.

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Far left: The Xbox 360 HD-DVD drive is cheap and works with a PC (see page 126)

Left: Get to know the sidechain input (see page 138)

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- Q&A

Advice from our experts

Our team answers your queries and finds solutions for your PC problems

DATABASES

Good relations

Q I'm having trouble understanding when to use a relationship in the relationship editor and the benefits of doing so. Most of my Access use is for data manipulation and any relationship I use between two tables is set up in my queries.

For instance, in the Databases column, Winter 2006/2007 'A rare one-to-one' (see www.pcw.co.uk/2173408), I completed the example as shown and everything worked as expected. I thought about the example and decided that I would have used exactly the same method to achieve the results other than creating the relationship in the relationship editor. Instead, I would have relied on the relationship defined in the query. I set up my method and got the same results as in your example.

I realise that by doing it my way I didn't take into account any referential integrity. Is this the reason the relationship editor is used? What unforeseen problems or errors would my method cause?
Keith Dryden

A You have put your finger beautifully on the distinction when you say that your method didn't take into account any referential integrity.

Creating a relationship in the relationship editor does two things: first, it enables you (if so desired) to set up the constraints for referential integrity. Second, when you add the two tables to a query, Access can automatically create a join between the tables, based on the fields used in the relationship.

So, your method is fine for data manipulation. If you move to data entry then referential integrity is very often useful and I would recommend using the relationship editor. But it isn't necessary for querying.

SCREEN 1

C2 =INDEX(Commission,MATCH(B2,Sales,1))

Rep	Sales (000)	C Rate	D Commission
Sam	£498	13%	£64,740
Sid	£234	11%	£25,740
Val	£678	15%	£101,700
Art	£546	14%	£76,440
Bob	£733	16%	£117,280
Dot	£399	12%	£47,880
Gus	£189	10%	£18,900
Iris	£854	17%	£145,180
Meg	£912	18%	£164,160
Pam	£698	15%	£104,700
Peg	£299	11%	£32,890

Calculate sales reps' commission easily with Excel

SPREADSHEETS

On commission

Q Our company pays our representatives a commission of 10 per cent for annual sales of £100,000 to £199,000 and an extra one per cent for every £100,000 above that to a maximum of 18 per cent. Can you help me construct a table in Excel that will calculate each rep's earnings, based on their sales?
Iki Ahmed

A When you have short lookup tables such as these, you can put them in Names. Enter the representatives down column A. Enter their sales in thousands down column B. On the Insert menu choose Name, Define. Where it says 'Names in workbook:' enter Sales. Where it says 'Refers to:' enter

```
={0,100,200,300,400,500,↙
600,700,800,900}
```

(Key: ↙ code string continues)

Click the Add button. In the top box enter 'Commission'. In the bottom box enter

```
={0,0.1,0.11,0.12,0.13,↙
0.14,0.15,0.16,0.17,0.18}
```

Click Add. In cell C2 enter

```
=INDEX(Commission,MATCH↙
(B2,Sales,1))
```

and in D2 enter

```
=B2*1000*C2
```

(see screen 1). Drag these two formulas down their respective columns.

You've got mail

Q I have a club Access database from which I want to export a column to Excel that contains members' email addresses. I want to merge these addresses from the single column to one text item, with entries separated by a comma and space, so that I can paste it into the send box for an AOL email to the club members.
Ken Pavitt

A Manipulating text is best left to a word processor. Excel usually has a limit on the amount of text that can be stored in a cell. Copy the Access column and Paste it into an Excel column. If the email addresses are in column A starting with cell A2, in cell B2, enter `=A2` In cell B3 enter `=B2&", "&A3` (see screen 2). Drag this formula down column B to the last address. At this point you can ignore all the entries in column B above and Copy and Paste the contents of the last cell into the AOL send box.

The right place

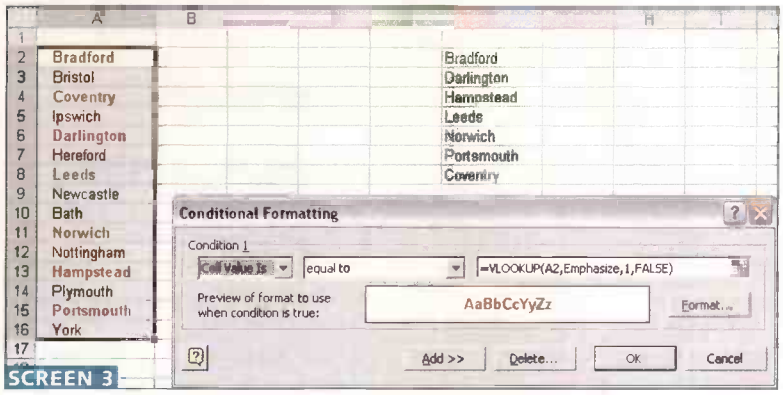
Q I have a list of places and surnames on an Excel 2000 worksheet. I need to call attention to as many as seven of these. Can I increase the maximum number of conditional formatting entries?
Syeda Irtizall

You can combine email addresses into one cell so they can be pasted into a send box

SCREEN 2

B5 =B4&", "&A5

	A	B
1		
2	brown@abc.co.uk	brown@abc.co.uk
3	bob@xyz.com	brown@abc.co.uk, bob@xyz.com
4	dot_green@opq.org	brown@abc.co.uk, bob@xyz.com, dot_green@opq.org
5	gus@ok.com	brown@abc.co.uk, bob@xyz.com, dot_green@opq.org, gus@ok.com
6	barby@help4U.com	brown@abc.co.uk, bob@xyz.com, dot_green@opq.org, gus@ok.com, barby@help4U.com
7		



Make certain names stand out in Excel with the conditional formatting tool

A Enter your list of places in any order in column A, starting in cell A2. Enter the seven special names elsewhere. Highlight the secondary list and choose Name, Define on the Insert menu. Name the range Emphasize. Highlight the range containing all your place names. Select Conditional Formatting on the Format menu. Accept the default in the first box, Cell Value Is (see screen 3). Click the down arrow in the next box and choose equal to. In the next box enter `=VLOOKUP(A2,Emphasize,1, FALSE)` Click the Format buttons and, under the Font tab, select Bold and the colour of your choice. OK out. The special names will now stand out.

Turn back time

Q If I enter the date 20/05/29, Excel wrongly shows it as 20/05/2029. What's the problem here?
Andrew Campbell

A Years should be entered in the yyyy format not yy. Don't leave it to Excel to guess the century. When you enter two-digit years 00 through 29 Excel will store the date number as 2000 through 2029, but if you enter two-digit years of 30 through 99 Excel will assume you mean 1930 through 1999.

Excel-lent reads

Q I'm trying to advance my Excel skills for work, particularly in the area of advanced IFs, SUMIFs, LOOKUPs and Pivot Table manipulation. I already have the Microsoft Press *Step By Step* book. There are lots of Excel titles on Amazon.co.uk but it's difficult to ascertain what's most appropriate. Can you please recommend a good book?
Vivek Sharma

A The most useful books on Excel are the Special Edition *Office* series by Ed Bott and Woody Leonhard, published by QUE; and *The Missing Manual* series by Matthew MacDonald, published by O'Reilly. You'll find comprehensive coverage of Excel 10, 11 and 12 (in *Office 2002, 2003, 2007*). Keeping a file of these Spreadsheets columns can also be rewarding, and don't forget to check out **www.pcw.co.uk/tags/spreadsheets**.

DIGITAL IMAGING

Shuffling shots

Q We have downloaded photos from our digital camera to our PC, which runs Windows XP. I want to rearrange some of the photos into a more logical sequence. I've done it by clicking and dragging, which is fine, but when I come to copy to CD, the photos go back to their original position.
Liz Freeman

A When you copy photo files to a data CD or DVD they are treated like any other files. You can sort them in any order available from the bar displayed at the top of the folder in Details view (Select View> Details from the folder menu). You can't rearrange the order on a CD in the same way as for files on a hard drive because Windows has no way of storing the new order information.

One way around the problem is to rename the files so that, when listed alphabetically, they are in the order you want. Alternatively, use an application like Adobe Photoshop Elements or Ulead Photoimpact to create a slideshow and copy this to disc. As well as maintaining the desired sequence you can add captions, transitions and music. You can always include the originals, if you want the CD to double as a backup.

Moving pictures

Q I am considering purchasing a Sony HDR-HC7 HDV camcorder in the US. I only wish to use it to transfer recordings to my PC and then to DVD, using Ulead Videostudio 10 software. Will this cause problems relating to NTSC and Pal systems, since the camera can connect to an HDMI port on a TV?
Ted Walley

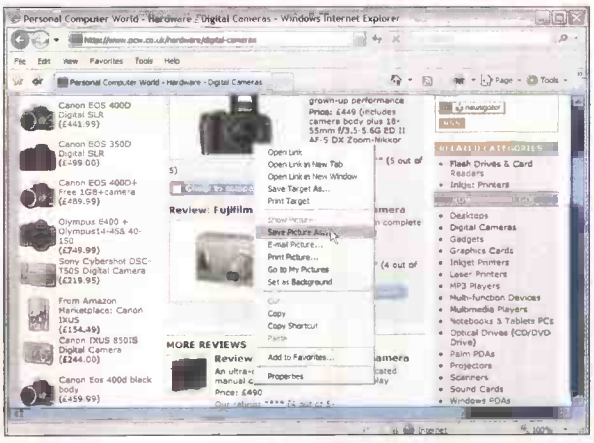
A You won't have a problem transferring to PC. Just configure Videostudio to accept input from an NTSC camcorder. Once

Image options in Internet Explorer 7

WINDOWS

Q This sounds a really easy Windows XP question but it has defeated me so far: in Internet Explorer 6 resting the mouse near the top left corner of a Jpeg image brings up a group of icons for Save, Print etc. How do I get the same thing to happen in IE7?
Richard Barker

A The image toolbar has been discontinued in IE7, but you can get a similar set of commands by right-clicking on the image.



The image commands are now on the right-click menu in IE7

the DV video stream is captured to your hard disk, the analogue video signal format becomes irrelevant – until you record to DVD. If you're recording an NTSC disc, no problem, if you want a Pal disc, you'll need to do size and frame rate conversions on the footage, which can be complicated and expensive if you want to maintain quality. You also won't be able to connect your NTSC format camcorder directly to the HDMI port on a Pal TV.

HARDWARE

Viiv live

Q I've begun buying parts to build a new PC and wondered if they could be used for a Viiv/Media Center system? I've heard MCE can be fussy when it comes to hardware. So far I've bought a Pentium D 915, Gigabyte GA-945PL-S3, 320GB Seagate Sata disk and a BFG Geforce 7600 graphics card.
Desmond Birch

A It's true Windows XP Media Center Edition 2005 has certain preferences, but these are mostly concerned with the choice of TV tuner, its driver and the software DVD player. The base PC requirements aren't that specific and it should happily run on your motherboard, processor and graphics card.

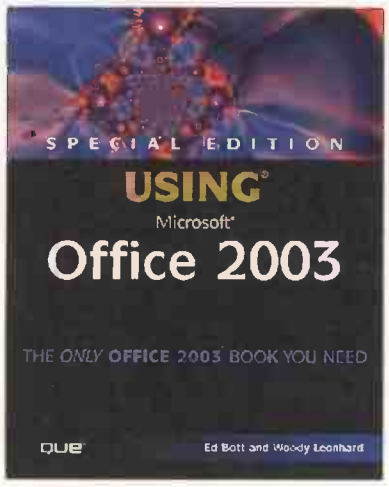
In terms of the fussy elements, we'd recommend Cyberlink PowerDVD 7 for the Mpeg-2 decoding (necessary for DVD and TV playback), and either a GTA Black Gold or any of the MCE-branded TV tuner cards from Hauppauge. You'll only need to install the driver for the TV tuner for it to work with MCE, but it's crucial to go for the MCE-specific driver.

While your system should happily run MCE 2005 or Vista (the Home Premium and Ultimate versions also include Media Center), Viiv is a different matter. To build a Viiv-compliant Media Center PC, you'll need some very specific components. These include a motherboard equipped with a specific Intel Express chipset; compatible models include the 975X with ICH7-DH, 965X (G or P) with ICH8-DH, and the 945 (GT or GM) with ICH7M-DH. You will also need to install software for Intel's Quick Resume technology and Intel Viiv, both of which are supplied with Viiv-compatible motherboards.

As far as we understand, the only official Viiv-compatible motherboards from Gigabyte are the GA-8I945GMH-RH and the GA-8I945GMMFY-RH. The model you've bought doesn't appear to officially support Viiv.

That said, there's not a great deal that Viiv adds to an entertainment PC. We prefer implementing genuine S3 standbys over Viiv's Quick Resume, the exclusive Viiv online content hasn't really happened in the UK, and we've had no compatibility issues getting plain MCE systems talking to other devices.

If you are interested in putting together a Viiv-compliant system though, check out December's Hardware column (see **www.pcw.co.uk/2166206**) where we built one around the Asus N4L-VM DH and a Core Duo processor. We eventually got it to pass Intel's Viiv tests, but couldn't find any real benefits to jumping through the hoops. In our experience, Media Center by itself, whether through XP or Vista, works just fine. More details on Viiv's component requirements can be found at **www.intel.com/products/viiv/requirements.htm**. Finally, don't forget to enable S3 in your Bios Power section before installing Windows if you'd like to implement the full power-saving, silent standby mode.



A couple of useful Excel books

Parallel printing

Q In a recent Question time you described how to connect an old parallel port printer to a PC with only USB ports. I have the reverse problem: I have an Epson R200 printer that only has USB ports, but would like to use it with older Dos programs that expect to find a parallel printer on the LPT1 port. I'm currently forced to use my first-ever printer, an Amstrad nine-pin dot matrix which, after years of storage and a precautionary pre-use squirt of WD40, works perfectly and noisily but clutters up my desk. Is there any hardware or software that will allow me to direct a parallel port output to my USB printer?
Gordon Nunn

A You can achieve what you're after from Windows itself. The trick is to give your USB printer a name as if it were being shared on a network, then to associate that name with a spare LPT port which your Dos software can print to.

First, share your printer and make a note of its shared name – for example 'Epson_R200'. Then make a note of your computer's name – in Windows XP this can be found under the Computer Name tab of your System Properties, such as 'MyPC'. Third, choose an unused LPT port, such as LPT1, if you no longer intend to use the physical parallel port.

Now open a Command Prompt window and enter the following, leaving out the quotes: 'net use LPT1 \\MyPC\Epson_R200', substituting your own printer and computer names. This should redirect any print requests to the LPT1 port to your USB printer. If you'd like Windows to remember this redirection every time you reboot, simply use the following line instead, again removing the quotes and substituting your own computer and printer names: 'net use LPT1 \\MyPC\Epson_R200 /Persistent:YES'. To remove this, enter 'net use LPT1 /Delete'.

Alternatively, there are several utilities which claim to perform the redirection for you, including DOSPRN (**www.dosprn.com**) and DOS2USB (**www.dos2usb.com**) although we cannot vouch for their effectiveness.

LINUX

KDE switch

Q I have been using KDE for a long time and my settings are a bit of a mess. I would like to start with a fresh setup without having to create another login. I know that configuration files are kept in my home directory, but what do I need to delete?
Harry Day

A You are quite right, KDE stores your configuration settings in your home directory under the .kde directory. On some systems this may be a symbolic link to another directory, such as .kde-3.5. You need to remove (or move) these directories completely to start from a fresh KDE setup. Bear in mind that email stored with Kmail is kept in here as standard too, so export that or back it up if necessary. You should also remove the .mcop* and .qt directories in your home directory. Remove these directories while logged in as another user, or when logged in outside of KDE. The next time you log in, KDE will set up a default configuration.

WINDOWS

Upgrade advice

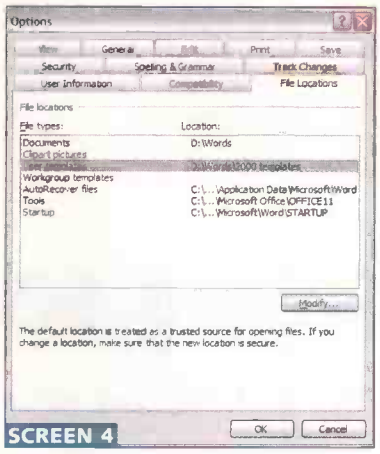
Q Could you tell me how to upgrade from Windows 98 to Windows 98 SE please?
Graham Hamilton

A You need a Windows 98 SE CD. At the time it wasn't a free upgrade option for 98 users, and of course Windows 98 is no longer supported by Microsoft. There are, however plenty of copies on Ebay – go for a 'full retail' version rather than a 'rescue' disk.

Tend the F-lock

Q I'm sure I read in a past column about a way to stop the Microsoft Wireless keyboard starting with the function keys remapped without having to press the F-lock key.
Dave Taggart

A You need Jason Tsang's Flock, which comes as either an XML file (for USB and PS2 keyboards) or a Registry file (PS2 only). You can find both versions at **http://jtsang.mvps.org/flock.html**.



SCREEN 4

Transfer your Word user settings from one computer to another by accessing User templates in the Tools option

WORD PROCESSING

Text transfer

Q I have been using Word satisfactorily for a long time on a desktop PC equipped with Windows 2000. I have lots of macros and other settings that are used all the time. I wish now to prepare for a long writing spell on a laptop which uses Windows XP Home Edition. How can I transfer all the settings from the desktop?
Michael Oppenheim

A Starting with the settings in Word's Options dialogue, these are stored in the Registry, but there's a simple way of transferring them. Start the macro recorder then go to Tools, Options, and page through all the tabs. When you've done this, OK out of the dialogue and repeat for Tools, Autocorrect Options. OK out of this and stop the macro recorder. When you run the recorded macro on the new PC, it will set the old options.

Macros, styles, autotext entries and custom toolbars are stored in templates (.dot files). You can find out where these are by going to Tools, Options, File Locations, User Templates (see screen 4). Copy these to a suitable folder on the new installation, then make sure that the new Word has its User Templates location pointing to this folder. You may also have global macros stored in the Office Startup folder or elsewhere – you can track these down from Tools Templates and Add-ins. If relevant, you may also want to check for XML schema or expansion packs and linked Style Sheets (CSS) from the other tabs on this dialogue, as well as Com add-ins from the Tools menu.

Your additions to the spelling checker dictionary will be stored in one or more .dic files, and you can find out where these are from Tools, Options, Spelling and Grammar. If you have an exclusion dictionary – a list of words that should always be queried even if spelled correctly – this will be at Program Files\Common Files\Microsoft Shared\Proof with the .exc extension. Finally, custom Autocorrect lists are stored under each user's profile as Application Data\Microsoft Office\MSOnnnn.ACL, where nnnn is a number denoting the language.

Row, row, row...

Q Sometimes when constructing a table in a Word document I find that I need a lot more rows. The only way I know of inserting extra rows is to repeat the process 'Table, Insert, Rows' as many times as the number of extra rows needed. Is there a way of giving a command such as 'Insert 16 rows below'?
Peter Ellis

A One way is to select multiple rows, then 'Insert, Rows Below' will add the same number of rows as originally selected. If that isn't enough then Control & Y will repeat the action. Alternatively, this simple macro does the trick.

```
Sub Addrows()
numrows = InputBox("How many ↙
rows?", "Insert Rows Below")
Selection.InsertRowsBelow ↙
(numrows)
End Sub
```

It hasn't been foolproofed, so if the cursor is not in a table or you enter an invalid number into the input box, it will bomb out.

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Gordon Laing has been a hardware enthusiast since his first Sinclair ZX80 and as a former editor of PCW and contributor for over 10 years, what he doesn't know about technology isn't worth knowing

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Vista in the driving seat

With Vista, you don't need a floppy drive to install disk drivers, but there are snags

Windows Vista finally resolves one of the most annoying catch-22s in PC installations: the need for a floppy drive for the latest disk controllers. While Vista still offers the opportunity to install third-party disk controller drivers during its initial setup, and supports the use of a floppy drive to deliver them, it now adds CD, DVD and USB-connected media as alternative sources.

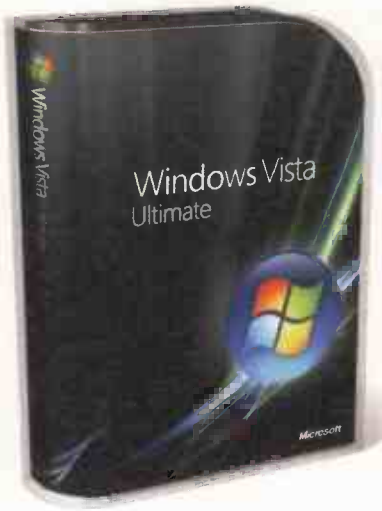
It's been a long wait: having to dig out a dusty floppy drive and an ancient blank disk to install support for the latest hard disk controllers is one of the most infuriating aspects of building a modern system. After all, who fits a floppy when building a modern PC, and does the old drive lurking in the back of a cupboard even work? Like many PC builders, I've often sacrificed the advanced features of a serial ATA (Sata) AHCI (advanced host controller interface) disk controller and switched it back to plain IDE emulation in the Bios for an easy Windows installation.

Now Vista finally lets us provide third-party disk controller drivers on far more convenient media, life is a lot better (see screen 1). If you're really lucky, Vista might even recognise your AHCI or Raid disk controller during setup and install its own drivers.

The parallel problem

Unfortunately, my euphoria may be short-lived. Just as one problem has been solved, an equally infuriating one is puzzling Vista installers.

The long-standing snag that Vista solves concerns the fact that every Windows installation disc contains a certain number of standard device drivers. If your hard drive is connected to a controller for which Windows has a driver, the setup process can see the disk and install the operating system on it.



Windows Vista offers a streamlined installation process compared with XP, but it's still easy to get tripped up with certain hardware combinations

Problems occur when the hard disk is connected to a controller for which the Windows installer does not have a driver. Without an appropriate driver, Windows setup simply can't see the hard disk and therefore cannot install on it.

The solution is to provide a driver for the controller during the initial installation, which for Windows XP and earlier versions involves pressing the F6 key after the setup process has begun. Windows setup would then request the driver, enabling it to see your hard disk and copy files to it. Annoyingly, though, Windows XP and earlier versions demanded that this driver be supplied on a floppy disk.

Vista eliminates this old-fashioned nonsense by accepting disk controller drivers on alternative, modern media, and even then may not need them all, thanks to a larger array of standard drivers on the installation DVD itself.

So far, so good, but this issue has generally only applied to hard disk controllers not being recognised. Ironically, the new catch-22 doesn't concern hard disks at all – the problem is the optical drive used to install the OS. As Sata hard disks become increasingly widespread, the demand for older, parallel ATA (Pata) interfaces has greatly reduced. Some of the latest motherboard chipsets don't include support for Pata drives at all.

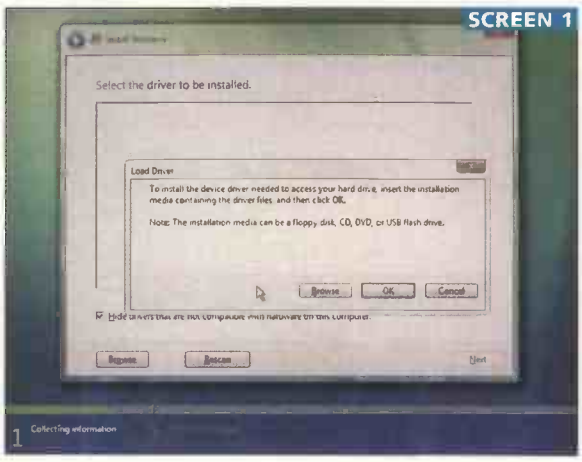
But of course, there's one Pata device that's still very common: the optical CD/DVD drive. Despite Sata optical drives now becoming available, it's fair to say that most of us building a PC will fit an existing Pata optical drive.

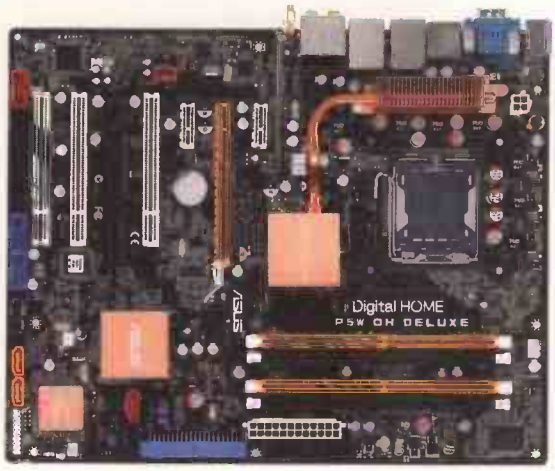
Motherboard makers realise this and typically support these 'legacy' parallel drives with additional, third-party disk controllers. So, on a modern motherboard, you'd normally find the main chipset only supporting Sata drives, while a secondary controller looks after older parallel drives.

You've probably already guessed where this solution falls down. The Windows installation disc happily recognises the main chipset and therefore spots your Sata hard disk without a problem. Unfortunately, it may not recognise the third-party parallel controller, and therefore at some point during the installation may no longer see your optical drive. And there's the new catch-22: the

A good part of the Vista installation process is being able to supply drivers for disk controllers on CD, DVD and USB-connected media along with the floppy disk

SCREEN 1





Many modern motherboards, such as the Asus P5W Deluxe, use a third-party controller for their parallel ATA ports. This can confuse the Vista installation

installation runs aground because Windows setup can no longer see its own disc.

To be fair to Microsoft, this problem also affects other operating systems, including Linux.

Affected systems

I first noticed this problem when trying to install Windows Vista on the popular Asus P5W DH Deluxe motherboard (pictured). This motherboard uses the Intel 975X/ICH7R chipset for Sata disks and an additional Jmicron controller to support older parallel drives and further Raid options.

Interestingly, Windows XP is happy to install on this motherboard without complaint, but Vista typically hangs after only a few minutes, unable to find the DVD it booted from a few moments earlier.

The lack of a suitable driver for the Jmicron controller on the Vista DVD is the problem, and at first the only way to resolve the situation was to install Vista using an external DVD drive connected to a USB port.

Modern motherboards are quite happy to boot from a USB device and, since the USB controller was part of the main Intel chipset, Vista spotted it and completed the installation without a problem.

Once Vista had installed itself from the external drive, My Computer and Device Manager reassuringly listed both it and my internal parallel drive. I thought I was in the clear until I tried using a number of discs and realised the internal drive refused to read them. The only way I could install further applications was to use the external drive. This problem seems to affect many modern motherboards that use an additional controller to support parallel drives.

Two fixes

While an external USB DVD drive allowed me to install Vista and other programs, it's hardly an ideal solution, especially with an internal DVD drive lying redundant. I wasn't about to swap it for a Sata version, either.

After much tweaking, I eventually discovered a solution, although for my P5W DH Deluxe board it involved a combination of several fixes. If you're experiencing a similar problem with a different board, you may have success after fewer tweaks, although if you're unlucky, the problem may prove insurmountable until support for Vista becomes more widespread.

To test the fixes, I used two different installations on two different hard disks. The first was my existing Vista installation from the external USB DVD drive, which listed the internal DVD drive, but wouldn't allow access. My goal there was to get the internal drive working. The second installation was a clean setup on a blank hard disk, where the goal was to complete the process using only the internal DVD drive.

The first fix simply involves updating the Bios for your motherboard (see screen 2). Plenty of people will recall a Bios update was necessary in many systems just to install Windows XP Service Pack 2 without any problems. Vista is no different and many strange issues can be resolved with this one fix. Sadly, it wasn't sufficient for my P5W DH Deluxe to behave, though.

The next fix was extremely basic, and one I'd tried previous to the Bios update without success: swapping the connector used for the optical drive. The Asus P5W DH Deluxe features two parallel ATA connectors, the primary located where you'd expect it, but the secondary hidden at the bottom of the board, near the last PCI slot. In the absence of any other parallel drives, I'd been connecting the DVD drive to the primary connector, and tried the less accessible secondary connector, but to no avail. After updating the Bios, though, which crucially included an update for the Jmicron firmware, I thought I'd try again.

The combination of a Bios update and the change of connectors proved sufficient for the clean installation, which now proceeded beyond the earlier hanging point and completed, despite a couple of worryingly long pauses. This fresh Vista installation seemed 100 per cent fine with the internal DVD drive working normally and able to read other discs.

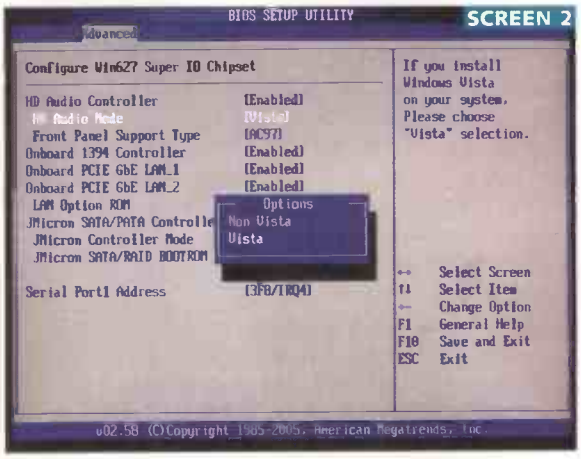
Sadly, though, the Bios update and swapped connectors weren't enough for the existing Vista installation made with the external DVD drive. Indeed, it no longer even showed the drive in My Computer or Device Manager. As a last-ditch attempt, I installed beta Vista drivers for the Jmicron controller from the Asus website. Despite these not being required for the clean installation, they seemed to do the trick here. The Jmicron controller appeared in Device Manager and the DVD drive was listed in both it and My Computer, becoming fully operational following a restart.

Teething troubles

While it's a relief to have my internal Pata DVD drive now working under both clean and existing Vista installations, I somehow feel I'm not 100 per cent in the clear. It's strange that the clean installation didn't require the Asus Jmicron drivers, nor list the Jmicron controller under Device Manager, whether operational or alongside the infamous yellow exclamation mark. Still, at least the drive is operational and also able to perform a clean installation.

As people begin to install Vista on their PCs, I suspect there'll be a number of teething troubles to resolve, especially during this transition period where support for older, Pata drives is offloaded to third-party controllers. I'm still relieved Vista recognises popular AHCI serial ATA controllers and can finally accept drivers from non-floppy media, but clearly the installation process will be less than smooth for certain hardware combinations. PCW

To ensure the smoothest installation of Vista, the first step is to update your motherboard's Bios. This may even add support for specific Vista options, such as audio



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Gordon Laing has been a hardware enthusiast since his first Sinclair ZX80 and as a former editor of PCW and contributor for over 10 years, what he doesn't know about technology isn't worth knowing.

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Watch the box

How to link the Xbox 360 HD-DVD to your PC easily and cheaply

When Microsoft launched its external HD-DVD drive for the Xbox 360 last Christmas, it's fair to say many interested parties had no intention of connecting it to the games console. As the HD-DVD drive uses a standard USB2 connection, the question was whether or not it would work on a PC. After all, At £130, it could be one of the cheapest HD solutions for the PC.

Early pioneers figured out a workaround, although it involved some fiddling. Just a few short months later, though, the situation has changed and getting the Xbox 360 HD-DVD drive working on your PC is relatively straightforward – so long as you have the right parts and do everything in the right order.

Installing the drive

The Xbox 360 HD-DVD drive is an external unit which uses a USB2 connection. Since it's designed for use with the Xbox games console, it doesn't come with any specific Windows drivers, but thankfully Microsoft now provides them.

Windows Vista includes suitable drivers, so just plug the drive right in. Windows XP is almost as easy. It will recognise and install the optical drive, but you'll be faced with the New Hardware Wizard for an Xbox Memory Controller. Luckily, there are now drivers on Windows Update, so just tell the wizard to check online. The drive will now be operational and read the data on HD-DVD discs, but playing movies is another matter.

Like DVD before them, both HD-DVD and Blu-ray use digital video compression to squeeze a movie onto the disc. Unlike DVD, which exclusively uses Mpeg-2 for compression, HD-DVD and Blu-ray can also use the newer and more efficient H.264 and VC-1 codecs. So to watch a movie on your PC, you'll need software which can decode the three possible codecs, as well as sufficient processing muscle.

You can watch HD-DVD movies on your PC using the Xbox 360

Cyberlink was first out of the gate with an updated version of its popular PowerDVD program. The new Ultra version costs about £60 and includes support for both HD-DVD and Blu-ray, although, at the time of writing, it would only support one or the other. A patch released by the time you read this should allow it to accommodate PCs with both types of drives. The crucial thing is to set up PowerDVD while the HD-DVD drive is connected and switched on or it won't install the appropriate version. PowerDVD Ultra will work on systems running Media Center, but not from within the Media Center interface itself. For that, you'll need Cyberlink's Playmovie software, which at the time of writing was for OEM customers only.

Now for that processing muscle. Even though much of the decoding work can be offloaded to a modern graphics card, you'll still need a minimum of a single or dual-core Pentium clocked at 3.2 or 3GHz respectively, or an Athlon 64 4000+. In terms of the graphics card, you're looking at an Nvidia Geforce 6600 GT or ATI X1600 Series as a minimum. You should also run the very latest drivers for your graphics card and ensure hardware acceleration is enabled in PowerDVD.

PowerDVD Ultra also installs an HD Advisor utility, which checks your system for suitability and advises where any components or drivers may be lacking.

HDCP and copy protection

One of the biggest surprises in this project was not requiring a monitor or graphics card with HDCP (High-bandwidth Digital Content Protection) to watch HD content in its full glory. To be more accurate, you will need HDCP to watch discs that carry the ICT content protection flag, but the studios just haven't included that on any movies yet – and are rumoured not to be planning to do so until 2010.

Interestingly, PowerDVD Ultra still demands HDCP – even for today's unprotected content – if you're using a DVI connection, but appears happy to output HD over an analogue cable, at least with the Nvidia card we tested. Thank goodness analogue VGA connectivity is still commonplace on both graphics cards and monitors.

We tried the Xbox HD-DVD drive and PowerDVD Ultra on a Core 2 Duo E6700 system with 2GB of Crucial DDR2 memory and a Gigabyte Geforce 6600 graphics card. Our sample HD-DVD movies, bought from both the UK and US, played back smoothly without a glitch and looked superb on HD displays over an analogue connection with the desktop resolution set to either 1,280x720 or 1,920x1,080.

So long as you have a sufficiently quick processor and graphics card, you too could be enjoying HD content for the price of the Xbox drive and PowerDVD Ultra. Standalone HD-DVD players are coming down in price, but it's still tempting for entertainment PC fans, especially given the support for older analogue displays. We'll look into equipping a PC with Blu-ray in a future edition. PCW

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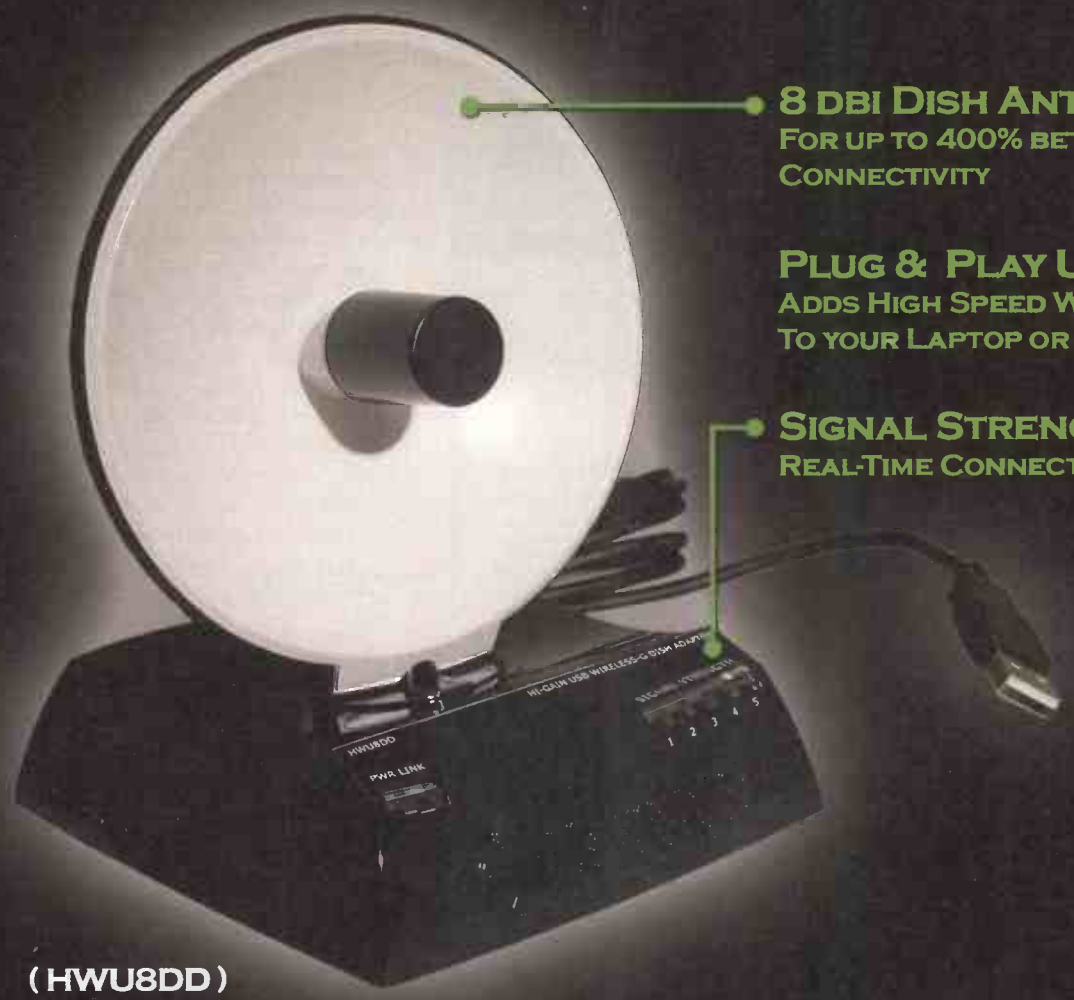

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Tim Nott is a full-time freelance journalist. When he's not writing about Windows and word processing, he tackles many other diverse subjects. He currently lives in France with his wife and family.

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Desktop search

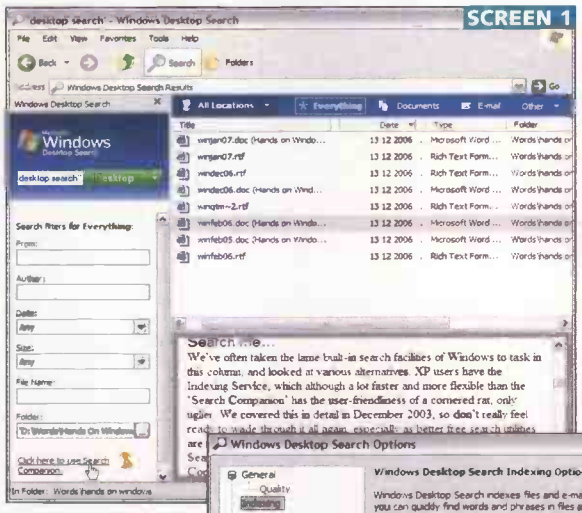
How to find important documents – and recover from a disk disaster

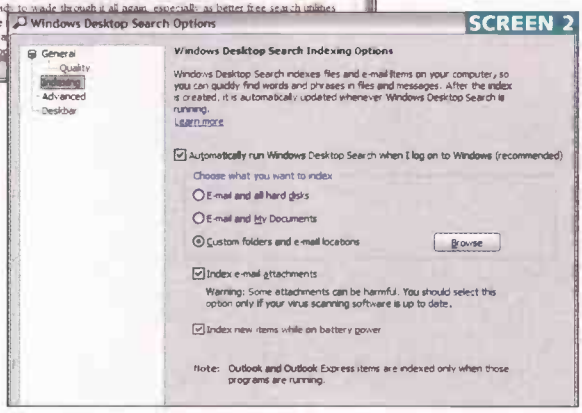
If you use Windows Desktop Search, as I do, you'll find it a great improvement over the standard Search Companion, the impenetrable XP indexing service or the rather dire file search capabilities of Microsoft Office.

Properly configured, it's fast and efficient. I use it a lot to search my Hands On archives. Last February, I wrote that although the MSN Search (as it was then) "has several 'ways in'... it misses the screamingly obvious, which is supplanting the existing lame-duck XP Search Companion". Since then, there have been developments. Desktop Search has replaced the Search Companion and I now rather regret those harsh words.

Good though Desktop Search is at tracking down content keywords (yes, I just used it to track down the February 2006 reference), it isn't a lot of good at the mundane task of searching for files by name and location, say for locating a system file or font. Unlike the Search Companion, target locations are set globally – although you can search from the current folder or specify a location, it will only search folders that have been indexed. Fortunately, when searching from a folder or the Start menu command, even though the dialogue defaults to Desktop Search, there's an option at the bottom to switch to Search Companion (see screen 1).

If you'd like to have the Search Companion back by default, and confine indexed searches to the Search Deskbar, this is one of the Desktop Search options. Finding those options is something of a challenge. Start typing any search term into the Deskbar, then press Enter to get the full Desktop Search window. On the right of the toolbar, you'll see a folder view icon, similar to that in Explorer. Click on this and you'll get a menu offering large or small icons (large icons give you the first few words of each file in the results), the position of the preview pane, and the options.





Top: Come back, Rocky!

Bottom: Choose which folders you want indexed

You'll find the 'Use Search Companion' option in the General section. If you choose this, you don't get an option to switch back to Desktop Search from Search Companion on a per-search basis. Turning to the indexing branch of the options, you will find that you have a choice of what gets indexed (see screen 2). If you select the 'Custom folders and email locations' option, you will find you can pick just those folders you want to be indexed and searched, hence improving the relevance of search results.

Disaster recovery

It has not been a good year for hard disks at the Hands On Windows column. In January's column, I related the story of salvaging the contents of a failing disk using Acronis Migrate Easy (see www.pcw.co.uk/2168779). This month, the replacement disk suddenly took a dislike to starting Windows. None of the usual strategies – 'Last known good configuration', 'Safe Mode' (in all its flavours) or the recovery console – worked. Booting from the XP CD proved equally fruitless. Fortunately, I had a nearly empty second drive, partitioned into two NTFS volumes, so I disconnected the bad drive, promoted the second drive to IDE 0 (or master) and installed Windows XP SP2 on that. Although I had recent backups, inevitably some were not up to date, such as my Firefox bookmarks, Thunderbird emails and a few documents, images and other data files.

So having got a working version of Windows and an internet connection going, then having downloaded and installed AVG Antivirus, Mozilla Firefox and Thunderbird, I was ready to rescue the bits I needed. So I set the dodgy drive to IDE 1 (or slave) and reconnected it. And guess what? Windows still wouldn't boot – it seems even the mere presence of the offending disk cast a curse on the new installation.

At this point, I was starting to get a little annoyed. So after a foray into the Bios, I managed to boot, with both drives connected, from a floppy disk. A normal XP boot floppy won't give access to NTFS partitions – you'll just get an 'Invalid Drive' message – but there are a couple of utilities that overcome this. NTFSDos is a free

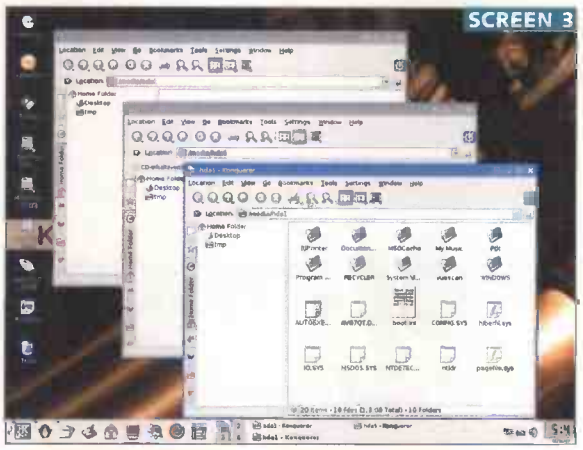
utility developed by Sysinternals, the same people who brought us Filemon and Regmon mentioned in previous columns, and recently acquired by Microsoft. A rival product – also free – is ReadNTFS from **www.ntfs.com/products.htm**. This is slightly easier to use as it incorporates a tree view of your folders and files, but I found the display rather erratic.

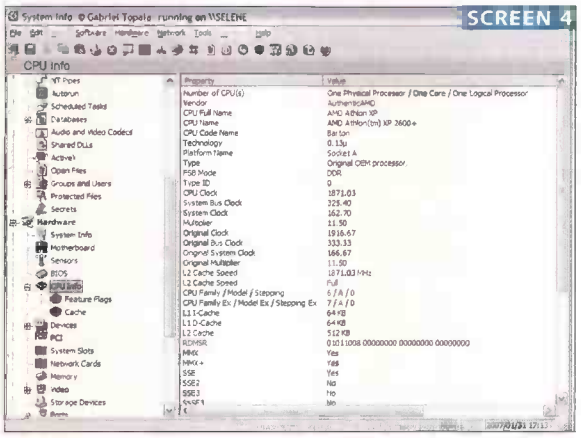
However, both let me see the files I was after and copy them from the NTFS partitions, but – catch one – they will only let you copy to a Fat or Fat32 partition. So I had to turn off the PC, disconnect the dodgy drive, boot into the good version of Windows, reformat the second partition as Fat32 (this destroys all the data on that partition), shut down, reconnect the dodgy drive and boot from the floppy again.

Having done that, and after a little lie down, I discovered catch two. The rescued files had lost their long file names and their 'last modified' dates were changed to the current date and time. Not the end of the world, but a pain nevertheless.

At times like this, it pays to cast one's net a little wider – in this case, beyond Windows and Dos to Linux. Knoppix is a Linux distribution that runs entirely from a CD. You can download an image (.iso) file free from **www.knoppix.com**, burn this to a CD and then boot from it. Which I did. Since Knoppix has built-in USB support, I was able to copy files from the damaged disk to a USB key and, after some reassuring advice from our Linux expert, Barry Shilliday, to the Fat32 partition on the good disk, in both cases retaining the long file names and dates (see screen 3). It is possible to get write-access to NTFS partitions with Linux (see February's Linux column at **www.pcw.co.uk/2170805**) but my version of Knoppix didn't have this capability and in any case, being a Windows wimp, I found the instructions somewhat scary.

Having rescued and checked the files, there remained one more task before I returned the disk to the supplier for replacement under guarantee – wipe all my personal data from the damaged disk. Booting from a Windows 98 floppy, (an XP floppy won't do, so never throw anything away) I was able to fdisk the offender. This meant I could boot to the fresh Windows installation with the freshly fdisked drive as slave and then format it from the comfort of Windows.





Top: Knoppix to the rescue – from top left, a USB key, a Windows Fat32 volume and an NTFS volume

Bottom: All you ever wanted to know about your PC

Lost keys

Sometimes – as we see above – it becomes necessary to reinstall Windows from scratch on a freshly formatted disk. For this, you need two things – the original installation CD and the product key. In earlier versions of Windows, this wasn't too much of a problem – in some versions you could make up a valid product key and in others find it in the Registry before wiping the disk. In XP, the product key isn't stored in readable form in the Registry, so if you've lost the case that the XP CD came in and have no other record of the key, you may think you're stuck. But don't panic. There are at least two utilities that can recover the XP product key. Belarc Adviser (**www.belarc.com/free_download.html**) presents all sorts of information about your PC as an HTML document in your browser. This tells you all about the hardware and software installed on your PC, including the product key – a set of five groups of five characters. System Info for Windows (**www.gtopala.com**) is simpler to use – it's a single executable file – and tells you even more (see screen 4). You'll find the Windows key under 'Licenses' and there is all sorts of other useful stuff, such as remembered website passwords, filed under 'Secrets'. System Info also has the edge in that you can export selected branches to a variety of file formats. Both are free for personal use and it would be a good idea to save the results on paper in case disaster strikes.

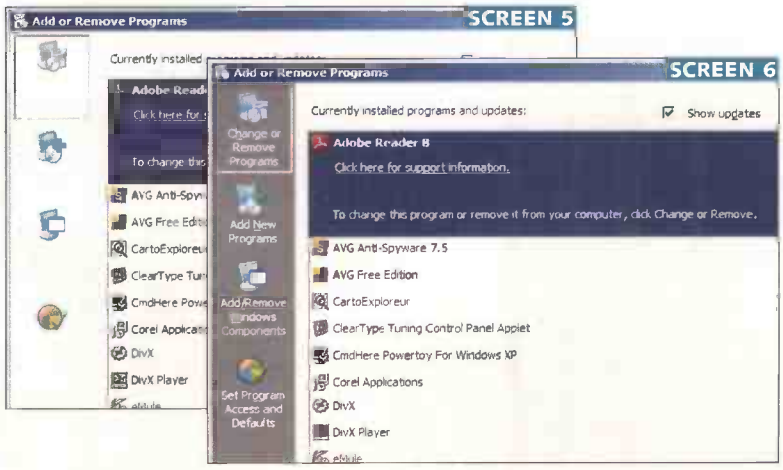
Windows weirdness corner

Now here's a strange thing. Roger Graham was surprised to see that the text labels that should be on the left of the 'Add or Remove programs' window had disappeared (see screen 5). He was using Windows XP but with the Classic theme – as in our screen.

We just love readers who not only solve their own problems, but are kind enough to let us know the answer, and Roger did just this. It turned out that in the Appearance tab of Display Properties, under the Advanced button, the Application Background was set to white. And Windows dutifully displayed a white background to the left of 'Add or Remove...' with white text. Changing the Application background back to grey solved the problem (see screen 6). This doesn't seem to be a problem with the XP themes. PCW

Right: Where did those labels go?

Far right: Ah, there they are



Barry Shilliday has worked with computers for almost two decades. By day, he is a Linux and Unix consultant, but in his free time he prefers to travel the world – and snap it with his camera.

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Brush up your image

Linux can treat an image file – an exact copy of your disk data – as a device itself

In last month's column (see www.pcw.co.uk/2174520), we looked at ways to help protect your files from loss and – in the event of a disaster – some options to get your data back.

One method was to use raw partition images, and this month we shall look at these again in more detail. We will also see how CD images are used for Linux distribution installations.

A partition on a hard drive holds a filesystem, which is an ordered and structured layout on the disk for files and directories to be stored on. Linux – or any other operating system – must be able to understand how this layout works to read and write to it, and thus access the files in any way, and it does this using a filesystem driver.

The raw data on the disk, however, needs no such understanding. The operating system needs only to be able to read and write to the disk itself which, in an operating system such as Linux, is handled completely separately from the filesystem drivers.

A raw image of a drive or partition can be created using the dd or ddrescue commands. These read every byte on the drive and duplicate it exactly. The resulting file is known as an image, since it reflects the exact contents of the original. Any filesystem can be duplicated in this way, so long as Linux can read each byte from the source successfully.

Loop filesystems

When you mount a block device (such as a partition), you make it accessible for reading and writing. A typical mount command is something such as:

```
# mount /dev/hda1 /var/myfiles
```

Here the filesystem stored on the hda1 partition is laid onto the root filesystem in the /var/myfiles directory. This is standard across all forms of Unix and you have no doubt seen or used the command before.

However, what difference is there between a device file such as /dev/hda1 and an image file created by duplicating the data on that device? Each contains the same data, laid out in exactly the same way. It would be useful if Linux could treat the image file like a device and mount it as such. And it can.

As above, the driver that handles the filesystem (such as ext3 or Fat) is entirely separate from the driver that handles the disk drive (such as IDE or Sata); one is effectively layered on top of the other. This means that the only practical difference between mounting an image file and mounting a device is at the lowest level: the filesystem driver is the same.

Linux handles this using the 'loop' driver. This tells the kernel that the device you wish to mount is not a standard block device but a regular file on a filesystem. It couldn't be much simpler to use. As an example, we can create an image file from a partition:

```
# dd if=/dev/hda1 of=image.ext3
```

Next, if we try to mount this file directly, the mount command gives an error, but guesses what we are trying to do.

The suggestion is to use '-o loop', which tells mount to use the loop driver to mount the file. Running the command again with this option works (see screen 1):

```
# mount -o loop image.ext3 ↙
/files
```

(Key: ↙ code string continues)

SCREEN 1

```
root@edgy: ~
File  Edit  View  Terminal  Tabs  Help
root@edgy:~# dd if=/dev/hda1 of=image.ext3
208782+0 records in
208782+0 records out
106896384 bytes (107 MB) copied, 2.77218 seconds, 38.6 MB/s
root@edgy:~#
root@edgy:~#
root@edgy:~# mount image.ext3 /files
mount: image.ext3 is not a block device (maybe try `-o loop'?)
root@edgy:~#
root@edgy:~#
root@edgy:~# mount -o loop image.ext3 /files
root@edgy:~#
root@edgy:~#
root@edgy:~# mount | grep image.ext3
/home/barry/image.ext3 on /files type ext3 (rw,loop=/dev/loop0)
root@edgy:~#
```

Mount an image file directly

SCREEN 2

```
root@edgy: ~
File  Edit  View  Terminal  Tabs  Help
root@edgy:~# losetup /dev/loop0 image.ext3
root@edgy:~# losetup /dev/loop0
/dev/loop0: [0303]:1189700 (image.ext3)
root@edgy:~#
root@edgy:~#
root@edgy:~# mount /dev/loop0 /files
root@edgy:~#
root@edgy:~#
root@edgy:~# df | grep loop0
/dev/loop0              101086      4129     91738   5% /files
root@edgy:~#
```

Using an image file as a normal block device

Finally, the mount command is run to display the currently mounted filesystems, and the results are grepped to show lines containing 'image.ext3'. As you can see, the filesystem is recognised as ext3, and the mount options show that '/dev/loop0' is in use.

If you now access the files and directories in /files, you are writing to and reading from the image file instead. In every other way, the behaviour is identical to mounting a normal block device; the filesystem looks and behaves the same way, and applications and utilities neither know nor care about the underlying structure when they use it. Unmount the loop filesystem in the same way as normal:

```
# umount /files
```

When you mount a filesystem with '-o loop', everything is automatically set up for you to access the filesystem immediately. An alternative method is to set up a loop device yourself and then mount that in the regular direct way. This involves associating a loop device (such as /dev/loop0) with a file (such as image.ext3). Use the 'losetup' command to manipulate loop devices. First of all, associate the device:

```
# losetup /dev/loop0 image.ext3
```

You can check the status of a loop device by running losetup with the device's name alone. In screen 2, you can see that /dev/loop0 is associated with image.ext3. Once done, /dev/loop0 behaves exactly like a regular block device, and so can be mounted normally:

```
# mount /dev/loop0 /files
```

As you can see from the screen, the filesystem is mounted just like any other. Unmount it in the usual way, but also remove the association between /dev/loop0 and the image file with losetup:

```
# umount /files
# losetup -d /dev/loop0
```

'The dd and ddrescue commands read every byte on the drive and duplicate it exactly'

Encryption

An impressive benefit of using loop devices is that it is relatively straightforward to create an encrypted filesystem using any supported filesystem – even Fat. The first step is to create a blank image file on which to create the filesystem; this will not work on existing filesystems. Use the dd command to create the file:

```
# dd if=/dev/zero of=image ↙
bs=1M count=10
```

This command copies 10MB of zeros to the file called 'image'. Now we must associate a loop device with the image as before, but tell the kernel to encrypt the device. Use the '-e' option for this, followed by the type of encryption, or cypher.

For this example, we'll use the AES cypher, though the kernel supports many other forms of encryption. It may be necessary to load the 'cryptoloop' driver before encryption will work.

After running the losetup command, you must enter a password, which is used to encrypt and decrypt the filesystem:

```
# modprobe cryptoloop
# losetup -e aes /dev/loop0 ↙
image
```

It is possible to use a hard drive partition directly with losetup, instead of an image file if you want to use an encrypted partition.

Running losetup on the device shows the association as above (see screen 3), but also shows that the device is encrypted with the AES cypher. Now the encryption mechanism is in place, create a filesystem and mount it as usual:

```
# mkfs.ext3 /dev/loop0
# mount /dev/loop0 /files
```

The result is that the filesystem on /files is a regular ext3 filesystem, but is encrypted with a secure AES cypher at a lower level. To demonstrate this, unmount the filesystem and remove the association with 'losetup -d' as before. Next, repeat the first step to associate the loop device using the AES cypher, but this time enter a different password. When you try to mount the filesystem (do not re-create a new filesystem with mkfs.ext3), you will find that the mount command gives an error as, without being decrypted successfully, there is effectively no filesystem in the image.

The encryption is handled at the device level. This means it is necessary to create the filesystem after the loop device is set with the correct encryption key.

It isn't possible to encrypt an existing filesystem, nor is it possible to decrypt an encrypted image or partition directly. To get around this, just copy the files from an encrypted filesystem to an unencrypted one, and vice versa. PCW

SCREEN 3

```
File Edit View Terminal Tabs Help
root@edgy:~# dd if=/dev/zero of=image bs=1M count=10
10+0 records in
10+0 records out
10485760 bytes (10 MB) copied, 0.861182 seconds, 171 MB/s
root@edgy:~#
root@edgy:~# losetup -e aes /dev/loop0 image
Password:
root@edgy:~#
root@edgy:~# losetup /dev/loop0
/dev/loop0: [0303]:1189700 (image), encryption aes (type 18)
root@edgy:~#
root@edgy:~# mkfs.ext3 /dev/loop0
mke2fs 1.39 (29-May-2006)
Filesystem label=
OS type: Linux
Block size=1024 (log=0)
Fragment size=1024 (log=0)
2560 inodes, 10240 blocks
512 blocks (5.00%) reserved for the super user
First data block=1
Maximum filesystem blocks=10485760
2 block groups
8192 blocks per group, 8192 fragments per group
1280 inodes per group
Superblock backups stored on blocks:
        8193

Writing inode tables: done
Creating journal (1024 blocks): done
Writing superblocks and filesystem accounting information: done

This filesystem will be automatically checked every 37 mounts or
180 days, whichever comes first.  Use tune2fs -C or -i to override.
root@edgy:~#
```

Creating an encrypted filesystem using the loop driver

Dealing with Iso images

Just like a filesystem on a hard drive, the filesystem on a data CD can be stored as an image file. These images are commonly known as Iso images, since the filesystem found on a CD is the international standard Iso-9660. On *PCW*'s cover DVD, you will regularly find Linux distributions stored in this way, just as you will find them stored on websites if you go to download a distribution.

This is the universal way of distributing Linux (and BSD) when not using physical CDs, though it often causes confusion with newcomers to Linux.

Just as with other filesystems, ISO images can be written back to a blank CD to recreate the full original filesystem. Writing out Iso images is simple in Linux and OSX, but Microsoft Windows doesn't supply any tools to do this, so a third-party application is necessary. All commercial CD burning suites will provide this feature, though a free open-source option is Infra Recorder (**http://infrarecorder.sourceforge.net**).

For Linux, if you're using the Gnome desktop, simply right-click on the Iso image file and select 'Write to disc'. In KDE, use the k3b application.

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→ Comments welcome on the Digital imaging & video column. Email digitalimaging@pcw.co.uk *Please do not send unsolicited file attachments.*

Windows Photo Gallery

Vista offers all the easy-to-use image-handling features amateur snappers will need

After all the talk, Windows Vista is finally with us. Things being as they are in publishing, I'm writing this on the day of the official release date for consumer versions of Vista.

If you're running XP, you may wonder what new digital imaging features Vista offers and whether these, in addition to other obvious benefits of a brand new OS, make an immediate upgrade something you should give serious thought to.

Although it has come in for some stick over the years, XP's support for digital photos has been pretty good. The ability to display a folder of thumbnails, get large image previews in filmstrip view and play a full-screen slideshow of a photo folder means there's a lot you can do without an image-editing application.

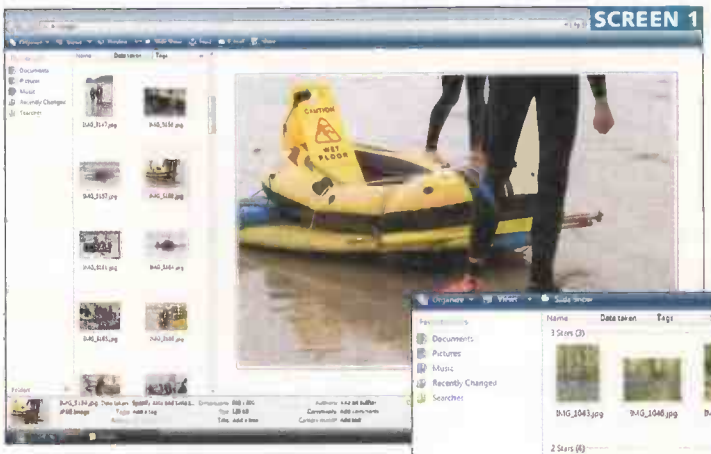
If you just want to look at your photos, XP offers better support, at the OS level at least, than the Mac. But Microsoft had nothing to compete with Apple's iLife suite, which includes iPhoto – a basic image-editing application with organisational tools.

Vista changes all that, though. Windows Photo Gallery is a photo editor and organiser that ships with all editions of the OS. Before we look at WPG, there are some digital image-specific features of the operating system itself that are worth a mention.

Folder views

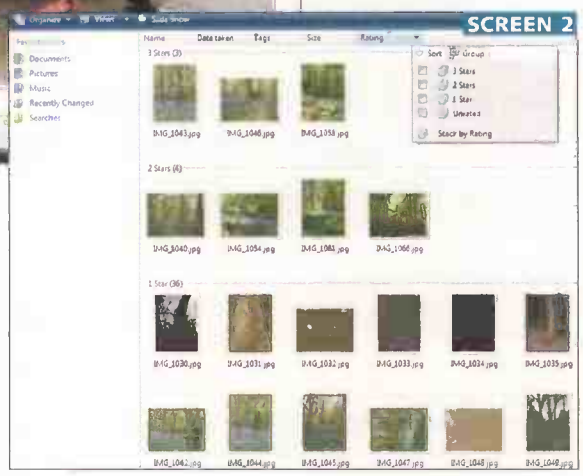
Unlike XP, which treated photo folders in a separate way from folders of other documents, there's no distinction in Vista. View options include resizable icons that can be made quite large.

The Filmstrip view has been dropped, which is a shame as I used it all the time to preview a batch of shots before editing and considered it one of XP's strongest assets. Vista has other features, however, that make up for this one shortcoming. If you select Preview Pane from the Layout sub-menu of the Organize menu you can more or less emulate the old filmstrip view by resizing the Preview pane to fill most of the window (see screen 1). It's a side-by side, rather than a top/bottom split, but it works in essentially the same fashion and if you turn off the navigation pane you can allocate even more space to the preview.



SCREEN 1

Vista folders can be configured for large previews, filmstrip style



SCREEN 2

Display a folder of images grouped by rating, name, date, tags or size

At the bottom of the window is the Details pane and this, for me at least, marks the biggest departure from XP, providing the most powerful digital-imaging features yet found in an operating system – the ability to directly edit metadata.

The Details pane includes date taken, keyword tags, rating, pixel dimensions and file size. Camera metadata – make, model and exposure details – are included, as is a subset of the IPTC (International Press and Telecommunications Council) standard metadata fields, including title, subject, author and comments.

All this is editable, so you can offload images from your camera, get a good look at them, rate them and add keywords and metadata without going anywhere near an image editor.

Vista also provides very good search and sort features, which are a breeze to use. Four buttons just below the menu bar allow sorting by name, date taken, tags, (file) size or rating.

The first click on any of these buttons sorts images according to the relevant category in ascending order; subsequent clicks toggle the sort order (see screen 2). Each sort button has a pulldown menu, which allows you to filter the sorted results. You might, for example want to display only images with filenames beginning A-C, or those taken in May 2005.

Another option on the date pulldown, 'A long time ago', will appeal to anyone who can remember only one thing about the photo they're looking for – that they took it a long time ago. The downside is that, unless this is a one-off memory lapse, there's going to be a long list of results.

Organisational tools are the main focus in WPG – and as good as those found in consumer photo library applications

Date Taken is a good way to track down photos, and keyword tagging is a better one. If you're organised enough to apply keyword tags to your photos, you can filter the sort results so that only those photos in the folder that have the keyword are displayed.

In common with the other sort categories, the Tags menu has a group option. Rather than filtering the results, this displays everything sorted into groups with a divider between each one. There's also a stack option, eg 'stack by tags', or 'stack by date'. In the case of tags, this displays a stack icon for each keyword which, when opened, displays all the images that carry that tag.

And if you still can't find what you're looking for, there's always the Advanced search feature, which can be used to search a folder of images (or anything else) on the basis of filename, date, size, tags and author. As well as all this, you can present a slideshow, print email and share image folders over a network.

Editing features

Unless you've changed the default editing application, double-clicking an image file opens it into Windows Photo Gallery. The first thing you should do when you get here – assuming you haven't previously done so – is add the folder to a gallery. WPG replicates a lot of the folder tasks already described but makes it much easier to view, organise and edit photo collections (see screen 3).

The Gallery view displays image thumbnails in the centre, flanked by navigation and filter options on the left and, when the info button is clicked, file info, rating and tagging buttons on the right. Oddly, there appears to be less emphasis here on Exif metadata (you can add and edit a caption, but that's about it) than in the operating system, but it makes life a lot simpler.

Editing tools are confined to an auto-adjust, brightness and contrast sliders, basic colour adjustments, a crop tool and red-eye fixer. Compared with even the most budget image-editing application, this is a fairly meagre set of tools, but they are simple to use and cover what the casual point-and-shoot snapper needs for the majority of situations.

Windows Photo Galleries tools are basic, but very simple

Windows Photo Gallery is no substitute for Adobe Photoshop Elements, Corel Paint Shop Pro or whatever your image editor of choice happens to be (see screen 4). If that sounds like a criticism, it's not meant to. Microsoft has clearly decided to pitch it at the level of Windows users who happen to own a digital camera – just about everyone – rather than providing the kind of feature set that will excite photo enthusiasts.

That's not a bad thing, either. Let's be honest – an operating system and the software supplied with it is never going to do everything your favourite photo editor does. Between them, Vista and Windows Photo Gallery make many of the basics – previewing, rotating, cropping and tagging – and one of the most time-consuming tasks, finding pictures, so easy that you won't need to bother with your image-editing application.

Microsoft Photo Info 1.0

If you've decided against upgrading to Vista for the time being, but you want to add and edit photo-file metadata from the OS, rather than having to fire up your image-editing software, head to the Microsoft website, where you can download Photo Info 1.0 at **http://tinyurl.com/2wpt7h**.

Photo info adds a new item to the context menu; right-clicking an image file and selecting 'Photo info' opens the Photo Info properties editor and allows you to add and edit metadata. It also provides enhanced hover tips and additional sort properties (in Details view) from within Windows Explorer. To edit metadata for a batch of files, just select them all.

The Photo Info dialogue box has five tabs. The first provides input fields for IPTC metadata and will automatically generate a copyright notice for you from the author field. Another allows you to apply keyword tags and IPTC category codes. The third is for adding date and location information, while the fourth provides yet more IPTC fields such as credit, headline and instructions. The final tab displays the Exif data recorded by the camera at the time of exposure.

A small thumbnail preview is displayed on the right, and below this you can view and edit the star rating for the image, scroll through all the images in a folder to edit them individually, or apply changes to a batch.

Photo Info 1.0 works with Jpeg, Tiff, Wdp, Hdp, Nef, Cr2 and Crw (providing the Thm file is also present) file types. It uses a new Windows technology, called Windows Imaging Component (Wic), which is a component of Windows Vista (Windows Info 1.0 works with Vista too, but given the existing level of metadata support in the OS, you're unlikely to need it). Wic uses codecs to display the various image formats. These are built-in for file types such as Jpeg and Tiff, but for proprietary codecs, including Raw formats, you need to go to manufacturers' websites. You can find the Nef codec at **www.nikonimglib.com/nefcodec**. URLs for other manufacturers' Raw codecs are in the Readme file that accompanies the Photo Info download.

Proceed with caution when using Photo Info 1.0 to edit metadata in Raw files. Microsoft has reported compatibility issues with Nef files using version 1.0 of Nikon's Raw codec. The issue, which also affects Nef file metadata edited in Vista, causes the files to become unreadable in Photoshop and other apps. The readme file also documents compatibility issues for Adobe Bridge and Apple's Aperture. **PCW**

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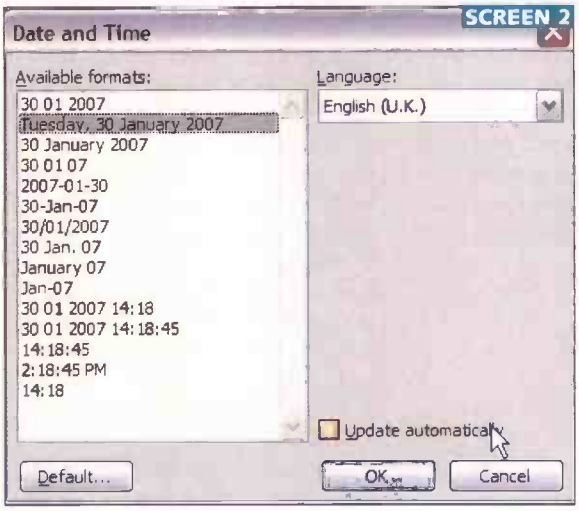
→ Comments welcome on the Word processing column.
Email wp@pcw.co.uk
Please do not send unsolicited file attachments.

Blind date

Fun with dates in Microsoft Word, and a look at some handy keyboard shortcuts

Although the word-processing capabilities of Windows Notepad are rudimentary – it only became possible recently to change the font – it does have a few little-known features. You can add headers and footers from File, Page Setup using a set of simple ampersand codes. The code &p produces the page number, &f the file name (but not the path), &d the date, and &t the time. You can also add free text, such as 'Page number &p', and should you want a literal ampersand, type &&. Finally, &l, &r or &c at the start of the header or footer aligns the text left, right, or centred. Note that these headers only appear in print – you can only view them on screen if your printer driver has a preview option.

Turning to the visible body of a Notepad document, you can insert the current time and date from the Edit menu (or by pressing F5), but there's an even neater trick that has been around since at least Windows 3. Open Notepad, type .LOG (it must be in upper case and preceded by a full stop) at the top of the page, then save and close the file. On subsequent openings of the file, the current time and date will appear at the end of the document. If you want to change the format of this, you can do it from Control Panel's Regional settings – click the Customise button and you'll find you can change the date separator and format. We set the separator to a space, and the month format to MMM to get the date nearest the end of the document (see screen 1). Note that doing this affects Windows globally, so things such as the Taskbar date format will also change.



Don't tick the box if you want an unchanging date

Many years ago, I kept a diary in Notepad using the .LOG feature, but when Word for Windows arrived I switched. Not only could I have different fonts and formatting, but I was no longer limited to a 64KB file size. And my very first macro inserted the current date and time at the end of the document each time I opened it – just as Notepad did.

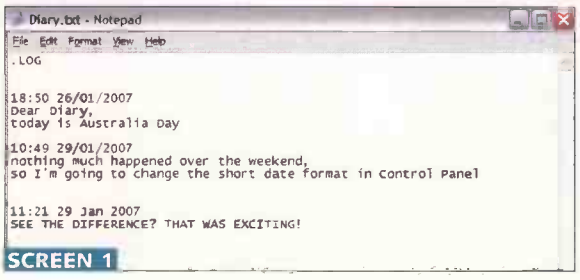
After a couple of weeks of this, I suddenly noticed, to my dismay, that every single date had changed to the current one. Having ruled out time standing still and the discovery of the secret of eternal life, I realised this was something to do with the date field.

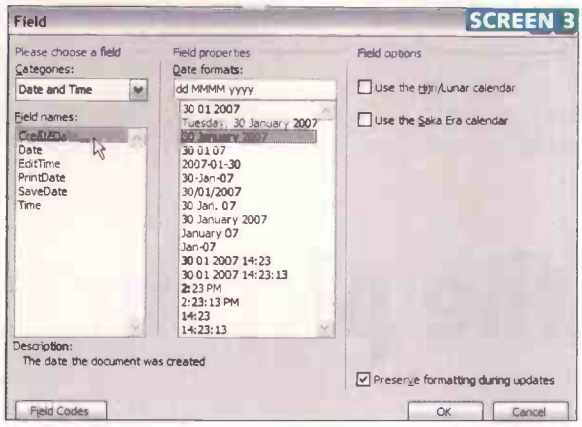
What was happening was that all the dates were inserted as fields. Fields are a bit like embedded mini-macros – they are a piece of code that returns a possibly changing result. A typical example is page numbering. If you paste some text or graphics into a document which is sufficient to create one or more extra pages, then you obviously want the page numbers to update themselves automatically. Field codes perform this excellently. If, on the other hand, you are keeping a diary, log or journal, you want your dates to stay put. Similarly with letters – if you write a letter on 14 February, you don't want that date to change if you re-read the letter a month later.

There are several ways to nail down a date. If you choose 'Date and Time...' from the Insert menu, then choose a format from the list, and make sure the 'Update automatically' box is not checked, then you'll get the date and/or time inserted as text rather than a field – just as if you'd typed in the date (see screen 2). You can also convert a date (or any other) field to its current value with the 'Unlink Field' command – you won't find this in the menus, but by default it's assigned to Control & Shift & F9. Other useful function key combinations are F9 to update the selected field(s), Shift & F9 to toggle the selected field(s) between code and results and Alt & F9 to toggle all fields between code and results – this last being the same as going to Tools, Options, View, Field Codes.

There are other time and date related fields in the 'Insert, Field...' dialogue (see screen 3). The CreateDate field records the time and date the file was created – that is, first saved to disk. Once this is done, the value never changes – but it remains a field. SaveDate, on the other hand, returns the time and date of the last save, and PrintDate that of the last time and date the document was printed – or rather, the last time a print command was issued. This is updated before the data is sent to the printer, so what you see on the printed page is when that printing took place. In general, fields are updated to their current values

Create automatic date and time stamps in Notepad

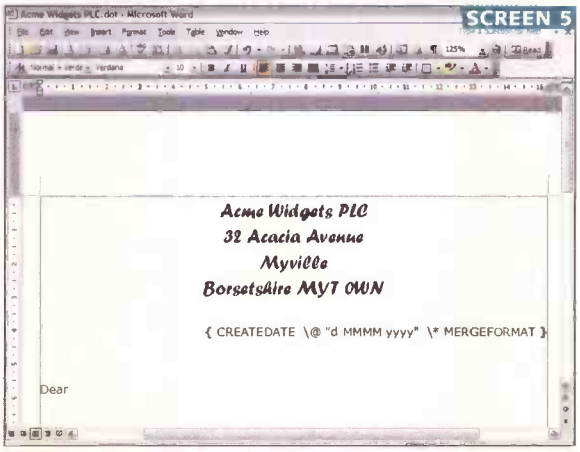




You can use other time and date fields

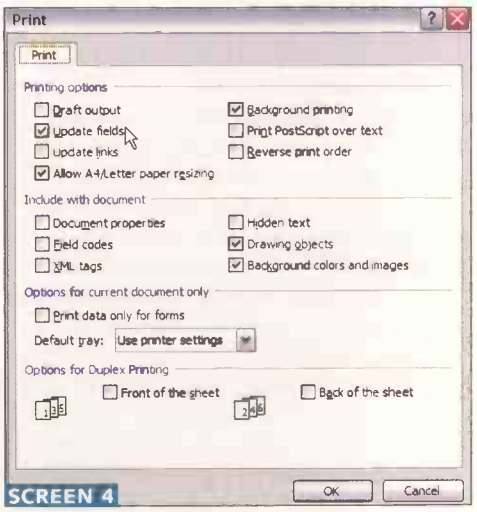
when a print command is issued. If this isn't happening, click the Options button in the Print dialogue and ensure the 'Update fields' option is checked. It doesn't matter if you have codes or their results visible when you print – you'll get the results on the printed page. If you see field codes on the printed page, this is caused by a rather odd print option. You need to go back to the Options button in the Print dialogue and clear the 'Field Codes' checkbox (see screen 4).

The CreateDate seems something of an anomaly – why does it stay as a field if it never changes? If you save the document under a different name, the new file will have its own create date and the original will keep its original date. This seems sensible enough, but it gets better when you put a CreateDate field into a template (see screen 5). Each time you create a new document based on the template, the CreateDate field reflects the creation date not of the template, but of the document. Moreover, this happens as soon as the new document appears on the screen as 'Document n' – that is, before it is saved. Since this date doesn't change (unless you create a new document with 'Save As...'), it is an excellent way to automatically insert the date into a letter or other dated document.



Adding the date to a letterhead template

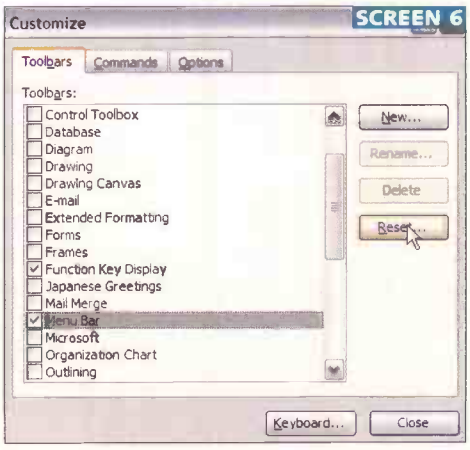
Update those fields but don't print the codes



The case of the missing menu

Customising Word can be fun and having tool buttons and menu commands where you want them can save a lot of time. But it can sometimes go wrong. To lose one command may be regarded as a misfortune, to paraphrase Oscar Wilde, but to lose an entire menu looks like carelessness.

This is what happened to a correspondent who shall remain nameless and who managed to lose the File menu. "So that I can continue, I've dragged the common commands, such as Save as and Print, into the Edit category, but how can I restore the File menu with all the usual commands available?" Fortunately there's an easy solution. Go to Tools, Customise, Toolbars and select 'Menu Bar' (or any other bar that has been damaged). Click on the Reset button, and having confirmed that you want to reset the bar stored in Normal.dot (or another template or document) that bar will be set back to the out-the-box default. Word 2007 users, of course, won't have this problem, as the only toolbar that's customisable is the Quick Access bar (see screen 6).



Rectify customisation disasters

Control freaks

Everybody knows that holding down the Control key and pressing C copies the selected text, and most will know a few other Control shortcuts, such as B or I for bold or italic. So here is a top 10 of equally useful Word tricks featuring the Control key. There's nothing here you can't do from menus or buttons but why not – excuse the pun – keep those hands on the keyboard?

Control & End	Go to the end of the document
Control & X	Cut – remove selected text and place on clipboard
Control & F	Find (if a word or phrase is selected, this will appear in the Find dialogue)
Control & G	Go to...
Control & R	Right-align paragraph
Control & E	Centre paragraph
Control & Return	Page break
Control & Z	Undo last action or autocorrect/autoformat
Control & Y	Repeat last action (or redo an undo)
Control & A	Select entire document

Feedback

Printer's devils appreciate irony, which is why the caption to the Word 2007 contextual spelling screen at the bottom of page 141 in our Winter issue is itself misspelled in a contextual way.

'Underling' should, of course be 'underlining'. On the other hand, I rather like it the way it was printed – the 'blue underling' sounds like a particularly objectionable Office Assistant. Thank you, Ray Harris, for spotting that. PCW

Stephen Wells is a freelance journalist and a regular contributor to computer magazines. He's been writing PCW's Spreadsheets column for over 10 years.

→ Comments welcome on the Spreadsheets column.
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Let me put you in the picture

Use Excel to turn numeric data into a graphical display

Vince Emmerson writes, "I have spent hours trying to create a chart embedded in an Excel worksheet that has dates on the X axis and numbers on the Y axis. It never seems to come out right. The dates on the underside come out as a 1in high mass of scribble. There is no explanation of the jargon in the various format tables. When I give up and click the question mark I get the message, 'There is no help for this item'. Can you point me to a simple guide to using these chart elements?"

It's probably high time I talked about the Excel options for turning numeric data into a graphical display. Look at the simple table at the top of screen 1. Enter these details on a new worksheet, select the whole range, A1:E3 and click on the Chart Wizard tool. In Step 1, select the first sub-type of the default offering; a column chart. Click the three consecutive Next buttons and then Finish. Excel will then display the chart also shown in screen 1.

Taking advantage of the Chart Wizard is always a good way to start. Once you have a preliminary chart, you can always format the constituent parts to suit your needs. However, you need to know the terms Excel uses to describe the various elements of a chart. Screen 2 illustrates the basics.

You also need to pick the right chart for the job. A line chart is for showing trends or changes in data over a period of time. It emphasises time flow and the rate of change rather than the amount of change.

A High-Low-Close line chart is useful for showing a day's movement in a stock's share price, for example. You could also omit the close value and use this type of line chart to record blood-pressure readings. The high of the high-low line can record the highest pressure in the cycle (systolic), and the low can show the lowest (diastolic) pressure reading (see screen 3).

An area chart may seem similar to a line chart but it emphasises the amount of change over a period of time rather than the flow of time and the rate of change.

A column chart draws comparisons between items. Its categories are organised horizontally and its values vertically, as in screen 1. A bar chart has the categories organised vertically and the values horizontally.

Dividing up the pie

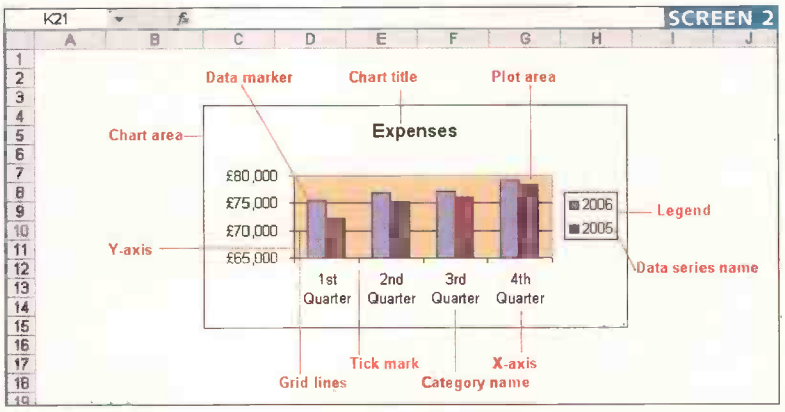
A pie chart shows the relationship or proportions of parts to a whole, in actual units, expressed as percentages or, as in screen 4, both. The chart shows the countries from where the US imported oil in 2002, expressed as percentages of its total oil imports. It emphasises an interesting fact that might not jump out at you from a data table: the largest single national contributor of oil to the US in 2002 was Canada.

If you want to find patterns or trends in a data table, an XY scatter chart will do the job. It uses numeric values along both axes as opposed to values along the vertical axis and categories along the horizontal axis. It can plot two groups of numbers as one series of XY co-ordinates.

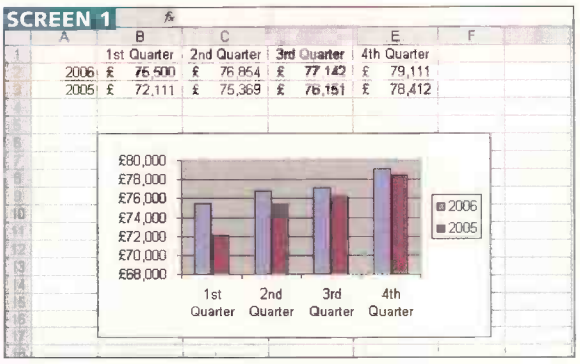
Excel lets you combine charts. You can overlay a column chart with a line chart, or overlay a line chart with an independent Y-axis scale (see screen 5).

Let's go through the making of this graph step by step. Cells A2:A73 of a

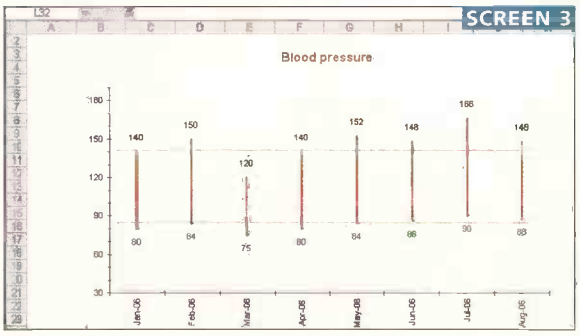
The basic elements of an Excel chart

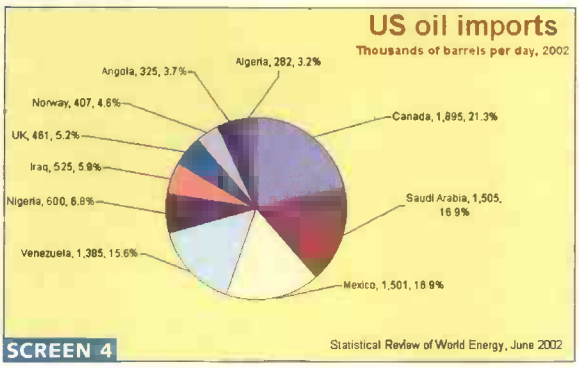


Below: The Chart Wizard will start your chart for you



A High-Low line chart can record blood-pressure readings





SCREEN 4

A pie chart can show parts of a whole in percentages

data table give the date each month from January 2001 to December 2006 when the rate of the US dollar to the British pound was recorded. This will form the X-axis. Column B in the table gives the cost of the pound in dollars on those dates. Column C calculates the value in pounds of $1,000 on the entered dates. In other words, cell C2 has the formula, =1000/B2 and this is dragged down column C.

Assuming there are labels in row one of the data table, highlight the range of values A2:B73 and choose the Chart Wizard tool. In Step 1, choose sub-type 1 of the Line chart option. Click Next and accept the Series in columns option. Click Next, and under the Titles tab enter Years 2001 – 2006 in the Chart title: box. Click Next, choose As new sheet and enter a worksheet name to go on the tab of the new sheet. You should now have a chart that looks like screen 5. It's rather unpromising but things can only get better, as someone once said.

Improving on the wizard

The first problem is that the Chart Wizard assumes you want to have the Y-axis running from zero to something much higher than the largest value. The largest value in data table column B happens to be $1.95. The smallest is $1.41. It would be preferable for the graph to chart closer to that range.

So right-click on the Y-axis and choose Format Axis. Under the Scale tab make the following entries. For minimum put 1.3. For maximum put 2. For major unit put 0.1. For minor unit put 0.02. Where it says Category X axis Crosses at, enter 1.3.

Under the Number tab, choose Accounting, 2 decimal places with a $ for the symbol.

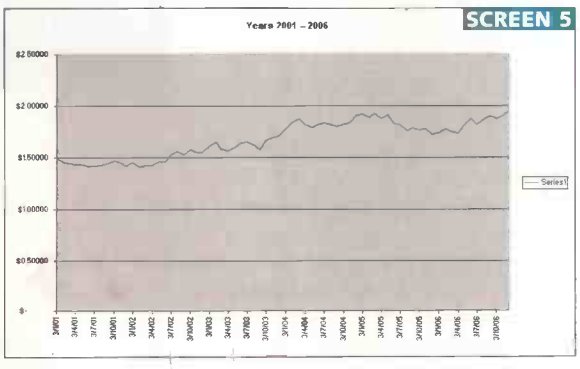
The X-axis picks up its data from column A where there are 72 dates. If you put too many date labels along that X-axis, they can all run into each other displaying a big smudge, as Vince found out. Right-click on the X-axis and choose Format Axis. Under the Scale tab put 31/12/2000 for minimum; 31/1/2007 for maximum; for the base unit, click the down arrow and choose days; for the major unit choose 3 months; and for the minor unit choose 1 month. Where it says Category Y axis Crosses at, enter 31/12/2000 and check Value Y axis crosses between dates.

Now, right-click on the line on the chart. Choose, Format Data Series, pick dark green as the colour and a heavier weight to make it stand out more.

We have plotted the pound against the dollar for six years. To illustrate what has happened to the value in pounds of $1,000 brought into this country every month over the same period, we can add another axis.

One more axis

On the Chart menu select Add Data. Click the little red arrow and then highlight the range in your table that lists the calculated values to be added, C2:C73. Click the arrow to go back and then OK. Click the new line added to your chart, and on the Format menu choose Selected Data Series. In the Format Data Series dialogue box, choose the Axis tab and then choose Plot Series on Secondary axis. Click OK.



SCREEN 5

Above: The Chart Wizard makes a good first attempt

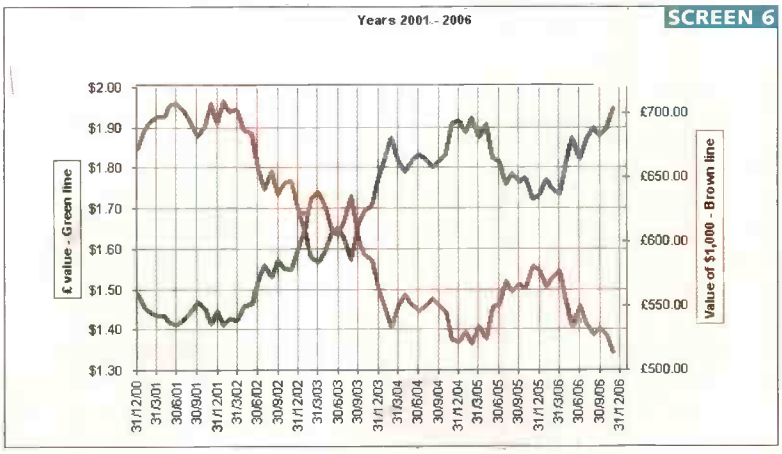
By default the new axis will run from zero to $800. Right-click on the new axis and in the Format Axis dialogue box, under the Axis tab, enter 500 as the minimum and 720 as the maximum. Put 50 and 10 for the major and minor units respectively. Where it says, Category X crosses at, enter 500.

Right-click on the new second line and format for weight and colour as before. Right-click in the Chart Area, rather than the Plot Area, and choose Chart Options. Under the Gridlines tab check the Major gridlines boxes under the Category X axis and Value Y axis headings.

Clear information

Have you ever seen a chart in a newspaper with no indication of exactly what is being illustrated? My Sunday paper irritates me by making these omissions all the time. So let's make it very clear to our readers. Right-click on the chart and choose Chart Options. Under the Titles tab, where it says, Value Y axis: enter £ value – Green line. Where it says, Second value Y axis enter Value of $1,000 – Brown line.

Taking them in turn, right-click on these new axis titles and choose, Format Axis Title. Under the Patterns, Font and Alignment tabs make your choices. You should now have a chart looking something like screen 6. The green line shows how the pound has risen in value from around $1.40 to nearly $2. The brown line shows how monthly payments of $1,000 have suffered under the exchange rate – dropping from over £700 to nearly £500. While those travelling to the US for their holidays could buy more with their pounds, companies or individuals receiving payments from America have suffered. PCW



SCREEN 6

The completed two-axis chart with labels

Niall Magennis has been dabbling in Midi and digital audio since the days of the Atari ST. He writes for a number of music magazines and lives in London in a flat overrun with music equipment.

→ Comments welcome on the Sound column. It returns in the July issue. Email sound@pcw.co.uk *Please do not send unsolicited file attachments.*

Compression tricks

Compression can do many tasks – if you know how to use the sidechain input

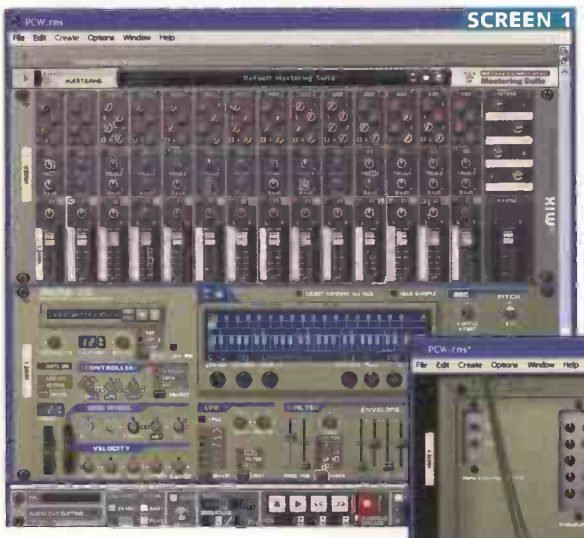
Compression is one of the trickier effects to master for those starting out in music-making. When it's used in the traditional way, its presence should be hardly noticeable. It should make your music sound fuller and punchier, without stamping a recognisable mark on your tracks.

But there are times when you may want to forget tradition and use compression as an upfront effect. That's what we're going to do in this column. Instead of showing you the right way to use compression, we're going to show you an outrageously wrong way to use it. Rather than blending into the background, we'll show you how to push compression to the front of your mix to give your music a heavy, pumping sound.

To do this, we'll use the compressor's sidechain and change the way the signal is routed to the compressor. We'll use the MClass compressor module in Reason 3, but you should be able to apply the same principles in other music packages. All you need is a compression module with a sidechain input.

A compressor is normally wired up so the music you want to compress runs directly into the main input. The compressor then reacts automatically to the dynamics of the signal – or in layman's terms, the differences in the volume of the signal as the music plays. However, many compressors also have a sidechain input and this allows you to be a bit more creative with your signal routings.

If you use the sidechain input on the compressor, it no longer reacts to the dynamics of the signal coming through the main input. Instead, it responds to the dynamics of the signal being piped into the sidechain input. So the compression of the sidechain signal is superimposed on the signal coming through the main input.



Left: We start by adding the sampler into the rack and loading up a long sustained pad sound

Below: Reason should automatically wire the NN-19 into the compressor

You will have heard this effect before – probably at a wedding, where a cheesy DJ is shouting "remember folks – there's no charge for dancing!" over the top of some dodgy Justin Timberlake track. As the DJ talks, the volume of the music is automatically ducked out so that you can hear what he's saying. This is achieved by running the mic through the sidechain of the compressor.

The sidechain is also used a lot in dance music to make the music pump heavily in partnership with a bass line pattern or a bass drum kick. We're going to show you how to achieve this effect by running a sustained pad sound into the main input of your compressor and then feeding a bass line into the sidechain. The result will be an effect where the pad sound seems to duck and bounce in time with the bass line.

Setting up the compressor

To get started, load up Reason V3 and start a new project. We're going to use the NN-19 sampler to produce our sustained pad sound, so add it into your rack. Click on the Browse Patch button and select the LeadSynthPadMute preset from the Reason Factory Sound bank (see screen 1). With the sampler loaded into the rack and the preset selected, we now need to create a chord for it to play.

Open up Reason's sequencer and then choose the track for the NN-19 sampler. On this track, draw in a Dminor chord to play over four bars. We want this chord to play as a constant loop so that we can instantly hear the effects of the changes that we're going to be making to the compression settings. Turn on looping to have the chord play continuously.

Now that you've set the sampler up to play a continuous Dminor chord, it's time to add the compressor into the Reason rack. There is more than one compressor in Reason, but we need to use one that has a sidechain. The

MClass compressor fits the bill, so right-click in an empty space in your rack to add it into your project.

To create the pumping effect that we're after, the output of the NN-19 sampler needs to be routed to the input of the compressor. Reason should have automatically wired the NN-19 sampler to the compressor's main audio input, but you should check that this is the case with your Reason setup. Just hit the Tab key to flip the rack around and check that the routing is correct. If it's not wired up properly, make sure you rewire it now before going any further (see screen 2).

Now it's time to add the instrument that we're going to feed into the compressor's sidechain. Right-click in an empty area of the rack, select the Subtractor synth and add it into the Reason rack. Click on the Browse Patch button to open up the preset window. Open the Reason Factory Soundbank and choose a big bass patch, such as the 'Bassy Bass' preset.

Reason's automatic signal routing will have wired the Subtractor synth up to channel 2 on your mixer, but we need to change this so that it's fed into the sidechain of our compressor. We can feed it both into channel 2 and the sidechain input by using a splitter module. Right-click in an empty space in your rack and add the Spider Audio Merge and Splitter module into your rack (see screen 3).

Now hit the Tab key on your keyboard to turn the rack around. Have a look at the back of the Spider module and you'll see that the right-hand side of the unit acts as the splitter. Disconnect the Subtractor synth from the mixer and connect its main output to the A(L) input on the splitter. Connect the Split Output 1 to the sidechain L input on the MClass compressor and hook the Split Output 2 to channel 2 on the main mixer.

It's time to turn our attention to the compressor settings. We want the compressor to duck out the volume of the NN-19 sampler every time that sound is emitted from the Subtractor synth. To do this we first need to make sure that all the Input and Output Gain settings are at zero and adjust the Threshold, Attack and Release settings to their minimum values. Finally, you need to change the compressor's ratio control so that it's set to its maximum value of 'infinite:1'. Now if you play a note on the Subtractor synth, you should hear the pad sound duck out of the mix to create room for the Subtractor bass sound. If this doesn't happen, you need to retrace you steps and check both the connections and the compressor's settings (see screen 4).

With the setup of the compressor complete, it's time to create a simple bass line that we can use to trigger the sidechain to open and close the compressor. Call up the Reason sequencer again and look for the Subtractor synth track. Create a simple one-note bass line by adding some notes on the D2 line. Make sure you leave some space between the notes to give the compressor time to open and close in response to the notes.

With the bass line set up, it's time to add a simple drum pattern. Right-click on an empty space in your rack and add in the Redrum module. Create a simple four to the floor dance pattern with a heavy bass kick drum.

Now when you hit Play in Reason, you should hear your pad sound duck in and out of the mix as notes from the bass line are played. The effect gives the track a heavy, pumping sound.

At present, the sidechain is being triggered by the bass line, but you can easily swap your connections around so it is being triggered by another module. For example, you can change it so that it's triggered by the kick drum in your drum loop. You can try this by spinning the rack around and hooking the Send Out 1 from the Redrum module to the Sidechain input. Hit Tab again to return to the front of the rack and turn up the S1 control on the bass drum channel in Redrum. You should hear the pad duck in time with the bass drum instead of the bass line. PCW

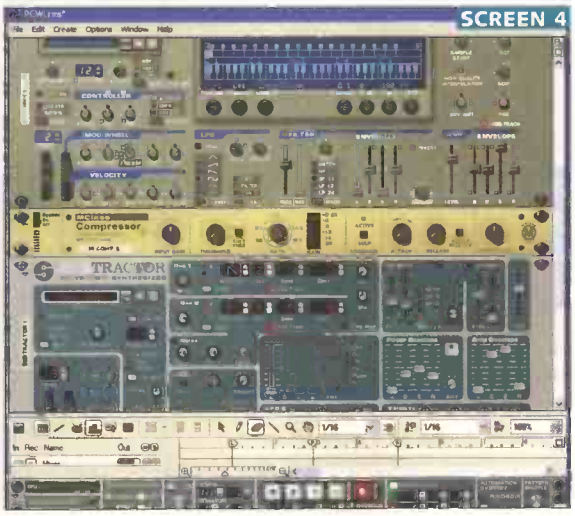
How a compressor works

In this Sound column, we're showing you how to use a compressor in extreme ways, but usually compression is applied to a track to just make it sound punchier and louder. A compressor does this by reducing the dynamic range of your music. Essentially, it reduces the difference between the peak and the trough volumes in your mix. Once a compressor has done its business, your track should have a much more even volume level with fewer spikes. This, in turn, allows you to increase the overall volume of the track without introducing any distortion. That should mean that you end up with a CD or mp3 that sounds louder and more exciting than it did originally.

SCREEN 3

You can use the Splitter to send audio to the mixer and the compressor's sidechain at the same time

SCREEN 4



When the compressor is set up correctly it should duck the volume of the pad when a bass note is played

Noise gate

An effect that's closely related to the compressor is the noise gate. A noise gate works a bit like a compressor, except in reverse. The gate only allows through sound above a certain threshold. All sound below the threshold is reduced to total silence. Like compressors, some gates have a sidechain input that allows you to feed another signal into the gate to cause it to open and close. Just like on a compressor, you can use this sidechain input in creative ways. For example, you can give a pad sound a stuttering effect by running it through the noise gate and then triggering the sidechain with a kick drum or even a hi-hat pattern.

Alan Stevens has implemented and supported networks for over 25 years, working for IT vendors, system integrators and customers. He now mostly researches and writes about networking matters.

→ Comments welcome on the Networks column.
Email networks@pcw.co.uk
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MAC attack

Find out how to use Media Access Control to protect your wireless network

Lately I've had several emails asking me to clarify issues raised in recent articles. Nick Helm in Sheffield was one of several readers to ask about wireless security: "After stating your golden rule – always use some form of encryption – you go on to say that if you don't use any encryption, 'you're not protected and anyone will be able to connect to your wireless network'.

"Does this really apply when you are using Media Access Control (MAC) on your router? Surely not. A packet sniffer will be able to read your wireless data, but how could anyone without an authorised MAC address gain proper access to the network?"

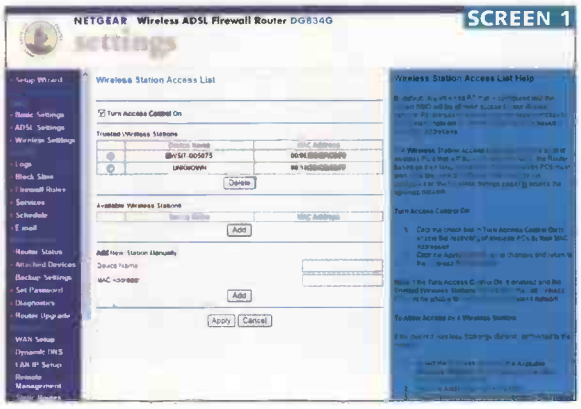
The question is easily answered, but first we need to recap on what MAC address filtering is all about.

MAC filtering in a nutshell

MAC addresses are unique 48-bit numbers, usually represented using six pairs of hexadecimal digits separated by colons, such as 00:09:5B:98:73:46.

Every networking device has one of these addresses, from a Lan adapter to a wireless access point or router, typically encoded into the main Ethernet chip on the hardware itself. They can also be programmed into firmware, adapter drivers and other networking software which, as I'll explain, is important to bear in mind.

It's also important to understand that MAC addresses are employed independently of higher level protocols and are used to direct packets to their correct destination. For example, if you need to send TCP/IP packets to an IP address of 192.168.0.1, somewhere along the line that IP address will be translated, using the Address Resolution Protocol (ARP), to the associated MAC address to enable the delivery to take place.



This Netgear wireless router lets you control wireless station access using MAC addresses, but it's far from foolproof

So MAC addresses are used to identify network devices at a fundamental hardware level. On most wireless access points and routers, they can also be used to control access to the Lan and its resources, either by only allowing clients with certain known MAC addresses to connect and exchange information or by explicitly barring known 'hostile' clients. Screen 1 shows how MAC filtering can be configured on a common Netgear wireless ADSL router.

Not a complete answer

You wouldn't want to control access this way on a large network, but if you only need to manage a handful of PCs it's a quick and easy technique that ought to provide a high level of security. Unfortunately, it isn't quite as foolproof as it might seem because, although MAC address filtering stops unauthorised stations from connecting, it does nothing to protect the data being transmitted back and forth by legitimately attached devices. A hacker could use a wireless sniffer to intercept those packets and see what's inside them. That could include items such as user names, passwords and financial details.

That's bad enough and a good reason why you should always use some form of encryption to scramble the contents. However, that's not the only problem; intercepted packets will also contain MAC addresses. So, on an unprotected Lan, all a hacker has to do is sit back and collect a few minutes' worth of wireless transmissions to build a compete list of MAC addresses that the target routers or access points consider to be the 'good guys'.

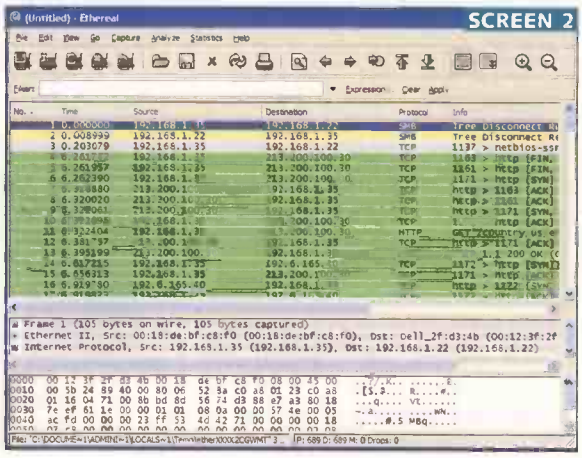
Once MAC addresses have been captured using a tool like Ethereal (see screen 2), all a hacker has to do is pretend to be one of those MAC addresses which, again, isn't as hard as you might think.

MAC spoofing

Remember when I said earlier that MAC addresses don't have to be encoded into the networking hardware? That's important here because most network drivers allow the built-in hardware address to be changed to anything you want, and it's not difficult to get hold of the tools to make such changes.

MAC address spoofing isn't something most of us will want to do every day but on a Linux PC, for example, a MAC address can be changed using just a couple of commands, as shown in screen 3,

Using a freely available protocol analyser such as Ethereal, hackers can soon find out what client MAC addresses a wireless access point or router will accept



SCREEN 3

```
alan@sled10:~
File  Edit  View  Terminal  Tabs  Help
sled10:/home/alan # ifconfig eth0 down hw ether 00:00:00:00:00:01
sled10:/home/alan # ifconfig eth0 up
sled10:/home/alan # ifconfig
eth0      Link encap:Ethernet  HWaddr 00:00:00:00:00:01
          inet6 addr: fe80::200:ff:fe00:1/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:3012 errors:0 dropped:0 overruns:0 frame:0
          TX packets:1944 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:4224350 (4.0 Mb)  TX bytes:148644 (145.1 Kb)
          Interrupt:201

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:16436  Metric:1
          RX packets:101 errors:0 dropped:0 overruns:0 frame:0
          TX packets:101 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:6540 (6.3 Kb)  TX bytes:6540 (6.3 Kb)
```

The MAC address of the Lan adapter in this Suse Linux PC has been changed using the ifconfig command

where I've changed the address of a Lan adapter in a PC running Suse Linux to 00:00:00:00:00:01.

The commands are

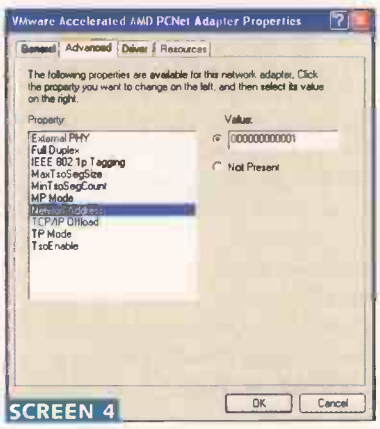
```
ifconfig eth0 down hw ether ↙
00:00:00:00:00:01
ifconfig eth0 up
```

(Key: ↙ code string continues)

You need to be logged in as root to do this; the first ifconfig command stops the Lan interface (in this case the default 'eth0') and at the same time changes its hardware Ethernet address to '00:00:00:00:00:01'. The second command then uses ifconfig to start it again, after which the results can be confirmed by just typing ifconfig, without any parameters.

On a Windows PC it's a little harder as the ipconfig command, although similar to ifconfig, doesn't support MAC address changes. But in many cases, the address can be altered from its network connection properties (see screen 4). It can also be changed via the Registry, although that's a little harder as the keys involved aren't immediately obvious. And there are plenty of free tools available for download that can make changing MAC addresses very easy.

It really is that easy, and there are yet more ways of spoofing MAC addresses that I won't go into here. Most networks won't object to or even notice such changes, making it easy to circumvent MAC address filtering security on an otherwise unprotected wireless router or access point.



SCREEN 4

Some network adapter drivers make it very easy to change the MAC address on Windows PCs

Turn on encryption, however, and it becomes a lot harder. Not only do hackers need valid MAC addresses, but they also have to match your encryption technology and the keys used – a bit like locking and bolting the door. And that's why, regardless of any other measures, such as MAC address filtering, you should always use encryption of some kind to protect a wireless network.

Of access points and routers

You may have noticed that, when talking about wireless networks, I mention routers and access points in more or less the same breath.

In reality, however, the two are quite different beasts. Judging from their emails, one or two readers may not have realised this.

One says: "I want to run Cat cable downstairs, then use a second wireless router to broadcast a strong signal in that area. I am getting a wireless signal downstairs at present, but it's very variable and can sometimes disappear altogether."

Using a second wireless router to extend the network is a possible solution but isn't necessarily a good idea because a router is primarily designed to connect two networks together – typically a local area network (Lan) and the internet – with packets selectively directed between the two (routing).

In this instance, a second router could be used, but there's really only one network involved, albeit part wired and part wireless. There's no need for two connections to the internet and you really wouldn't want to divide this kind of small network into two subnets, which is what a router would do unless properly configured. A lot of what this reader would be paying for in a router would be superfluous – not just the separate internet interface but the extra functions, such as firewall, content filtering and other security tools.

A wireless access point is, therefore, a better solution as it merely bridges wireless and wired users together to create one network. Most also only have one wired port for Lan attachment and should, therefore, be both cheaper and easier to install.

All that's necessary is to run a UTP cable down from the existing wireless router to the new access point and configure the WLan interface with the same SSID and encryption settings. Users connecting downstairs will then be connected to the same Lan and, via the existing router (and its built-in firewall) will be able to get out onto the internet.

Rather than add another router, all you need to extend wireless access on an existing network is a wireless access point

The current alternative

Lastly, a subject I've touched on before, but which keeps cropping up and is pertinent to this question, too. That is, extending a wired or wireless Lan using the AC mains wiring, rather than custom UTP cables.

Referred to as Homeplug or Powerline networking, it's possible to get devices that simply plug into a standard three-pin socket to create a network. One such product is the Netgear WGXB102 wall-plugged range extender kit, which consists of two devices.

These are remarkably easy to install. One connects to an existing router, which can be of any make, using the short UTP cable supplied. The other is a self-contained 802.11b/g wireless access point. The two then communicate with each other using the mains wiring with almost no setup or other configuration work required to establish the link. However, you can browse to the access point and turn on either Wep or WPA security and MAC address filtering.

If you're prepared to install UTP cables yourself then at about £80 ex Vat, it might seem a little expensive. But to have such cables installed professionally would cost a lot more and the cabling could be unsightly unless buried in the walls, floor or ceiling, further adding to the cost.

I use Powerline products and, although they don't always deliver the claimed bandwidth, for the most part they work well and can be used to solve a lot of common networking problems. PCW

Mark Whitehorn is one of those lost souls who actually likes databases. He splits his time between consultancy, writing, working for two universities and tinkering with old cars.

→ Comments welcome on the Databases column.
Email database@pcw.co.uk
Please do not send unsolicited file attachments.

Piece of the fraction

How to calculate vulgar fractions, plus adding data such as a phone list to a table

Last month, I provided two solutions for a problem about appointments (**www.pcw.co.uk/2183829**). In the first, we store the data as shown in screen 1. This is very compact, but any query to find out which appointments are due on a particular date will involve a lot of computation – and that kind of query is going to be run against this database all the time.

An alternative is to add another table, which explicitly lists all the occurrences of a given appointment (see screen 2).

The data in this new table can all be derived from that of the original. It will give a much better query response time but it breaks a fundamental rule of relational databases, which is that we shouldn't store derivable data. So, which of these structures is 'best'?

Neither, both, whatever. To see either as 'fundamentally better' is to miss the point that virtually all solutions to a problem have their pros and cons. If you understand these, you are in a perfect position to pick the 'best' solution for any given situation.

The big advantage of solution one is that the data is stored in a very compact way with very little redundancy. It also happens to represent the way in which the users of this system want to enter the data.

In addition, it's very easy for them to alter an existing record (maybe changing an appointment from daily to weekly).

The disadvantage is that querying it is very slow. Effectively, every time we run the query 'Which appointments occur on this day', the database will have to generate the answer table (shown in screen 2) on the fly in order to answer the question.

Solution two holds that very table all the time, so queries will run much faster. On the other hand, each time you enter a new appointment or change an existing one, the system has to add or update the occurrences for the second table.

So, for example, the first solution may be better if you have a very powerful server and/or when the system is very rarely queried. The second may be optimal in situations where the system is rarely updated but very frequently queried.

It is this kind of delicate balance that makes good database design both challenging and rewarding.

App : Table — SCREEN 1

AppointmentNo	InitialDate	Repeat	EndDate
1	01/01/2007	No	01/01/2007
2	02/02/2007	Weekly	05/03/2008
3	03/05/2007	Monthly	01/01/2011
4	04/05/2007	Yearly	01/01/2010
(AutoNumber)		No	

Record: 1 of 4

The basic appointment information

A second table stores every occurrence of an appointment

Vulgar fractions

Handling vulgar fractions (such as $\frac{1}{4}$) within a database is a topic that surfaces from time to time, and has recently done so in the form of a question from a reader. Mimi has a collection of old British postage stamps, which frequently have values with half-penny increments, such as $1\frac{1}{2}$d, for instance.

You can certainly store fractions in text fields within the database by copying and pasting the special characters from the character map, which you can find from the Windows Start menu, under All Programs, Accessories, System Tools, Character Map. But these cannot be used to perform arithmetic so you can't produce the total face value of $10\frac{1}{2}$d, from three $3\frac{1}{2}$d, stamps by summation. While summing the value of stamps may not be useful, there are many circumstances where it is vital to use fractions arithmetically. I recently built a database for an engineering works that produces spare parts for machinery built from the late 1800s onwards. All its measurements are still imperial, with fractions scattered liberally throughout, and the engineers still talk in fractions, so that's what they wanted to see in their database. However, they also needed the database to be able to add and subtract the values. (As all engineers know, tolerances sum.)

AppDate : Table — SCREEN 2

AppointmentID	AppDate
1	01/01/2007
2	02/02/2007
2	09/02/2007
2	16/02/2007
2	23/02/2007
2	02/03/2007
2	09/03/2007
2	16/03/2007
2	23/03/2007
2	30/03/2007
2	06/04/2007
2	13/04/2007
2	20/04/2007
2	27/04/2007
2	04/05/2007
2	11/05/2007
2	18/05/2007
2	25/05/2007
2	01/06/2007
2	08/06/2007
2	15/06/2007
2	22/06/2007
2	29/06/2007
2	06/07/2007
2	13/07/2007
2	20/07/2007
2	27/07/2007
2	03/08/2007
2	10/08/2007

Record: 1

If you want to be able to see the vulgar fractions but also perform arithmetic on the numbers, the trick is to store the values as decimals. As an example, we can start with a table called Stamps that has three columns – StampID, Name and StampValue. A second table, StampFractions, stores each vulgar fraction in a Text field and the decimal equivalent in a Number field (see screen 3).

We'll first build a query that looks at the decimal value and identifies the part that contains the fraction. One way to do this is to identify the integer part (the whole number) of a value and subtract that from the value. Int is the ideal function because it returns just the integer part of a value. So, given a value of 1.5, Int returns 1, which we can subtract from 1.5 to give 0.5 – the fraction element we're after. The query called StampCalcDecimalBit has all three fields from Stamp, plus an additional one that is defined as:

```
DecimalBit: [StampValue]-↙
Int([StampValue])
```

(Key: ↙ code string continues)

SCREEN 3

StampCalcDecimalBit : Select Query

StampID	Name	StampValue	DecimalBit
1	Penny Black	1	0
2	Three Penny Wonder	1.5	0.5
3	Two Josephine Surprise	2.25	0.25
4	Two Penny Dam	2.5	0.5
5	Penny Dreadful	2.75	0.75
6	Bent Copper	9.25	0.25
7	Eighty Shilling	96	0
8	Penguin Black and White	120.25	0.25
9	Guinea Foul	0.25	0.25
(AutoNumber)		0	

Record: 1 of 9

Two tables, one for the stamp data (Stamps) and the other to hold text characters for the fractions (StampFractions)

This calculates the fraction element for each entry in the table as described above (see screen 4). The SQL is:

```
SELECT StampID, Name, ↙
StampValue, [StampValue]-↙
Int([StampValue]) AS ↙
DecimalBit
FROM Stamps;
```

Now we want to match each DecimalBit value that we've just generated with the corresponding DecimalBit in the StampFractions table. This lets us find the correct text fraction from the StampFractions table, and then we need to weld that text fraction to the integer part of the StampValue.

We'll use another query, called StampsRevealed, to do this. The code we'll use to weld the two parts together is:

```
TextStampValue: Int([Stamp↙
Value]) & [Fraction]
```

As I mentioned last month, in Access the & operator converts anything that isn't a text string into one, allowing us to concatenate a number and a text character. If you're not using Access, you may need to perform an explicit string conversion.

The final refinement is to ensure that we see all the records from the StampCalcDecimalBit answer table (which equates to all records in the original Stamps table) and just corresponding ones from the StampFractions table. Right-click on the join line between the two DecimalBit fields, select Join Properties and then select the option that gives you 'ALL records from StampCalcDecimalBit' (see screen 5).

The SQL reads:

```
SELECT ↙
StampCalcDecimalBit.StampID, ↙
StampCalcDecimalBit.Name, ↙
StampCalcDecimalBit.↙
StampValue, StampFractions.↙
Fraction, Int([StampValue]) ↙
& [Fraction] AS ↙
TextStampValue
```

SCREEN 4

StampCalcDecimalBit : Select Query

StampID	Name	StampValue	DecimalBit
1	Penny Black	1	0
2	Three Penny Wonder	1.5	0.5
3	Two Josephine Surprise	2.25	0.25
4	Two Penny Dam	2.5	0.5
5	Penny Dreadful	2.75	0.75
6	Bent Copper	9.25	0.25
7	Eighty Shilling	96	0
8	Penguin Black and White	120.25	0.25
9	Guinea Foul	0.25	0.25
(AutoNumber)		0	

The query StampCalcDecimalBit that extracts the decimal component of the number

```
FROM StampCalcDecimalBit
LEFT JOIN StampFractions
ON StampCalcDecimalBit.↙
DecimalBit = ↙
StampFractions.DecimalBit;
```

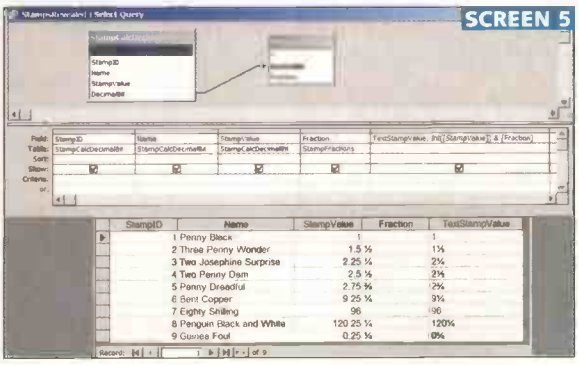
The words LEFT JOIN indicate that we want all records from the left-hand table, whether or not a match is found with the other table.

The result of all our work is a query called StampsRevealed, which shows both the decimal and vulgar fraction values of the stamps. We can now run queries against this query that, for example, count the number of stamps with a halfpenny component and sum their values.

What you really want to know is why they are called vulgar fractions. They are also called common fractions, and the number above the line is the numerator and the number below is the denominator. But why are they called vulgar? A 1901 dictionary says "a fraction written in the common way". Vulgar is, of course, a synonym for common, but that still doesn't tell us why. Can any readers throw further light on this?

Here we can see both the query and the answer table: the TextStampValue field shows the fractions in vulgar form

SCREEN 5



Heads up

Robert Newmark manages a database for a local branch of a large company. Each month, he receives a table of 3,000 local members from head office with up-to-date information but not phone numbers. Robert has a table listing about 200 of the local members with phone numbers. He wants to add the phone numbers to the larger table.

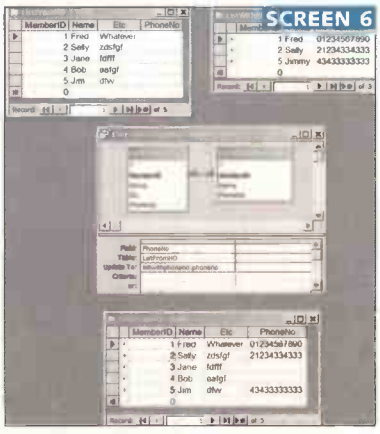
If you've bought the DVD edition of *PCW*, you'll find the sample database on the cover disc. It is also on the web at **www.pcw.co.uk/2151344**. In this database there is a table called ListFromHO and another called ListWithPhoneNo. (We will assume these are copies of the original tables, for obvious reasons.) I have already added a blank column for telephone number to ListFromHO (see screen 6).

An update query (ListFromHO Update) allows us to add information to a table and, since both tables use the same primary key value, we can use that to link the correct records together. For those who aren't using Access, the SQL is:

```
UPDATE ListFromHO
INNER JOIN ListWithPhoneNo
ON ListFromHO.MemberID = ↙
ListWithPhoneNo.MemberID
SET ListFromHO.PhoneNo = ↙
ListWithPhoneNo.PhoneNo;
```

Of course, this only works if the primary key values are the same in both tables. If they weren't, we could start matching on names but that means we will also have to check the results manually because two people may share a name. **PCW**

SCREEN 6



Above: At the top you can see the List from head office and Robert's own list. The query is in the middle and, when run, it updates the list from head office as shown at the bottom of the screen

Tim Anderson is an IT journalist and software developer, and began writing for PCW in 1993. Since his first Commodore Pet, he has acquired expertise in Rad programming, Windows and the Internet

→ Comments welcome on the Visual programming column.
Email visual@pcw.co.uk
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Javascript comes of age

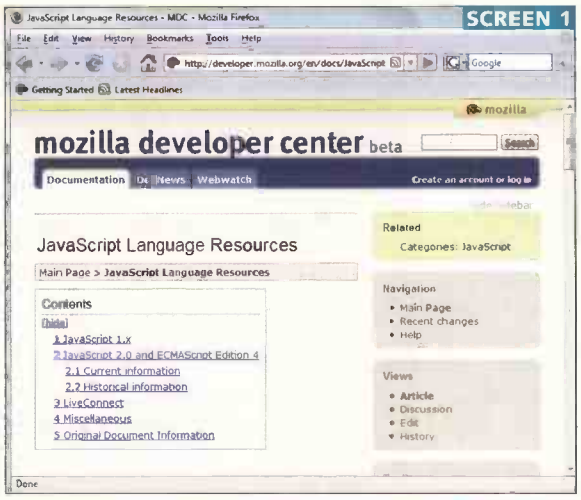
Adobe's muscle is taking Javascript beyond simple web scripts

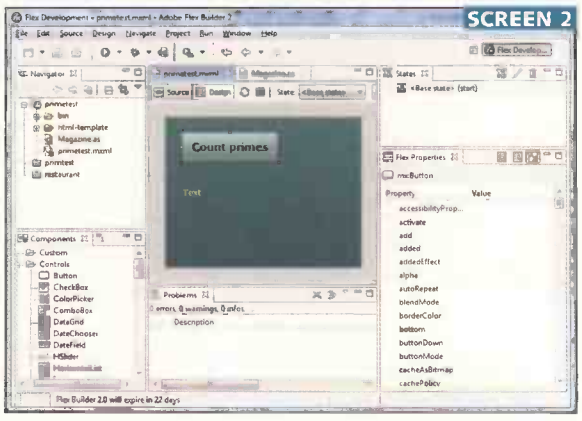
In 1995 a programmer called Brendan Eich joined Netscape Communications. Netscape "was looking for someone to work on a scripting language or some kind of language inside the browser that could be used to automate parts of a web page or make a web page more dynamic", wrote Eich in an article on Netscape's website. The language was initially called Mocha, then Livescript, and finally Javascript, in a deliberate attempt to ride the waves of Java's success.

The name still causes confusion, since Javascript is completely different from Java. Microsoft attempted to derail it with VBscript, but this was not implemented by browsers other than Internet Explorer, making Javascript the only choice for scripting web pages. Javascript was standardised by ECMA, a European standards body, and the official specification is called ECMAscript. Microsoft's implementation is called Jscript, while Adobe has a version running in Flash called Actionscript.

Javascript is widely used, but not really loved. There are many compatibility issues, mainly with the document object model presented by different browsers. Javascript developers have to learn tricks to get code working everywhere. These issues, combined with the perception that Javascript is only for scripting, meant that few developers attempted to use Javascript for substantial applications.

This is changing and Javascript usage is growing fast. The first key factor is the rise of Ajax, where web applications have extensive client-side script to give users a richer, more seamless user interface. The second factor is the use of Flash for applications beyond multimedia effects. Adobe's Flex product, soon to be joined by a related project called Apollo, lets you code for Flash with XML and Actionscript, which is easier for developers than the designer-oriented Flash IDE.





Top: The Mozilla developer centre is among the best Javascript resources on the web

Bottom: Flexbuilder is Adobe's design tool for Flex

Object orientation

Javascript has long supported object oriented programming, although if you only use it for scripting web pages, you might not have explored this part of the language. Javascript is a dynamic language, allowing a free and easy approach where properties are created on the fly. For example, if you were writing code to manage a magazine archive, you might have something such as this:

```
mag = new Object();
mag.name = "PCW";
someLabel.innerHTML = "The ↙
magazine name is: " + mag2.name;
```

(Key: ↙ code string continues)

This code creates a new object, adds a property on the fly, and then references it. You can even add methods in similar style:

```
function describe()
{
return "The magazine name is:↙
" + this.name;
}

mag = new Object();
mag.name = "PCW";
mag.getdescription = describe;
someLabel.innerHTML =
mag2.getdescription();
```

This looks odd to someone who has coded in languages like Java, C# or Visual Basic .Net, because the function declaration is detached from the object definition, yet still uses the keyword 'this' to access the properties of the current instance.

There is more to say about object orientation in Javascript; but what is most interesting is that Actionscript 3.0 has a more conventional approach. You can write code like this:

```
public class Magazine
{
var name:String;

function getdescription()
{
return "The magazine name is: ↙
" + this.name;
 }
}

var mag: Magazine
mag = new Magazine();
mag.name = "PCW";
```

```
someLabel.text = ↙
mag.getdescription();
```

Notice the strong typing, using a colon followed by a type name after the variable name. The way the class is defined looks much more like Java or C#. The full ECMAscript 4.0 specification allows for other features including interfaces, inheritance, property getters and setters, and all you would expect from a modern language.

Why not just use Java?

You could say these extensions are not needed. The language is losing some of its simplicity and becoming more like Java and C#. Why not just use these instead? It just happens that Adobe has come along with a lightweight but powerful cross-platform virtual machine. Java and .Net programmers assume the presence of huge class libraries that are, in effect, part of the platforms, improving productivity but also complicating use. Javascript does not carry this baggage.

'Javascript is losing some of its simplicity and becoming more like Java and C#'

Perhaps the closest equivalent to Actionscript and Flex is Microsoft's Windows Presentation Foundation Everywhere (WPF/E), featured in the March column (see **www.pcw.co.uk/2183722**). This is meant to include a cross-platform Jit compiler for C#. WPF/E is interesting for .Net programmers, but Adobe has a substantial headstart with Flash and Flex, which is here now. **PCW**

Resources

Adobe Flex downloads, including the free SDK, are at **www.adobe.com/products/flex**
Information on the Tamarin project is at **www.mozilla.org/projects/tamarin**

Testing Javascript performance

The performance of script code is often unimportant, but it matters when there is significant processing. An example might be a financial application that generated cost and income projections, or a game that has to calculate the positions of numerous sprites. For this test, I used an algorithm called the Sieve of Eratosthenes, which identifies prime numbers. It is useful because the only known way to do this is to test each number, although there are obvious shortcuts such as eliminating even numbers. Here are the results in seconds on the test machine for counting the number of primes up to 500,000:

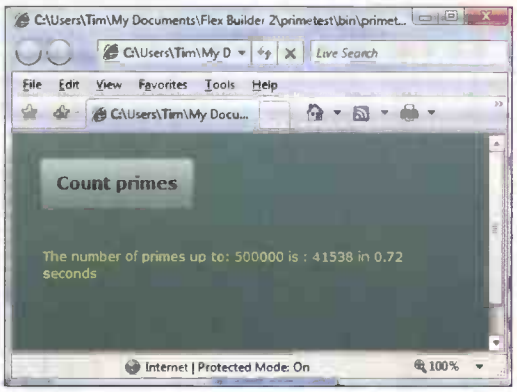
Visual C++:	0.2
Internet Explorer:	11.8
Firefox:	11.0
Flash typed:	0.7
Flash untyped:	2.4
Jscript.Net untyped:	2.6
Jscript.Net typed:	0.6

The C++ code is three times faster than any of the others, and more than 50 times faster than the slowest. This is the main reason so many applications are still written in C or C++.

Moving on, in this example the Flash virtual machine is neck and neck with Microsoft's .Net JIT compiler for Jscript. Since .Net is already widely used for business applications, the implication is that Adobe's Flash runtime may perform equally well.

Third, there is a major performance benefit in using strong typing. To be fair, this kind of test exaggerates the typing factor because everything happens using a few variables in a tight loop. Real-world applications often have bottlenecks elsewhere.

Finally, the JIT compilation in the Flash 9 VM seems to have genuine performance benefits, even for untyped code. In this test, it is four times faster than the same code running in Firefox or Internet Explorer.



Testing the performance of Flash 9 for counting prime numbers

Jscript: Microsoft's hidden .Net language

Microsoft supplies a .Net compiler for Jscript.Net, its version of ECMAscript, with every installation of the .Net Framework. However, this is well hidden, mainly because there is no obvious way to use it in Visual Studio 2005, although you can create and edit Jscript files. Apparently the compiler can be used by ASP.net, but you can also compile .Net executables from Jscript at the command line. In Visual Studio, choose File, New, File, Script and then Jscript File. Alternatively, you can use any text editor and write some Jscript code, for example:

```
import System;
Console.WriteLine("Testing ↙
JScript");
```

(Key: ↙ code string continues)

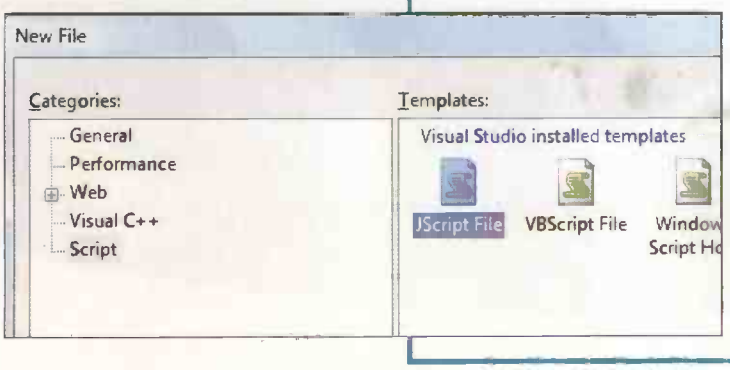
Save the file as testjscript.js. Then open a Visual Studio command prompt, navigate to where you saved the script, and type:

```
jsc /out:testjscript.exe ↙
testjscript.js
```

Now you can run testjscript.exe like any other Windows executable.

Presumably most developers do not think this is a useful tool, otherwise Microsoft would have put more focus on it. On the other hand, if Javascript grows in popularity to the point where more programmers consider it their language of first choice, Jscript.Net might get more use.

A crucial advantage of Jscript.Net over Actionscript is that you get access to all the class libraries in the .Net Framework. If you can manage without visual tools, there should be few limitations.



Visual Studio has scant support for Jscript.Net, but you can create Jscript files with syntax highlighting

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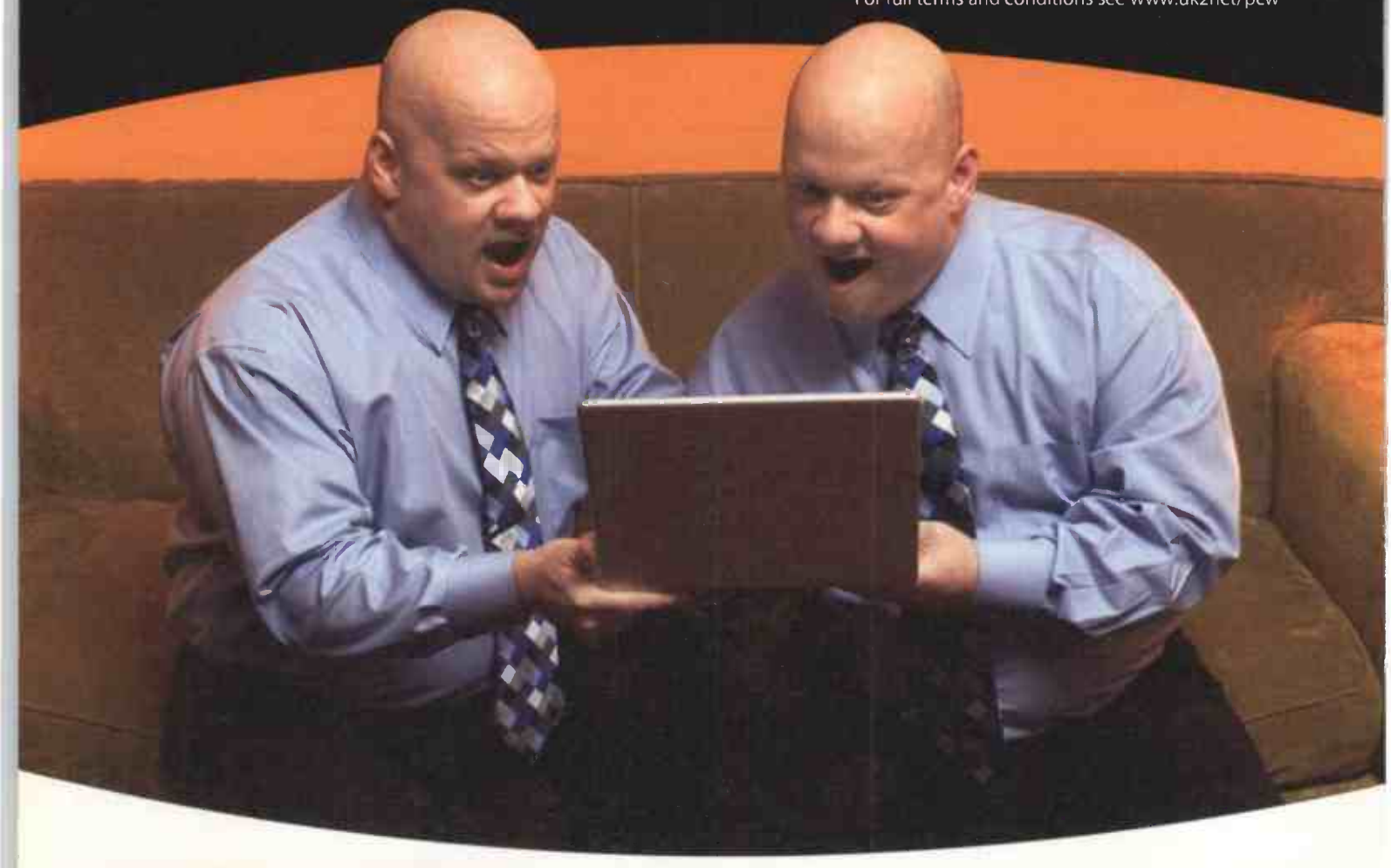

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Domain Names, Web Hosting, E-commerce and Dedicated Servers

How to buy the best products tested by our Labs

This Buyer's Guide is a comprehensive listing of the best products PCW has tested across a range of areas, helping you to make the best decision when you're planning a purchase. Over the following pages you'll find products, their verdicts and ratings, plus information on where you can read the full review.

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Digital cameras
Routers
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Prices are for guide purposes only and may be subject to change

BUYER'S GUIDE

78 PRODUCTS REVIEWED TO MAKE YOUR BUYING DECISION EASIER

HOW TO BUY: PCs

Many of the choices you are faced with when buying a PC are covered in the following pages. You need to think about the graphics card, memory, sound requirements, size and type of hard disk, CD or DVD burner and so on.

Once your budget is set, the starting point is the CPU (central processing unit), because it is the brains of your PC.

Intel and AMD offer a bewildering number of processors. The differences between the CPUs are in technical details that don't necessarily mean much to end users. Pricing is also competitive, with AMD PCs are generally cheaper than comparable Intel models.

You can still buy budget PCs with older Intel Celeron or AMD Sempron CPUs. These are aimed only at undemanding users. If your needs are for word-processing tasks, surfing the web and some low-end gaming or, a PC running either of these processors will suffice. You won't need a huge hard disk – 80GB will be plenty – coupled with 512MB of Ram and a low-end graphics card. You'll be fine with onboard sound, and can expect to pay up to about £400, depending on the monitor. Be wary of running Windows Vista on a low-end budget PC though.

In the mainstream desktop market, it's Intel Core 2 Duo versus AMD's Athlon 64. Both are 64-bit CPUs, but to take full advantage of this you need a 64-bit operating system and applications – Windows Vista is available in both 32-bit and 64-bit editions.

More memory can be supported by 64-bit systems – 32-bit Windows or Linux systems are limited to 4GB of Ram, whereas a 64-bit Windows or Linux system can support 128GB. Data is also moved in larger chunks, allowing a theoretical speed advantage.

AMD and Intel offer high-end processors with the Athlon 64 FX and Core 2 Extreme ranges aimed at the hardcore gaming market. Both are dual-core CPUs (the Core 2 Extreme QX models are quad-core). Dual-core processors, in effect, act as two CPUs in one and offer superior performance.

If you're choosing a PC running the above CPUs, other considerations come down to your needs. If you store lots of music, video or photos, go for a big hard disk – 200GB or above. Memory will help speed up applications, so aim for 1GB or above and don't drop below 512MB. The latest games demand the latest graphics cards, but for most people, cards that were new six to 12 months ago will be powerful enough.

Most new PCs now come with Windows Vista Home Premium. The Home Basic edition offers improved file handling, but you'll miss out on many of the new features. If it's for a small business, or you need features such as remote access, buy the Business edition of Vista. Few PCs are sold running Linux, and we recommend only the technically confident buy such a system. Linux can always be installed later. Finally, don't overlook the monitor, especially if you're using the PC for gaming or imaging. Buy the best you can afford.

1

Chillblast Fusion Tornado Quadro Q6700
£2,450 ★★★★★
Reviewed May 2007
www.chillblast.com
A supremely powerful PC with an overclocked quad-core processor.

2

Evesham Solar Quadro Q6700
£2,199 ★★★★½
Reviewed May 2007
www.evesham.com
Good-quality components and fast performance combine to create a decent system.

3

PC Nextday Zoostorm 2-3305 Versatile PC
£499 ★★★½
Reviewed May 2007
www.pcnextday.co.uk
One of the cheapest Vista Home Premium desktops currently available

GRAPHICS CARDS

SUB £200

1

Gainward Bliss 6800GS GLH
£176.19 ★★★★★
Reviewed July 2006
www.overclockers.co.uk
A terrific graphics card for those who like to dabble with overclocking.

2

3D Fuzion Geforce 7600GS
£75.20 ★★★★☆
Reviewed November 2006
www.novatech.co.uk
A good value card for those on a tight budget.

3

Sapphire Radeon X1600 XT Ultimate
£110 ★★★★☆
Reviewed September 2006
www.sapphiretech.com
Not totally fan free, but still one of the quietest cards around, and performs well.

£200-£349

1

Gecube Radeon X850XT Uniwise
£269.97 ★★★★★
Reviewed May 2005
www.gecube.com
A single-slot design using Gecube's own cooling system, and it offers good performance.

2

Gainward Bliss 7800GT GLH
£244.89 ★★★★☆
Reviewed July 2006
www.overclockers.co.uk
A little expensive, but this card has plenty of overclocking potential.

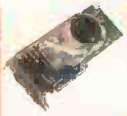
3

Powercolor Radeon X850XT Platinum Edition
£320 ★★★★★
Reviewed July 2005
www.powercolor.com
Based on ATI's fastest Radeon processor, this card will run the latest games with ease.

4

Gecube X850XT Platinum Edition Uniwise
£307 ★★★★☆
Reviewed January 2006
www.gecube.com
High-end performance and quiet cooling for AGP motherboards.

£350+

1 

ECS N8800GTX-768MX
£411 ★★★★☆
Reviewed April 2007
www.ecs.com
The fastest graphics card we've tested, but you'll need a similarly fast CPU.

2

EVGA E-Geforce 8800GTX KO ACS3 Edition
£469.99 ★★★★☆
Reviewed May 2007
www.evga.com
An overclocked beast of a graphics card.

3

Foxconn FV-N88XMAD2-OD
£397 ★★★☆☆
Reviewed www.pcw.co.uk/2184289
www.foxconn.com
High-end graphics card, though slightly faster 8800GTX models are available.

HOW TO BUY

Most graphics cards are based on either the Nvidia Geforce or ATI Radeon family of chips. Each has its strengths and both offer state-of-the-art image acceleration and comparable features.

Performance improves as you move up a range. Top chips offer more features and draw more pixels or textures in a single pass than cut-down, lower-cost options. All current graphics processors are fine for office work, but hardcore gamers favour Nvidia's Geforce 7800 or new 8800 series and ATI's latest X1950 XTX card.

There are usually three clock speeds quoted (in megahertz). Core clock is the internal speed of the graphics processor. Memory speed (or memory clock) is the speed of data transfer between the graphics card's onboard memory and the graphics processor. Ramdac speed is the capability of the digital-to-analogue converter that provides the graphics output from the card.

Graphics cards use their own dedicated video memory to store data, images and textures. The more you have, the better the performance. A card with 64MB is fine for office tasks, but we recommend at least 256MB for the latest games and video applications.

About £40 will buy you a Geforce FX 5700 or Radeon 9550 card with 256MB of Ram, which is good for 2D action/strategy games, image editing and less demanding 3D games.

To play 3D action games smoothly, you'll need to spend around £150 on your graphics card. Serious gamers should consider the Geforce 7800GTX or Radeon X1900 XTX at around £300. If you're really after top performance, opt for a Geforce 8800GTX, but expect to pay more than £400.

Depending on the motherboard, you'll need an AGP or PCI Express graphics card. PCI Express is the newest interface standard, offering up to double the bandwidth of an AGP eight-speed slot for even faster and more complex graphics. Both ATI and Nvidia offer PCI Express versions of most of their cards. Nvidia also has SLI (Scalable Link Interface) technology, which lets you use two PCI Express graphics cards in SLI-enabled motherboards for ultimate performance. ATI's rival technology, Crossfire, is an alternative.

Look for support for both analogue (VGA) and digital (DVI) displays, and S-video and composite video outputs for use with TVs. Some 'all-in-one' cards have a built-in TV tuner and video-capture options, so you can save money, rather than buying separate cards.

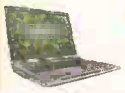
NOTEBOOKS

1

Samsung NP-Q35T006/SUK
£1,056.32 ★★★★☆
Reviewed March 2007
www.samsung.com/uk/
A portable powerhouse with exceptional battery life.

2

Mesh Pegasus S271
£799 ★★★★☆
Reviewed March 2007
www.meshcomputers.com
A good, solidly built all-round notebook with decent battery life.

3 

Evesham Voyager C720DC
£1,499 ★★★★☆
Reviewed November 2006
www.evesham.com
A super-fast notebook with Intel's new mobile Core 2 Duo processor.

4

Rock Xtreme CTX Pro
£1,807.75 ★★★☆☆
Reviewed February 2007
www.rockdirect.com
Rock debuts Nvidia's Geforce Go 7950GTX mobile graphics.

5

ACI Matrix 1500 notebook
£1,198.50 ★★★☆☆
Reviewed May 2007
www.aciplc.com
Solid performance in an uninspiring chassis.

HOW TO BUY

Notebooks have caught on like wildfire with consumers, thanks to plummeting prices and massive marketing campaigns. However, there are so many options that it's easy to get confused.

Decide why you want a notebook. Is it for occasional use, running some office applications and accessing the internet and email? If so, then almost any low-cost notebook will do the job. If it's for playing games or running video-editing software, look for a notebook with a large 15in/17in screen - possibly widescreen - a high-end Nvidia or ATI graphics chip, 1GB of memory and an 80GB (or bigger) hard disk. In the low-cost arena, Intel has its Mobile Celeron chip and AMD has Sempron. In the mid-range/high-end space, there are Intel's Core Duo models, while AMD offers Mobile sempron alternatives.

For the best in performance with power-saving technology, go for Intel's Core 2 Duo or AMD's Turion 64 processors. Intel currently leads the way with its Core 2 Duo models and, if you're looking for top performance, you should opt for one of these.

Any notebook you get should have in-built Bluetooth and Wifi connectivity, an 80GB hard disk drive, 512MB of Ram, 14-15in screen, USB2 or Firewire ports, DVD/CD-RW combo drive and three to four hours' battery life.

MOTHERBOARDS

SUB £100

1 **ECS PF88**
£64.63 ★★★★☆
Reviewed August 05
www.ecs.com.tw
The PF88 is feature-packed and compatible with both Intel and AMD processors.

2 **Aopen i915GMm-HFS**
£79 ★★★★☆
Reviewed July 05
www.aopen.com
The HFS makes the ideal platform for building a quiet, power-efficient Intel PC.

3 **Asus A8N-SLI Deluxe**
£98 ★★★★☆
Reviewed April 05
www.asus.com
A good, all-round AMD SLI board, packed with plenty of features.

4 **ECS 915-A**
£61.81 ★★★★☆
Reviewed June 05
www.ecs.com.tw
All the features you'd expect from a modern Intel-based motherboard and outstanding value for money.

5 **Gigabyte GA-M61VME-S2**
£39 ★★★★☆
Reviewed Winter 06/07
www.giga-byte.com
Building a cheap, quiet PC for your granny? Job done.

6 **ECS RS485M-M**
£43.06 ★★★★☆
Reviewed January 07
www.ecs.com.tw
Good budget motherboard for PC builders with home theatre in mind.

7 **Epox 8HDA3+**
£79.92 ★★★☆☆
Reviewed July 04
www.epox.com
An AMD board that stands out from the crowd thanks to its dual Lan and external Sata support.

£100+

1 **Gigabyte GA-965P-DQ6**
£164.44 ★★★★☆
Reviewed October 06
www.giga-byte.com
A decent Core 2 Duo motherboard that's loaded with overclocking features.

2 **Asus M2N32-SLI Deluxe Wireless Edition**
£136.59 ★★★★☆
Reviewed www.pcw.co.uk/2156925
www.asus.com.tw
This is one of the new motherboards to support the AMD AM2 socket.

3 **Intel D975XBX2**
£180 ★★★☆☆
Reviewed February 07
www.intel.com
The first quad-core motherboard from Intel is a good all-rounder.

HOW TO BUY

The motherboard dictates the type of processor you can use, how well the components communicate, the features on offer and upgrade potential. About £70-£100 gets you the recent technologies, but you can spend upwards of £200.

We recommend Intel Core Duo/Core 2 Duo or Athlon 64/FX processers for an all-round system.

Divided into northbridge and southbridge, the chipset on a motherboard handles the communication between all the components and dictates the features on offer.

Today's motherboards mainly use DDR or DDR2 Ram.

Fit dual in-line memory modules (Dimms) in pairs if the chipset supports dual-channel operation as this will boost performance speeds.

The latest boards support both older IDE and new, faster serial ATA (Sata) hard disks. Check there are enough connectors available for both of these types.

Some chipsets provide Raid support so data can be spread across two drives. SCSI controllers are found on more expensive boards, or can be added with expansion cards.

Also important is the number of USB2 and Firewire sockets for add-ons. Look out, too, for onboard Ethernet networking (Gigabit Lan is now common), integrated graphics and onboard sound.

DIGITAL MUSIC PLAYERS

1 **Sony NW-S706**
£180 ★★★★★
Reviewed April 2007
www.sony.co.uk
Sony's superbly stylish player threatens to outperform the competition.

2 **Sandisk Sansa e280**
£149 ★★★★☆
Reviewed March 07
www.sandisk.co.uk
Great range of features for a very reasonable price.

3 **Samsung YP-T9**
£149 ★★★★☆
Reviewed May 2007
www.samsung.co.uk
A strong 4GB rival to Apple's Nano.

4 **Netac A200**
£69.99 ★★★★★
Reviewed www.pcw.co.uk/2162508
www.netac.co.uk
Broadcast your tunes directly to an FM radio with this compact portable media player.

5 **Maxfield Max-Ivy**
£125 ★★★★☆
Reviewed www.pcw.co.uk/2173471
www.maxfield.de
A super-sleek player takes on the Apple iPod nano.

HOW TO BUY

There are two main categories of mp3 player: Flash memory-based players, which go up to 8GB; and mini hard drive-based models, which can be up to 80GB. Prices for a 256MB player start as low as £20, rising to about £250 for an 80GB player. Although hard disk-based players offer more capacity, flash-based models tend to be more robust since they have no moving parts. In terms of songs, the difference is the ability to hold around 80 tracks on 256MB player and 20,000 on an 80GB model. Ensure whatever you buy supports playback in different formats. The ability to listen to FM radio and record voice is also a bonus. Most importantly, check the battery life.

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Silentium T1 PRO Case with 500W PSU
Mft Code: AC-CASE-T1P
YOYO Code: 74892
£56.26 INC VAT

Aluminium PC-60A Plus Silver Case
Mft Code: PC-60 plus
YOYO Code: 14179
£71.96 INC VAT

SLI ATX, 650i SLI, GLAN, DDR2 800 Motherboard
Mft Code: Fatality FP-IN9 SLI
YOYO Code: 88288
£82.15 INC VAT

Socket 775 Dual DDR2 800 PCI-E Motherboard
Mft Code: AB9 QuadGT
YOYO Code: 6730
£116.47 INC VAT

Sunbeam TUNIQ TOWER 120 CPU Cooler
£28.72 INC VAT
YoYo Code: 4396

750GB 7200rpm SATA 2 Hard Disk Drive
Mft Code: ST3750640AS
YOYO Code: 4438
£203.06 INC VAT

400GB 7200rpm SATA 2 Hard Disk Drive
Mft Code: ST3400620AS
YOYO Code: 4205
£82.40 INC VAT

Core 2 Duo E6600 Socket 775 CPU
Mft Code: BX80557E6600
YOYO Code: 5142
£207.45 INC VAT

5600+ Socket AM2 2.8Ghz CPU
Mft Code: ADA5600CZBOX
YOYO Code: 8551
£209.33 INC VAT

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512Mb nVidia 7900GT PCI-E Graphics Card
ASUS
Mft Code: EN7950GT/HTDP/512M
YOYO Code: 80271
£161.95 INC VAT

8800GTX 768MB PCI-E Graphics Card
ASUS
Mft Code: EN8800GTX/HTDP/768M
YOYO Code: 4973
£382.58 INC VAT

2Gb(2X1Gb) XMS2 Dominator, DDR2 PC8500, 240 Pins Memory
CORSAIR
Mft Code: TWIN2X2048-8500C5D
YOYO Code: 80372
£247.26 INC VAT

2GB(1 x 1GB) DDR2 PC8000 Platinum XTC Memory
OCZ
Mft Code: OCZ2P10002GK
YOYO Code: 4257
£249.72 INC VAT

Aerocool Gatewatch 2 Silver Fan Controller
£25.27 INC VAT
YoYo Code: 37793

700W U35 Easycon PCI Express, SLI PSU
Tagan
Mft Code: U35
YOYO Code: 6651
£109.09 INC VAT

600W Noiseless Switching PSU
ZALMAN
Mft Code: ZM600-HP
YOYO Code: 1255
£81.08 INC VAT

Black Aluminum MicroATX Desktop Case
LIAN LI
Mft Code: PC-V300B
YOYO Code: 27142
£75.01 INC VAT

Silver Aluminum MicroATX Desktop Case
Mft Code: SST-SG01-S
YOYO Code: 5238
£77.69 INC VAT

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www.yoyotech.co.uk
YOYOtech
30 Windmill Street
Off Tottenham Court Road
London W1T 2JL

HARD DRIVES

INTERNAL

1. **Seagate Barracuda ST3750640AS**
£352.44 ★★★★☆
Reviewed August 06
www.seagate.com
An internal hard drive that provides you with a whopping 750GB capacity.

2. **Western Digital Raptor X**
£243.17 ★★★★☆
Reviewed June 06
www.wdc.com
Two 75GB platters combine to create one of the fastest non-SCSI hard drives.

3. **Seagate Barracuda 7200.8 (ST3400832A) 400GB**
£186.96 ★★★★☆
Reviewed July 05
www.seagate.com
This massive 400GB drive offers impressive capacity and an 8ms seek time.

4. **Hitachi Deskstar 7K250 (250GB Sata150)**
£88 ★★★★★
Reviewed May 04
www.hitachi.co.uk
Those needing a large Sata150 drive will find this a great bargain.

5. **Samsung Spinpoint P120S**
£80.11 ★★★★☆
Reviewed February 06
www.samsung.co.uk
This isn't the fastest drive on the market, but it is extremely cool and quiet.

EXTERNAL

1. **Maxtor Onetouch II Firewire 800 300GB**
£179 ★★★★★
Reviewed November 05
www.maxtor.com
A good-quality 300GB USB and Firewire hard drive that comes with backup software.

2. **Western Digital My Book Essential Edition**
£149 ★★★★☆
Reviewed June 06
www.wdc.com
A stylish external hard drive, but it lacks a network option.

3. **Lacie Safe Mobile Hard Drive 80GB**
£149 ★★★☆☆
Reviewed December 05
www.lacie.co.uk
Featuring a fingerprint reader for security, this 80GB external hard drive would suit business users.

4. **Buffalo Linkstation 120GB**
£240 ★★★★☆
Reviewed October 04
www.buffalotech.com
If you want easy-to-use external network storage, this is a great choice.

5. **Buffalo Ministation HD-PHS40U2/UC**
£70 ★★★★☆
Reviewed April 06
www.buffalo-technology.com
This 40GB portable hard drive includes shock protection to minimise the risk of data loss.

HOW TO BUY

If you're building a high-performance system, buy the fastest drive you can afford. If you just want lots of capacity then slower drives offer better value.

The transfer rates in today's Ultra ATA drives are 100Mbytes/sec (133Mbytes/sec for Maxtor drives), while Sata (serial ATA) drives are rated at 150Mbytes/sec. Check the seek times, spindle speed, buffer size and the areal density of the platters (disks).

The larger the buffer (cache), the more recently written or stored data is held in the drive's memory, resulting in less time seeking the data on the disk.

Areal density is the amount of data stored on a given area of a drive's platter. The more data per square centimetre (gigabytes per platter), the less disk movement is required to bring it under the heads.

Faster Sata drives are more expensive than parallel ATA. Sata uses two pairs of high-frequency cables, working at low voltage.

SCSI drives are technically no different to ATA drives, but support up to 16 devices on a single channel, and you can have multiple channels in a PC.

Most motherboards support Raid (Redundant Array of Independent Disks), which connects multiple drives to improve performance or provide fault tolerance.

DVD DRIVES

1. **NEC ND-4551A**
£35 ★★★★★
Reviewed May 06
www.nec.co.uk
An excellent DVD drive supporting every format and Labelflash technology.

2. **Pioneer DVR-110 Supermulti**
£40 ★★★★★
Reviewed March 06
www.pioneer.co.uk
Supports all major formats, including DVD-Ram. Good value for money.

3. **Toshiba SD-R6472**
£83.42 ★★★★☆
Reviewed September 05
www.span.com
A slimline dual-layer DVD writer that performs well and is perfect for small form factor PCs.

4. **Philips DVDR16LSK**
£59.99 ★★★★☆
Reviewed October 05
www.philips.co.uk
An excellent Lightscribe-capable dual-layer DVD burner that's very keenly priced.

5. **LG 12X Super Multi DVD**
£116.99 ★★★★☆
Reviewed January 05
www.lge.co.uk
Good-value external USB2/Firewire rewriter with all-format media support.

HOW TO BUY

DVD burners can be divided into internal and external drives. Internal drives are cheaper, but require a level of knowledge so you can install them yourself. External drives can be hooked up simply via USB2 or Firewire.

Make sure your drive supports DVD+R, DVD+RW, DVD-R and DVD-RW discs. Newer double and dual-layer drives can write to new discs that can store 8.5GB. This is useful for backing up your DVD movie collection.

The dual-layer drives cost little more than single-layer drives, so are a good investment. The same cannot be said for the cost of dual-layer discs. A branded, dual-layer 8.5GB disc will cost about £3.75.

PRINTERS

PHOTO PRINTERS

1. **HP Photosmart Pro B9180**
£499 ★★★★★
Reviewed March 07
www.hp.co.uk
A range of powerful features makes this printer a force to be reckoned with.

2. **Canon Pixma IP6700D**
£149 ★★★★☆
Reviewed January 07
www.canon.co.uk
A very competent printer, with the added bonus of an auto-duplex feature.

3. **Canon Selphy CP730**
£170 ★★★★☆
Reviewed January 07
www.canon.co.uk
A simple-to-use dye-sublimation printer that produces good photos.

4. **Epson Stylus Photo R360**
£149.99 ★★★☆☆
Reviewed January 07
www.epson.co.uk
A good choice if you want to use an LCD control panel, with great-quality prints.

MULTIFUNCTION DEVICES

1. **Canon Pixma MP800R**
£329 ★★★★★
Reviewed July 06
www.canon.co.uk
A capable MFD with built-in wireless networking that's easy to set up and use.

2. **Brother MFC-440CN**
£179.99 ★★★★☆
Reviewed February 07
www.brother.co.uk
A mid-range entry from Brother's new all-in-one range.

LASER PRINTERS

1. **Oki B2500 MFP**
£149 ★★★★☆
Reviewed March 07
www.oki.co.uk
Expensive toner, but a low RRP and great print quality.

2. **HP Color Laserjet 2605dn**
£299 ★★★★★
Reviewed September 06
www.hp.com/uk
An affordable colour laser that would benefit any small business.

3. **Samsung CLP-300**
£179.99 ★★★★☆
Reviewed February 07
www.samsung.co.uk
Samsung combines inkjet-like convenience with laser-quality documents.

4. **Brother MFC-8860DN**
£527.58 ★★★★☆
Reviewed November 06
www.brother.co.uk
Fax, copy, print and colour scanning combined in a laser multifunction device.

HOW TO BUY

If you don't need colour, consider a monchrome laser or LED printer. The latter tend to be cheaper.

If you print hundreds of pages a week, a laser is cheaper and more reliable for high-volume printing. If you print a few pages a month, buy a cheap colour inkjet.

Look for the manufacturer's quoted 'duty cycle' – how many pages a month the machine can handle.

Quoted printer speeds often refer to the speed the printer pushes a blank sheet of paper through the mechanism; for documents they refer to lower quality settings. Our tests use real documents and photos, giving a better idea of print speed.

For serious inkjet photo printing, consider higher end models that use six, seven or eight colour cartridges.

Some 'convertible printers' use four separate black cartridges for longer life mono printing, and you can replace three of them with cyan, magenta and yellow cartridges for colour printing.

Laser models often have a large number of paper-handling options. They're usually modular so you can add features as required.

The quality and usability of the driver software is vital. Check our reviews and online forums (**www.pcw.co.uk/forums**), and read the manufacturer's technical support site for any known problems.

TV TUNERS

1. **Terratec Cinergy Hybrid T USB XS**
£89 ★★★★☆
Reviewed June 06
http://en.terratec.net
A dual-format USB TV tuner, complete with remote control and portable aerial.

2. **Elgato EyeTV**
£69.95 ★★★★☆
Reviewed November 06
www.elgato.com
A digital TV receiver and recorder for Mac OSX.

3. **Twinhan Magic Box**
£69.99 ★★★★☆
Reviewed August 05
www.twinhan.com
A stylish external USB2 tuner with good software and an attractive price.

4. **Terratec Cinergy 400 TV**
£89.99 ★★★★☆
Reviewed March 05
http://en.terratec.net
A PC Card-based analogue tuner with good software. It's a great buy for laptop users.

5. **Kworld Dual TV Tuner DVB-T 220**
£49.99 ★★★☆☆
Reviewed October 06
www.kworld.com.tw
This device provides one analogue and one digital tuner at a decent price.

HOW TO BUY

Internal TV tuners require a PCI slot. External options connect via USB and are easier to set up. Hi-speed USB2 is often needed and devices typically require Windows ME, 2000 or XP.

A Freeview digital tuner offers the best channel choice, picture and sound, but may need an outdoor aerial (check **www.freeview.co.uk**).

Digital tuners record to disk for maximum quality; analogue signals need to be digitally encoded – look for mpeg2 hardware for real-time video and audio encoding.

Most analogue systems let you capture video from a VCR or camcorder. Look for composite or S-video connectors and stereo phono inputs.

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G15 Keyboard with GamePanel
Logitech
Mft Code: 967599-0120
YOYO Code: 2428
£54.62 INC VAT

MX Revolution Cordless Mouse
Logitech
Mft Code: 931689-0120
YOYO Code: 30860
£57.82 INC VAT

22" WideScreen 2ms TFT Monitor
ASUS
Mft Code: MW221U1
YOYO Code: 6510
£262.38 INC VAT

32" 8ms HD Ready LCD TV + Remote
MIRAI
Mft Code: DTL-532W100
YOYO Code: 4727
£407.48 INC VAT

Universal UPS 1200VA with USB & Serial Interface
BELKIN
£126.61 INC VAT
YoYo Code: 71837

Joystick Flight Control System USB
Saitek
Mft Code: PS28
YOYO Code: 50750
£72.59 INC VAT

Labs Sound Blaster X-Fi Elite Pro
CREATIVE
Mft Code: 70SB05500200
YOYO Code: 2068
£215.60 INC VAT

Creature II Aluminium 2.1 Speaker
JBL
Mft Code: CREATUREIIALU
YOYO Code: 91132
£53.78 INC VAT

Z-5500 Digital 5.1 505W RMS Speaker
Logitech
Mft Code: 970115-0120
YOYO Code: 9710
£215.55 INC VAT

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IN STORE
YoYoMan
tel: 08700 27 11 26
www.yoyotech.co.uk
YOYOtech
30 Windmill Street
Off Tottenham Court Road
London W1T 2JL

MONITORS

20IN

1

Sony MFM-HT205
£649 ★★★★☆
Reviewed June 06
www.sony.co.uk
An elegant widescreen multimedia monitor, with superb image quality and a built-in TV tuner.

2

Belinea 10 20 30W
£319.99 ★★★★☆
Reviewed July 06
www.belinea.co.uk
A high-quality MVA panel with great specifications, but lacks a DVI port.

19IN

1

CTX W1961A
£139 ★★★★☆
Reviewed April 2007
www.ctxeurope.com
A good entry-level screen for multimedia and Vista.

2

Formac Gallery 1900 TNX
£233 ★★★★☆
Reviewed March 07
www.formac.com
Good image quality and distinctive styling.

17IN+

1

LG Flatron L1732P
£239 ★★★★☆
Reviewed February 06
www.lge.co.uk
Fast response times make this 17in panel a good choice for gamers.

HOW TO BUY

Monitor resolution is the number of picture elements (pixels) displayed on a screen. In any TFT or LCD monitor, each pixel is composed of three sub-pixels coloured red, green and blue. The number of pixels equals the 'native' resolution; a 1,024x768 TFT will have exactly that number of pixels horizontally and vertically. Users wanting 1,600x1,200 will probably need an expensive 20in model - most 19in panels are currently limited to 1,280x1,024.

Modern TFTs can be viewed from a wide range of angles vertically and horizontally, but anything over +/- 45° makes no difference in normal use. Response time is the time taken for a pixel to reach maximum brightness. Some newer monitors now have response times as low as 4ms, but 12-25ms is typical.

The ISO 13406-2 standard specifies minimum requirements for display contrast, viewing angle, brightness, reflections, flicker, contrast and defective pixels. ISO 13406-2 has stringent standards for defective pixels. Only Class I TFTs are guaranteed no defective pixels - most consumer models are Class II. Some manufacturers offer dead pixel guarantees with Class II TFTs, so check the policy before you buy.

DIGITAL CAMERAS

DIGI SLR

1

Nikon D80
£699.99 (body only) ★★★★★
Reviewed January 2007
www.nikon.co.uk
Nikon ups the ante with a 10-megapixel sensor, bigger screen and improved functionality.

PROSUMER

1

Fujifilm Finepix S9500 Zoom
£469.99 ★★★★☆
Reviewed February 06
www.fujifilm.co.uk
A serious contender to entry-level digital SLRs, with a 10x zoom and 9-megapixel CCD.

COMPACT

1

Canon Powershot A640
£329 ★★★★☆
Reviewed January 07
www.canon.co.uk
Outstanding image quality and a host of features make for an enticing camera.

2

Casio Exilim EX-770
£230 ★★★★☆
Reviewed March 07
www.casio.co.uk
A superbly stylish compact digital camera.

3

Fujifilm Finepix F31fd
£199 ★★★★☆
Reviewed April 2007
www.fujifilm.co.uk
A quality digicam complete with face-finding technology.

HOW TO BUY

In general, the higher the megapixel count of a digital camera's sensor - and the bigger the sensor's physical size - the more detailed the images. A small sensor and high megapixel count won't always produce better image quality. Four to five megapixels is good for 8x10in or larger prints. The quoted 'effective' pixels number is the camera's true megapixel resolution.

Forget digital zoom and concentrate on the optical zoom, which zooms in on the subject and produces a better-quality image. Digital zooms simply crop into the centre of the picture. Look at the selection of automatic or preset picture modes for standard shots, portraits, night shots and landscapes, plus macro modes for close-up photography.

Movie modes are not as good as a basic camcorder, but are fine for short movie clips to play on your PC. Most offer 15fps (frames per second), but some are 30fps, which means the video will be smoother. Experienced photographers will want manual controls for aperture and shutter priority, white balance and focusing. Good cameras should also provide quick and easy access to image quality, resolution and format settings.

ROUTERS

WIRELESS/MODEM

1

Zyxel P-336M
£73 ★★★★☆
Reviewed Winter 06/07
www.zyxel.co.uk
Clearly demonstrates that Super G remains a valid choice, as it is both cheap and effective.

2

Netgear 108 ADSL router
£159 ★★★★☆
Reviewed April 05
www.netgear.co.uk
If you need a Super-G router with built-in ADSL modem, this offering from Netgear is great value.

WIRELESS

1

Linksys WAG54G (wireless)
£76 ★★★★★
Reviewed August 05
www.linksys.com
This 802.11g wireless model offers advanced features for home and professional users.

2

D-Link DSL-G624M
£110 ★★★★☆
Reviewed March 06
www.d-link.co.uk
Combines Mimo technology with Super G to give faster speeds and extended coverage.

VOIP

1

Intertex IX66+ ADSL Airsip GW (wireless VoIP)
£269.08 ★★★★★
Reviewed March 05
www.intertex.se
For a small business needing multi-user VoIP telephony, the Intertex IX66+ is hard to beat.

HOW TO BUY

The router is at the heart of any home network. Costing less than £100, they are an inexpensive way to exploit the advantages of being able to share information between the computing devices in your home. A router is a simple networking device to which you connect your PCs and notebooks using a network cable. They often include built-in firewalls and other security measures, making them ideal for protecting your PCs from intruders. The router connects to your broadband modem, as long as your modem uses an RJ45 Ethernet connection - most routers don't support USB modems. Special broadband routers, also called ADSL gateways, come with built-in ADSL modems. If your broadband is provided via a cable company's set-top box, you should buy a standard router without a built-in modem. Once hooked up, your devices can share broadband as well as swap data. Wireless (Wifi) routers are increasingly popular in the home market, allowing devices to connect to the internet and each other remotely, without the need for cables - but wireless routers usually have network (Ethernet) ports to let you connect non-wireless devices.

PRODUCT INDEX

Below is a list of every product reviewed by PCW over the past three months, to help you find the full reviews quickly and easily in your back issues.

Key: ★ Editor's Choice ★ Recommended ★ Great Value All scores are out of five

	COMPANY	PRODUCT	ISSUE	SCORE
	2K Games	Sid Meier's Railroads	Mar 07	3
	Acer	PH730	Apr 07	4
★	Acronis	True Image 10 Home	Mar 07	4
	Adobe	Premiere Elements 3	Feb 07	4
	Aigo	A029	Mar 07	4
	Altar	UFO Afterlight	Apr 07	2
	Ambros	Shuttle SS31T	Feb 07	3
	Ambros	Shuttle SD32G2	Apr 07	3
	Antec	Fusion	Apr 07	4
	Asus	EN8800GTS	Mar 07	4
	Asus	Silent Knight	Apr 07	4
	Avanquest	Small Business Manager	Mar 07	2
★	AVM	Fritzbox Fon WLAN 7140	Apr 07	5
	Axis	212 PTZ	Feb 07	4
	Belkin	N1	Feb 07	3
★	Benq	PE7700	Apr 07	4
	Billion	Biguard S10	Feb 07	3
	Brother	MFC-440CN	Feb 07	4
	BT	Internet Radio	Mar 07	2
★	Buffalo	Airstation Nfiniti WZRG300N	Feb 07	4
★	Buffalo	Drivestation Duo	Mar 07	4
★	Buka Entertainment	Pathologic	Mar 07	4
	Canon	DC95r	Feb 07	3
★	Canon	Powershot A640	Feb 07	4
★	Cardscan	Cardscan Executive	Apr 07	4
★	Casio	Exilim EX-770	Mar 07	4
★	Chillblast	Fusion Tundra 6300 OC	Apr 07	4
	CMS	ABSplus Notebook Backup	Apr 07	3
	CTX	W1961A	Apr 07	4
	Dell	Dimension C521	Feb 07	3
	Dell	Poweredge 1950	Feb 07	3
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	D-Link	Web Smart Switch DES-1228	Mar 07	3
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	Evesham	Solar Creation	Apr 07	4
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★	Linksys	SPA942	Apr 07	4
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★	Meebo	Meebo.com	Mar 07	5
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	Ulead	Photo Impact 12	Feb 07	4
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★	Viewsonic	VG2230wm	Mar 07	4
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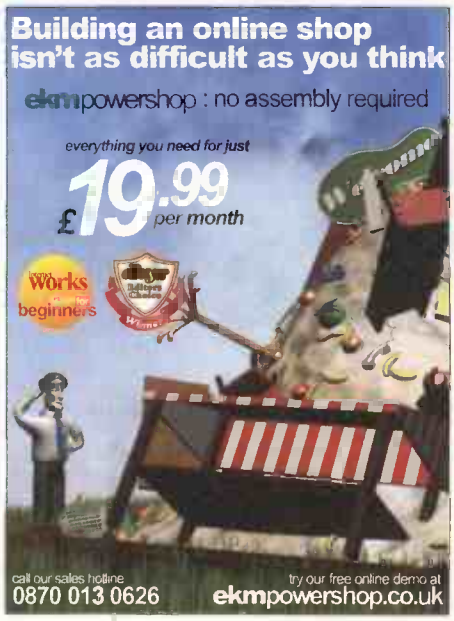

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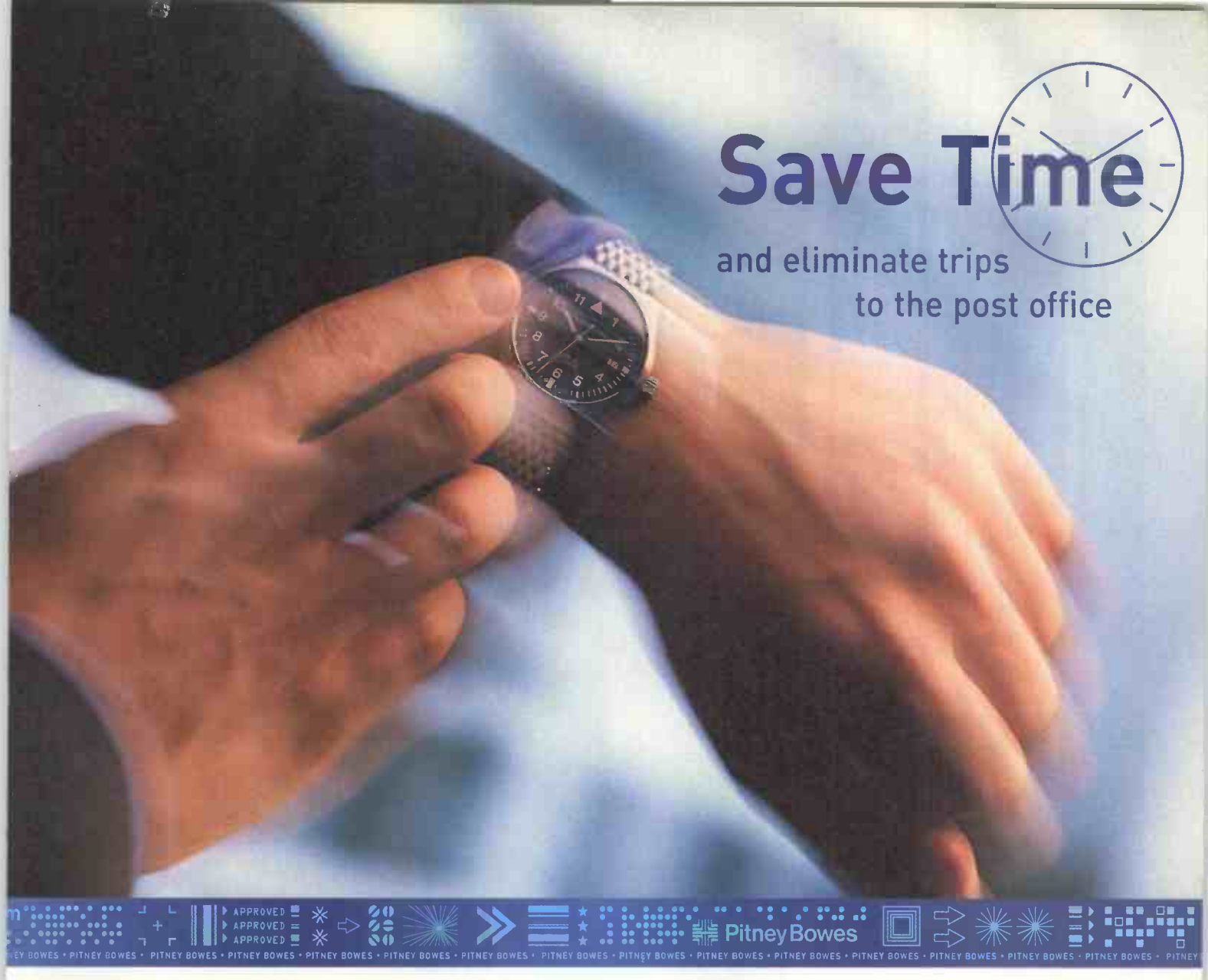

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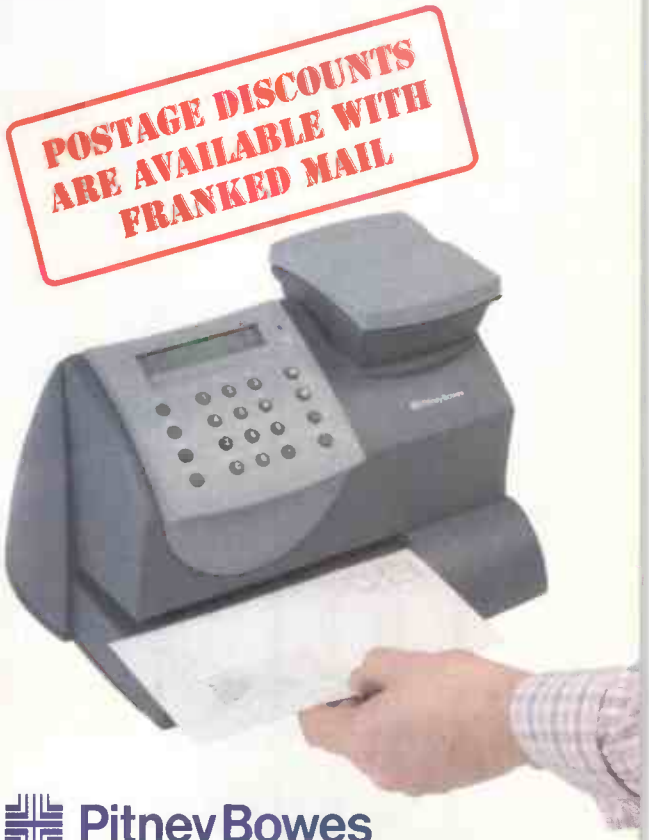

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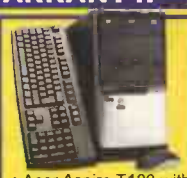

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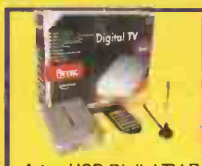

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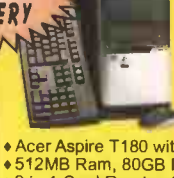

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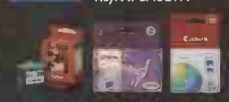

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Device compatibility

Blackberry, Nokia N series and 6600 models,Fujitsu Siemens LOOX 420, LOOX 720, T- Mobile MDA compact, MDA II, MDA III, Vodafone VPA II, VPA III, VPA compact, O2 Xda II, Xda III, Qtek 2020, HP iPAQ hx2110, iPAQ hx2410, iPAQ rx3715, iPAQ hx2750, iPAQ hx4700, iPAQ hx5150, iPAQ hx6340, Acer n30, Acer n50, Dell Axim X50, X30, Palm Zire 72 - silver, Tungsten T2, Tungsten T3, Tungsten T5, Treo 650, LifeDrive.
Please contact us direct if your model isn't shown new devices added regularly.

Bluetooth™

Operating System

Palm OS 5.2.1, 5.2.8, 5.4.5, Windows Mobile 2003 4.20.1081 (Build 13100), 4.20.0 (Build 14053), 4.21.1088 (Build 14235.2.0.0), Windows Mobile 2003 SE 4.21.1088 (Build 14132), Windows 2000/XP, Symbian and RIM

ON THE CD

Paragon Hard Disk Manager 8 SE • Internet Cleanup 4.0 • Ashampoo Magical Optimizer 1.20 • Shopfactory 6 Light • Ashampoo Magical Snap • Idigicon VHS Backup

ON THE 8GB DVD

Paragon Hard Disk Manager 8 SE • Internet Cleanup 4.0 • Ashampoo Magical Optimizer 1.20 • Shopfactory 6 Light • Ashampoo Magical Snap • Idigicon VHS Backup • Roxio Easy Media Creator 9 • Microsoft Office 2007 • Fedora Desktop 7 • Slax 6 Preview

SOFTWARE LISTING

ON THE CD

FULL VERSIONS

Paragon Hard Disk Manager 8 Personal SE
Internet Cleanup 4
VHS Backup
Ashampoo Magical Optimizer
Ashampoo Magical Snap
Shopfactory 6 Light

TRIAL VERSIONS

Adobe Lightroom 1.0
Ashampoo Burning Studio 6.5
Driver Genius Pro 2007
Internet Cleanup 5
Shopfactory 7

FROM THE MAGAZINE

Audio DVD Creator 1.9.1
DOS2USB
DOSPRN 1.7
Print Audit 5
ReadNTFS
Ulead Burn Now 1.5

FREEWARE INCLUDING

Abiword 2.5.1
Autohotkey 1.0.46.08
Belarc Advisor 7.2.8.2
Bitcomet 0.83
McAfee Site Advisor 2.3.6028
Moretunes 2.04
Ncleaner 2.2.1
Outlook on the Desktop

ON THE 8GB DVD

EVERYTHING ON THE CD PLUS...

TRIAL VERSIONS

Microsoft Office Professional 2007
Roxio Media Creator 9 Rollback Edition

LINUX & OPEN SOURCE

Damn Small Linux 3.3 RC1
Fedora Desktop 7 Test 1
Puppy Linux 2.14
Slax 6 Preview

RESOURCES

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GAME DEMOS

Freak Out: Extreme Freeride
Infernal
Runaway: The Dream of the Turtle
Sam & Max Episode 3
Sudden Strike III: Arms for Victory
Supreme Commander

USING THE COVER DISC

The PCW cover disc uses a web-browser-style interface. To get full functionality, you'll need to use Microsoft Internet Explorer (version 5.5 or later). Unfortunately, Netscape doesn't properly support this software. However, we have also provided links to the featured programs so you can still copy them to your hard disk or install them manually (the standard download dialogue box will appear). Programs can be found in the \software\folder on the disc.

STARTING THE DISC

The CD-Rom (or DVD) should auto-start. If it doesn't, double-click the CD-Rom/DVD icon in My Computer or open the terms.htm file on the root of the disc.

PROBLEMS?

Please note that we cannot give support on individual programs contained on this disc. If you have problems running the disc or any of its content, please note these guidelines:

FAULTY DISC

If the disc is physically damaged and will not load, return it to this address for a replacement: PCW May 2007, cover disc ABT, First floor, 13 Clifftown Road, Southend on Sea, Essex, SS1 1AB quoting reference: 'PCW Vol 30 No 6'.

PROBLEMS INSTALLING/ RUNNING THE SOFTWARE

Check the support page on the disc or check the manufacturer's site.

GENERAL DIFFICULTIES

Call 08700 885 995 (9.30am to 5pm Mon, Tues, Thurs & Fri; open until 8pm on Wed and 10am to 2pm Sat). Or go to www.vnusupport.co.uk or email us at pcw@vnusupport.co.uk.

For software requiring registration, PCW cannot guarantee that serial codes will be available later than three months from the on-sale date of the magazine. Please avoid disappointment by registering your software promptly.

COVER DISC

SEVEN PAGES OF INFO, INCLUDING

- PRODUCT DESCRIPTIONS
- WORKSHOPS
- UPGRADE OFFERS
- KEY FEATURES
- CONTACT DETAILS
- NEED TO KNOW

Paragon Hard Disk Manager 8 SE

All the hard drive management functionality you need in one place

Partitioning, cloning, troubleshooting, backup, recovery: keeping your hard drive running smoothly usually requires a library of tools. But, install Paragon Hard Disk Manager 8 SE, and you'll get all the hard drive functions you could need in a single, easy-to-use interface.

If you're thinking about buying Windows Vista, say, but would like to dual-boot with XP for now, then Hard Disk Manager will quickly set up a suitable partition for you. There are also tools to move or resize existing partitions, without losing data. The program can delete a partition, too, or recover one that has been deleted accidentally (this can even be done from a bootable CD, useful if your PC won't start).

Or perhaps you've decided to leave Vista for now, and spend your money on a larger, faster hard drive. Hard Disk Manager can clone your current drive onto the new one, including the boot structures, so it's immediately ready to use.

Once your new drive is installed, you might use Hard Disk Manager to keep it backed up. This quickly creates an image of the drive or partition you're copying, and can store it in a protected part of the same drive if you don't have another (assuming there's enough free space). Differential backups are also supported, speeding up the process by only saving files that have changed recently.

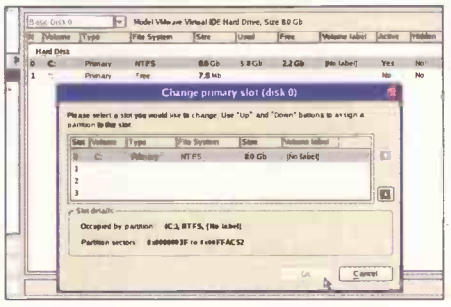
Explore the menus and you'll find plenty of other interesting functions, from speeding up NTFS drives by defragmenting the Master File Table, to converting NTFS drives to Fat32, editing hard drive sectors directly, and a lot more.

INFORMATION

System requirements Windows 98/ME/NT/2000 Professional/XP, 36MB hard disk space
Contact www.paragon-software.com
Registration http://registry.paragon-software.com/hdm8pers/

Recover from just about any data disaster with Hard Disk Manager 8 SE

1 Hard drives are generally very reliable, but it still only takes a single changed byte to prevent your PC from booting up, so it pays to be prepared. And Hard Disk Manager 8 SE can help. Start by running the Unpack & Burn wizard to create the Hard Disk Manager 8 Recovery CD, then boot from it to make sure everything's working. You should see an attractive graphical interface like the screen above.



2 If your PC won't boot in future, use the CD instead and click 'View the mounted partitions'. This will let you see if the drive can still be read, and whether or not its partitions can still be read. If there are problems, load Hard Disk Manager to fix them. You might click Partition, Undelete to recover a lost partition, say, or Hard Disk, Update MBR to rewrite a corrupted Master Boot Record.

3 Click Partition, Check file system integrity to try and fix any corrupted files, or use Partition, Retest surface to look for and block off faulty areas of the hard drive. If these still don't help, then you might also try restoring the partition or hard drive from your last backup. And if all else fails, use the File Transfer Wizard to recover key files and burn them directly to CD or DVD.

UPGRADE OFFER

NEW FEATURES

- Synchronous backup support
- Convert dynamic disks to basic disks
- Backup/Restore dynamic volumes
- Email notifications
- Disk wiping operations
- Microsoft Volume Shadow Copy Service

PARAGON HARD DISK 8 PROFESSIONAL

If you're a system professional, you may want to ugprade to Paragon Hard Disk Manager 8 Professional, which offers automated notification support, the ability to back up a dynamic drive, synchronous backup support and much more. As a user of the Personal Edition, Paragon is offering 30 per cent off the retail price. To place your order, head to **www.paragon-software.com**, add Hard Disk Manager 8 Professional to your cart and enter coupon code **VNUHDM8Off**.

Internet Cleanup 4.0

Securely erase your internet tracks with this versatile privacy tool

Installing a firewall, anti-virus tool and spyware detector will help keep your data safe from snoopers, but there's another avenue of attack you might want to consider. Anyone who gains access to your PC can learn a great deal about you from the tracks your internet software leaves behind: user names, passwords, credit card numbers used in web forms, cookies, cache, history files, the list goes on. And while you can delete many of these directly from the browser, using a specialist tool such as Internet Cleanup 4.0 makes a lot more sense.

Clear your cookies from within Internet Explorer, for instance, and you'll lose them all: it's very indiscriminate. Internet Cleanup 4.0, on the other hand, recognises there are 'good' cookies you want to keep, perhaps because they hold logon information for your favourite sites. It lets you protect cookies like this, then delete all the others, so you can safely erase tracking cookies without having to re-enter user names and passwords wherever you go.

Deleting cookies, history or cache files from within a browser isn't very secure. Intruders can use a simple Undelete tool to restore old files. Internet Cleanup 4.0 gives you the option to securely delete information, overwriting it multiple times, ensuring that it really has gone for good.

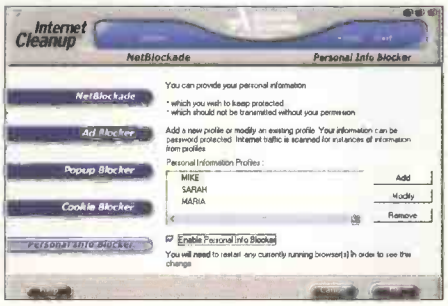
Internet Cleanup also has a simple but effective spyware detector, a tool for password-protecting the files and folders of your choice, and an ad, pop-up and cookie-blocker, which aims at minimising the junk that ends up on your PC in the first place.

INFORMATION

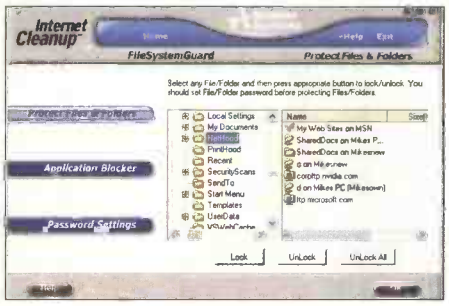
System requirements Windows 98/ME/2000/XP, 50MB hard disk space, IE 5.01 or later
Contact www.allume.com
Registration To get your serial code, visit **www.allume.com/cgi-bin/freeallume.cgi?cleanup4-vnu**

Three easy, effective ways Internet Cleanup can protect your privacy

1 Internet Cleanup defaults to wiping your browser cache and history when requested, but most other options must specifically be enabled. If you'd like to remove Instant Messenger message histories and downloaded files, for instance, click Settings, Instant Messenger, select any programs you use, then check 'Secure Delete Files'.



2 Click Net Blockade, Personal Info Blocker for another interesting option. Add personal information such as phone or credit card numbers, names or addresses to the list, and the program will monitor internet traffic for these items, not letting them through without your permission.



3 Internet Cleanup is also capable of password-protecting folders. Click Filesystemguard, Password Settings, and enter a password. Now click Protect Files & Folders, navigate to the folder you'd like to keep safe, click it and select Lock. Enter your password and the folder won't be accessible to anyone, until you unlock it from the program.

UPGRADE OFFER

INTERNET CLEANUP 5.0

NEW FEATURES

- Block spam and phishers
- Generate and protect passwords
- Safely and easily fill out forms
- Protect against keyloggers
- Remove hidden IE preferences
- Clean across networks

The latest version of Internet Cleanup comes with a collaborative spam blocker, keeping your Inbox free of junk mail and phishing scams. Personal details such as phone numbers, addresses or account information are held in a private encrypted vault, where they can be used for automated form filling, defeating keyloggers. There are more cleaning options throughout the program, and now you can clean all the PCs across your network from one computer: just enter the IP address, choose some cleaning options and Internet Cleanup does the rest. The list price for all this is $29.99 (about £16), but you can upgrade for only $14.99 (about £8). To upgrade, head to **www.allume.com/store/vnu-upgrades.html**.

Ashampoo Magical Optimizer 1.20

A hassle-free way to clean up your PC

As a *PCW* reader you're probably very knowledgeable about Windows, skilled in the art of PC optimisation, and have a wide collection of tweaks you can apply to get your system running at peak performance. But you'll also know that these speed gains won't last for long. As soon as you go back to using your regular applications, or using new ones, they'll begin to clutter your system with orphaned Registry entries, 'temporary' files that have long outstayed their welcome, and a bulky browser cache. You need help, fast.

Ashampoo Magical Optimizer aims to assist by combining three automated system cleaning functions into one program, and so giving your PC a complete spring clean in a couple of clicks. This starts with the Registry cleaner, which checks for and removes orphaned Registry entries. It's a great way to clear up what messy uninstall programs have left behind.

The second module is the Drive Cleaner, which looks for and deletes redundant files all across your PC. You can configure exactly which files are deleted, as well as excluding particular files or folders from the scan, in the Magical Optimizer preferences.

The final module is the Internet Cleaner, which removes the browser cache, cookies and history for Internet Explorer, Firefox or Opera.

Although you could run each module separately, Ashampoo provides a One Click Optimization shortcut on the desktop. Launch this, then Magical Optimizer will start up and clean your entire system in one go.

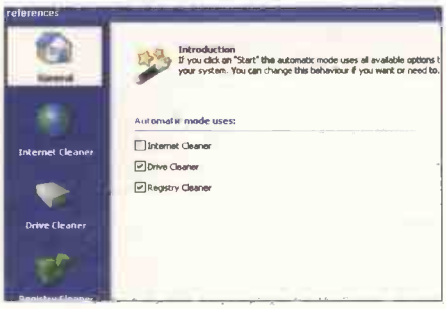
INFORMATION

System requirements Windows 2000/XP/Vista, 1MB hard disk space

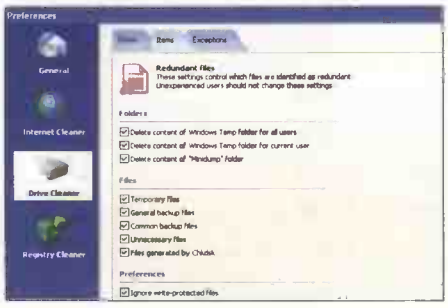
Contact www.ashampoo.com

Registration Leave 'Get full version key' checked during installation or click 'Get Full Version' on the splash screen

The 'set it and forget it' guide to PC optimisation



1 Launch Ashampoo Magical Optimizer, then click Options, Preferences, General. If you don't always want to perform a particular optimisation, perhaps the Internet Cleaner, then clear the box next to it. You'll still be able to run this later, by clicking Manual Mode, Internet Cleaner, but it won't be included in the automated optimisation scan.



2 Now click one of the tabs relating to an optimisation you are going to run, and configure it to suit your needs. Drive Cleaner, for instance, lets you choose the drives you want to scan, the items you'd like to delete (temporary files, backup files and more), and even configure exceptions, files or folders you'd like Ashampoo Magical Optimizer to ignore.

3 Click OK, Automatic button to run the tests you've configured. Or, in the future, just launch the One Click Optimization shortcut you'll find on your desktop. And that should be it, but if a Registry entry is removed in error, launch the program, click File, Show Backups, and double-click on the last backup file to restore your previous Registry settings.

UPGRADE OFFER

ASHAMPOO WINOPTIMIZER 4

NEW FEATURES

- Fast, efficient disk defragmenter
- Tweak 450+ Windows settings
- Encrypt and decrypt files
- Customise your desktop
- Control Windows processes
- Disk space explorer

Ashampoo Winoptimizer 4 takes the cleaning tools of Magical Optimizer, and extends them with new features, such as the ability to detect duplicate Dlls. It then adds a tool allowing you to tweak more than 450 Windows settings from a single, simple interface. Security features include file encryption and secure deletion, the Visual Styler lets you customise the look of your desktop, and there's a speedy disk defragger thrown in, too. But best of all, while Ashampoo Winoptimizer 4 usually costs £29.99, as a registered owner of Magical Optimizer you need only pay £7.99. Click Internet, Upgrade to Ashampoo Winoptimizer 4 to buy.

Shopfactory 6 Light

Make money online with your own internet store

While the high street struggles, internet shopping is booming, rising from a feeble two per cent of all retail sales in 2002 to a predicted 15 per cent by the end of this year. Millions of households are online every day looking for bargains, so if you'd like a share of their cash, there's no better time to create your own online store. Shopfactory Light makes it easier than you could imagine.

You don't need any web design skills, for instance. The program comes with 23 built-in professionally designed templates. They can be easily customised later to add a logo, your company colours, or other touches.

You don't need to know anything about SQL, databases or PHP, either. Shopfactory builds everything you need from simple HTML pages, which also means there are no special requirements for your server to fulfil. You'll be able to run your store on just about anything, even free space provided by your ISP, just as long as it accepts FTP uploads from the integrated publisher.

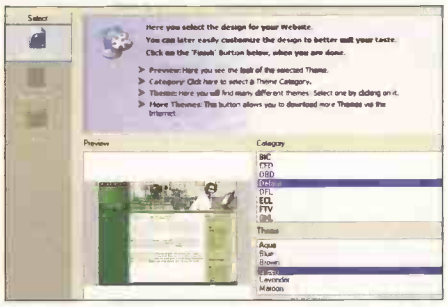
The static HTML pages mean you'll do better with the search engines, too, as it's much easier for them to index your site.

There's still plenty of work to do, entering details of up to 50 products, sorting out shipping charges, deciding on discounts, and sorting out a payment method (your store is compatible with Paypal, ideal, Globecharge, Worldpay and many more). But even here Shopfactory makes setup as easy as it can, ensuring you'll soon be online and dealing with your first customers.

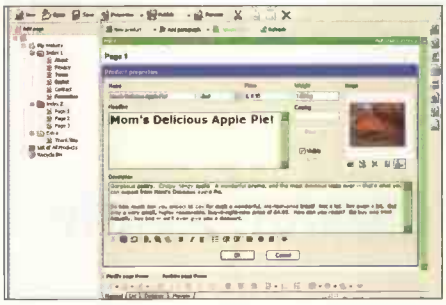
INFORMATION

System requirements Windows 98/ME/2000/NT/XP, 100MB disk space, 256MB Ram, IE 6
Contact www.makemeashop.com
Registration http://www.makemeashop.com/covermounts/vnu
Need to know Your store may contain a maximum of 50 products and 25 pages

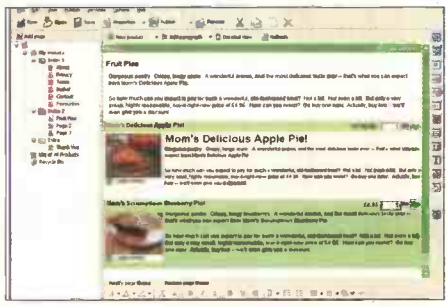
The easy way to get started in online retailing



1 Launch Shopfactory, then click Next to begin the Website Startup Wizard. Enter a name for your shop, and click Next. Browse through the templates listed in the Category to look for a design that appeals, then pick a colour scheme in the Themes box. Don't worry if it's not exactly what you want, you can customise the design later. Click Finish.



2 The left-hand window shows your site as a tree. 'Index 1' shows standard pages, such as 'About us', 'Privacy' and 'Terms': double-click on the name of each and enter the text appropriate for your site. Index 2 will act as the first category for products. Enter text on that page in the same way. Click on Page 1, select New product. Detail your first product.



3 Right-click Page 1, select Page Properties and give it a title. Type an introduction to your products. Click OK. Click on New Product while in the same page, and add another product or two, until you can see the site building up. Select the Preview tab to see how the page will look in a browser, and click View, Live Help for extra advice.

UPGRADE OFFER

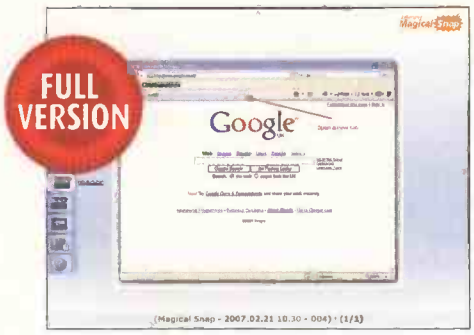
SHOPFACTORY 7 LIGHT

NEW FEATURES

- New themes with Flash support
- Point-and-click theme customisation
- Discount and gift voucher support
- Real-time shipping charge calculation
- Export order data via XML
- Improved search engine optimisation

The latest Shopfactory produces sites that look better than ever, some even with Flash support for smarter navigation. And if you're not quite happy, point-and-click theme customisation makes it easy to customise the shop to suit your needs. There's more help with promotion, including support for discount or gift vouchers. Orders can be exported to interface with business software such as Safe Line 50, and improved search engine optimisation features should keep the customers coming. Upgrade and save 40 per cent. For more information, register Shopfactory 6 Light and you should receive an email with the upgrade offer.

Ashampoo Magical Snap



INFORMATION

System requirements Windows 2000/XP/Vista, 10MB hard disk space
Contact www.ashampoo.com
Registration Leave 'Get full version key' checked during installation, then click Configure the Capture, Internet Menu, Get full version for free.

Magical Snap provides a range of tools to edit and annotate any screengrabs it takes

The Windows PrtSc function is a simple and effective way to take screengrabs, but it's not exactly versatile: press PrtSc to get the full screen, Alt+PrtSc to get the active application window only, and that's about it. You can get by with this if you're willing to edit the image later, but we have a much better idea.

Launch Ashampoo Magical Snap and it adds a small panel to the top of your screen. When you're ready to take a grab, move your mouse to the panel so it drops down, then click 'Start the capture'. Then draw a box around the area you want to capture, choose a full screen or application window, then capture it with a click.

If you've told Magical Snap you'll be taking multiple snapshots, then just carry on using your application, taking new grabs as required.

Once you have finished your captures, Magical Snap takes you into an Edit mode. Toolbars tucked away at the left, right and top of the screen let you resize an image, rotate it, crop or cut a selection and more. There are annotation tools (highlight, erase, draw, add a caption or arrow), and when done you can save an image, print it, copy it to the clipboard, and more. It's a surprisingly innovative and powerful tool, and if you rely on screengrabs a lot then we think you're going to love it.

UPGRADE OFFER ASHAMPOO MAGICAL SNAP 2

The very latest version of Magical Snap adds the ability to grab off-screen content, for example a complete spreadsheet that otherwise you'd have to scroll around to view. There's full support for multiple monitors, lots of new editing and annotation tools (Flip, Mirror, Drop Shadow, Pencil and more), radically improved print support, and it's now fully Vista-compatible, too. Already very reasonably priced at £6.99, you can get Magical Snap 2 for just £4.99: click Configure the Capture, Internet Menu, Upgrade to Ashampoo Magical Snap 2 to find out more.

Roxio Easy Media Creator 9 Suite

INFORMATION

System requirements Windows 2000/XP/Vista, 1GB free hard disk space, 1,024x768 display, Internet Explorer 6 or later, Windows Media Player 9 or later for Windows 2000, 10 or later for XP/Vista
Contact www.roxio.co.uk
Registration Follow instructions during installation
Need to know This Rollback edition expires after 30 days, after which it may be used for basic data and audio CD burning only

This 32-track video editor is just one of the apps you'll find bundled in Easy Media Creator 9

Easy Media Creator 9 Suite is one of the most versatile mastering packages around, with features covering all your burning and copying needs, audio file creation, editing and management, DVD creation, editing and playback, photo and video viewing and editing, backup, and a whole lot more. This special Rollback Edition lets you try out the full feature set for 30 days, then provides a core set of functions that will never expire: audio and data disc creation, and copying. This program is worth a look for these features alone.

The audio CD creator, for instance, builds your discs with just a few drag-and-drops and a mouse click or two. And it supports lots of audio and playlist file formats: mp3, Wma, Wav, Cda, M4a, Wpl, Asx, M3u, Ac3, Flac, Mpga, mp4 and Ogg. The data disk creator is just as simple, supports Blu-ray media, makes it easy to create bootable disks, supports spanning if you're saving more data than can be held on one disk.

The real fun comes in exploring the full Easy Media Creator 9 Suite features, in particular the 'extras'. Need a video editor, for instance? There's a 32-track program here with studio-quality tools and effects. A desktop publisher turns your photos into calendars, cards or posters, you can capture streaming internet radio and music in a couple of clips, and there's an excellent digital photo slideshow creator.

UPGRADE OFFER ROXIO EASY MEDIA CREATOR 9

Spend a while exploring Easy Media Creator 9 and you'll come across features such as Automix, a tool designed to generate perfect playlists. Give it one track and it will automatically pick out complementary tunes from your library, quickly producing an upbeat selection of songs for the gym, relaxing tunes for a dinner party, whatever you need. The suite is full of innovative ideas like this, but if you want to use them after your 30-day trial is up then you'll need to purchase the regular edition. The list price is £59.99. Order by clicking on Help, Purchase... or by visiting your favourite online store.

Idigicon VHS Backup

Preserve your old VHS movies for ever with this great video tool

INFORMATION

System requirements Windows NT/2000/XP/Vista, 40MB disk space, graphics card or TV tuner card with video input or other video-capture device, soundcard with Line-in, CD or DVD burner
Contact www.idigicon.com
Registration Not required

From weddings to holidays, birthdays to births, home movies are a great way to preserve the precious moments in life. At least, that's the idea. But if you've stored them on VHS tape then they may not last for as long as you'd like. Tapes deteriorate while they sit on the shelf, degrade a little every time you play them back, and can be permanently damaged if they get jammed inside your VCR. And even if you avoid such accidents, the lifetime of a VHS recording is typically only 10 to 15 years, not enough for movies you want to keep for ever.

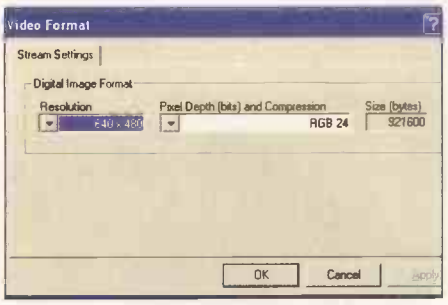
The solution? Use VHS Backup to import as many old tapes as you like onto your PC, then either burn them onto CDs in VCD or SVCD format, or save them as Avi files. You'll still need to take care – CDs have a shelf life, too – but converting them to a digital format will at least prevent them degrading further. And you'll be able to do more with them, too, perhaps emailing clips to other family members, or send them complete VCD or SVCD discs that should play on most home DVD players.

To try this out you'll need a video capture card (and suitable cables) capable of accepting the video input from your chosen video source. If you don't have one already, search for 'video capture card' at **www.pcw.co.uk/bestprices** for a selection costing from £20. Connect it to your video source (which can be webcam or camcorder as well as a VCR), launch VHS Backup, and you'll be ready to start recording in a few clicks. It's easy: preserve your most valuable movies now, before it's too late.

From VHS tape to hard disk in four simple steps

1 If VHS Backup doesn't find a video-capture device when it loads, it will not open. If you have a USB or other external video capture device, plug it in and connect it to your VCR before starting the program. If it still doesn't work, check that drivers are installed and the device works as a video source elsewhere (in Windows Movie Maker, for example).

2 Once VHS Backup recognises your source, you can choose the conversion it should perform. Conversion to Video CD (VCD) lets you burn up to 74 minutes of 352x288 video on a 650MB CD; Super Video CD (SVCD) stores about 35 minutes of 352x576 video, also on a CD; and conversion to AVI will create a video file on your hard drive.



3 If you have multiple video input sources on your system, click Source, Capture Source and choose the one you need. The Format button also lets you customise the video stream, and so here, for instance, we can choose a video resolution of 640x480. This affects the input stream to VHS Backup only. The output resolution remains whatever you chose earlier.

4 Click Next and choose whether you're saving video to hard drive or CD. If it's the latter then VHS Backup will automatically burn the video to disc. Start playing your old video tape, and click the Start button immediately to begin recording. Watch the preview window to confirm you're recording the right thing, and click Finish when you're done.

HOW TO CONNECT A VCR

If you missed our recent feature on capturing VHS to your PC, you can read the relevant part on our website at **www.pcw.co.uk/2166225**.

As mentioned above the basic item you will need is a suitable video-capture device: if you have a TV tuner card in your PC or laptop this may do just fine: they often have either an S-video or a composite video input. Some modern graphics cards also have an S-video input – check your product's manual.

If your capture device doesn't have audio inputs, you'll also need a soundcard with a line-in port to take the sound from your videos.

On VCRs the most common output is the Scart plug that connects to your TV – you might need an adapter to convert this to the same type of input as your video capture and sound devices. More expensive VCRs may have more options, such as composite video or S-video outputs.

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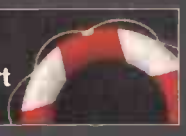

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COMPETITION

WIN! A Samsung SM226BW 22in TFT monitor

Samsung's stylish 22in Syncmaster 226BW widescreen TFT is a design marvel and is one of the first displays in the PC industry to be built to maximise the benefits of Windows Vista. And *PCW* is giving away not one, but three of these marvels, worth £270 each.

Developed in full collaboration with Microsoft, the Syncmaster 226BW has been designed to deal with the multi-tasking and increasing graphical demands placed on PCs and display technology by Microsoft's next-generation Windows Vista operating system.

Maximising the benefit of widescreen displays and boasting a 1,680x1,050 resolution, the SM226BW is a perfect accompaniment for the home PC user, or a small business preparing to upgrade to Windows Vista. Whether it's movies, games, multimedia or business applications, the SM226BW will maximise your visual experience, improve productivity and look great wherever it goes.

The Samsung SM226BW is housed in an ultra-smooth and stylish chassis that has been merged with class-leading functionality. It comes complete with glossy black bezel, swivel capabilities and tilt – which means that it not only looks great in just about any environment, but can also easily be manipulated by users to customise their view to exactly suits their needs.

The high-quality TFT screen also offers both VGA and DVI connections (the DVI output being HDCP-certified), and a mind-boggling 2ms response time. And if that wasn't enough, it is accompanied by a world-beating dynamic contrast ratio of 3000:1.

This high-tech specification makes the Syncmaster 226BW perfectly suited for multimedia users and those who want the very best in wide and digital display capabilities. For more information, vist **www.samsung-europe.com**.

For your chance to win this cutting-edge Samsung display, answer the following question and enter at **www.pcw.co.uk/competitions**. The competition opens on 22 March 2007 and closes on 20 April 2007.

What is the response time of the Samsung Syncmaster 226BW's screen?

a) 22ms
b) 2ms
c) 3000ms

This competition is open to readers of *PCW*, except for employees (and their families) of VNU Business Publications, and Samsung. PCW is the sole judge of the competition and the Editor's choice is final. Offer applies to residents of the UK and the Irish Republic only. Entrants must be over the age of 18 and only one entry per household will be accepted. Winners will be selected at random from all correct entries received. No cash alternative is available in lieu of prizes. VNU will use all reasonable endeavours to notify the winner(s) within 14 days of the close of the competition. VNU reserves the right to substitute the prize for one of greater or equal value if circumstances make this unavoidable. Prizes will be dispatched by the competition sponsor(s) and the winner(s) name(s) and address(es) will be provided to the competition sponsor(s) for this purpose. No purchase of the magazine is necessary to enter the competition. VNU will use all reasonable efforts to ensure that the prizes are as described on this page. However, VNU cannot accept any liability in respect of any prize, and any queries regarding a prize should be taken up directly with the sponsor of that prize.

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→ http://labs.pcw.co.uk → http://www.reportlabs.com/testbed

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Widescreen TFT monitors

If you're fed up with trying to squeeeze all your document windows into a tiny display, you might want to upgrade to a larger model. We've rounded up the best 22in widescreen models for you to choose from.

The future of display interfaces

The good old VGA connector has been with us for years, and even the DVI interface is getting a bit long in the tooth for modern high-resolution displays. Here's a peek into the future to see what will replace them over the next couple of years.

Hard drive megatest

Whether or not you've upgraded to Vista, hard disk space is something you can't get enough of these days. We've tested almost every hard drive on the market and put the results into a reference guide just for you.

There's lots more in June's PCW DON'T MISS IT...

MAY 2002

From the archives: Take a look at the important events in technology five, 15 and 25 years ago.

Five years ago was the heyday of bundled PC packages and we tested 10 £999 systems all featuring speakers, webcams, printers, scanners and other assorted paraphernalia. Evesham took top honours for including quality components and the best graphics card on test, an ATI Radeon 8500LE.

Andy Stewart tested Apple's undeniably attractive iMac2, the one that looked like an angle-poise lamp. He speculated that the 15in LCD attached to the frosted-white dome would be too small for most graphic designers. The 800MHz G4 processor and poor upgradeability meant the whole system was an average affair. A high price, it debuted at £1,599 in the UK, and flat sales meant that despite appearing on the front cover of Time magazine, the iMac2 was relatively short-lived, being scrapped in two years.

Finally, Intel was banging the Pentium 4 drum louder than ever this month. Its chief technology officer, Pat Gelsinger, announced that Intel would boost chip speeds at a rate of 25MHz a day and that a 4GHz Pentium 4 processor would be available in the not too distant future. The chip never saw the light of day.

MAY 1982

The cover of the May issue in 1982 featured two very odd looking fruits, the Hitachi Peach and the Apple III, both of which were called in for a bench test.

Stephen Withers reported from Australia on the Hitachi Peach and concluded that while it lacked decent documentation and needed software gaps filling, it could attract many buyers at the right price.

Dick Pountain tested the Apple III, which featured a powerful 2MHz processor and 128KB of Ram. Even though he liked the machine, he wasn't entirely convinced. "The truly user-friendly operating system is still in the future," he said.

Lara Croft wasn't even a pixel in her creator's eye back in 1982, but there were plenty of games on the market – enough for a group test in fact. Dick Olney rounded up a series of playable programs for the TRS-80 Model I, starting at what now seems an unbelieveably pocket-friendly £6.95. Star Trek 3.5, a text-based adventure game, took first place with Defend coming a close second.

MAY 1992

Perhaps the most eye-catching section of this month's magazine was a group test with the first eight laptops to feature colour displays.

By today's standards half of the machines would not qualify as notebooks since they were more luggable than portable. The performance winner was the Compaq Portable 486c which, at 15in wide, looked more like a small suitcase than a notebook computer. It didn't use batteries, but it did have a gorgeous 256-colour TFT display panel.

Dan O'Brien looked at two of the first Intel 486DX2-50 systems, from Tulip and Viglen. At first he was sceptical but the more he used it, the more impressed he became, until by the end of the review he commented: "I like this new chip."

If you found the PCs of the day a bit boring then Steve Jobs' Nextstation Turbo would have been more up your street. The two advantages of this new version were that the Motorola 68040 CPU speed had been increased from 25MHz to 33MHz, and colour graphics were now standard.

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