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## MEDIA PCs



ISSUE 212 MAR 2013

IDG | UNITED KINGDOM

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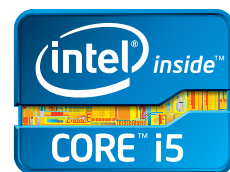
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# Perfect combination of hardware...

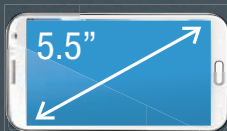
TECHNOTE  
#01

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# 5.5"

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battery to power all the features of the Samsung Galaxy Note II.

### S Pen

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# INCREASED SENSITIVITY

and responsiveness.

### Computing

With a 1.6 GHz quad-core processor and Android 4.1 (Jelly Bean) OS, the Note II is fast and responsive.



## AMAZING TOOLS FOR EXPRESSION

### Photo Note

# TREASURE YOUR MEMORIES



with handwritten notes on the back of your photos.

### Paper Artist

Transform photos into original artworks.



### Best Face



Create the

# PERFECT PHOTO

by capturing the best pose of each person.

### Idea Sketch

# VISUALIZE YOUR IDEAS

using the S Pen.



# ...and software

## MULTI-TASKING

### Multi Window

# DO TWO THINGS AT ONCE

on the same screen, at the same time.



### Air View

Preview folders without opening them.



### Popup Video

Watch videos while performing other tasks.



Samsung  
**GALAXY Note II** | Be creative



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MATT  
EGAN



# Put a PC at the heart of your digital home

**It's been 10 years, but the time for the media-centre PC has finally come**

It's a rule of Silicon Valley that the exact moment at which tech companies are at their most brilliant is the start of their decline. For every IBM that manages to parley early success into long-term Blue Chip status, there's a Silicon Graphics: one day riding high at the cutting-edge; the next, just another tech company churning out products the public no longer wants.

In technology, change is constant. So are the wants and needs of consumers: it's the means of delivering them that changes. The PC that cost you £5,000 in 1995 is less useful than the £450 box you picked up last week - but you still want it to do similar things, in better and faster ways.

We want computers to help us work more efficiently, communicate more easily, and entertain us more thoroughly. Tablets, laptops and phones now offer us these things on the move (see page 131 for our Top 5 Charts), but the position of the PC in the home is due an upgrade.

There's a battle going on for the main screen in your house. Set-top boxes and games consoles vie to be your home's main entertainment feed, while smart TVs seek to challenge the hegemony of the PC as your chief internet portal. It's an idea first espoused in the late 1980s by the founder of the aforementioned Silicon Graphics (and then Netscape), James H Clark, who predicted the internet boom with eerie precision. In those pre-PC days Clark suggested that we would all access entertainment and communications via our TVs - at the time the only viable electronics device in most people's homes.

These days, of course, many people have multiple computers of various shape and sizes, capable of accessing on-demand entertainment wherever they are. But relatively few houses take advantage of their PC through the TV screen - something that may be due to change soon.

Microsoft would love for Windows 8 to form the cornerstone of your home-entertainment experience: that's why it has grafted the interface on to the Xbox, now sells music and movies, and is pushing Windows Phone 8 and Windows RT as connected entertainment platforms. Meanwhile, Apple has Apple TV, iTunes and iPad, and Google has its own take on the connected TV concept, as well as its own media stores. They all want to provide the content for your TV screen.

I can well remember *PC Advisor* reviewing what we then called 'media-centre PCs' as long as 10 years ago. Back then, they were buggy, loud and expensive. More importantly, the amount of content available over the - mostly dialup - net was minimal.

Now TV publishers such as Sky and the BBC deliver all their standard broadcasts and more over the web, and more content is uploaded to YouTube every day than has ever been broadcast. You can access music online from myriad sources, and the gaming capabilities of a PC should never be in doubt. The web is ubiquitous, constant and fast.

A media PC could easily replace all the boxes that live under your TV, which goes a long way to justify the £700-plus asking price of such machines. Check out our media PC group test on page 72. ☒



## Reader comments



Whether it's with useful tips, pithy observations, or a good old moan, we're always happy to hear from PC Advisor readers. For your chance to appear here, keep in touch via email, our forums, comments on our news stories, and via Facebook, Google+, Twitter and LinkedIn

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### Console gaming rocks

David Jones' published letter in the previous issue praises the Windows PC as a gaming machine, with him noting that previously he had been a slave to consoles. For me, the conversion has been the other way around.

The constant crashing of Windows PCs with new games was always an issue, and it came to a head after I purchased the most powerful gaming PC I could find some four years ago. The Xbox 360: what a clever machine. A brilliant piece of marketing methodology, with quite acceptable graphics, and it never crashes. Okay, the games cost more, but I am spared the constant cost of graphics cards and remembering to update drivers. **Mike Wilson**

*The Xbox 360 has a lot going for it, Mike, but PCs offer a great deal more useful functionality in addition to gaming firepower.*

pcadvisor.co.uk

### Battle of the tablets

The Google Nexus 10, Microsoft Surface RT and fourth-generation iPad represent the best of Google Android, Windows 8 and Apple iOS. We recently compared these tablets at [tinyurl.com/ca3gvyq](http://tinyurl.com/ca3gvyq), but not all of you were happy with our findings.

"Every review reads the same: the Google Nexus 10 is slimmer, lighter, has a better screen and a better camera, is way faster (Geekbench), and cheaper, but the iPad is always declared the superior tablet. Checking logic and common sense at the door," wrote *annoyed guest*.

Of course, when you look at the specs, the Nexus 10 wins hands-down, but the iPad has a trio of aces up its sleeve in the form of the slick, user-friendly iOS, faultless build quality and a curated app store that's brimming with software. In the end, the choice is very much a personal one, and you won't be disappointed with either device.

### WP8: the coolest kid in school

We think Windows Phone 8 will be a successful mobile platform for Microsoft, and some of you think it might just benefit from the decline of the competition, too



([tinyurl.com/bpp7aot](http://tinyurl.com/bpp7aot)). "Apple used to be the 'think different' company, and now it's just me-too. iPhones and iPads are now the standard, but that also means everyone has one and the products have become bland. Apple used to be the cool kid at school. Now the kids will find a new idol and move on," wrote *newyorkcitymale*.

Indeed, the OS already has many fans. "The point of Windows Phone 8 is quite simple: to offer the style, quality, performance and security of the iPhone with the flexibility of Android. It bridges the rather wide gap between these two, while providing a unique and elegant user interface," wrote *WP7Mango*.

## Flagged: Star letter

### Kids and computers

I love the idea of children's tablets such as the LeapPad2 Explorer from LeapFrog. It lets kids be kids, while educating them in phonics, reading, maths and science skills, and it's fun and easy to use.

The LeapPad2 censors children from inappropriate use of the internet, and lets you manage how they use the device. In my opinion this should be for educational purposes only, so I'm glad that you can't download Angry Birds, movies or cartoons - they spend enough time watching television and playing games as it is. I'm not a complete ogre: once in a while I let

my five-year-old play Angry Birds on my smartphone, but she's at an age where she actually wants to learn with fun activities.

An iPad or any other adult tablet, by comparison, diminishes a child's ability to learn anything educational. Let's face it: the majority of parents get their kids these devices just to keep them quiet for hours on end. *Rsepulveda86*

*They say computers are the future, and these children are our future, so we're sure you're right: children's tablets can be a fantastic educational resource when used correctly.*

NETFLIX

Our Star letter writer wins a six-month subscription to Netflix. Sign up at [Netflix.co.uk](http://Netflix.co.uk) to watch instantly. For your chance to win, tell us your thoughts on any tech issue:

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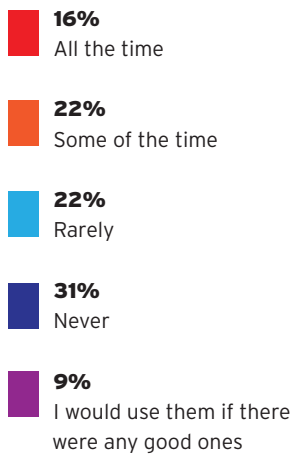


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## pcadvisor.co.uk/polls

Do you use Windows 8 Modern apps on your laptop or PC?



Based on 1,751 votes, [tinyurl.com/bsrb42g](http://tinyurl.com/bsrb42g)

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### Children's phones & tablets

We wanted to find out how many people had kids under the age of 18 who use a smartphone or tablet so, naturally, we took to Speakers' Corner for answers ([tinyurl.com/ckm647s](http://tinyurl.com/ckm647s)).

**carver** Both my son and daughter had smartphones by the age of 16.

**Fruit Bat \O/** My two-year-old grandson loves to play with phone apps that have pictures of animals and their associated sounds, and some games like Angry Birds. Like any child of this age, his attention to the phone doesn't last more than a few minutes at a time.

**Aitchbee** My niece's baby has been photographed so many times by dozens of different smartphones by friends and relations... poor little girl. I think she has already developed an extra thick skin regarding smartphones and social networking, and who could blame her.

**D@ve** My brother has recently turned 12, and he's had a phone for almost a year. Most of his classmates had phones years before him, too.

**Taff™** Of all the kids I know I would say the majority of 11-year-olds have a mobile phone of some description. By the time they are 13 they have smartphones. The take up of tablets, however, is less pronounced. To a kid the smartphone is top priority; those more fortunate might have a tablet, but parents prefer them to have a more traditional device for getting on with their homework.

**tanjagersten** My son has become an Android expert for tablets, phones and what not. He's only 14.

**User8662** There is no need for a young kid to have a phone. What do they have to look forward to? ☒

## facebook.com/pcadvisor



### Size matters

Samsung is rumoured to be making a 6.3in Galaxy Note III smartphone, so we asked our Facebook fans how big a phone could get before it was too big. "They aren't phones any longer, but gadgets you can make calls with! Luckily, I like Craghopper Kiwi trousers, as they include a phone pocket, but it's also the weight of the things you have to think about," replied *Keith Bishop*.

### Sales patter

Gmail went offline for many users at the beginning of December. "How to look a fool," wrote *Greg Talt*. "Talk a client into an Android phone (I'm no iFan), only for Gmail to go down while I'm demonstrating her lovely new smartphone locking me out of the Play store, along with big warning messages about there being no Gmail sync."

### Instagram outta favour

Having removed the 'cards' integration from Twitter, Instagram is now displaying distorted or cropped photos. We asked our fans what were their thoughts on the matter. "That I will be using Instagram less rather than more," wrote *Kenneth Wilson*. "Just like

Facebook, which I use even less because of the games it is always playing with the terms of service and privacy policy," he added.

### Spot the artist

Spotify has some great new features rolling out in the near future, and some of you are already enjoying the music service. "I love Spotify. It needs a slightly more diverse selection, though. Sometimes I can't find the artist I'm looking for," wrote *Jonny Jones*.

### Bending the wrong way

The first flexible smartphone displays are tipped to roll out this year, but not everyone would want one. "Terrible idea. It would do my nut in," said *Carly Standing*, to which *Imp Snickers* added: "I usually keep my phone in my back pocket. Sit on one of them and you would sure have a shock."

### Old texts

As the text message turns 20 years old, Antony *D'Andrea* wishes he could remember the first text he sent. "I reckon it was to my dad, as he gave me his old phone and I probably sent him a test message," he wrote. Anyone else remember their first text?



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# TABLET SALES EXPLODE FOR XMAS 2012



## Tablets were the must-have gadgets in 2012

The tablet as we now know it has been around only since the launch of the iPad in 2010, yet these portable computers are already a huge market. The previous year has been big for tablets, with devices of all shapes, sizes and prizes leading to a boom in demand.

Strong demand and high expectations led IDC to raise its worldwide tablet forecast a number of times during 2012. Most recently, it predicted that tablet shipments would hit 122.3 million in 2012.

"Tablets continue to captivate consumers and, as the market shifts toward smaller, more mobile screen sizes and lower price points, we expect demand to accelerate in the fourth quarter of 2012 and beyond," said Tom Mainelli, research director of tablets at IDC.

### Google's input

Google was a key player in the growth of tablets during 2012 with the introduction of its own-brand Nexus 7, a high-end tablet with a game-changing price tag of just £159. Huge demand means this tablet is often sold out at Google Play.

Google is rumoured to be selling one million Nexus 7 tablets every month, although it hasn't released sales figures.

A recent storage-capacity update and the addition of a 3G-capable model to the Nexus 7 line-up has boosted sales.

Having set a new standard for budget tablets, Google next took aim at the iPad with its Nexus 10. This Samsung-made tablet has a Retina-beating resolution of 2560x1600 pixels. Sales figures are still unknown, although both the 16- and 32GB models were sold out at press time.

### Kindle: All I want for Christmas

Amazon has announced that its December Black Friday was the biggest sales day it has ever had for the Kindle family.

The bestselling product on Black Friday was the original Kindle Fire - most likely because Amazon dropped the price from £129 to £99 for a few days.

Meanwhile, the Kindle Fire HD, which matches the Nexus 7 at £159 with 16GB of storage, was predicted to be the must-have tablet gift for Christmas 2012.

Jorrit Van der Meulen, vice-president of Kindle, said: "The reaction has been incredible. Customers purchased more than three times as many Kindle devices on Black Friday than on any other day in its history on Amazon.co.uk, and our previous record was impressive."

### Two new iPads

In our February issue we reported that Apple has lost 15.1 percent tablet market share to Android. However, this was during a period leading up to the launch of two new iPad models.

The fourth-generation iPad, known as the iPad with Retina display, and the new iPad mini did incredibly well over their first weekend on sale. According to Apple, it sold three million iPads in the space of three days, setting a new launch-weekend record.

The figure, which included all models of the iPad 4 and iPad mini, was double that of the third-generation iPad. Reports suggested that the smaller iPad sold more units, at 2.3 million.

Apple also joined in the Black Friday celebrations by offering discounts on its products. Up to £51 was shaved off the price of an iPad 4, and £21 off the iPad 2.

### Microsoft, too

Microsoft joined the tablet party in October with its Surface RT, a tablet running Windows RT (an ARM-specific variant of Windows 8) that it hoped would become your ideal tablet for work and play. Reports suggest demand has been lower than expected, however.



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# WINDOWS 8 SALES HIT 40M IN FIRST MONTH

Microsoft says OS is shaping up to be the company's most successful product ever

Microsoft sold 40 million Windows 8 licences in its first month on sale, fuelling suggestions that it could well be the software giant's best OS yet.

"We believe Windows 8 is shaping up to be one of the company's most successful products," said Tami Reller, Microsoft's chief marketing officer and chief financial officer for Windows.

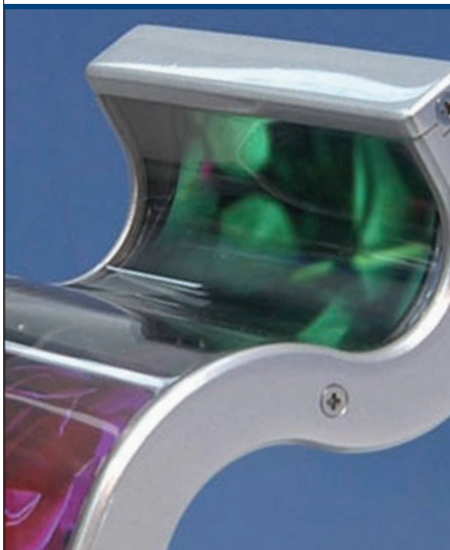
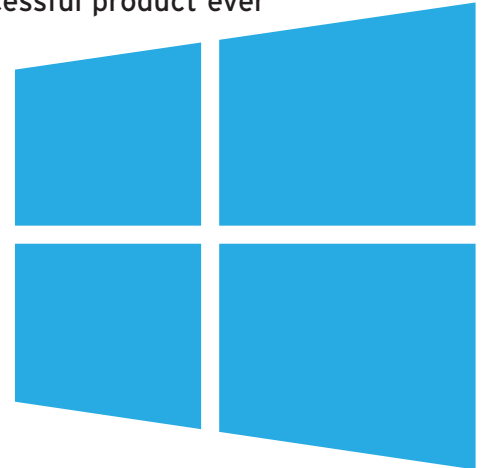
"When people experience Windows 8, they find it is easy to get started and fun to learn," she said.

Various statistics collected through remote telemetry reveal more than

1.5 billion impressions of users deploying the Start screen, with an average 19 tiles added to it within the first three weeks.

The Charms are in use by 90 percent of customers, who access them two to three times during each sitting. More than 85 percent use the desktop during their first use, and approximately half visit the app store. Fortunately, the number of available apps has doubled since launch.

Windows 8 adoption has been faster than with its predecessor, although Windows 7 didn't address a major change in the underlying hardware platforms.



## Samsung to launch flexible phone in 2013

Samsung tipped to beat LG, Sony and Nokia to the bendy phone

Samsung is expected to launch the first flexible-display smartphone this year.

The fight is on between LG, Philips, Sharp, Sony, Nokia and Samsung to produce the first bendy phone, but it's the latter company that's tipped to get there first, according to the BBC. A flexible screen could well be the headline feature of the Galaxy S IV and Galaxy Note III.

Samsung's screens will be "foldable, rollable, wearable and more. They will allow for a high degree of durability through their use of a plastic substrate that is thinner, lighter and more flexible

than conventional LCD technology," according to a Samsung spokesperson.

The firm believes that the technology will be very popular worldwide.

The S IV will be Samsung's flagship smartphone in 2013, and it's rumoured to feature a 5in full-HD display, a quad-core Cortex-A15 CPU and a 13Mp camera.

Flexible screens have been around for a while in devices such as e-readers, but making an entire device supple is quite different from creating a bendy display. Cost is the main reason why this hasn't happened yet.

## B&N launches Nook Video store

Becomes first UltraViolet digital retailer in the UK

Barnes & Noble launched its Nook Video store in December for Nook HD and HD+ tablets, rivalling Apple's iTunes and Google's Play Movies & TV. Nook tablet users can now watch TV shows and films on their devices.

Jonathan Shar, vice-president of emerging digital content at Nook Media, said: "We purposefully designed our new Nook HD and HD+ tablets with stunning high-resolution displays for unmatched reading and entertainment experiences.

We're excited to expand our content partnerships to bring Nook Video to our growing base of UK customers."

At launch the Nook Video store has content from BBC Worldwide, HBO, NBCUniversal, Sony Pictures Home Entertainment, STARZ and Warner Bros. Titles include *Sherlock*, *Game of Thrones*, *True Blood*, *The Bourne Legacy*, *The Dark Knight Rises* and *Inception*. Barnes & Noble also said it is the first digital retailer of UltraViolet titles in the UK.



Videos can be streamed or downloaded in standard and HD formats. Purchased content will be accessible on other devices via a forthcoming Nook Video app.





## EE and Vodafone users get free Tube Wi-Fi

Virgin Media has confirmed that EE and Vodafone users will be able to use London Underground Wi-Fi for free from early 2013. The broadband provider has signed up EE and Vodafone as wholesale partners of its London Underground Wi-Fi service. Other customers will be offered pay-as-you-go Wi-Fi deals starting at £2.

**MORE:** [tinyurl.com/d2qh3xw](http://tinyurl.com/d2qh3xw)

## Sky Now TV available on Roku players

Sky has made its Now TV service available on Roku media streamers. The Sky Now TV app is available from the Channel Store for Roku LT and Roku 2 XS users. Sky Now TV offers subscription-free Sky Movie streaming over the internet. New customers can trial the service free for a month.

**MORE:** [tinyurl.com/bps874a](http://tinyurl.com/bps874a)

## Twitter adds Trends feature for 12 UK cities

Twitter has launched Trends in 100 cities around the globe, including 12 in the UK. The micro-blogging social network said it wanted to make it easier for users to see what's happening on a more local scale and get involved.

**MORE:** [tinyurl.com/cpcaaea](http://tinyurl.com/cpcaaea)

# OFCOM ANNOUNCES 5G BROADBAND PLANS

## 5G mobile broadband network to satisfy increased user demand for data

Ofcom has announced plans for 5G mobile broadband services to avoid a data 'capacity crunch'.

Data usage is on the rise and demand could be 80 times greater than it is now by 2030, according to Ofcom. The telecoms regulator is making plans to release extra spectrum for 5G mobile broadband to avoid what it is calling a "capacity crunch".

Ed Richards, chief executive of Ofcom, said: "Within the coming months we will hold the UK's largest ever auction of mobile spectrum for 4G. However, that may not be enough to meet consumers' future data demands, which is why we are already making efforts to prepare to go beyond 4G."

"Our plans are designed to

avoid a 'capacity crunch', ensuring that the UK's mobile infrastructure can continue to support the inescapable growth in consumer demand and economic growth more generally."

Mobile broadband users are consuming twice as much data compared with 2011, and this will no doubt

increase with the introduction of faster 4G mobile services.

Ofcom plans to free the 700MHz spectrum for 5G, which is currently used for digital terrestrial TV.

This could be migrated to 600MHz without a digital switchover process, harmonising the spectrum used by the rest of the world.

An international spectrum plan is unlikely to be in place before 2018.



## EE LAUNCHES 4G LTE SIM-ONLY DEALS

Following heavy criticism for the pricing of its monthly 4G LTE tariffs, EE has quietly launched SIM-only deals starting at £21 per month for 500MB of data.

iPhone 5 owners and early adopters of other 4G-compatible smartphones can now get their hands on a 4G data plan without having to endure such steep monthly prices. It also presents

consumers with the possibility of picking up a cheaper 4G smartphone secondhand, for example, then paying for the SIM card only.

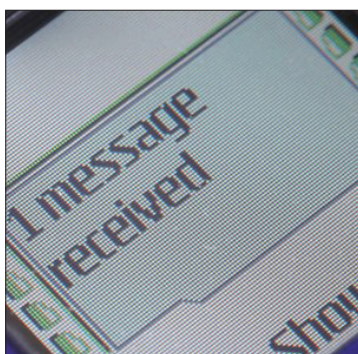
All EE's SIM-only plans come with unlimited calls and text messages - it's just the data allowance that varies. Those needing more than 500MB can opt for 1-, 3- or 5GB, priced at

£26, £31 and £36 per month respectively. No 8GB tariff is currently available.

A key element to EE's SIM-only deals is that they are 12-month contracts, rather than 18- or 24 months. All the plans come with EE Film, allowing users to watch a film every month for free without it eating into the data allowance.

## Text messaging turns 20 years old

### Text messaging still beats IM as the most popular form of communication



The humble text message turned 20 at the beginning of December, but it's still the most popular form of communication among young people, according to Ofcom.

The first text message was sent on 3 December 1992 by engineer, Neil Papworth, who sent "Merry Christmas" with an Orbitel 901.

Ofcom reports that the average UK consumer sends 50 text messages per week. However,

12- to 15-year-olds send almost four times the national average, at around 193 per week. In 2011, more than 150 billion text messages were flown across the UK - almost triple the amount sent in 2006.

James Thickett, director of research at Ofcom, said: "Texts have now surpassed traditional phone calls and meeting face to face as the most frequent way of keeping in touch for UK adults." ☒





278G4

# Intensify your gaming experience

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# Hacktivism

**The nature of protest is changing. Martyn Casserly investigates the motivations behind hacktivist group Anonymous**

**O**ver the past two years around 90 people worldwide have been arrested for criminal activities relating to the hacktivist group Anonymous, notably including a leader of spin-off group Lulzsec, who has since become an FBI informant. The charges range from disabling commercial websites and stealing sensitive information to attacking government security sites. But these aren't just tech-savvy kids with malicious intent; some of them have a real cause.

## Intent

Ever since the dawn of computers there have been hackers. Indeed, some major advances in technology, along with Google, Apple, Microsoft, Facebook and other familiar brands, owe their beginnings to those who enjoyed taking things apart to acquire a better understanding of how they worked. Steve Jobs and Steve Wozniak were famous for selling little blue boxes that hacked the US telephone system and allowed their customers to make long-distance calls for free, for example.

Not all hackers have the greater good in mind, of course. There are also those who use their skills to make a misery of people's lives, steal personal information and generally wreak havoc. They are the very reason we install firewalls and virus scanners on our PCs, and receive emails from Nigerian princes who make false promises of parting with millions of pounds.

Somewhere between these extremes is a class of hacker whose motives are considered noble by some, and criminal by others. These are the hacktivists, a modern equivalent of political protesters. Rather than picketing embassies and wielding banners outside corporate headquarters, they conduct their campaigns online, with arguably more profound results.

## Origins

Hacktivist is a compound of the terms 'hacker' and 'activist', formed in 1996 to describe those for whom there is a political agenda behind their digital infiltrations. But hacktivism began long before this date, with politically motivated online attacks recorded as early as 1989.

Early hacktivism includes the launch of a mass attack on the Indonesian government to highlight conditions in East Timor, a series of hacks championing those murdered in the Acteal Massacre in Mexico by a paramilitary death squad, plus the 1994 Guy Fawkes day attack on the UK government in protest of the proposed Criminal Justice bill, which disabled its official website for a full week.

Hacktivist's preferred weapon is the distributed denial of service (DDoS) attack, which bombards the target servers with thousands of page requests, overloading and crashing the site. The idea is likened to a virtual sit-in and seen as disruptive rather than destructive: the target sites aren't damaged and no information is stolen, but it is temporarily taken offline.

## Anonymous

One hacktivist group has claimed more column inches than any other in recent years. Anonymous announced itself to the world in 2008 via a YouTube video that declared war on the church of Scientology.

The conflict arose when an internal promotional video starring Tom Cruise leaked on to the web, and the Church's notoriously aggressive legal team issued take-down orders to any site hosting the video. This struck at the very heart of issues Anonymous held sacred: freedom of speech and non-censorship.

Anonymous' video response threatened to destroy Scientology "for the good of

your followers, for the good of mankind", and marked the beginning of a sustained campaign of DDoS attacks and phone pranks, culminating in a call to arms for followers to take to the streets and picket Scientology offices around the world.

As more than 10,000 people assembled in several major cities across the globe, many wearing Guy Fawkes masks similar to that which appeared in the movie *V for Vendetta*, hacktivism had left the murky realms of basements and bedrooms and come out on to the streets.

Anthropologist Gabriella Coleman recently said: "Prior to Anonymous, critics of the Church still had to be very, very careful because of the aggressive lawsuits that were launched against academics, journalists and other critics. I would say that era is over, and Anonymous more than any other sort of intervention is responsible for that change."

## WikiLeaks

2010 saw the political whistleblower site WikiLeaks release confidential communication records between the US state department and various representatives overseas. In response, pressure was put on Amazon, PayPal, Visa and Mastercard to remove their services from WikiLeaks, in effect hiding the site, freezing its assets and preventing supporters from making donations.

Anonymous saw this as an attempt to censor the truth, and for federal and corporate bodies to crush those who would question them. The group quickly launched an offensive, which centred around the Low Orbit Ion Cannon program. This software allows those with little or no coding or technical knowledge to execute DDoS attacks. PayPal, Visa and Mastercard were knocked offline in no time. PayPal reported





**We are Anonymous. We are Legion. We do not forgive. We do not forget. Expect us**



a loss in the region of £3.5m, and was eventually bullied into releasing the funds it had held back from WikiLeaks – although it didn't reactivate the account.

The offensive inspired the FBI, Interpol and other law-enforcement agencies to step up their efforts in hunting down members of Anonymous. It also spawned the appearance of the Jester. This self-proclaimed ex-US military operative had previously targeted anti-US sites, such as those linked to the Taliban, and believed WikiLeaks' actions had endangered the lives of troops. The Jester launched a series of DDoS attacks on WikiLeaks and crossed swords with Anonymous.

## Rebellion

In the midst of these turbulent days, hacktivism saw what many believe was its finest hour. Had the Tunisian government not blocked WikiLeaks, alleged incidences of censorship, and Facebook hacking to alter anti-government statements and track the identities of those speaking out against the leadership, might never have been uncovered. Members of Anonymous and fellow hacktivist group Telecomix took out several official sites, provided Tunisians with the tools to avoid detection online, and hacked the president's servers, then sent the information to WikiLeaks. The dictatorship toppled under the weight of online attack, social-media broadcasts and powerful civil protest.

Homocarnula, a member of Anonymous, said of the Tunisian uprising: "There's a video in which they are thanking us for being involved, holding up a mask saying we were the only ones that stood by their side. It was awesome to hear that and feel the connection."

This first chapter in the Arab Springs uprising gave courage to those in Egypt

who were also fighting to remove their ensconced dictatorship. The government attempted to block internet access across the nation, preventing the use of social media to bring the world's attention to their plight. But Anonymous and Telecomix worked hard to ensure the footage of protesters clashing with aggressive government forces in the streets reached audiences outside the country. They also created various dial-up web-access points, taught Egyptians how to validate SSL keys and certificates to circumvent the imposed restrictions, and launched their own DDoS attacks on government websites.

Google also showed its hacker roots when it created the Speak2Tweet service that enabled Egyptians to call certain numbers and leave their stories, which were subsequently posted on Twitter.

When president Mubarak eventually ceded power, those who had fought with the Egyptian people in the digital realms knew that, although their role wasn't pivotal in the overthrow, it was certainly significant.

## Future

Sadly, these methods may be required again, as reports from Syria at the end of November 2012 show that the failing government has adopted the same tactics of restricting internet access. Google and Twitter have already reactivated the Speak2Tweet service, but only time will tell whether the hacktivists rejoin the fight.

One of the most impressive things about the exploits of Anonymous is that it remains a leaderless collection of hacktivists, brought together in response to perceived injustices. There are no meetings, membership programs, nor stated agenda. A bulletin-board-style site at Anonnews.org on which causes are posted is about as centralised as things get.

## Lulzsec

This is the organisation's strength, but it also represents a problem, since it allows any hacker to work under the banner of Anonymous, regardless of their intent. In 2008, for example, members who thought Anonymous had grown too serious hacked epilepsy forums and posted animations that flashed black and white and could induce seizures in sufferers. There have also been factions within the group that have decided to follow a more destructive path.

In 2011 a splinter group of Anonymous called Lulzsec went on what it termed '50 Days of Lulz', a 50-day rampage in which it targeted big-name sites just for laughs. Lulzsec stole thousands of customer account details from Sony, several game companies and porn site Pron – those from the latter were also made public. And Lulzsec attacked the sites of government agencies such as the CIA, US Senate, NHS, and the Serious Organised Crime Agency, seemingly in a display of its tech abilities and to highlight security shortcomings.

When the 50 days were over the group announced it had completed its objectives and would now disband. The attacks ceased and the destructive force of Lulzsec vanished. The FBI eventually caught a Lulzsec leader known as Sabu, real name Hector Xavier Monsegur, and his evidence led to the arrests of five other members.

But Anonymous isn't such an easy enemy to dispel, and the worldwide nature of its followers means that for every one the police detain there could be a hundred others to take their place. The nature of protest is changing, and a growing dissatisfaction with corporate control, coupled with our continued transition to an online existence, means Anonymous will be a force to be reckoned with for some time to come. ☒





# APPLE *VS* SAMSUNG

Just what is it with the two tech giants always getting at each other's throats? Mikael Ricknäs explains all

**A**pple and Samsung just don't seem to be able to get along. Apple under Tim Cook has become choosier about picking its fights, but the company shows no signs of wanting to settle with Samsung as the pair continue to battle over smartphone and tablet buyers.

The bad blood between Apple and Samsung is turning into a classic tech battle. The two companies continue to duke it out in stores and courts, while their component relationship has seen better days.

"It's a close and well-fought battle," said Neil Mawston, executive director at market research firm Strategy Analytics.

That Apple fights on with Samsung, but settled with HTC, makes sense. In stores, Samsung is without a doubt the single biggest threat to Apple, according to Ben Wood, director of research at CCS Insight.

"The recent settlement with HTC signals that Apple is becoming choosier about picking its fights. On the flip side, Apple shows absolutely no signs of wanting to settle with Samsung," said Wood.

For HTC, having the distraction of ongoing litigation each time it puts out a new product or launches into a new market has been extremely unhelpful for its business. Apple possibly settled to better position HTC against Samsung, suggested Wood.

Samsung took advantage of the announcement by forcing Apple to produce documentation detailing the settlement, claiming it is relevant to its own patent dispute with Apple. However, the documents

detailing the agreement will be available only to the attorneys in the patent lawsuit.

Outside the courts, Samsung has taken competition in the smartphone market to a new level this year. Thanks to the success of the Galaxy S III, which was the best-selling model during the third quarter of 2012, it's now catching up to Apple's share of profits.

"Samsung and Apple, globally in the third quarter, accounted for 98 percent of the profits in the mobile phone industry. Apple's share is 52 percent and Samsung's 46 percent," said Mawston.

## Close competition

Apple's iconic brand and exceptionally strong product portfolio in the high-end complement its excellent distribution system.

"Even if consumers think there are other companies that can offer them different or better features, they still feel very locked into the iPhone. At same time, they love the familiarity it offers," Wood said.

Samsung also has a powerful brand; strong distribution worldwide; good pricing and excellent component sourcing, thanks to the fact it makes many of its own components. Above all, it has a product portfolio that covers all segments.

Competition between the two companies could get even more venomous in 2013 if Apple launches its rumoured TV set.

What sets this particular battle apart from others is the two firms' component relationship; Samsung makes the processor for the iPad mini, iPad and iPhone 5.

Severing the ties could have negative repercussions for both companies, agree both Wood and Mawston.

"Apple is a phenomenally important customer on the component side. For Samsung to remain a leader it has to invest an enormous amount of money in R&D, and the company can't do that just selling to its own mobile phones," Wood said.

"Apple gets good-quality components from Samsung. It may find that components from other vendors aren't as reliable. The recent display problems may have been an example of that," added Mawston.

Neither Apple nor Samsung is invincible, though. Samsung may be the second-largest tablet vendor, but its products in this arena haven't been as successful as its smartphones.

Success in the enterprise smartphone space continues to allude Samsung, which has a strong focus on Android. Meanwhile, Apple is heavily dependent on operator subsidies, and would suffer if they were to remove their subsidies. Unlike Samsung, it doesn't have a product in the low-end prepaid segment of the market.

## No end in sight

The 2013 smartphone wars will be between Apple and Samsung during the first half of the year, at least.

"It is an event-driven market ... If Samsung and Apple don't execute well on forthcoming products, plenty of competitors will be ready to pounce," Mawston said. ☒





# What's next for smartphones?

Voice-over-LTE, HD screens and longer battery life will push smartphone sales over 1 billion, says Mikael Ricknäs

**S**martphone vendors will rely on upgrades such as full-HD screens and more powerful yet more frugal processors to entice customers in 2013.

Those tactics may work: processor designer ARM thinks sales will surpass 1 billion units for the first time this year. But competition will continue to be ruthless as vendors and platforms fight for dominance or just survival.

## Full-HD screens

In 2012 it became clear that smartphones with 1920x1080-pixel resolution were on the way when Sharp and LG Display announced they were working on such screens.

The first phone to be equipped with the higher resolution is the HTC Droid DNA or Butterfly, but later this year more high-end smartphones are expected to also get full-HD displays, including the Samsung Galaxy S IV.

So far, reviewers have been impressed. "The display looks fantastic, with crisp, sharp details and brilliant colours that delight the eye," Computerworld wrote about the Droid DNA's screen.

The upgrade to full-HD also continues to fuel the trend of even larger smartphone displays; the DNA has a 5in screen, which is slightly larger than the S III's 4.8in panel.

The one worry with a bigger screen and more pixels is shorter battery life, and the DNA has been getting mixed reviews in that regard. We can only hope smartphone vendors will learn from this and equip their handset's with larger-capacity batteries than the DNA's 2,020mAh cell.

## ARM's big.Little arrives

The arrival of the first phones to use ARM's big.Little processor architecture will be the most interesting hardware upgrade this year.

ARM's goal has been to build processors that allow mobile devices to do more, but at the same time become more efficient at doing small things. The first-generation big.Little chip combines the powerful Cortex-A15 and the frugal Cortex-A7 on one die.

The A15 is about 50 percent faster than processors powering current smartphones, while the A7 is the most energy-efficient processor ARM has ever developed, according to Laurence Bryant, director of mobile solutions at ARM.

Vendors can choose any configuration with up to four cores of each processor. But the first implementations of big.Little are expected to have a symmetric number of cores, such as two small and two large ones, Bryant said.

Going forward there will be a larger variance. For example, two powerful and four frugal processors would be a good fit for the kind of workloads smartphones have to handle, according to Bryant.

To save power each core can also be turned off when not in use.

The silicon is ready and ARM has tested chips running Android on multiple small and large cores, but it won't be more specific about when the first devices will arrive.

The Cortex-A15 is already used in products such as the Nexus 10 tablet.

## LTE evolves

Even though three years have passed since the first commercial LTE network was launched, there is still a lot of room for improvements in the 4G market. For example, several chipset vendors are developing products that combine application processors and LTE modems on a single die, which will result in better power efficiency, according to Gartner.

Also, more operators will launch Voice-over-LTE (VoLTE) services.

"We see that interest is growing a lot, and during 2013 several operators want to roll out the technology," said Kati Öhman, marketing manager for VoLTE at Ericsson.

US operator MetroPCS as well as SK Telecom and LG Uplus in South Korea were the first to announce VoLTE services, and in 2013 most of the demand will still be in North America and Asia. But European operators are also starting to look at using LTE for voice, according to Öhman.


The move to an all-IP network will make it easier for operators to add more voice-related services that can compete with today's web-based offerings, such as Skype, Facebook and WhatsApp.

Such services include video calls, chat, presence and other multimedia services, according to Öhman. Users will also be able to configure incoming calls to ring on multiple devices and will be able to easily move sessions between a tablet and smartphone, she said.

But first operators will concentrate on getting just the voice part right. Also, installing HD Voice will be the default in VoLTE networks.

"You don't have to do it, but there is really no reason not to do it. All VoLTE smartphones will have HD Voice from day one," said Öhman.

HD Voice offers improved sound quality thanks to AMR-WB, a speech-compression algorithm that doubles the range of voice frequencies transmitted.

The number of commercial LTE networks will continue to grow, with 209 expected to be up and running by the end of the year compared to an estimated 166 in 2012, according to industry organisation GSA. 



# Which tablet is right for you?

2012 saw the launch of three iPads, Windows RT tablets, and the rise of mini tablets. The result: a market that's now more confusing than ever. Matt Egan explains your options

**H**ere's a fun game. Ask the person next to you when the iPad was first announced. Then watch them look surprised when you reveal that Apple's iconic tablet was launched as late as 2010.

Tablet computing has been around for a long time, of course. PDAs were popular in the 1990s, and Microsoft was heavily pushing tablets at the start of that decade. But until the iPad changed everything, tablets occupied only a tiny niche of the wider personal computing market. The tablet boom has grown from next to nothing to its current staggering pitch in just two-and-a-bit years.

Following the never-to-be-surpassed success of the iPad, tech manufacturers rushed to capture a slice of the pie with what turned out to be inferior devices. Throughout most of 2010 and 2011 the iPad had no rivals that could match its combination of high-end software and good-looking, stable and seamlessly integrated platform.

Android tablets were hobbled with, in essence, an outsized smartphone operating system, and the best ones cost the same or more than the iPad anyway. Windows tablets were heavy, shrink-wrapped laptops with poor battery life and a desktop OS. BlackBerry managed to launch a great tablet in the PlayBook, just as smartphone users were turning their back on BlackBerry phones, and with barely an app worthy of the name to make the PlayBook useful or fun.

As of the end of 2011, there was only one answer to the question 'what tablet should I buy?'. The iPad.

## All change

That all changed in 2012, however. For one thing, Apple released an unprecedented three tablets in the year, including its first 7in device, meaning a broader choice for iOS users. Meanwhile, Google pulled off the neat two-card trick of finally creating

a true tablet OS in Android 4.2 Jelly Bean, and then subsidising hardware makers to produce in the Nexus 7 and Nexus 10 genuinely high-quality products at a staggeringly low price.

In Windows 8 Microsoft has an OS fit for tablets, and in Surface RT the ARM-based hardware to match. Meanwhile, e-book makers Amazon and Barnes & Noble have brought to the UK their own subsidised devices, the Kindle Fire HD and Nook HD. Both offer high build quality and easy access to content - in theory.

## Christmas 2012

The range of tablets that lined up to fill stockings for Christmas 2012 has never been bigger or better. The Kindle Fire HD was predicted to be the must-have present, closely followed by Nexus 7, iPad mini and Barnes & Noble Nook HD.

At the top of the range sits Apple's fourth-generation full-sized iPad, under some pressure from the Google Nexus 10. The Surface RT means Microsoft has added its own intriguing device to the mix, with Intel Windows 8 Pro tablets to follow in 2013. Meanwhile, a plethora of Android devices of varying quality plug every price point... and we haven't even mentioned BlackBerry, set to relaunch in the new year.

For children, there is a dedicated category of specialised tablets, and laptop makers are beginning to launch hybrid devices that offer the benefits of both tablet and PC.

Tablet sales are set to go through the roof, which can only help to push app, movie and music makers into creating more content and software to be enjoyed on these devices. So expect 2013 to be the year tablet computing really matures, and these truly portable computers become capable of being your only entertainment device or workstation. Which leads on to the question, which tablet is right for you?

## Mini tablets

The Nexus 7 changed the tablet market, bringing to the market iPad-like build quality, an easy way to purchase movies and music, and a good tablet OS at a staggeringly low price. It also relaunched the 7in tablet.

That size change from the 10in form-factor of the original iPads makes a big difference: mini tablets are great for reading on and using on the move, fitting into a handbag or suit pocket. They are less able than full-sized tablets for creating or editing documents, and the smaller screens can make for a less satisfying movie-watching experience. But if you are watching on the move, you'll find that holding a 7in device in one hand is more fun than taking on a wrist-aching 10in tablet.

The Nexus 7 is an utterly brilliant media-consumption device, with which you can also email and web browse, as well as edit documents and photos and so on. You probably won't want to use it for anything more complex than that, but at this price why would you? The Nexus 7 is cheap enough that you could buy it and a cheap laptop, and it will still cost you only about the same as a top-end iPad.

Further along the media-consumption road is the Kindle Fire HD. It's priced to shift and well built. You can web browse and email, and consume all the media you want. In fact, it seems too good to be true and, to an extent, it is - but only if you are looking for a fully featured tablet. The Kindle Fire HD is made - and subsidised - by Amazon to drive content sales. It's very easy to use, but only if you're happy to buy your books from Kindle and your films from LoveFilm.

A similar proposition is the Barnes & Noble Nook HD. It is also a well-built and easy-to-use tablet made for the consumption on the move of movies, e-books, music and so on. But like the Fire HD it is locked down, in this instance to B&N's own Nook store.





Should you want a 'proper' tablet at this size, the iPad mini is possibly better even than the Google Nexus 7. But it costs over £100 more, and we're not sure that it's worth the extra cash. Buy one, however, and you won't be disappointed.

There are other, cheaper, 7in Android tablets, such as the Acer Iconia Tab A110. There's nothing wrong with these devices, but in the tablet world you get what you pay for, and we think that in the list above there is a device for everyone.

## Full-size tablets

The iPad remains the best full-spec, full-sized tablet. Apple's fourth-generation iPad with Retina display is a beautiful device with unsurpassed build quality, and the iTunes market offers more quality apps than any other platform. But you pay a premium for quality, and will be locked in when purchasing music and movies.

Apple still sells the iPad 2 at a discounted rate, and it remains a great tablet. So if you want an iPad, but don't want to pay the full price, it's worth checking out.

The list of alternative 10in tablets starts with the Nexus 10. Google's 10in Android tablet has an impressive PLS screen with a resolution of 2560x1600 pixels. The Samsung-manufactured device is also thinner and lighter than Apple's iPad, and netted the fastest overall performance score in Geekbench of any tablet we've seen. It runs Android Jelly Bean 4.2 and, with prices starting at £319, is a bargain.

Samsung has two other 10in tablets in the Android tablet market, both are solid competitors: the Galaxy Note 10.1 and Galaxy Tab 2 10.1. With pen input and a highly customised version of Android 4.0, the Samsung Galaxy Note 10.1 distinguishes

itself in a crowded market, but at £500 you'll have to really want pen input before it makes sense to choose the Note. Meanwhile, the Tab 2 10.1 is like the iPad and the Nexus 10, only not as good. Unlike its predecessors, however, it is cheaper. For £299 it will make all but the most stringent tablet fans happy.

Honestly, unless price is your primary driver, we wouldn't recommend devices such as the GoClever Tab R974, Toshiba AT300, Archos 101 XS and Disgo 9104. In the 10in tablet market you get what you pay for. It doesn't make them bad devices, but you will be making a compromise.

There is an alternative, however. The Barnes & Noble Nook HD+ is a 10in tablet that costs only £229. It shares the Nook HD's high build quality and custom OS. You'll be locked into B&N's world, but less technical users may actively enjoy the ease of use in a closed market. ☒





# Laptops, tablets, and all points in between

**Laptops and tablets are becoming one and the same thing, says Agam Shah. And that's a good thing**

**T**he lines between laptops and tablets are blurring with a new generation of hybrid devices, which are multi-mode laptops that can also function as slates.

Hybrid devices turn into tablets simply by manipulating the screen, solving portability problems and saving users from carrying multiple devices. The hybrids have many features derived from tablets, including touchscreens, long battery life, multiple connectivity options and quick boot times.

Hybrids came out of the need to shake up traditional laptop designs, with users moving away from laptops to smartphones and tablets. Most of these devices remain heavier than tablets, but ship with a screen and keyboard base, with hardware in both elements closely connected.

Some interesting hybrid devices include HP's Envy X2. At first glance it looks like a laptop, but turns into a tablet when the screen is detached. Lenovo's Yoga laptop (pictured) has a different take, with the screen folding to turn the computer into a tablet. Dell's XPS 12 Convertible Touch Ultrabook has a screen that flips inside the frame to turn the device into a tablet.

Many hybrids today ship with 10in or larger screens, Windows 8 and Intel's Atom Z2760 tablet chip or laptop-class Core

processors. The PC makers are united in believing that the devices are laptop first, and tablet second. But sometimes the definition of hybrid devices can be muddled - some PC makers sell tablets with an optional keyboard and call it a hybrid.

## Neither one nor the other

HP, for example, says the hardware in the keyboard base and screen in its Envy X2 are closely connected, even though the screen detaches to become a tablet. HP is not selling the tablet unit separately.

PC makers agree that hybrids with keyboards give them configuration flexibility and the ability to add more memory and storage, plus plug in powerful processors and graphics chips. Most hybrids with Core processors can be full PCs and run 64bit applications, while tablet-only processors can be slower and run only 32bit applications.

The electronics in tablets are highly integrated, while a hybrid design provides flexibility to add more components that help make devices more powerful, said Peter Hortensius, senior vice-president of the product group at Lenovo.

"All the Yoga designs put the processor in the base," said Hortensius.

There are challenges in making thin products, but the different designs - tablet

or hybrid - help address different usage requirements. "The market is huge and there will be many people that like different kinds of things. We want to satisfy their needs," Hortensius said.

Tablets have been widely accepted, but there is still some confusion around hybrid devices, said David Daoud, research director at IDC. Advertising has shown what hybrid devices are capable of, but units are not readily available at retail stores to test.

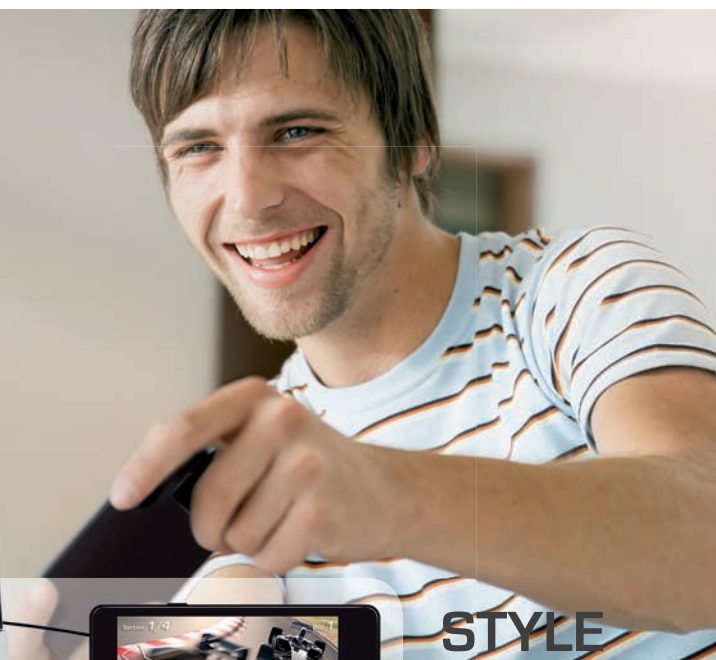
Usage and price will ultimately drive adoption, and the challenge is to get users away from buying a tablet such as an iPad, which has a well-defined mobile usage pattern. Such tablets are much cheaper than hybrids, with the iPad starting at £399 and decent-quality smaller slates at £159. The Yoga, by comparison, costs £699.

Another option is to buy a tablet-first model, such as Lenovo's IdeaPad Lynx or ThinkPad Tablet 2, and then attach a keyboard accessory. A hybrid is the closest a traditional laptop can get to a tablet, and may be good for those who need to type and run corporate applications.

"If you take a keyboard-free system, the ergonomics become an issue," said Daoud. "If you're going to use it as a power device for productivity, it makes sense for you to grab a hybrid model." ☒



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### << **Acer Iconia W510**

#### *Hybrid laptop/tablet*

The W510 by Acer is a 10.1in Windows 8 tablet with a keyboard docking station that turns it into a laptop. The device runs on an Intel Atom dual-core processor, and Acer touts a staggering battery life of up to 18 hours.

**£499 inc VAT**  
**acer.co.uk**



### **Archos GamePad >>**

#### *Handheld games console*

In a bid to rival the Sony PS Vita and Nintendo 3DS, Archos has launched its GamePad. It's a 7in Android 4.1 Jelly Bean tablet with gaming controls bolted on. It runs on a 1.6GHz dual-core A9 processor and has Mali quad-core graphics.

**£129 inc VAT**  
**archos.co.uk**





CHRIS  
MARTIN**>> Barnes & Noble Nook HD+****Tablet**

The Nook HD+ is Barnes & Noble's answer to the iPad. It comes with a customised Android interface and access to the Nook content store. A 9in screen with a 1920x1280 resolution is this tablet's standout feature.

**£229 inc VAT (16GB)**  
**uk.nook.com**

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### ^ ZTE MF823

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ZTE describes the MF823 as the world's smallest 4G LTE datacard. The driver-free USB stick enables 4G broadband on the go. The MF823 uses Qualcomm's second-gen LTE chip platform and is 13mm thick.

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[zteuk.co.uk](http://zteuk.co.uk)

### v Olive One

#### HD music player

The Olive One is claimed to be the first all-in-one HD music player. It features a 32bit/384kHz DAC by Burr-Brown and dual HD amplifiers. Music can be accessed via the touchscreen or free apps, while a hard drive makes the Olive One your personal cloud device.

**\$399 (around £247 plus VAT)**  
[myoliveone.com](http://myoliveone.com)



### >> Nokia Lumia 620

#### Smartphone

The Lumia 620 is Nokia's latest budget handset. This Windows Phone 8 smartphone has a 3.8in screen and interchangeable shells. It runs on a 1GHz Qualcomm Snapdragon S4 Plus dual-core processor and has 8GB of internal storage.

**\$249 (around £154 plus VAT)**  
[nokia.com/gb-en](http://nokia.com/gb-en)

### << Toshiba AT300SE

#### Tablet

The AT300SE is a cheaper version of Toshiba's AT300 tablet. The main cutbacks are found in its physical dimensions, weight and cameras, while other specs remain the same. It runs Android 4.1 Jelly Bean and has a 10.1in screen, 16GB of storage and an nVidia Tegra 3 CPU.

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### << Sony Xperia E

#### Smartphone

Sony's latest smartphone is the no-nonsense Xperia E. It's a straightforward Android device that's set to have a budget price tag. It features a 3.5in (320x480) screen, a 1GHz Qualcomm processor, 4GB of internal storage, a microSD card slot and a 3.2Mp rear-facing camera.

Price TBC

[sonymobile.com/gb](http://sonymobile.com/gb)

### >> Oree Board

#### Keyboard

The Oree Board is a wireless Bluetooth keyboard hand-crafted from a single piece of maple or walnut. It can be paired with a tablet, smartphone or PC. You can choose between a PC and Mac layout and three different fonts. The Oree Board can also be engraved.

€125 (around £100 plus VAT)

[oreedesign.com](http://oreedesign.com)



### >> Focusrite iTrack Solo

#### iPad accessory

The iTrack Solo is a portable recording accessory for iPad users. Audio can be recorded at 24bit/96kHz via XLR and jack inputs. Inside its aluminium case is a microphone pre-amplifier. The Solo works with iOS apps such as GarageBand.

£129 inc VAT

[focusrite.com](http://focusrite.com)

### >> Livescribe Sky

#### Smart pen

The latest smart pen to hit the market from Livescribe is the Sky. This clever ballpoint uses a built-in mic to record audio, which it then synchronises with your notes. Onboard Wi-Fi allows automatic uploads to Evernote.

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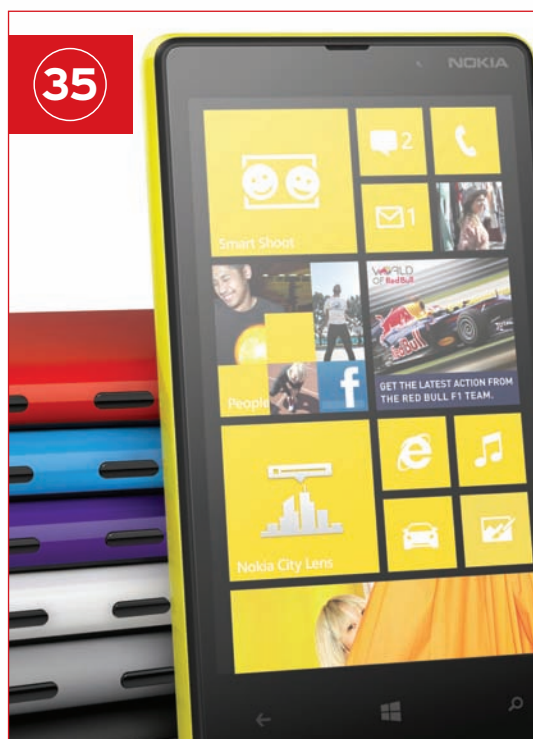




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ANDREW  
HARRISON

# Massed gadgets

**A** new year lies ahead for PCs and computing gadgets. If it's even half as eventful as 2012, we've got quite a year ahead. For *PC Advisor*, a magazine that can trace its history through the rise of Microsoft's innovation-crippling monopoly on personal computing, the most important event should have been a whole new Windows. Except it wasn't.

It wasn't a whole new version, although it was rather important. In my opinion, it revealed to even Windows' Stockholm-Syndromed users that Microsoft has truly run dry of ideas in the face of smarter, reliable, user-focused products and services.

Windows 8 was the Frankenstein quick-fix, Windows Phone 7 taped on to the Windows desktop, in an attempt to underpin the company's declining relevance with a one-operating-system-to-unite-them-all approach.

Microsoft would have been better off consigning the lingering odour of Windows to the Recycle Bin, and launching a new mobile OS with a fresh image, as it did with Xbox - a new platform that many forget was even spawned by the suits of Redmond. Kids would've loved the Xphone, but Windows

Phone? Doomed the day it was christened.

Let's not dwell on Microsoft's first attempt at making PC hardware. The Surface tablet PC has Zune, PlaysForSure and Kin written all over it. Instead, let's recall the lighter moments of 2012,

such as Google paying for a seat at the tablet table by subsidising the production of an Asus 7in tablet. This introduced tablets to people who weren't sure whether they needed one, and helped Google increase mindshare - even if it boosted the product portfolio by only around one million people a month since it launched last July.

Apple returned volley with a 7in iPad mini that sells for a realistic price. This contrasts with Google/Amazon/Barnes & Noble, which seduce buyers with affordable, but string-laden tablets that restore the respective suppliers' profit the more people use them.

For an encore, Google put its name to Samsung's Nexus 10 tablet (see page 33), another attempt to loosen the public's fixation on iPad and divert revenue toward Mountain View.

2013 will finally see faster wireless become a reality, as we move from 3G mobile broadband and 802.11n Wi-Fi, to 4G cellular and 802.11ac. Read about the potential of next-gen Wi-Fi in our group test on page 64. Neither are revolutions in performance terms, roughly doubling speeds that have remained largely static for half a decade.

There will be another incremental nudge in processing speed, as Intel polishes the venerable x86 once again. But the springtime rollout of Haswell microarchitecture chips is really about reducing power consumption, which is crucial in its retaliation against ARM.

By the time the British chip boffins sign off 64bit chips, probably in 2014, laptops and any remaining desktop PCs will as likely be running ARM as they will be Intel chips. In this future, PCs as we know them will all be simply computing gadgets. ☒

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**Specification**

2.5GHz Intel Core i5-3210M; Apple OS X 10.8.2 Mountain Lion; 8GB 1600MHz DDR3L RAM; 256GB SSD; 13.3in (2560x1600) IPS display; Intel HD Graphics 4000; dual-band 802.11a/b/n, 3x3 MIMO; Bluetooth 4.0; 2x USB 3.0; 2x Thunderbolt; HDMI; DisplayPort; SDXC slot; 1Mp FaceTime HD webcam; stereo speakers; headset jack with mic in and Toslink digital output; glass buttonless multitouch trackpad, 105x76mm; iLife '11; 60W mains adaptor with MagSafe 2 connector; 74Wh lithium-polymer battery, non-removable; 313x219x18.9mm; 1.64kg

Build: ★★★★★  
 Features: ★★★★★  
 Performance: ★★★★★  
 Value: ★★★★★



**LAPTOP**

## Apple MacBook Pro 13in Retina

**PC ADVISOR  
RECOMMENDED**

It was inevitable that the original Retina-class laptop, the 15in MacBook Pro, would be joined by a similarly screened 13in model. In the case of this 13in Retina laptop, the display's pixel count has been doubled in both directions, from 1280x800 to 2560x1600. This unlocks a HiDPI mode, whereby the desktop interface looks the same size and proportion as before, but every element is twice as sharp.

The display is still made from reflective glass, but is the least annoying of the breed. This is due to a reduction in the number of reflective layers that sit between you and the TFT, now that the LCD and glass are bonded. Rich, saturated colours are as you'd expect from a gloss screen, and IPS tech allows unsullied viewing from any angle. Apple also applies an anti-reflective top coat.

As with the 15in model, you get two USB 3.0 ports for peripherals, plus HDMI and a pair of faster and even more versatile Thunderbolt ports. When driving only the Retina display, there are moments when you can perceive juddering, such as when scrolling in Safari. The Intel graphics are being stretched to their limit, but we hope this may yet be smoothed by software optimisation.

Other ports include an SDXC slot for storage expansion, and a revised MagSafe 2 power clasp. Absent are an ethernet connection and an optical drive (although these can be added via a Thunderbolt adaptor or USB optical drive), plus the pulsing sleep light and Kensington lock slot.

Dual mics assist voice-capture clarity, with noise-cancellation algorithms helping to remove background noise. These mics are sited on the left, in front of a single headset jack that replaces separate audio-in and headphone sockets on earlier models. Still present is the handy Toslink digital output.

At 19mm thick, and 314mm by 219mm in plan view, the 13in Retina model is more portable than ever. At 1.64kg it easily undercuts the 2.06kg of the classic 13in unibody model.

The 15in MacBook Pro Retina has a faster processor, with a quad-core Intel Core i7 chip in place of this



model's 2.5GHz Core i5. You can add a 2.9GHz Core i7 for an extra £160, but RAM is always limited to 8GB.

### What's in store

Solid-state flash is the future of storage, and the only choice for a performance laptop. In the £1,499 entry-level model it's limited to 128GB, while the £1,699 model reviewed here has 256GB. Specifying a 512GB SSD adds £400 to the price, while the top-spec MacBook Pro with 768GB costs £2,499. You can't officially upgrade this laptop later, so be sure to select a suitable model for your needs.

A high-performance IPS display means increased battery drain. The 13in Retina packs a non-removable 74Wh lithium-polymer battery, which lasted more than 9 hours (524 mins) running Windows 7 in our MobileMark tests. Stay in OS X and you can expect even longer life.

### Performance

In WorldBench 6, the 13in Retina reaped a tidy 152 points. PCMark 7 gave us a headline result of 4,596 points, putting performance firmly in the premier league - the standard MacBook Pro 15in (Mid-2012) with a quad-core processor and hard-disk storage scored 2,697, for example.

Our Windows gaming tests revealed performance that's typical for Ivy Bridge chips bearing Intel's HD Graphics 4000. We recorded 29fps in both Fear at Maximum detail, and Hard Reset at 1280x800 with High detail. Light gaming is more than a possibility.

Overall, system performance is far from wanting, and backed with fantastic battery life.

### Caveats

Lest we give the impression this is the perfect - if pricey - laptop, we should reiterate our misgivings about this undoubtedly advanced example of precision computing.


Past Macs have been relatively easy to upgrade - in terms of storage and memory, at least. Some, notably the Mac mini (reviewed on page 74) with its twistable hatch, have been engineered with the easiest imaginable memory access.

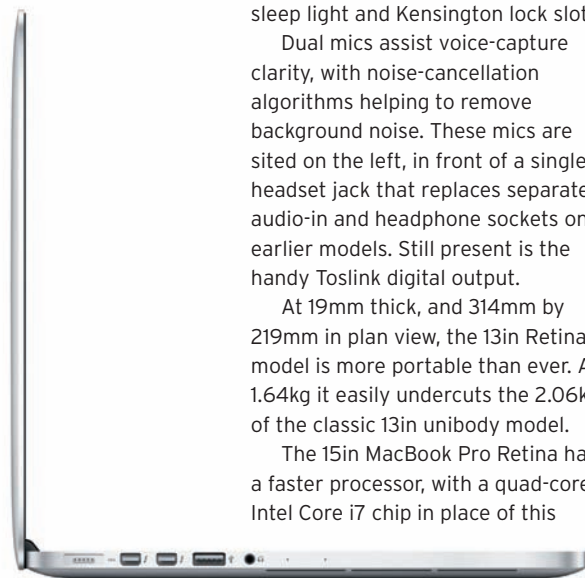
Other times, we're frustrated by non-standard parts, such as custom HDDs issued to recent iMacs. But Apple's latest hardware sees upgrade options whittled to near-zero.

The 13in MacBook Pro Retina has RAM soldered to the logic board, and uses proprietary solid-state storage modules. Lithium batteries are epoxied to the chassis. Everything is sealed with 'tamper-proof' Pentalobe screws. Future expansion is now limited to whatever can be adapted to work through USB, Thunderbolt or a card slot.

Super-thin also carries security issues. If you want to discourage theft of your precious, you'll need to wait for some innovative supplier to come up with a locking solution to match the Kensington lock, now the slot itself has been swiped by Apple.

### Verdict

With a specification that closely follows that of the groundbreaking original 15in, graphics and processor cores are the only casualties of the reduced size. The union of components delivers, shoehorned into a state-of-the-art ultraportable that sets a reference point for 13in laptops.  **Andrew Harrison**





**£319** inc VAT**Contact**■ [play.google.com](http://play.google.com)**Read more**■ [tinyurl.com/arL2kdq](http://tinyurl.com/arL2kdq)**Specification**

10.1in (2560x1600)  
capacitive multitouch  
screen; Android 4.2  
Jelly Bean; 1.7GHz Exynos  
5250 dual-core processor;  
Mali T604 graphics;  
2GB RAM; 16GB storage;  
802.11b/g/n; Bluetooth 3.0;  
NFC; 5Mp, 1.9Mp cameras;  
Micro USB; Micro HDMI;  
3.5mm headphone jack;  
33.3Wh lithium-polymer  
battery; 264x178x8.9mm;  
603g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★

**TABLET**

## Google Nexus 10 by Samsung

**PC ADVISOR**  
**GOLD**

Google set a new standard for budget tablets with the Nexus 7; now it's back with the larger Nexus 10. Is this the new benchmark for 10in tablets?

Google's Nexus 10 was the first Android tablet to launch in 2012 that stands a real chance of taking on the full-size iPad. Manufactured by Samsung, its design isn't too far removed from the Galaxy Tab 2 10.1.

Like most 10in Android tablets, the Nexus 10 is designed to be primarily used in landscape mode. It has a Gorilla Glass 2 front and a plastic casing.

The build quality is excellent, and the tablet has a soft and grippy feel, but it doesn't match the quality of the iPad. It's fractionally thinner and lighter than the fourth-generation iPad at 9mm and 604g.

Physical power and volume buttons are located on the top of the tablet, while ports are found on the sides. Refreshingly, the Nexus 10 charges via Micro USB.

A cover similar to Apple's Smart Cover can be attached, but at press time this had yet to go onsale.

### Hardware

This tablet is incredibly fast, with some impressive hardware specifications. Samsung has equipped it with its own 1.7GHz Exynos 5250, a dual-core processor based on the ARM Cortex-A15 architecture, plus 2GB of RAM.

In Geekbench the Nexus crushed its rivals, with 2,505 points. Its closest rival, the fourth-generation iPad, managed 'just' 1,769. The iPad fared much better in SunSpider, though, with 854ms versus 1,329ms.

The Nexus 10's graphics are competent, too. It beat the third-gen



iPad's 22fps in GLBenchmark with a playable 27fps, but the fourth-gen iPad was faster still with 39fps.

The Nexus 10 is fast to respond to input, apps open quickly, and pinch-zooming in the Chrome browser is silky smooth.

Google's tablet is available with 16- or 32GB of storage, priced at £319 and £389 respectively. This cannot be expanded via removable memory in a card slot.

The third- and fourth-gen iPads boast Retina-quality screens, but the Nexus 10 sports an even higher resolution at 2560x1600. Its pixel density of 300ppi is nothing short of incredible. Everything displayed onscreen looks super-sharp and detailed. We found the screen very responsive and viewing angles astounding. Combined with a 16:10 aspect ratio and front-facing speakers, the Nexus is a great tablet on which to watch films.

The Nexus is well-connected, too, with dual-band 802.11b/g/n Wi-Fi with Mimo antennae and Wi-Fi Direct. There's also Bluetooth, NFC and GPS, but no 3/4G connectivity.

A Micro HDMI port lets you hook up the Nexus to a big-screen TV, while a magnetic 'Pogo pin charger' is found on the bottom edge. At press time no compatible accessories were available.

If you don't mind looking a bit odd when taking photos with a 10in slab then the Nexus 10 has a decent 5Mp rear-facing camera with an LED flash. It can shoot full-HD (1080p) video footage, too.

There are a few simple settings within the camera app, such as

exposure and white balance, but you can go to town afterward. The built-in editing software lets you crop and tweak photos, plus add Instagram-style filters and frames. A Photo Sphere mode enables 360-degree panoramas.

### Software

Buying a Nexus device is a sure-fire way to ensure you always have the latest version of Android. Version 4.2 Jelly Bean offers the vanilla experience Google intended, with none of the clutter and bloatware other manufacturers so often add.


A few new features are found in expandable and actionable notifications, offline dictation and Google Now; you can also create and easily switch between user accounts.

The interface now has two pull-down bars - swipe downwards from the left side of the screen and you get the notification bar, swipe from the right and you get a new quick settings bar. A Swype-style keyboard is a real boon, too.

### Battery life

The Nexus 10 has a 33.3Wh battery, which promises up to nine hours of continuous video playback. This tablet has plenty of stamina: even with moderate to heavy use, we were able to go a solid few days between charges.

### Verdict

This is easily the best 10in Android tablet we've seen, with a fantastic screen and performance. Look no further for a decent alternative to the iPad.  **Chris Martin**





£900 inc VAT

Contact

■ [toshiba.com/uk](http://toshiba.com/uk)

Read more

■ [tinyurl.com/d3xfymd](http://tinyurl.com/d3xfymd)

Specification

1.8GHz Intel Core-i3-3217U; Windows 8 64bit; 4GB DDR3 RAM; 128GB SSD; 12.5in (1366x768) IPS capacitive multitouch display; Intel HD Graphics 4000; 802.11b/g/n; Bluetooth 4.0; 2x USB 3.0; HDMI; SDXC card slot; 3Mp, 1Mp cameras; stereo speakers; mic; 3.5mm line-in; 3.5mm headphone jack; 36.2Wh lithium-ion, non-removable battery; 326x213x22mm; 1.46kg

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



## HYBRID LAPTOP/TABLET

### Toshiba Satellite U920t

At first glance, the U920t looks like a tablet, albeit a big one at 1.5kg and 22mm thick. More like an old Windows slate, in fact. Its 12.5in touchscreen lets you use Windows 8 just like the Microsoft Surface.

But the U920t also transforms into a laptop, thanks to a clever slide mechanism. The screen slides away from you on runners, revealing a keyboard and trackpad. You then angle upward the screen in typical laptop style. It works in a similar way to Sony's Vaio Duo 11, but benefits from adjustable tilt.

Unlike the Sony, the U920t keyboard has a wristrest and large backlit keys. The latter have little travel, and the limited space available means your wrists rest uncomfortably half on and half off the laptop while typing. The trackpad is pretty small at 85x43mm, but it works fine.

We weren't impressed by the build quality. The U920t feels distinctly plastic, and unlike a £900 device. Pushing even lightly the

Windows key below the screen, for example, bows the bezel. We also wonder about the long-term reliability of its slide mechanics.

Inside our sample was a 1.8GHz dual-core Intel Core i3, the least powerful Ivy Bridge chip, 4GB of memory and a 128GB SSD.

In the PCMark 7 benchmark, the U920t scored a middling 3,918 points. Subjectively, we found the system snappy, with gestures smooth and apps quick to open.

Graphics are courtesy of Intel's integrated HD Graphics 4000. In Hard Reset and Sniper Elite V2, both at 1280x720 and Medium detail, we recorded 21- and 17fps respectively.

The 12.5in screen has a decent resolution for its size, at 1366x768, and the IPS panel tech affords great viewing angles. The touchscreen also feels very responsive.

Ports comprise HDMI, two USB 3.0, an SD slot and a 3.5mm jack. Cameras are fitted front and back.



Unlike the Surface RT, the U920t can run regular Windows software. Toshiba also preinstalls a load of Modern apps, such as Netflix, eBay and Evernote, but big-names such as Facebook are notably absent.

A Core i5 version of the Toshiba lasted 3 hours 42 mins when looping a video. From this model you can expect around 5 hours in normal use.

## Verdict

The Toshiba U920t makes neither a great laptop nor a decent tablet, cramped and awkward as the former, and too big and unwieldy as the latter. **Chris Martin**

£700 inc VAT

Contact

■ [uk.asus.com](http://uk.asus.com)

Read more

■ [tinyurl.com/czhxtym](http://tinyurl.com/czhxtym)

Specification

1.9GHz Intel Core i7-3517U; Windows 8; 4GB DDR3 RAM; 500GB HDD; 14.1in (1366x768) glossy TN display; Intel HD Graphics 4000; gigabit ethernet; 802.11b/g/n; Bluetooth 4.0; 1x USB 3.0, 2x USB 2.0; HDMI; VGA; SD slot; stereo speakers; headphone jack; webcam; 44Wh lithium-polymer battery; 2-year warranty; 339x239x21mm; 1.8kg

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



## LAPTOP

### Asus VivoBook S400E-CA040H

The S400E is the first in Asus' VivoBook range of highly portable Ultrabook laptops with 10-point touchscreens. An 11.6in-screen model will also be available.

The S400E-CA040H sports an Intel Core i7 processor; cheaper models have similar specs, but run Core i3 and i5 processors.

The styling is Apple-esque, with the Asus 21mm thick at the rear, falling to just 12mm at the front. Brushed aluminium makes for a smart, attractive case, although the lid is quick to pick up smudges.

Our review sample had a 500GB hard disk. It didn't seem to slow down the Asus too much in everyday Windows tasks, and the laptop booted in less than 15 seconds.

The 14.1in display offers clarity, even if it doesn't bring out all the detail with its 1366x768 resolution. Despite it being a glossy screen, reflections aren't too obtrusive.

The panel uses cheap TN rather than IPS tech, and has limited viewing angles. You'll need to

fiddle with the screen angle to get the best picture. For touching, the 14in display is a triumph. It's sensitive, and with practice we were able to accurately tap small icons.

The Asus isn't as fast as we expected. In PCMark 7 it achieved 2,928 points, which isn't all that surprising for an i7 chip, given the slow HDD. Gaming performance is also curtailed, and the Asus mustered just 22fps in Fear (Maximum detail). In our Crysis tests, it finished only marginally ahead of the i5-powered Acer V3-571, playing 64fps at 1024x768 in Low detail.

Ardent touch-typists may hanker for a deeper keyboard. Size isn't an issue with the 104x71mm trackpad, and its decent size offers plenty of finger room. Multitouch gestures are implemented, but lack precision; it's easy to accidentally resize a window when you mean to click an icon.

HDMI and VGA ports offer both digital and analogue options for



external monitors, while three USB ports (one of them USB 3.0) and an SD slot are placed at the sides. Wireless facilities are covered by single-band 802.11b/g/n and Bluetooth 4.0 controllers, while the ethernet port is gigabit.

Sound from the speakers is a little distant, while the Asus itself is pleasingly quiet in operation.

Battery life is disappointing, at 3 hours 27 minutes in MobileMark.

## Verdict

This model is all about delivering the Windows 8 experience. The Asus looks good, the touchscreen works well, and the laptop is itself light and nimble. **Robin Morris**



**£380** inc VAT**Contact**

■ [nokia.co.uk](http://nokia.co.uk)  
 Read more  
 ■ [tinyurl.com/bocfnrj](http://tinyurl.com/bocfnrj)

**Specification**

1.5GHz Snapdragon S4;  
 Windows Phone 8; 4.3in  
 (480x800, 216ppi)  
 AMOLED display; 1GB RAM;  
 8GB storage; microSDHC;  
 Adreno 225; 802.11a/b/g/n  
 with channel bonding;  
 Bluetooth 3.0; Micro-SIM;  
 A-GPS/Glonass; 8Mp, VGA  
 cameras; 1920x1080  
 video; 3.5mm headphone  
 jack; Micro-USB; NFC; Qi  
 wireless charging; 6.1Wh  
 removable battery;  
 68x124x12.2mm; 175g

Build: ★★★★★  
 Features: ★★★★★  
 Performance: ★★★★★  
 Value: ★★★★★

**SMARTPHONE****Nokia Lumia 820**

Chunky, but still smaller than Nokia's 920, this 820 sits better in the hand than its bigger brother. Compared to its slender rivals, though, this Windows phone looks rather dated.

Indeed, the 820 takes you back to the good old days with various coloured interchangeable covers.

Build quality is good. Once the shell is clipped into place the Lumia feels solid and robust, but weighty.

This Nokia is very much a cheaper 920, so it's pleasing to see the same 1.5GHz Snapdragon S4 processor and 1GB of memory inside.

The Geekbench test we usually run on smartphones doesn't support Windows Phone 8, but our subjective tests revealed mostly smooth operation. Animations are effortless, but some apps take a few seconds to load. In the SunSpider JavaScript test, the Lumia 820 averaged a speedy 940ms.

It has a quarter the storage of the 920 at 8GB (with 2GB consumed by Windows). But, unlike the 920, a microSDHC slot lets you add more.

While the 4.3in screen isn't much smaller than the 920's, the resolution is considerably down at 480x800, and the pixel density around a third lower at 217ppi. Pixels are easily visible around the edge of text and icons, for example.

Besides the usual Wi-Fi and Bluetooth, it supports EE's 4G LTE mobile broadband in the UK.

At 8Mp with a Carl Zeiss lens, LED flash and dedicated camera button, the photography potential sounds impressive. But we were disappointed by our test shots. The exposure and colour balance were reasonable, but the photos weren't as sharp as you might expect.

Video can be captured in full-HD, although 720p is the default. Our test footage was detailed and smooth at 1080p, but the auto white balance struggled when filming indoors. The 0.3Mp front camera is adequate for Skype.


The interface is attractive, but far more complex and less intuitive than both iOS and Android; we often



found ourselves getting lost. The Windows Store is still lacklustre, too.

We were pleased with the performance we got from the 6.1Wh battery, and had 40 percent capacity remaining at the end of one day's use.

**Verdict**

The Nokia Lumia 820 is a smaller and cheaper 920, with a cheaper screen and camera. We like the interchangeable covers and decent battery life.  **Chris Martin**

**£109** inc VAT**Contact**

■ [amazon.co.uk](http://amazon.co.uk)  
 Read more  
 ■ [tinyurl.com/bqjqmm5](http://tinyurl.com/bqjqmm5)

**Specification**

6in (768x1024) E Ink XGA  
 screen; 16-level greyscale;  
 two-point touch; 2GB  
 flash storage; 802.11b/g/n;  
 3G optional; Micro-USB;  
 117x169x9.1mm; 222g

Build: ★★★★★  
 Features: ★★★★★  
 Performance: ★★★★★  
 Value: ★★★★★

**E-READER****Amazon Kindle Paperwhite**
**PC ADVISOR**  
**RECOMMENDED**

The Paperwhite's UK arrival is good news for anyone wanting a Kindle you can read in the dark. It replaces the same-price Kindle Touch.

A 6in E Ink screen follows the norm, although resolution increases from 600x800 to 768x1024. That's almost 64 percent more pixels. Its 213ppi density makes text crisper, if not to the degree Amazon suggests.

Four low-power LEDs light the screen from the front. Not only does this mean you can read in the dark, but it assists reading any time. Brightness can be adjusted on a scale of 0 to 24 and, whether you're in bright sunlight or a dim room, the screen works well.

If you're familiar with Kindles, you'll immediately notice an absence of buttons. There's just one, for power; everything else comes through the touchscreen. You touch anywhere to go to a book's next page; on the left to go back a page; or at the top to display the menu.

It's the same size as the standard Kindle, comfortable to hold in one

hand and with a soft, rubbery feel. It weighs just 213g - more than the £69 Kindle, but it still feels light.

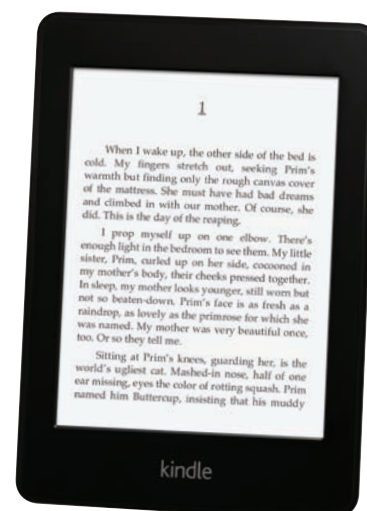
The Paperwhite's interface and menus are largely unchanged from the Kindle Touch. It's very easy to use, which includes when browsing and buying from Amazon's vast catalogue. Prices here are competitive, with plenty of titles under a pound, and some even free.

When reading a book, you can place a bookmark, make notes, and view notes you (or someone else) wrote. Whispersync links any device you're signed into, including the Kindle smartphone/tablet apps.

A 3G model costs £169, and lets you buy books on the fly; there's no data contract - Amazon foots this bill.


Build quality is better than the Kindle Touch, and the Paperwhite looks stylish in black, too. Battery life is specified as up to two months, even when using the light.

There's 2GB of internal storage, of which 1.25GB is available for books. You can also email



documents to your @kindle.com email address. Unlike the cheaper Kobo Glo, there's no slot for adding more memory, which is a shame.

**Verdict**

Kobo's Glo is a good alternative if you think you'll need more storage, but Amazon's sizable e-book library and the Kindle's ease of use make the Paperwhite a fantastic e-reader. The screen is excellent, both light and touch elements, and the device is very well built.  **Jim Martin**



£830 inc VAT

Contact

■ lg.com/uk  
Read more  
■ tinyurl.com/c5ycknk

Specification

42in LCD TV; 1920x1080; stereo speakers; 2x 10W amp; Freeview HD tuner; 7-day EPG; 4x HDMI; Scart; Component; composite; PC VGA mini D-Sub; digital audio coaxial S/PDIF; headphone jack; phono stereo outputs; 10/100 ethernet; 802.11n; 3x USB 2.0; CI slot; 100W average power consumption; 1,063x628x33.4mm; 15.2kg

Build: ★★★★★☆  
Features: ★★★★★☆  
Performance: ★★★★★☆  
Value: ★★★★★☆



3DTV

## LG 42LM660T

This on-trend LCD TV straddles the often confusing middle ground between bargain-belter and high-end hotshot. Consequently, it's easy to miss when you're shortlisting sets. But this forward-thinking £830 flatscreen is well worth auditioning.

The model reviewed here is a 42-incher but, if you need more glass, 47- and 55in versions are available.

As with other 2012 LGs, the cosmetics are crowd-pleasing. The set comes with a black plastic variation on the sculptured metal pedestal seen further up the food chain, while the minimal bezel makes the panel easy to accommodate. The set is just a sniff over 33mm thin.

Two remotes are supplied: a generic LG infrared job and the latest version of the brand's Bluetooth Magic Remote, which now sports a scrollwheel.

Connectivity is excellent for the price. There are four side-mounted HDMI (one ARC-compliant), a PC D-Sub input, Component and Composite AV, Scart (via an adaptor), plus a digital optical audio output and mini-jack audio input.

In addition to ethernet, Wi-Fi is built-in, and the LG supports WiDi/ Wi-Fi Direct for non-network local connections. Three USB ports and a CI slot are also onboard.

LG's user interface remains one of the slickest, with the brand's

heaving online portal melded into the dashboard itself. Apps are arranged into navigational blocks. iPlayer, Blinkbox, Lovefilm, KnowHow Movies, Netflix, Acetrax and YouTube head the streaming pack, and there's plenty more where that lot came from. Your network shares, NAS drives and PCs are also within clicking distance. Codec support is solid, both from USB and across the LAN.

Picture performance gets the thumbs-up, provided that you ignore both the set's Intelligent Sensor and Picture Wizard - both misnomers. The LED edge-lighting, with LED Plus-controlled dimming, maintains backlight uniformity.

Pictures are madly dynamic, with blacks rewardingly deep. *The Dark Knight* looks his best when Dynamic Contrast is set low, keeping down sparkling pixel noise. Colours ping, although reds veer toward orange.

If there is a caveat, it's motion resolution. The 400Hz TruMotion processing doesn't bequeath much of a crispy edge. With TruMotion off, the set can manage only around 650 lines of motion resolution.



The best results are gleaned through the customisable User setting, with De-Judder ramped up - this delivers around 900 lines. But this improvement in clarity brings smudgy artefacts. For most content these aren't too obvious, but could lead to some bleary sports coverage.

The set's passive-polarised 3D is perfectly entertaining. A party pack of four lightweight glasses are included in the box, plus a pair of clip-ons. While there's a loss of definition, stereoscopic images are bright and have plenty of depth.

The TV's two 10W speakers create a decent mid-band noise.

### Verdict

For most buyers, the 42in LM660T ticks all the right boxes. It looks pretty, has an enviable spec, with excellent IPTV and file-streaming facilities, and it dazzles with brightly hued, contrasty images. It's well worth seeking out. Steve May

LAPTOP

## Acer Aspire S7-391

£1,395 inc VAT

Contact

■ acer.co.uk  
Read more  
■ tinyurl.com/dy4j46e

Specification

1.7GHz Intel Core i5-3317U; Windows 8; 4GB RAM; 128GB SSD; 13.3in LCD; Intel HD Graphics 4000; 802.11b/g/n; 2x USB 3.0; 323x223x12.5mm; 1.28kg

Build: ★★★★★☆  
Features: ★★★★★☆  
Performance: ★★★★★☆  
Value: ★★★★★☆



Microsoft and Acer want to usher in a brave new world of touch-controlled Windows. The Aspire S7-391 is the first touchscreen Windows 8 laptop.

At heart it's an ultraportable laptop, driven by an Intel Core i5 processor and solid-state storage. So, another replica of the MacBook Air, gifted with Windows 8 and dubbed Ultrabook™ by Intel? Not quite.

Like the Air, it comes with an 11- or 13in display. And that's where comparisons to the glut of MacBook Air-wannabes end. Unlike every Ultrabook tested to date, Acer has invested in a decent display: an IPS panel with a full-HD resolution.

This screen has good colour and excellent off-axis visibility. Windows'

desktop elements are tricky to comfortably read, but tweaking the settings to 125 percent restores the interface to legible levels.

Touchscreen Windows is divisive, and more so on a laptop. One problem is the bendy lid, which Acer has solved with a variable-friction hinge. From closed you can open it one-handed; as the screen approaches the vertical the hinge stiffens to resist light prodding.

It's remarkable how thin Acer has made this laptop - just 12.5mm, with no sneaky bulges. The lower deck is a 7.7mm two-layer aluminium shell. The underbelly of these is painted white, and the upper left in natural metal. The lid half seems almost

thick in comparison, although it's just 4.5mm thin.

The Acer's display is glossy, as you may expect for a touchscreen prepped for greasy fingertips; the back, shiny glass white.

To hit that wafer-thin spec, the keyboard has been squashed so the individual keys just peep above the deck. Their travel is minute, barely 1mm. We found using this unnatural at first, but it permits fast typing if you can adapt.

The buttonless trackpad had play in its plate, so the first stage of the pad's click was just rattle.

After the screen, there are fewer surprises. Two USB 3.0 ports and an SD slot grace the laptop's right side.



**£311** inc VAT**Contact**■ [ilgs.co.uk](http://ilgs.co.uk)**Read more**■ [tinyurl.com/cmago8](http://tinyurl.com/cmago8)**Specification**

22in (1920x1080) TN LCD touchscreen;  
1GHz TI OMAP 4 dual-core processor; Google Android 4.0; 8GB flash storage; 1GB RAM;  
802.11b/g/n; Bluetooth; Micro HDMI; microSD slot; 1.3Mp webcam;  
513x353x21.9mm; 4.8kg

Build: ★★★★★☆

Features: ★★★★★☆

Performance: ★★★★★☆

Value: ★★★★★☆

**ALL-IN-ONE PC****ViewSonic VSD220**

How big is the screen on your tablet – 7in, 10in? How about 22in. Devices such as this ViewSonic are a bit too big to squeeze into a pocket or bag, but well on the way to becoming a bedroom, study or home office base station, with all the same functions as an Android mobile device.

ViewSonic is the first PC maker to launch an accredited Google Mobile Services (GMS) all-in-one with its VSD220.

This 22in device may not be a tablet in the conventional sense, but it mirrors the features of a typical Android slate right down to the gesture-sensitive touchscreen, and it can also show HD movies in their original 1920x1080 resolution.

It does this very well, provided your video source is Android-compatible. Currently, Lovefilm doesn't support Android, but Netflix appears to have no such trouble.

The VSD220 is equipped with three USB sockets, micro HDMI and fast ethernet, as well as 802.11n wireless and Bluetooth connections.

There's also 1GB of memory, 8GB of storage and a microSD card slot for expansion.

The 1.3Mp camera is fine for video conferencing; the fact this is a desktop machine explains the absence of a rear snapper. Power is provided by a PSU so small it should have been built into the case.

The ViewSonic runs Google Android 4.0 Ice Cream Sandwich, which is clean and easy to navigate. Things you would expect, such as Adobe Reader, Chrome, Google Maps and Blogger, are preinstalled. For web browsing, email, social networking and media playback, it's great – although you might want bigger, better speakers.

A 60-day trial of Mobi Office Suite Professional is provided, which is a clean-cut, basic Microsoft Word, Excel and PowerPoint workalike. You can download other Android apps as you need them from the Play store.

The touchscreen is reasonably easy to use. Scrolling pages on the big screen feels as though it should take more effort. The ViewSonic occasionally misses your gestures, though, and the click-sound feedback on the onscreen keyboard seems to kick in two or three characters into typing.

From an ergonomic standpoint, the VSD220 doesn't work as well as a smaller tablet. In its default position it's angled at 45 degrees to the desktop, which is fine for standing at the desk to check your email or Facebook. But it isn't ideal for typing. The onscreen keyboard is huge, and holding up your arms while moving your fingers to the keys soon induces arm ache.



You can lay down the VSD220 at a shallow angle – the rear support is spring-loaded to ease such an operation. Then, however, the low vertical range of the LCD comes into play and the screen colours start to veer off from normal. It's not like a tablet that you can hold in one hand and operate with the other at exactly the angle that feels comfortable. Your best bet, for more than the occasional tweet, is to plug-in a USB keyboard and mouse.

**Verdict**

If you're willing to abandon Windows or Mac OS and conduct your day-to-day work on a mega-size Android tablet, the ViewSonic VSD220 is a classy take on what may well become a new desktop genre. If you expect to work on it with more than occasional typing, though, we'd strongly suggest a separate keyboard and mouse, or your arms will quickly begin to ache.

✉ **Simon Williams**



Inside is a 1.7GHz Core i5-3317U with 4GB of RAM, and a 128GB SSD. With no space for an ethernet port, Acer bundles a USB 2.0 adaptor. Full-size video ports, similarly constrained, give way to Mini HDMI.

The build quality is generally good; it's the best we've seen from

Acer, excepting that flaky trackpad. The Aspire S7's waifiness does imbue it with a certain delicacy, though. It's not one for klutzes or kids, we'd wager.

Wielding the S7 means learning Windows 8, and the touchscreen adds options for the constant journey between desktop and Start screen.

We found ourselves reach out and touch the screen to complete tasks for which we'd normally use a trackpad – of course, this was more because the trackpad was annoying. Some operations do lend themselves to a tablet-style hands-on, however, such as pinch-zooming in maps.

The familiar roster of ultraportable components gives

decent application performance. The Acer Aspire scored 4,581 points in PCMark 7, which puts it just ahead of the 13in MacBook Air's 4,473.

Gaming performance was behind the curve for Intel HD Graphics 4000 graphics, though, and we measured 23fps in Fear against the best-case 28- to 29fps.

**Verdict**

The Aspire S7 is vanishingly thin and nicely finished, but a little flimsy-feeling. The touchscreen interface may prove useful, but more so the superb display. But Acer pegs itself as a budget brand, and may struggle to convince users to pay the premium. ✉ **Andrew Harrison**





## WIRELESS ROUTER

### AVM FritzBox 3370

AVM's FritzBox 3370 is the company's first '450Mbps' router, meaning it has three internal MIMO antennae and supports three-stream 802.11n wireless. It can operate on either the 2.4GHz or 5GHz, but not both simultaneously. Set the router to 5GHz mode and no older 2.4GHz device will be able to connect.

At the rear are four gigabit ethernet ports, a USB 2.0 port (with another at the side) that can be used to share storage via a built-in DLNA server, and an ADSL/VDSL port for broadband connections, including BT Infinity. Cable connections work fine, although one of the LAN ports must be repurposed into a WAN port for your external modem, leaving only three for home networking.

The 3370 retains the red-and-silver casing and wedge shape synonymous with FritzBox, along with AVM's trump card: FritzOS firmware. Whereas many routers run poorly thought out, badly designed software, FritzOS is in another league. The software is visually appealing, has simple step-by-step wizards and clear explanations of functions, and is regularly updated.

There are some extra software tools, too. For example, when configuring wireless settings, a graph shows which channels are occupied by other nearby networks, so you can choose the least congested. An accurate built-in monitor can diagnose at the router level poor latency issues with long ping times, and whether a device on the network is saturating your upstream bandwidth.

The mobile DECT base station and analogue telephone functions of the flagship 7390 have been removed. SIP telephony still works though, via the Fritz Fon mobile app for Android and iOS, and can route calls through the router. The telephony menu appears only when SIP is enabled, and has an address book, dialling rules and call-routing options, as well as a list of dialled numbers and incoming calls.

In wireless performance terms, the 3370's triple antennae serve it well. At a distance of 1m, transferring a file via FTP from a locally connected NAS to a 2011 MacBook Pro over 2.4GHz wireless, we measured 88 megabits per second (Mbps). Using the 5GHz band, the same file transferred at 132Mbps at 1m.

At a distance of 10m, 5GHz performance dropped to 12Mbps, while 2.4GHz, which is usually stronger at longer distances, dropped to 23Mbps. We tested the USB port in much the same way, transferring a file back and forth via FTP, and squeezed 58Mbps from the 3370.

None of these transfer speeds are record-breaking, and rival manufacturers have managed faster long- and short-range wireless transfers.

## Verdict

The FritzBox 3370 is a more solid offering than the previous mid-range 3270, with a feature set that makes it worth considering. Unlike the 7390, though, it's nothing special. Although the software is particularly good, and it has two USB ports, the 3370 does little that other routers cannot. Given the high price, the omission of concurrent 2.4GHz and 5GHz networks is an irritation we can't ignore. **✉ Orestis Bastounis**

**£150 inc VAT**

■ [avm.de](http://avm.de) ■ [Read more tinyurl.com/cvxx2qs](http://Read more tinyurl.com/cvxx2qs)

### Specification

Dual-band 802.11a/b/g/n;  
33 MIMO; 2 USB 2.0;  
4x gigabit ethernet;  
IPv6 support; DLNA  
server; SIP telephony;  
VLAN support

Build: ★★★★★  
Features: ★★★★★  
Performance: ★★★★★  
Value: ★★★★★



## 15in MACBOOK PRO CASE

### Tech21 Impact Slip

Even the most careful laptop owners see their valued machines fall prey to scratches and dents when they leave the security of their home or office. Protection is essential.

The Tech21 Impact Slip has no extra pockets or accessory flaps, nor a carry handle or a shoulder strap. With a laptop in its slip, you can be more confident about placing it inside a rucksack.

Tech21 offers impact protection through crafty synthetic polymers - a compound called D30. This is an elastomeric polymer that has liquid, gel-like viscosity under normal conditions. When subject to a sudden physical shock it momentarily hardens.

Tech21 has lined the leather case with flat sheets of D30, yet it's still just 2.5mm thick. There's no sign of D30 around the edges and corners, where protection is crucial, but the protruding leather seam may help.

The Impact Slip is a beautifully made cover, with high-grade nappa leather on the outside and a soft micro-fibre interior. The orange stitching is perfectly precise.

A fold-over flap tucks into an open seam to hold the case closed. We'd have preferred a more secure fastening; a magnetic fastener might add more confidence.

Used as intended, with a 2009 15in MacBook Pro, the case offers a comfy but tight fit. Holes in the corners prevent an airtight seal from making the laptop 'stick'.

## Verdict

The Tech21 Impact Slip is a superbly finished leather case, made from premium materials. It should do a better job of protecting a laptop than most cases. **✉ Andrew Harrison**



**£94 inc VAT**

■ [tech21uk.com](http://tech21uk.com) ■ [Read more tinyurl.com/ca694n5](http://Read more tinyurl.com/ca694n5)

### Specification

Black leather slip case;  
D30 polymer-sheet  
protection front and  
back; micro-fibre inner  
lining; 401x288x22mm;  
400g

Build: ★★★★★  
Features: ★★★★★  
Value: ★★★★★





**£89** inc VAT**Contact**

■ [itwin.com](http://itwin.com)  
 Read more  
 ■ [tinyurl.com/chngm45](http://tinyurl.com/chngm45)

**Specification**

Compatible with Windows XP/Vista/7/Mac OS X 10.6 or later

Build: ★★★★★☆

Features: ★★★★★☆

Value: ★★★★★☆

**USB DEVICE****iTwin SecureBox**

Mac- and Windows-compatible, the cross-platform iTwin is a USB dongle device that provides a novel way of connecting two online computers anywhere in the world. There are no subscription fees, and you can share unlimited amounts of data over the net without resorting to web-based storage or FTP solutions.

Neat and pocket-sized, the iTwin is aimed primarily at those who want to be better safe than sorry, or simply struggle to remember passwords. Users link the computers by sharing the two halves of the iTwin USB stick, which may involve some logistical problems if the two locations are a world apart.

Depending on your operating system, setup is pretty much plug and play, although it's not as simple as the maker suggests. Our initial attempt couldn't 'see' its other half somewhere up the road.

Once resolved, the process of transferring and editing files in either direction, and the ability to collaborate on one document from



two locations, makes sense. iTwin uses 'military-grade' AES 256bit encryption to protect your data and files, which is now the norm for cloud-based services.

One major down side to the iTwin is the ease with which you might mislay one half of the device, leaving open your precious files to others or abuse. Thankfully, you can remotely disable the other half until you (hopefully) find the device down the back of the sofa, and replacement dongles are available if you lose one.

If you're sharing content between a home or office PC and laptop while on your travels, for instance, both ends need to be switched on and online.

If you have sensitive data at the other end, you will need to take extra precautions to protect those files. That data may also struggle with the kind of firewalls employed by many businesses.

**Verdict**

At around £90, iTwin isn't the cheapest way of sharing content over the internet, and may seem over the top for anyone who occasionally needs to share files between computers or users. That said, business users and those with sensitive data should be more than impressed, thanks to a solid mix of security and relative simplicity.

✉ Nick Spence

**HEADPHONES****Motörheadphönes Iron Fist**

One of the world's biggest rock bands has jumped on the headbandwagon started by Dr Dre. Enter the Motörheadphönes. Forget the Germanic old guard of headphone makers such as Sennheiser - these fellas have two umlauts in their name, even though they're made by Swedish audio brand Krusell.

The idea might have started out as a jokey pun, but the Iron Fist is no one-gag gimmick.

The mid-range Iron Fist is said to pack the hardcore punch of the high-end Motörizer, with a more compact size. Macho metal codpieces don't get a look in when it comes to listening to these headphones. They have a big, spacious sound through which you could drive a tour bus. Placed over the head, the drivers to each side are set relatively distant from the ear, giving a wider than usual sense of stereo spread.

Tonally, they're surprisingly neutral. That's entirely unlike boutique brand Beats Audio, which is aligned to a misguided idea of

mangling the sound to flatter only urban music. Those ultra-trendy rap and R'n'B headphones distort the frequency response to make a muddy, bass-heavy balance with dull treble.

The Iron Fist has an even-handed approach, giving little unwarranted emphasis within the main divisions of bass, mid and treble. There is a little lift in the deep bass that gives them slam and low-end punch. Thankfully, that's a fast and well-timed effect, rather than any dreadfully slow bloated bass. It's not quite a metallic iron fist but, if it was, it'd be well cushioned in a velvet glove.

Mid-band may even be neutral to a fault. Rather than try to lift mid-range vocals clear of the mix, the Iron Fist headphones are just perceptibly recessed here. Which means screaming guitars remain easy to listen to at higher volumes, without numbing your ears.



Smooth is another way to describe the overall sound of the Iron Fist, particularly when focusing attention on top-end treble. It's crisp and incisive, minus the excessive lift that can initially be impressive, but later leads to listening fatigue.

Our main gripe is not about sound, but comfort. There's no way to manually adjust their size. Headbanging is not an option.

**Verdict**

Don't be misled by the posturing look and mock-gothic script - the Iron Fist suits a wide range of music.

✉ Andrew Harrison, Simon Jary

**£99** inc VAT**Contact**

■ [motorheadphones.com](http://motorheadphones.com)  
 Read more  
 ■ [tinyurl.com/cdzggvp](http://tinyurl.com/cdzggvp)

**Specification**

Dynamic, closed-back headphones; 40mm driver with neodymium magnets; 102dB SPL sensitivity (1mW) at 1kHz; 10Hz-20,000Hz specified response; 200mW maximum input power; 68 ohm impedance; velvet earpad; 4.5N headband pressure; 1m, 2.5m cables, single-sided; 3.5mm gold-plated stereo mini jack; 6.3mm adaptor; 244g

Build: ★★★★★☆

Features: ★★★★★☆

Performance: ★★★★★☆

Value: ★★★★★☆





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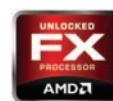
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## ART APP

# Griffin Crayola DigiTools Ultra for iPad

**£39** inc VAT

### Contact

■ [griffintechnology.com](http://griffintechnology.com)

### Read more

■ [tinyurl.com/c7joz67](http://tinyurl.com/c7joz67)

### System requirements

iPad 2/3/4/mini; iOS 4.3 or later



We've seen touchscreen styli aimed at kids – indeed, Griffin launched the Crayola ColorStudio HD well over a year ago – but the DigiTools Ultra pack takes things to another level. In the box you get three sets of 'tools', each of which works with one or more of the three free iPad apps.

## Effects

The first is a basic colouring-in app called Effects, which works with the purple Digital Crayon and Digital Colour Changer. The Crayon is really just a stylus, but it's well designed for kids' hands and works well with the app to allow children to colour in the many pictures provided. The Colour Changer, which looks like a potato peeler, has two rubber tips and changes a band of colour as you swipe it across areas that are already coloured in.

The round green Stamper tool can also be used just like an ink stamp. First a picture is chosen from the list, and the Stamper will 'print' this image on to the screen wherever it's pressed down. The images have sound effects and animations, which our five-year-old tester, Annabel, loved.

## Airbrush

The second app is called Airbrush, and uses the red Digital Airbrush and Digital Rainbow Roller. There are more sound effects, and the Airbrush



works just like the real thing, spraying digital paint at a series of backgrounds. The Rainbow Roller works like the Colour Changer, but you get to choose three colours from the palette and these form a 'rainbow' as you drag it across the screen. Again, the stamper tool can be used in this app.

## Digital 3-D

Finally, there's the 3D app, which works with the blue Digital 3-D stylus and glasses. The stylus has two tips and the child can pick from several colour combinations to draw 3D lines on 3D backgrounds. Move the iPad around and the lines jiggle, giving a better 3D effect.

It's possible to print the creations if you have an Air Print-compatible printer. Otherwise, your printer manufacturer may offer its own solution, or you may be able to use one of the many iOS printing apps, such as Print n Share Pro.

The three apps are free, but you need the Digital Stamper to unlock them. You can't download and use them without buying the tools.

That's a shame, because the apps are well designed and fun to use, but the tools are really just gimmicks – £39 is a lot to pay for what is in effect a set of styli. Most work interchangeably, and the app is none the wiser – it will still draw a rainbow or paint airbrush effects if you use the Digital Crayon. Or, you can just use your fingers and – in the case of the 3D app – draw more accurately than you can with the specific tool.

Sure, younger kids will love the set, and it's bound to keep them quiet when you need a bit of peace. However, if you don't want to spend £39, plenty of alternative apps are either free or cost a pound or two, while the Crayola HD Studio includes a similar colouring app and a stylus for less than £20.

If you do decide to buy the DigiTools Ultra pack and don't want your iPad's screen getting scratched, Griffin recommends installing a screen protector.

## Verdict

Although the colouring apps work well and are great fun to use, the Digital 3-D app is the weakest of the lot, and is unlikely to keep kids amused for long. The other two apps are excellent, but the £39 price is steep for what is really just a simple set of styli. **✗ Jim Martin**





## SHOPPING APP

## HotUKDeals

Free

## Contact

■ [hotukdeals.com](http://hotukdeals.com)

## Read more

■ [tinyurl.com/bu2aj5g](http://tinyurl.com/bu2aj5g)

## System requirements

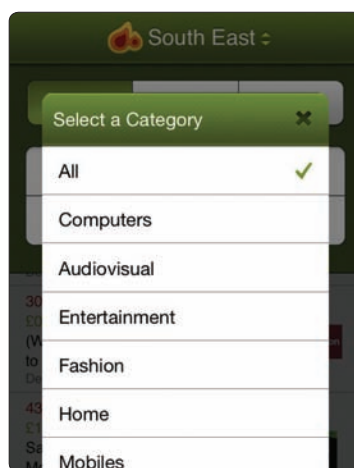
iOS 5.0 or later; 4.1MB storage; Android 2.0 or later; 2.3MB storage

The official HotUKDeals.com app brings access to 'deals, voucher codes, freebies and savings' on iPhone, iPad and Android.

The HotUKDeals app is extremely simple to use. Open the app and you get a list of 'This Week's Hottest Deals'. This isn't as useful as it could be, since it comprises only a list of the most popular deals in all areas of the UK. When we opened it this included lipsticks, skinny jeans and out-of-date advent calendars. These may be of interest to you, but we are less than fussed.

To get the most out of HotUKDeals it pays to offer up your location, and to sign in. You can sign in via Facebook or Twitter, and manually give your location or allow the app to access your device's GPS.

The best way to filter deals is via the pull-down tab at the top of each home screen, which offers a choice of 'Hot', 'New' and 'Disc'. Hot is the currently trending offers, New is, well, new ones, and Discussed is those offers that are getting the



most conversation. You can further filter by type (deals, vouchers, competitions and so on), and by topic, which includes 'Computers', 'Audiovisual' and 'Mobile'.


Once you've found an offer, clicking it gives you a detailed description and images. The deals are moderated, and mostly from major retailers, so you should be on safe ground. But we found plenty of dodgy-looking listings, so it pays to keep your wits about you.

At the top of the page, above the 'temperature' gauges, are icons



offering you the option to comment on the deal, share it or – where possible – take things further. Click the 'Go to Deal' icon and you should be delivered to the website of the deal. However, we often found this simply took us to the home page of the retailer involved.

## Verdict

The HotUKDeals app offers easy access to a wealth of information that can help you unearth a bargain. Just tread carefully – not all 'deals' are made equal.  **Matt Egan**



## ENTERTAINMENT APP

## Fake Windows 8

Free

## Contact

■ [mdbsoftwares.com](http://mdbsoftwares.com)

## Read more

■ [tinyurl.com/cpschdz](http://tinyurl.com/cpschdz)

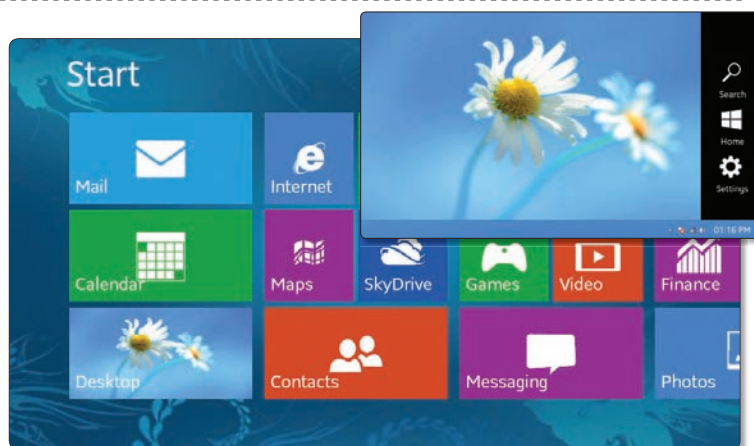
## System requirements

Android 2.2 or later; 1.9MB storage

Fake Windows 8 lets you add a Modern UI-inspired interface to your Android smartphone or tablet, although its landscape orientation makes it better suited to the latter. The difference here is that the Modern UI within Fake Windows 8 is not a Live Wallpaper, and it's present only when the app is running: click a physical Home or Back button and you'll be returned to Android.

There are some neat touches. For example, a Charms bar can slide in from the right, revealing quick links to Android's Settings menu, Google Search and a Home button. If you're in Desktop mode then the latter returns you to the Start screen – although we can't think why you would be, given that all you can do here is admire the wallpaper.

Some of the tiles genuinely work, including Messaging, Calendar, Camera, Mail, Store (Google Play), Maps and Contacts. We were also delighted to find the SkyDrive tile took us directly to our preferred cloud-storage service, Dropbox.




But Fake Windows 8 failed to find any of the audio tracks loaded on our device under Music, instead transporting us to the Deezer web store, and rather than present links to the number of games installed on our phone it displayed adverts for the developer's other Android apps. Click any of these and you're whisked off to the Play Store to download the app.

Another niggle: tap a tile at the far right of the Home screen and you'll open the Charms bar rather than the intended app. Gestures aren't supported, and there's no possibility of customisation.

Fake Windows 8 is a very simple app, designed to enable you to "trick and prank your friends by telling them you got the latest Windows 8 on your device". It's not much more.

Permissions are all reasonable but, interestingly, it promises that "No personnal (sic) information will never be stolen from you in our apps". It's not the most reassuring statement we've ever heard.

## Verdict

If pretending your Android device is really a Windows 8 computer floats your boat, fine – but we'd rather stick with Android.  **Marie Brewis**





## BACKUP UTILITY

# O&O DiskImage 7.0 Professional

£30 inc VAT

### Contact

■ oo-software.com

### Read more

■ tinyurl.com/cL3wk32

### System requirements

Windows XP/Vista/7/8

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★



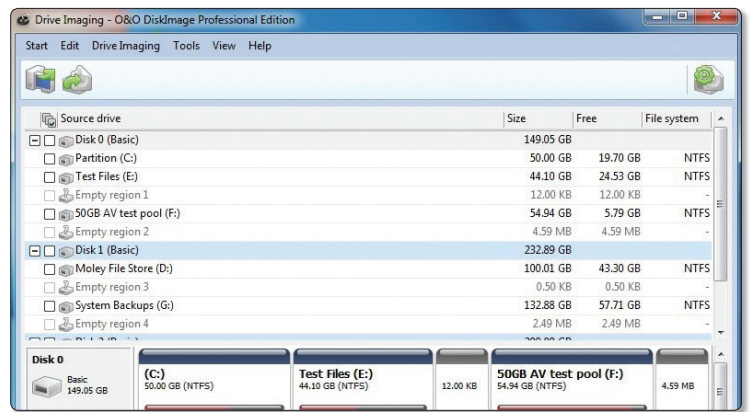
File backup is essential for all PCs, but it's estimated that only 10 percent of people back up on a daily basis. O&O DiskImage 7.0 Professional is designed to handle both system and file backup, and can be used to secure a whole PC, individual drives or partitions, or selected folders and files.

All the features are accessible from a single control panel. Four options on the Start page cover full- and incremental system image copies, file backup, and restoration of a drive image.

The full system copy page shows details of the drives available for backing up as an icon tree. Select the source drive or partition and, rather unintuitively, you must then click 'Start drive imaging' to specify the destination for the archive.

With file copying, O&O leaves it up to you to drill down to the relevant files. A simple scheduler is included for backup jobs, which enables automatic daily or weekly copying at specified times. Backups can be full, incremental or differential.

The program performs many of the same functions as Acronis TrueImage 2013, so it's worthwhile comparing the two products on performance. A full backup of our usual 50GB basket of test files took 1 hour 23 minutes with O&O, but only 26 mins with Acronis.



**DISKIMAGE 7.0 PRO** is a useful - if slow - file- and system backup utility

Furthermore, while TrueImage needed 1 hour 2 mins to create a file backup of the same basket, O&O took more than 8 hours.

Although DiskImage compresses files to save space, this seems very slow. Copying the files in Windows 7 took 25 minutes; zipping them added another 90 minutes.

There's an argument that you should keep your backups free of compression or encryption, which could cause recovery problems. With storage space now very cheap, straight copies of files are often the best solution. Unfortunately, we couldn't find a way to turn off compression here.

File backups can be accessed with compression tools such as WinZip, as well as with DiskImage itself, although not using Windows' own Zip-reading abilities.

O&O doesn't offer online storage to partner DiskImage, although plenty of third parties can provide this. Neither does it offer non-stop backup, which creates file copies in real-time.

DiskImage does support copying to external and network drives, though, and it can create ISO images that can be burned to disc.

An image can be restored to dissimilar hardware, too, after replacing or upgrading a machine, for example.

## Verdict

O&O DiskImage 7.0 Professional is a cheap and cheerful system and file backup tool, which handles the basics and can produce manual and scheduled backups on a variety of storage devices. It's not particularly quick, though. **Simon Williams**

## SECURITY SOFTWARE

# Malwarebytes Anti-Malware Pro 1.65

£19 inc VAT (1 PC)

### Contact

■ malwarebytes.org

### Read more

■ tinyurl.com/d79p823

### System requirements

800MHz processor;  
Windows XP/Vista/7/8;  
512MB RAM; 20GB storage

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★



Malwarebytes Anti-Malware Pro is difficult to categorise. It looks like an antivirus tool, but claims to work in a different way and be happy to sit alongside most other Windows security offerings as an extra layer of protection.

You can get the basic product for free (see tinyurl.com/cng57y6). That version offers manual scans on-demand; this Pro version adds real-time protection, and files are automatically scanned to a schedule you assign.

Once downloaded and installed, Malwarebytes Anti-Malware Pro presents a very business-like control screen. You'll see none of the fancy Modern UI-inspired tiles of recent

internet security programs. Instead, you get nine simple tabs, covering such things as scanning, live protection, update and quarantine.

A quick scan of 200,191 files took 2 mins 7 secs. When we aimed the scanner at our usual 50GB basket of test files, Malwarebytes needed 2 mins 17 secs to examine 202,193 files. This gives a scan rate of 1,476 files per second, which is very quick.

You need to choose Full Scan if you want to check a particular part of your system but, even then, you can narrow it down only to a particular drive. This is long-winded if you want to check a single file.

So how does Malwarebytes Anti-Malware work? According to

the guys who put it together, it was originally a tool to help computer technicians to remove stubborn software infections. It doesn't work in the same way as traditional antivirus software, which use a database of virus signatures to spot and eradicate infections.

To give them their due, most traditional antivirus programs have also progressed beyond this paradigm, today using heuristics to spot suspicious behaviour in zero-day exploits and cloud-based databases for quick remedies.

Malwarebyte's full-time protection - the bit that differentiates the Pro product from the free one - checks files as they come in as email



## SECURITY SOFTWARE

## Webroot SecureAnywhere Complete 2013

**£50** inc VAT (3 PCs)**Contact**■ [webroot.co.uk](http://webroot.co.uk)**Read more**■ [tinyurl.com/c4c7pu9](http://tinyurl.com/c4c7pu9)**System requirements**Windows XP/Vista/7/8;  
128MB RAM; 10MB storage

Usability: ★★★★★☆

Features: ★★★★★☆

Value: ★★★★★☆



Webroot's SecureAnywhere internet security suites are renowned for their low system footprint. The latest 2013 release, in its Complete version reviewed here, includes system clean-up, online file backup and Android mobile device protection. That's in addition to the core functions of antivirus, antispyware, anti-phishing and a firewall.

Installation is straightforward, and the main screen shows a lot of useful status data. The program hasn't had a Windows 8 Modern UI-style makeover like some of its rivals, although it is said to be compatible with the OS. Its business-like tabbed interface is better suited to the amount of info on display.

Six tabs offer quick access to Overview, PC Security, Identity & Privacy, Backup & Sync, System Tools and My Account.

Overview includes live counters on the number of events and processes that have been monitored, and the time since the last scan.

PC Security offers control over scans, while Identity & Privacy deals with the identity shield and password management.

Backup & Sync handles the 10GB of online storage provided in the package, and System Tools includes several apps which help clean up your PC. The latter freed up 2.5GB of storage in 9 seconds on our PC.



**SECUREANYWHERE COMPLETE** is very fast and light on system resources

The Webroot Android app is a freebie, but it may be worth using since it ties in with your main Webroot account. It can also be used to remotely disable a lost or stolen phone. However when lab-tested in early 2012, Webroot's Android app wasn't great at detecting malware.

Results of our usability testing shows the Webroot engine is unusual in lots of ways. It took only 5 mins 37 secs to complete our 50GB file scan, which is quick, but it looked at only 29,859 of them. This isn't the lowest we've seen, but neither does the software appear to fingerprint files – in a repeat scan saw it tested exactly the same number.


With SecureAnywhere running in the background, a 1GB file copy took 41 secs, which is one of the lowest times we've measured. With a full system scan running in the

background, this time rose only to 44 secs, a mere 7 percent increase. Along with Bitdefender, this is the lowest system load we've seen.

AV-Test scored the suite at 12.5 out of 18 points in Windows 7, which is enough to get it certified, but at the lower end of the products tested.

Breaking this down into the three measured categories, it scores five points for Protection, five for Usability, but only 2.5 for its ability to deal with established threats and repair a system after an attack.

**Verdict**

There's a lot that is good about Webroot SecureAnywhere Complete 2013, from its low hit on system resources to its fast scanning and cloud-based updates. Unfortunately, it falls down in the fundamental task of repair.  **Simon Williams**

**MALWAREBYTES ANTI-MALWARE**

is designed to run alongside your existing security suite

attachments or as you load them on to a system from the internet. It should pick up malware at the time of import, using later scans as a back stop.

This is why your best plan is to run Malwarebytes Anti-Malware Pro alongside a regular internet

security suite. What that doesn't pick up, Malwarebytes may have a different handle on. The program is engineered to co-habit with other security software, and we had no trouble running it alongside Webroot SecureAnywhere Complete 2013 (reviewed above). In the past, though, we have seen some antivirus apps object to its presence.


We recommend running the free 30-day trial to check it plays happily with your preferred security suite. If you do buy Anti-Malware, you'll be pleased to learn its £19 price includes lifetime updates.

The program supports whitelists of software it shouldn't block and a full quarantine system, with which

you can isolate suspect files, then reinstate those flagged in error.

We didn't see any false positives during testing. But nor do we have any independent test data to show if and how well it can spot and remove Windows malware.

**Verdict**

Malwarebytes Anti-Malware Pro could be a useful adjunct to a regular security suite, where its alternative way of working should complement the other software. It's quick and lightweight on resources, and may just get you out of trouble when you come across a new threat that your regular protection doesn't catch.  **Simon Williams**



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## MUSIC MANAGER

## Apple iTunes 11.0

Free

## Contact

■ [apple.com/uk](http://apple.com/uk)

Read more

■ [tinyurl.com/crea7tw](http://tinyurl.com/crea7tw)

## System requirements

1GHz processor; Windows XP/Vista/7/8/Mac OS X 10.8 or later; 512MB RAM

Usability: ★★★★★☆

Features: ★★★★★☆

Value: ★★★★★☆



iTunes 11.0 is a major update to Apple's multipurpose music player and iDevice sync program. With edge-to-edge styling, iTunes takes several design cues from iOS.

The latest version introduces a number of changes to the way you view content. With iTunes 10.0, you could view your content in four views: List, Album List, Grid and Cover Flow. Now, all four are more or less gone.

What was previously called List view is now Songs view. It's similar to what iTunes 10.0 offered but, with the new compressed font preferred by iTunes 11.0, it's more difficult to read. This shows you one song per line, with no artwork. You can still use the Column Browser, but there is no artwork viewer at the bottom left. So when you select a track, you don't get any visual indication of what album it belongs to.

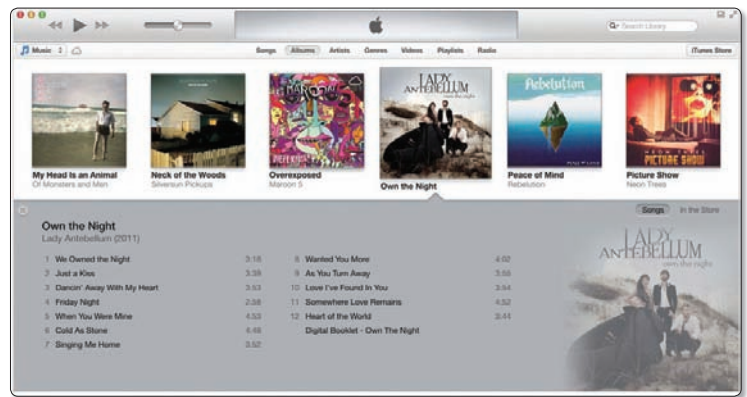
The main advantage of the new Songs view is the ability to display any columns you want with information from your media files' tags. This is greatly improved in iTunes 11.0, with different types of tags grouped into sections so they're easier to find.

Albums view is the new default view. It's similar to the previous Grid view, with some exceptions. You can't change the size of displayed artwork, but you can alter the sort order by pressing Command, J.

With Expanded Album view, you see the contents of your album in a colour scheme similar to that of the album's artwork. This view works with movies and TV shows, too.

## Artists and Genres views

Artists view and Genres view are also new. When you choose one of these, you'll see a sidebar at the left of the iTunes window showing



**ALBUM VIEW** neatly blends album artwork into track list information

a list of either Artists or Genres. For Artists, iTunes illustrates the entries using album art in your library; for Genres, it uses built-in icons for standard genres; if you have custom genres, it uses art from one album of that genre.

These views let you more closely examine your music, displaying album art, album titles, track names, and times. Also, if you've entered the year of the album's release, you'll see that date displayed at the right of the iTunes window.

The sidebar in previous versions of iTunes displayed your media libraries, any connected devices, and all your playlists, among other things. If you miss that old sidebar, you can restore it by choosing View, Show Sidebar, or pressing Command, Option, S. It will stay at the far left of the iTunes window, regardless of which view you choose.

Finally, there is Playlists view. This shows all your playlists in a sidebar at the left of the iTunes window, and is available only if you don't display the sidebar. Select a playlist to see its contents, and for each you can choose a number of view options.

View options are accessible by pressing Command, J, and these change according to which of the three views you choose. In List view, for example, the View Options window lets you choose which columns to display; in other views, you can select a sort order, choose whether to group compilations, and adjust artwork size.

Aside from the new visual style, the main difference in usability for iTunes 11.0 is the Up Next menu. This is accessed by clicking the Up Next icon in the iTunes LCD display and displays upcoming tracks.

Up Next is rarely empty, as clicking on a track in Songs plays that track, and displays the upcoming songs after it; clicking a track in Albums selects that track and all the tracks that follow it.

Up Next keeps adding tracks as it plays through the playlist. This makes sense, because choosing a track in iTunes would always move to the next track after playing it.

Another standout feature of iTunes 11.0 is the wholly redesigned MiniPlayer. In previous versions of iTunes, the MiniPlayer displayed only shuffle controls, volume and the iTunes LCD display; it is now fully interactive and enables you to search, select and play tracks. And it's even smaller than before.

## Performance

To test performance we converted a 47-minute MP3 file and used the Convert to AAC function in both iTunes 10.0 and 11.0. iTunes 10.0 took 1 min 17 secs to convert the file, while iTunes 11.0 did it in 51 secs - a good 26 seconds faster.

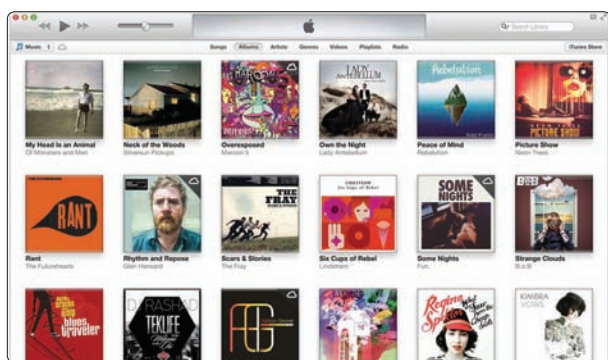
The new version also feels snappier in use. The interface moves more quickly, and we experienced fewer spinning ball situations. We also found iTunes responded faster when we edited information on multiple items.

## Verdict

iTunes 11.0 introduces some new ways to view your media. Even if you're a longtime iTunes user, take some time to try out the different views and their options to figure out which ones work best for you. But don't forget that you can switch views at any time, depending on what you're doing in iTunes.

✉ IDG staff

**LIBRARY VIEW** shows all your music, ripped and purchased, even those in your iCloud





## WEB DESIGNER

## Website X5 Evolution 9.0

£59 inc VAT

## Contact

■ inmedia.com

## Read more

■ tinyurl.com/d8jdkz2

## System requirements

Windows XP/Vista/7/8

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★



Evolution 9.0 is entry-level design software that lets you create a basic website without any coding knowledge. It strikes a balance between simplicity and the ability to create personalised web pages.

A grid-based what-you-see-is-what-you-get (WYSIWYG) visual editor provides scope to choose how you want your page to look. Your site can be customised with templates, which set the colours, background, header and so forth.

The five-step site-creation process involves a top-down sitemap view, in which you can see the hierarchy of pages and how they link to your home page. Each page is divided into a grid of rows and columns, and you drag content, such as a block of text, image, video or animation into one of these cells.

A simple word processor lets you customise the appearance of text, and you can add more complex elements, from lists and email forms to 'widgets', such as a Facebook feed or Google News banner.



**EVOLUTION 9.0** is a template-based, five-step web-design tool for beginners

This system is intuitive to operate. It took us about 30 minutes to create a basic home page, with text separated into columns and images resized to fit. Afterward, Website X5 provides an interface to upload your site via FTP.

You're unlikely to produce an award-winning website with this software. Template-based design apps often have a certain look that expose preset graphics. There may be dozens of templates here, but most use garish colours, shapes and 'cheesy' objects. It took plenty of searching to find one to our taste.

Website X5 has some advanced tools. Templates can be fully customised, and you can add a rudimentary shopping cart, for example, that emails orders to you, or links to a PayPal account.

Our test website is nothing special, but it does the job.

**Verdict**

Evolution 9.0 is effective as a simple tool for creating HTML web pages. The grid system ensures content flows correctly on the page, and provides a consistent visual style.

✉ **Orestis Bastounis**

## GAME

## Hitman: Absolution

£25 inc VAT

## Contact

■ hitman.com

## Read more

■ tinyurl.com/cqsdm4k

## System requirements

Dual-core processor;  
Windows Vista/7; 2GB  
RAM; nVidia 8600 with  
2GB VRAM or equivalent;  
DirectX 10

Given that one of the initial salvos from Hitman: Absolution's marketing cannon was a trailer in which the iconic bald-headed assassin brutally slays nuns dressed in stockings and rubber dresses, it's perhaps no surprise that the finished product has a nasty streak that's a mile wide.

Hitman embraces crime, violence and misanthropy, relishing in gruesome scenes starring awful people with awful motives.

The outright nastiness of the game's cutscenes is at odds with the more playful, sillier world of the game proper. Disguising himself from foes by wearing silly costumes, distracting with disco-dancing policemen, assassination via poisoned sushi - 47's ally is farce as much as ruthlessness. The close-up throat-slitting, lascivious strip-club visits and drawn-out beatings cinematics seem to have arrived from a different game entirely.

Hitman fans will notice how different Absolution is from the earlier puzzle-like games. It's still



**HITMAN: ABSOLUTION** unsurprisingly has a nasty streak a mile wide

third-person action, but moves toward cover-based stealth (or all-out gunplay), and largely leaves the experimentation and exploration of its predecessors behind.

There's always a choice of evasion via hiding, stealth takedowns of guards, or open violence with an assortment of weapons. But most levels are about getting to an exit alive, rather than devising a strategy to get in and out unseen.

Arguably the most appealing feature, disguising yourself as people you've killed or knocked out, is now restricted by an 'Instinct' meter. This enables 47

to temporarily cover his face, otherwise he'll be rumbled. Instinct also allows him to see through walls, identify vital items and chain up simultaneous gun kills.

The plot is something to be endured rather than enjoyed. Those who've never played Hitman might find this a confusing halfway house between stealth and action.

**Verdict**

Absolution is a bit of a misfire, for a once-proud stealth-action game. Good ideas are drowned out by routine hiding, illogical systems and an unsavoury tone. ✉ **Alec Meer**





## GAME

## Far Cry 3

**PC ADVISOR**  
GOLD**£29** inc VAT**Contact**■ [far-cry.ubi.com](http://far-cry.ubi.com)**Read more**■ [tinyurl.com/cs6gqwb](http://tinyurl.com/cs6gqwb)**System requirements**

2.6GHz processor;  
Windows XP/Vista/7;  
2GB RAM; 15GB storage;  
512MB VRAM; DirectX 9;  
broadband internet  
connection



**FAR CRY 3** offers a huge, wild environment for you to explore

Now here's a surprise. The last big game release of 2012 was flying somewhat underneath the radar, even without the difficulty of arriving after all those Call of Duties, Borderlands and Assassin's Creeds. But open-world shooter Far Cry 3 turns out to be one of the best of the games of last year.

It's a series that's always offered free-roaming settings within which to shoot and skulk, but multiple changes of developer, a relatively quiet marketing campaign and a highly mixed reaction to 2008's Far Cry 2 had seemed to put this third game firmly in outside-the-territory.

Perhaps that afforded its creators a freedom they otherwise wouldn't have had; as well as offering a wild, huge and gorgeous island to careen about on foot, in jeep or by hang-glider, Far Cry 3 does character and narrative well.

Packed with darkness and snark, it might occasionally veer into unsavoury territory, but Far Cry 3 certainly works its way into the brain and starts affecting things.

Something of a hybrid of the first (a straight-up shooter in a tropical island setting) and second (territorial war and survival systems) games, it finds its own voice. There are some similarities, mind.

The island, which is packed with vegetation and animal life, as well as the inevitable mercenaries, is blissful enough to explore, but a clutch of role-playing systems lends its more purpose than routine headshooting. It is very much a shooter, so you won't be resolving any conflicts through conversation, but it does have crafting, skill trees and a sort of magic, presented as herbal concoctions that offer temporary buffs such as fire protection.



**FAR CRY 3** does hunting very well: big cats are super-tough to take down

## Hunting

The crafting is particularly absorbing, as it requires combing the island for particular species of animal (usually rare), then brutally killing them for their skin. It's horrible; it's mesmerising; it's also more challenging than shooting soldiers - tigers are super-tough to take down, dogs will swarm you in hordes, and tapirs and deer will simply leg it at the slightest sound.

Once suitable beasts are skinned in suitable numbers, the hides are used to create an assortment of increasingly capacious pouches - for example, to carry more weapons, ammo, herbs or cash - and, while the concept is openly ridiculous when any analysis is applied, it's nonetheless compelling.

## Story

This hunting sub-game is arguably more engrossing than the main campaign, and its tale of rich, young American tourists trying to escape from and turn the tables on psychotic drug-runners.

That core story is better told than might have been expected, however. While there's some discomfort from the fact that this is ultimately a game about a wealthy white guy mowing down legions of foreigners who speak only in swear words, interspersed with a spot of endangered species hunting and visiting magic quasi-voodoo tribes, it does go further, too.

Far Cry 3 explores, at least a little, the psychological effects of killing hundreds of people, and offers some well-drawn and fascinating nutjob characters with whom to spend time. Crucially, and unlike its stablemate and similarly open-world action game Assassin's Creed III,

the narrative doesn't outstay its welcome - cutscenes are few and far between, and its characters tend to have dark charisma and wit, rather than simply spouting dry exposition.

## Objectives


Similarly, the raft of optional objectives scattered across the huge map offer satisfying conflict and spectacular vistas rather than hollow collectormania. For instance, activating a fast-travel point on the map involves storming (or stealthing into) an enemy camp and taking out everyone. This can be done with one of a wide selection of firearms, by silent knife or arrow takedowns, or even letting loose a caged animal and allowing the carnage to play out.

There's even a spot of light role-playing as you pick between skills in either open combat, long-range attacks or stealth when levelling up, as well as customising weapons to suit your play style.

In essence, Far Cry 3 is exactly what the more enlightened action game fan most desires - a huge and gorgeous setting, freedom of movement, a choice of ways to play, and tons of content to devour in one's own preferred order.

Perhaps due to the scope of what it tries to do, despite a day-one patch it is fairly buggy. But don't let that or the slightly iffy tone hold you back. In an age where shooters are often becoming ever-more linear and restrictive, Far Cry 3 offers a substantial glimpse of where things should go instead.

## Verdict

Enormous, gorgeous, unsettling and liberating, Far Cry 3 is an unexpected triumph.  **Alec Meer**







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#### Contact

■ [lomond.com](http://lomond.com)  
Read more  
■ [tinyurl.com/cLqaq5v](http://tinyurl.com/cLqaq5v)

#### Specification

Inkjet printer; Memjet printhead technology; 1600x1600dpi print resolution; quoted print speed: B=60ppm, C=60ppm; actual print speed: B=41.4ppm, C=23.1ppm; USB 2.0; 10/100 ethernet; 250-sheet input tray + 20 manual; 2-line LCD display; cartridge cost: B=£48, C=£50 x3; print life (pages): B=4,800, C=4,300 x3; 542x455x265mm; 12.8kg

Build: ★★★★★☆

Features: ★★★★★☆

Performance: ★★★★★☆

Value: ★★★★★☆



## PRINTER

### Lomond EvoJet 2 Office

The humble inkjet printer has seen its fair share of reboots over its several-decade history. Recent attempts to reinvent the inkjet have revolved around making it more business-friendly, kitting it out with oodles of features, and playing up its potential for vibrant graphics.

Few of these attempts have been little more than damp squibs. Enter Lomond, emerging from behind the Iron Curtain, with a technology that threatens to crack open the inkjet market. The not-so-secret ingredient is the Memjet printhead.

The Memjet is packed to the gills with print nozzles – the company estimates the EvoJet 2 has around 70,000 of them. To put this into some perspective, the Canon Pixma MX895 has around 4,608 nozzles. Add to this the fine drop size, and you have an astonishing amount of colour being plastered across the page at any one time.

The printhead remains static while the paper is passed underneath, in a reversal of the traditional inkjet mechanism. All this allows for some astonishing resolutions – Lomond promises detail levels of up to 1600x1600 – at searing print speeds.

You can tell the Lomond is a little unusual even while getting it out of the box. It's one of the largest inkjets we've seen, and its unusual design makes it look as though almost a quarter of the printer has been carved out.

The various consumables need to be fitted into a pair of spacious compartments, and the visual instructions weren't the easiest to follow. Better printed documentation would certainly be on our wish list for future versions of the EvoJet.

The main input tray is a meaty unit that takes up to 250 sheets, although a separate manual tray built neatly into the side can take up to 20 sheets. The Lomond has built into it a sizeable plateau on to which the finished prints land. Despite its size, this plateau still isn't large enough for the pages to remain flat, and so powerful is the EvoJet in its fastest mode that, even when extended to its fullest, the plastic paper guide struggles to contain the swell of sheets. The more nervous might feel a need to keep an eye on the EvoJet at work.



**PC ADVISOR  
RECOMMENDED**

What you don't get with the Lomond is an awful lot of features. It's aimed at the professional – rather than the home- or enthusiast user. As such, you don't get USB or removable memory card slots, nor a touchscreen. In fact, the display is a rather primitive two-line LCD. This isn't terribly clear, and we often had to peer closely at it to see what it said. But the printer ran smoothly in our tests, so we didn't need to refer to the screen too often.

The menu is useful rather than comprehensive, but the essential options and features are included. It's easy to navigate with the simple button system, and you can also cancel jobs with the tap of a switch.

Besides a USB 2.0 interface, the Lomond also supports 10/100 ethernet. Unsurprisingly, given the traditional business angle, no wireless facilities are included.

#### Performance

The Lomond delivers handsomely in terms of brute force. In its fastest ('Normal') mode, still boasting a very high resolution of 1600x800, it turned out sheets at the blistering rate of 41.4 pages per minute (ppm).

Take into account the 7-second startup time and this figure rises to an even more emphatic 52.2ppm.

Even the highest (1600x1600) mode saw a print speed of 21.4ppm. The quality is very good, too. Gone are the fuzzy letters characteristic of inkjet prints. The text is clean and sharp, while still offering decent levels of black in comparison with the rather light output of typical laser models.

In colour graphics, the Lomond churned out its fastest pictures at a rate of 23.1ppm, falling to 15ppm at

the highest quality setting. Colours are good, even if graphics aren't the EvoJet's greatest strength – its palette isn't as accurate as those of the typical Canon, for instance. However, the graphics certainly match, if not better, those of most laser printers. And the results on photo paper are very good.

There's no auto-duplexing, which will come as a disappointment to those wishing to save money on paper costs. The Lomond makes it easy for you to reload paper for manual duplexing, though.

The Lomond is quiet when it's printing in Best mode, but a touch noisy in Normal mode, adding around 24dB to the room in full cry.

This printer costs a rather steep £549 ex VAT, but running costs are superb, working out at around 1p per page of text and 3.5p for colour.

Businesses looking to buy this model should get in touch with Lomond, as it will be offering monthly contracts whereby you pay for the usage of the printer rather than buying the model outright.

With costs ranging from £49 to £149 a month, and including the costs of consumables and repairs, this interesting new approach might be the most significant innovation of all those unveiled by Lomond.

#### Verdict

The Lomond may seem expensive, but it'll cost next to nothing to run. Monthly payment plans might also be a good way to use the EvoJet without having to invest upfront. We'd like to see auto-duplexing, and the output tray will need to be better at containing paper, but for sheer speed and quality the Lomond is a revelation. **Robin Morris**



**£65** ex VAT  
**£79** inc VAT

#### Contact

■ [canon.co.uk](http://canon.co.uk)  
Read more  
■ [tinyurl.com/cgokhaw](http://tinyurl.com/cgokhaw)

#### Specification

Inkjet printer; Canon Fine (Full-lithography inkjet Nozzle Engineering); 5-ink Canon ChromaLife100+; USB; 802.11n; Apple AirPrint; 9600x2400 resolution; duplex; borderless printing, fit-to-page; CD/DVD printing tray; 125-sheet paper cassette; 20-sheet paper cassette; 451x368x128mm; 6.6kg

Build: ★★★★★  
Features: ★★★★★  
Performance: ★★★★★  
Value: ★★★★★



## PRINTER

### Canon Pixma iP7250

Most consumer and small-business printers are multifunction devices that include a scanner, copier and other features. However, if you're simply looking for a basic printer for light use, you might want to look at Canon's new budget iP7250.

Priced at just £65 ex VAT, the iP7250 is a standalone printer that provides little in the way of added extras – there's no scanner, touchscreen, nor memory card slots. It's also rather bulky for a straightforward A4 printer.

Yet Canon gets most of the basics right, offering 9600x2400 resolution, wireless networking, duplex printing, and the ability to print on to CDs and DVDs.

There are two separate paper trays, with the main tray holding 125 sheets and a smaller 20-sheet tray for photos and envelopes.

Canon quotes print speeds of 15ppm for text and 10ppm for mixed text-and-graphics. Our test results put those numbers closer to 12ppm and 7ppm respectively, but that's

still perfectly acceptable for an affordable inkjet printer. Print quality is consistently good, too, with smooth, sharp text, colourful graphics and bright, bold photos.


But, as is always the case with cheaper printers, you'll get stung when it comes to buying ink cartridges. Text printing isn't too costly, as the iP7250 uses a special black pigment cartridge that's dedicated to printing only text. The high-yield 'XL' version of this cartridge costs about £13 and promises around 500 pages, which works out at about 2.6p per page. We've seen lower running costs from a few rival printers, but this is reasonable for casual use.

Unfortunately, colour printing works out a lot more expensive. The problem here is that the high-yield colour cartridges don't provide very



high yields – only around 300 pages, at a cost of £12 each for the cyan, magenta and yellow cartridges. This adds up to 12p per page, which is well above average.

#### Verdict

The Canon Pixma iP7250 works well as a basic home printer for producing fast, affordable text documents. However, the high cost of the colour ink cartridges means that it's really suited for printing photos and graphics only on an infrequent basis. If you need to print colour documents on a regular basis, it's worth spending more upfront for a printer with lower long-term running costs.  **Cliff Joseph**

## PRINTER

### Dell C1765nfw

**£274** ex VAT  
**£329** inc VAT

#### Contact

■ [dell.co.uk](http://dell.co.uk)  
Read more  
■ [tinyurl.com/cLsh9by](http://tinyurl.com/cLsh9by)

#### Specification

Multifunction colour laser printer; 128MB standard memory; 600x600 max printing resolution; 1200x1200 scanning resolution; 15ppm specified speed; manual duplex printing; 150-sheet standard input capacity; 165-sheet maximum input capacity; 10/100 ethernet; USB 2.0; 410x379x338mm; 15.5kg

Build: ★★★★★  
Features: ★★★★★  
Performance: ★★★★★  
Value: ★★★★★



Dell clearly had small businesses in mind when it designed the C1765nfw. It has a comparatively modest footprint, a full set of multifunction capabilities and straightforward instructions. And yet it still manages to miss several obvious opportunities.

On the plus side, it will allow you to send faxes as well as print, copy and scan. It's also compact, with dimensions that will fit comfortably on a small desk (410x379x338mm), although it's weightier than we expected at 15.5kg.

Stylistically, however, it's one of the most ungainly printers on the market. The control panel unnecessarily juts out over the front of the machine, thus partly obscuring the output arm underneath it.

Dell has also insisted on fitting a monochrome four-line, 20-character LCD. It doesn't tilt, nor allow you to preview the documents you may want to print from the USB memory stick holder below the panel.

The C1765nfw is also a relatively low-volume printer, since the drop-down input tray at the front will hold only 150 sheets of A4 paper; an ADF on top will copy a further 15 sheets, while a small 'Priority Sheet Inserter' fits on top of the input tray when required.

Connectivity options are more expansive, including Wi-Fi alongside the usual USB 2.0 and ethernet, with a dedicated button for WPS. Auto-duplexing doesn't feature.


In terms of performance, the C1765nfw is a bit of a mixed bag. In our tests mono documents emerged at Dell's stated speed of 15ppm, and colour pages at 12ppm. Printing an A4 photo from a memory stick took a zippy 15 seconds. Yet copying text documents from the ADF is grindingly slow, and recommended only if you're longing for a coffee break.



Text quality is bold and generally solid. Photos are sharp, but with a slight yellow tinge. Copies are fainter than the originals, but acceptable.

Running costs are on the high side. High-yield toner refills (specified for 2,000 pages) cost around £70 for black, which works out at 3.5p per page, and 10.5p per page for colour.

#### Verdict

The Dell C1765nfw offers good connectivity, plus above-average speed and picture quality. However, it also has design idiosyncrasies, lacks a few important features and its toner is pricey.  **Martyn Clayden**



£1,141 ex VAT  
£1,370 inc VAT

#### Contact

■ [epson.co.uk](http://epson.co.uk)  
Read more  
■ [tinyurl.com/cp95p7g](http://tinyurl.com/cp95p7g)

#### Specification

3LCD tech; 0.59in LCD;  
1280x800; 16:10 aspect;  
4,200 Ansi lumens  
brightness (2,910 eco);  
3,000:1 specified contrast  
ratio; 37dB noise (29dB  
eco); HDMI; DisplayPort;  
VGA; Composite; USB;  
gigabit ethernet;  
802.11b/g/n; RCA audio;  
29-280in image;  
0.8m-8.4m throw; lamp  
life: 2,500 hours;  
377x271x108mm; 3.9kg

Build: ★★★★★☆  
Features: ★★★★★☆  
Performance: ★★★★★☆  
Value: ★★★★★☆



## PROJECTOR

### Epson EB-1945W

PC ADVISOR  
RECOMMENDED



Epson's EB-1945W is a strong all-round projector, kitted out with clever tools that simplify its siting in varied environments.

A prime asset is its 'testcard', which displays an image and invites you to make adjustments until the results match onscreen. A Focus Help button sits behind the lens, and a quick tap calculates optimum focus. You then adjust this until it precisely matches the figure.

Another button is there to assist you in finding the best screen size, again with a testcard to compare results. Other tools allow automatic adjustment for vertical and horizontal keystone, enabling you to create virtually flawless images in alien environments.

Not that the Epson's specs don't help. In particular, 4,200 Ansi lumens is a very high rating that'll allow this projector to work in full daylight. Indeed, we had to dial down the brightness.

The EB-1945W is capable of a large image, potentially up to 280in.

With a zoom factor of 1.6x, it can create an image of 100in from just 3.4- to 5.5m away. Adding an extra 2m increases the size by half again.

The off-white casing is pleasing, although its styling is a little clunky and it tips the scales at a hefty 3.9kg. However, the Epson is more about substance than style.

Built-in speakers suffice for basic soundtracks. More impressive are the connections on offer: DisplayPort, HDMI, USB 2.0, VGA and Composite. Networking stretches to gigabit ethernet and Wi-Fi, and you can project PDFs from a USB stick. It's kitted out for post-PC use on an Android or iOS device, too.

Epson's projectors can offer strong colours, and the EB-1945W

pushes 3LCD technology to its full. We saw plenty of depth of shade, and were impressed at the Epson's ability to move from dark crevices to sunny outdoor scenes in the twinkling of a pixel. Movie buffs won't like it - brightness too high, resolution too low - but it made a good job of *Batman*.

A remote apes the useful controls. It's chunky, but fits the hand.

Acoustic levels are high: 37dB in normal mode and even 29dB in eco.

#### Verdict

It's not the smallest, nor the most portable projector, but the Epson is a fantastic choice for presenting with great picture quality in any environment. ✉ Robin Morris

£82 ex VAT  
£99 inc VAT

#### Contact

■ [irislink.com](http://irislink.com)  
Read more  
■ [tinyurl.com/bqh6byr](http://tinyurl.com/bqh6byr)

#### Specification

Windows XP/Vista/7/8;  
512MB RAM; 120MB  
drive space

Usability: ★★★★★☆  
Features: ★★★★★☆  
Performance: ★★★★★☆  
Value: ★★★★★☆



## OCR SOFTWARE

### Iris Readiris Pro 14.0

Readiris has long been a reliable distillation of all that's new and sophisticated in optical character recognition. Pro 14.0 sees an overhaul of the interface - gone is the bright, but bewildering icon-heavy front-end of yesteryear. Version 14.0 is clean and sleek.

It taps into Microsoft's beloved ribbons, with the majority of options hidden behind dedicated tabs. It's relatively straightforward to manipulate zones, re-order pages or select where to send your scan.

We're promised a faster scanning engine, although our evidence is insubstantial. Version 12.0 was already fast, and a direct comparison suggested 14.0 was at most a second faster in most tasks.

The languages library was good, but lacked support for major far-east scripts. That's been corrected, with built-in languages including Korean, Arabic and Hebrew.

Third-party program support is comprehensive. Besides the usual suspects, Microsoft Office and



OpenOffice, are some welcome nods to the likes of Jarte and AbiWord. Web-friendly formats pop up, and you can send scans to HTML editors such as SeaMonkey Composer.

Adobe Acrobat Searchable PDFs will be the first port of call for archiving anything from bills to magazine articles. It gets steely support here, with smoother and more accurate conversions.

You can also create browser-friendly 'linearized' PDFs, designed to be loaded in chunks, so a user can start reading a PDF before the entire file has downloaded.

We found accuracy to be moderately improved, but just short of Finereader. It proved better at isolating columns of text that run around images, and did a better job of picking out the elements on each page. It's also good at eliminating unnecessary gaps at the ends of lines - a niggle in Version 12.0.

#### Verdict

Version 14.0 is a subtle step forward for Readiris Pro. Accuracy is good, and an improved interface and versatile file support are notable.

✉ Robin Morris



Dell recommends Windows.



The power to do more

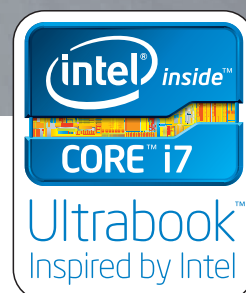


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[Dell.co.uk/XPS12](http://Dell.co.uk/XPS12)



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# Flat-panel

See the bigger picture with a large screen for your desktop PC. Paul Monckton rounds up six of the latest models, with buying advice from Jim Martin

**T**he screen is one of the most important elements of a PC. You'll be spending most of your working day staring at it, so it makes sense to choose one that's comfortable to view. It's also likely to be with you a long time - the average monitor is replaced less frequently than the PC that powers it. So it's crucial that you buy the correct type of panel for your needs.

Choosing a monitor isn't as simple as comparing the specifications of one against another, then plumping for the display that sounds superior. Indeed, some specifications are far more important than others.

## Screen size and resolution

First, decide on the panel size you want, which will most likely depend on your budget. Typically, 26in and larger screens will cost upwards of £250, but unless you pay considerably more you're unlikely to get a higher resolution than 1920x1080.

Provided that you're not limited by the available desk space, there's really little reason to choose anything smaller than a 23in display. Most such displays will have the same full-HD (1920x1080) resolution as larger screens.

## Panel type

It's rare to find a monitor that offers truly poor image quality these days, but that doesn't mean all modern displays are identical. Even if you already know and understand the differences between twisted-nematic (TN), multi-vertical alignment (MVA), patterned vertical alignment (PVA) and in-plane switching (IPS) screens, it's unwise to base your purchasing decision purely on the panel technology a monitor uses. Instead, read our reviews to find out what each is like in use.

**Twisted-nematic:** TN panels are typically used in budget monitors and tend to have limited viewing angles. This means colours will shift as you increase the angle at which you view the screen relative to the perpendicular. However,

TN monitors also offer fast response times and acceptable colours, making them a good buy for most users.

**Multi-vertical alignment:** MVA and PVA screens offer better viewing angles and contrast ratios than TN panels, but their often slow response times can lead to blurred frames in video and games. If fast response times are important, look to an advanced MVA (AMVA) monitor.

**In-plane switching:** IPS is widely regarded as the best monitor technology. It offers excellent viewing angles, contrast and colour accuracy. It also tends to be the most expensive, but there are some bargains to be had.

## Matt or gloss?

A screen's finish is an important consideration. The vast majority of monitors have a matt coating, which all but eliminates reflections. Glossy screens, which are more commonly found on laptops these days, can be overly reflective, but offer more vibrant colours.

## Extra features

Most monitors costing less than £200 tend to have basic stands that allow only tilt adjustment. Spend more and you may be able to find a height-adjustable stand, which can prevent you craning your neck. The top of your monitor should be roughly at eye-level. With height adjustment often comes pivot, which lets you rotate the screen to a tall portrait orientation.

Speakers are built into some models, but are generally of a poor quality and suitable only for email notifications and the like. A headphone output can be handy: most monitors include a 3.5mm minijack, which provides audio from the HDMI input.

USB ports may come in useful for plugging in peripherals and hard drives, but they're not a necessity.

Buy a monitor for its image quality, not its extra features. These should be viewed only as a bonus.





# displays







Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

## AOC MYPLAY I2757FM

**£230** inc VAT • [aoc.co.uk](http://aoc.co.uk) • [tinyurl.com/c53k8kp](http://tinyurl.com/c53k8kp)

AOC's 'frameless' design lends the myPlay I2757Fm a very clean, modern look. If you're considering a multimonitor setup, this display is one of the best you will find for keeping as narrow as possible the gaps between each display.

You can do away with the base and rest the panel directly on the desk if you want a more suitable height for pairing up with a laptop. In this configuration no tilt adjustment is available, and we found ourselves wanting to tilt back a little further the screen. A pair of small stereo speakers is built into the rear.

You get VGA and a pair of HDMI sockets, one of which also supports Mobile High-Definition Link (MHL) for connection to Android smartphones. Many handsets can be connected to a standard HD display via an HDMI adaptor, but these usually require simultaneous connection to a USB port and/or external power supply. An analogue audio input and a headphone socket are also included.

The monitor is operated via a row of touch-sensitive controls, which aid navigation through a very large, clear onscreen menu.

The star of the show is the 27in IPS panel, which offers a massive step up in quality over the TN-based panels supplied with most PCs. It's of a standard 1920x1080 resolution, but this allows the use of an HDMI port rather than Dual-Link DVI or DisplayPort connections, which require specific cables and graphics card support.

We measured 98 percent coverage of sRGB, and colour reproduction is both accurate and uniform across the surface of the screen. Brightness uniformity is acceptable, although our measurements revealed the panel to be slightly darker in the top left than in the bottom right. However, this is nothing that would be apparent to the casual observer.

The contrast ratio isn't as high as that of some other displays at this price, but the colour fidelity and viewing angles more than make up for this. The I2757Fm performs well in all types of usage scenarios, from desktop work to video and gaming.

**VERDICT:** The AOC myPlay I2757Fm is a good-looking monitor, which performs well and offers very good value at £230. MHL support is very handy for Android users, allowing them to hook up and charge their devices with a single cable.



Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

## ASUS PA248Q

**£333** inc VAT • [asus.com/uk](http://asus.com/uk) • [tinyurl.com/cpyx7mq](http://tinyurl.com/cpyx7mq)

Unlike the majority of 24in displays on the market, the 1920x1200 PA248Q has a 16:10 aspect ratio. It can display full-HD video, albeit with a letterbox effect, and this format adds a significant amount of screen space when working on two documents side by side.

Typically, for a monitor aimed at professionals rather than consumers, its design is rather more functional than stylish. The Asus also incorporates tilt, height and pivot adjustments.

Controls are provided in the form of physical buttons rather than the fiddly touch-sensitive ones we're used to seeing on some consumer monitors. It also includes a five-way cursor control to help you more easily navigate the menus. A QuickFit mode overlays various measurement grids for precise measurement of onscreen items and the ability to preview images at popular print sizes.

There's a sophisticated level of control over image quality with selections in real numeric values, such as '6500K' and 'Gamma 2.2' - there's none of your 'Warmish' or 'Gamma mode 3' nonsense. VGA, DVI-D, HDMI and DisplayPort inputs are provided, along with a four port USB 3.0 hub and a headphone jack.

We configured the monitor with a white point of 6500K and a gamma of 2.2, then tested the display with a Spyder4Elite calibrator. We found the results to be close, but by no means spot-on.

Asus advertises a pre-calibrated accuracy of less than 5 deltaE, to which our measurements attested. With an average colour difference of 1.31 deltaE, this Asus display will look accurate to the human eye. However, we've seen cheaper monitors produce more accurate results. Unlike such displays, though, the Asus has six-axis colour control for fine-tuning of the colour output and a zero-defective-pixel warranty.

Viewing angles are impressively wide, with just a little contrast shift at the widest viewing angles. The backlight uniformity is also very consistent. Contrast levels are more than adequate, but if you're after a display for watching video or playing games you'll find much more dynamic results are available from many consumer displays.

**VERDICT:** The PA248Q is aimed at serious graphics professionals and enthusiasts, and delivers great performance and plenty of features for the money. It offers more screen space than a typical 24in display, plus it has a full set of adjustments and comes calibrated.





Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

**PC ADVISOR**  
RECOMMENDED

## BENQ GW2750HM

**£195** inc VAT • [benq.co.uk](http://benq.co.uk) • [tinyurl.com/bqkt65s](http://tinyurl.com/bqkt65s)

BenQ's GW2750HM is a no-nonsense 27in full-HD monitor that delivers premium quality at a rock-bottom price. At £195, it's considerably cheaper than similar rivals.

While the BenQ won't win any design awards, it does have a trio of video inputs, comprising VGA, DVI-D and HDMI, plus an analogue audio input and a headphone socket. Internal audio is provided through a pair of integrated 2W speakers.

The real value of this monitor lies in its VA panel, which offers much better quality than TN technology. Viewing angles are increased, if not as much as with some IPS panels, and the screen is capable of extremely good contrast.

We don't like the onscreen menu. Most users won't need to delve into the settings but, if you do, many image-tweaking features can be found. For example, BenQ offers Senseye3 image-enhancement technology and an AMA response-time booster. But we found the control buttons awkward to use and the menus themselves painfully slow. In 2013, there's absolutely no justification for a monitor menu system that runs slow enough to cause frustration.

The GW2750HM redeemed itself in our lab tests with some of the best contrast results we've measured. Our checkerboard contrast figures are typically much lower than the manufacturers' stated specifications, which makes a score of 1,530:1 very impressive. Deep blacks and bright whites enabled by the 313cd/m<sup>2</sup> maximum output make for very dynamic results, which are especially evident when gaming or watching video in a well-lit room. Furthermore, there is no visible backlight bleed.

Colour accuracy is a bit disappointing, though. Although the BenQ performed well after calibration, colour deviations were measurably higher straight out of the box than on many other lower-cost premium displays we've tested. It's by no means terrible, but we were certainly hoping for better.

**VERDICT:** The BenQ GW2750HM isn't perfect: build quality is average and the styling is unremarkable; it also delivers less accurate colours than we would have hoped, given its VA panel technology. However, the monitor offers excellent viewing angles and very high contrast, and responds well to calibration. It's a big step up from any TN panel.



Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

**PC ADVISOR**  
RECOMMENDED

## DELL S2440L

**£194** inc VAT • [dell.co.uk](http://dell.co.uk) • [tinyurl.com/cxwjiLm](http://tinyurl.com/cxwjiLm)

The first thing you'll notice on unboxing the S2440L is its glossy glass finish and premium build quality. No physical buttons are present on the display; instead, an illuminated column of small white LEDs appears from behind the glass at the approach of your hand. Touching one of these brings up an onscreen control menu, which is navigated simply by touching the closest dot to your desired option.

This system is very easy to use, but you can also use Dell's Display Manager software. This automatically changes the monitor settings relevant to the application you're running.

Only two inputs are provided at the rear: a standard VGA port and an HDMI connector. There are no built-in speakers, but an audio output lets you hook up an external pair and route HDMI audio to them. Note that the power supply is external.

Like the IPS versions that make up the rest of Dell's 'S' range, this 24in VA panel offers vastly superior viewing angles to common TN displays. This means colours and brightness don't change toward the screen edges or as you move your head.

Although the high-gloss screen isn't to our taste, we were impressed with the image quality. This subjective assessment is backed up by our lab tests. Video looks equally impressive, with very good contrast and black levels.

At full brightness we measured a contrast ratio of 1,200:1, which is excellent at this price. Dropping the brightness to 25 percent boosted this to 5,060:1, which matches Dell's claimed performance and is really very impressive indeed. This means you'll experience very deep blacks, which make images look great and text easier to read.

Colour reproduction is also very good, and grey-level tracking is pretty much spot-on out of the box. In terms of uniformity, the S2440L is a little brighter at the top of the screen than at the bottom. The white point is also a little 'cool' at 7200K, meaning calibration would be required if you wanted it to accurately display a standard white point of 6500K.

**VERDICT:** The Dell S2440L is constructed to a very high standard, with the edge-to-edge glass adding a touch of class to its already very clean, minimalist lines. The display itself is capable of impressive performance. It's not the cheapest 24in display, but worth the money.





Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

### PHILIPS 248X3LFHSB

**£220 inc VAT** • [philips.co.uk](http://philips.co.uk) • [tinyurl.com/6mja2ns](http://tinyurl.com/6mja2ns)

This stylish, slimline and decidedly home-friendly 23.6in display is aimed at those who value graceful design and are prepared to pay a bit more for a metallic trim and gentle curves.

This is a great-looking monitor from all angles. The black rear panel is finished to a high gloss, too beautiful to sully with a Vesa mount.

It incorporates a stick-thin aluminium stand, which arcs into a circular die-cast base unit. However, it's the Lightframe 2-enabled front bezel that really makes this display stand out. Philips has surrounded the display with a frame of soft blue light. Three levels of intensity let you tune the effect to your preference.

Three display inputs are provided, with two HDMI ports and a single VGA connector. No speakers are built in, but an analogue audio output enables you to pass the sound to external speakers.

The display is controlled and configured by a row of buttons situated centrally below the screen. The onscreen menu is large and easy to read, and the usual brightness and colour controls are supplemented by a selection of custom image enhancements.

At its default settings, the Philips performs much as you would expect from a decent TN monitor. Its colour accuracy and viewing angles won't rival an MVA or IPS display, but its high brightness (326cd/m<sup>2</sup>) and good contrast (800:1) make it pleasant to use and powerful enough for watching video at some distance from the screen.

During calibration, the display required adjustment to bring the colour temperature in line with the sRGB standard, but overall it was consistent and could be relied on to correctly reproduce colours. We measured 98 percent of sRGB and 76 percent of Adobe RGB.

Although Philips claims viewing angles of 170 degrees horizontally and 160 degrees vertically, which is standard, if improbable, for a TN display, we noticed viewing-angle issues more on this display than its rivals. If poor off-axis performance bothers you then you may notice it more than you'd like on this monitor.

Power consumption was especially low – just 21W at the screen's full brightness and 12W at 120cd/m<sup>2</sup>.

**VERDICT:** The Philips is a good-looking monitor, rendered all the more interesting by its blue illuminated Lightframe bezel, but it's too expensive for the image quality on offer.



Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

### VIEWSONIC VX2460H-LED

**£150 inc VAT** • [viewsoniceurope.com/uk](http://viewsoniceurope.com/uk) • [tinyurl.com/cs92h7p](http://tinyurl.com/cs92h7p)

At 6.8mm thick, the ultra-slim VX2460H-LED is a 23.6in model that, like all models here, sports a space- and energy-saving LED backlight. The display is mounted on a tilting plastic stand, which is more elegantly proportioned than most. The panel itself is thin, but its thick glossy bezel is unsuitable for gamers wanting a multiscreen setup, for example. A matt panel cuts down on unwanted reflections.

To the rear, a standard VGA port is complemented by a pair of HDMI inputs. This will be useful if you want to simultaneously plug in a PC and a Blu-ray player or gaming console. You will need an adaptor if you want to use DVI, though.

The monitor doesn't use display presets for photo, gaming and movie modes, but offers discrete controls for tweaking the response time and enabling the dynamic contrast function.

There's no Vesa mount for hooking the ViewSonic to a wall, nor any built-in speakers, but a 3.5mm audio jack lets you plug in an external set of speakers.

The display is controlled by a row of touch-sensitive controls. We initially found these difficult to see, but the screen becomes simple to use once you get the hang of it.

The VX2460H-LED features a standard TN panel. This will be fine for most users, although the image quality it can achieve is considerably less impressive than that of IPS panels. It suffers from the usual reduced viewing angles inherent to TN technology, resulting in colours appearing less consistent across the surface.

Our tests revealed relatively good performance across the board, making this one of the better TN displays we've seen. Contrast, brightness and colour accuracy are all better than expected, and calibration with a Datacolor Spyder4Elite showed that very little correction is required.

The maximum brightness after calibration was 229cd/m<sup>2</sup>, and the contrast ratio reached 710:1. Colour error peaked at 5.87 deltaE, with an average figure of 0.89. The panel could cover 98 percent of the sRGB gamut, and 77 percent of AdobeRGB. Just 15W is required for the ViewSonic to operate at 120cd/m<sup>2</sup>.

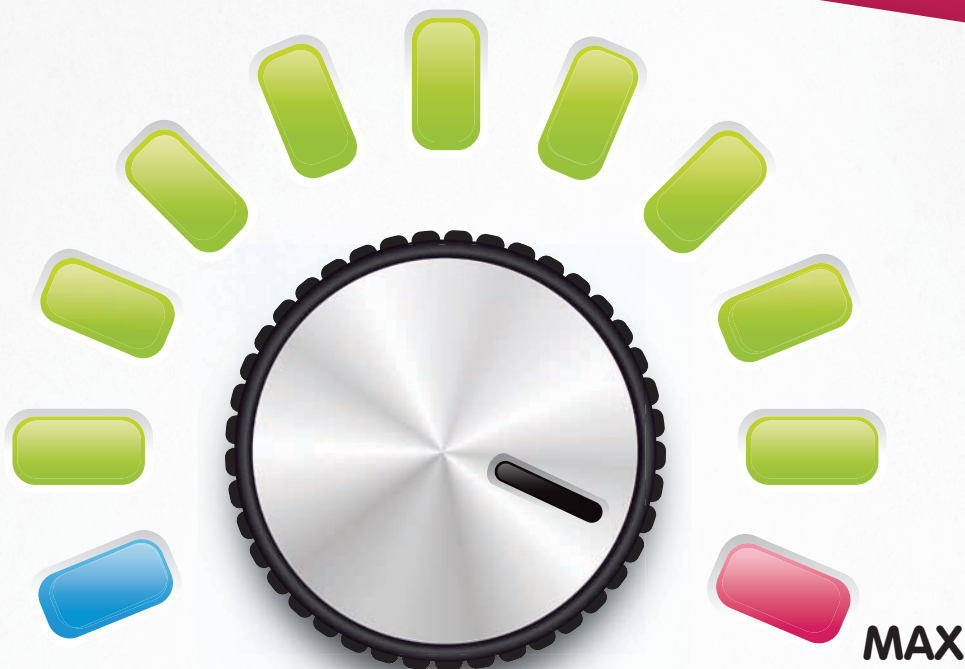
**VERDICT:** This slim and stylish monitor performs well and has a trio of useful inputs. Its image quality is bettered by IPS displays, however.



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## How we test

We allowed each monitor to warm up for 30 minutes before we began our tests. We set the colour temperature to 6,500 kelvin where possible; the red, green and blue sliders were otherwise pushed to their maximum values. Dynamic contrast and other enhancements were disabled.

Each monitor was connected to our PC via DVI or HDMI. We then ran Datacolor's Spyder4Elite calibration software. Combined with the Spyder4 colorimeter, this accurately measures gamut, contrast, brightness and colour accuracy.

We ran each panel through a selection of tests comprising HD video clips and games to observe image quality and response time.

Where speakers are available, a YouTube video was used to help us assess how well they can cope with music and film soundtracks. The speakers built into monitors are usually fit only for an operating system's audible notifications, however.

We examine each monitor's stand for adjustability and cable management. We also assess the usability of the menu system, and experiment with each option offered to judge its effectiveness.

	<b>AOC</b> £230 inc VAT ★★★★★	<b>ASUS</b> £333 inc VAT ★★★★★	<b>BENQ</b> £195 inc VAT ★★★★★ <b>PC ADVISOR</b> RECOMMENDED	
Product name	<b>myPlay I2757Fm</b>	<b>PA248Q</b>	<b>GW2750HM</b>	
Panel technology	IPS	IPS	VA	
Screen size	27in	24in	27in	
Screen finish	Matt	Matt	Matt	
Native resolution	1920x1080	1920x1200	1920x1080	
Pixel pitch	0.31mm	0.27mm	0.31mm	
Response time	5ms	6ms	6ms	
Dynamic contrast	20,000,000:1	80,000,000:1	20,000,000:1	
Contrast ratio	660:1	630:1	1530:1	
Brightness (cd/m <sup>2</sup> )	237	201	313	
Black point	0.36	0.35	3.08	
NTSC gamut	76%	78%	92%	
sRGB gamut	98%	97%	71%	
Viewing angles (V/H)	178/178	178/178	178/178	
Adjustments	Tilt	Height, pivot, tilt	Tilt	
Sound	None	3.5mm audio output (from HDMI)	2x 2W	
Ports	2x HDMI, VGA	4x USB, HDMI, DVI, VGA, DisplayPort	HDMI, DVI, VGA	
Power consumption <sup>1</sup>	30W/19W	39W/22W	39W/20W	
Dimensions	622x449x130mm	557x416x235mm	654x489x191mm	
Weight	5.7kg	6.4kg	5.6kg	
Warranty	3 years	3 years	3 years	

<sup>1</sup>Measured at maximum brightness and 120cd/m<sup>2</sup>




## Conclusion

With high-quality IPS and VA panels available at excellent prices, now is a great time to consider upgrading your monitor. Whether you're looking to upgrade to a larger screen or stick to around 24in, there's no longer any reason why your desktop PC shouldn't be able to display images that look every bit as good as they do on your tablet or smartphone. Only hardcore gamers will want to stick with TN panels to get the ultimate blur-free response times.

The displays in this round-up differ in terms of size and intended use: if you demand the very best image quality for editing photos

and video then you won't go wrong with the Asus PA248Q, which offers precise control over colour, plus ergonomic adjustments.

If you're after something with a lot more style, Dell's S2440L offers glossy edge-to-edge glass, superb contrast performance and great colour reproduction.

If you want something larger, the virtually frameless AOC I2757Fm is a stylish and well-priced 27in model with easy connectivity to an Android phone. For ultimate large-screen value take a look at BenQ's low-cost GW2750HM. It delivers excellent image quality at £195. 

DELL £194 inc VAT ★★★★★	PC ADVISOR RECOMMENDED	PHILIPS £220 inc VAT ★★★★★	VIEWSONIC £150 inc VAT ★★★★★
<b>S2440L</b>		<b>248X3LFHSB</b>	<b>VX2460H-LED</b>
VA		TN	TN
24in		24in	24in
Glossy		Matt	Matt
1920x1080		1920x1080	1920x1080
0.28mm		0.27mm	0.27mm
6ms		2ms	2ms
5,000:1 (native)		20,000,000:1	40,000,000:1
1200:1		800:1	710:1
239		326	229
0.2		0.41	0.33
72%		76%	77%
93%		98%	98%
178/178		170/160	170/160
Tilt		Tilt	Tilt
3.5mm audio output (from HDMI)		3.5mm audio output (from HDMI)	Stereo speakers, 3.5mm audio input, 3.5mm audio output (from HDMI)
HDMI, VGA		2x HDMI, VGA	2x HDMI, VGA
19W/13W		21W/12W	28W/12W
568x191x418mm		578x443x194mm	581x447x194mm
3.6kg		5.1kg	3.5kg
3 years		2 years	3 years



## The latest 802.11ac wireless-networking protocol can offer faster connections than 802.11n across your home network. Sander Almekinders tests a batch of next-generation wireless routers

Contributors: Michael Browne, Andrew Harrison, Jim Martin

**W**ireless routers are usually thrown in with home-broadband packages, but extra performance and features can be had by upgrading this usually basic model. The routers we test over the following pages should offer faster connections, longer wireless range, and neat extras, such as the ability to add a USB drive and share its files over the network. All can simultaneously operate on both 2.4- and 5GHz frequencies, allowing you to avoid the more crowded former band.

### Performance

Today's top-end models support a brand-new wireless protocol, known as 802.11ac. You may also see them marketed as 5G Wi-Fi or gigabit wireless routers, although the latter is misleading, given that you're unlikely to see speeds greater than 500 megabits per second (Mbps).

The discrepancy lies in part between the numbers quoted for the sync speed and the true data throughput. Whereas traditional wired gigabit ethernet, for example, performs at close to its promised 1Gbps, wireless data technology encodes the bits in a less efficient manner, and requires additional spare capacity to ensure data integrity when whizzing bits through the fickle aether.

The most popular Wi-Fi standard is still 802.11ac's predecessor, 802.11n, which is now standard on most devices. Routers supporting this standard may be sold as 300Mbps-capable, but remember this is only the sync speed - real-world delivery is often slower than 100Mbps.

Some wireless routers now use a three-antennae system and may be labelled N450 or N750. These aerials may be hidden inside, so it won't always be obvious what hardware a device is packing.

With 802.11n technology, the theoretical sync speed for a single datastream is 150Mbps, and 300Mbps for two streams (using two aerials). This leads to a nominal 450Mbps figure in a full three-stream system, otherwise known as 3x3 MIMO (multiple-in, multiple-out). To take advantage of all three streams, your connected device must also have a three-stream wireless chipset and antenna array. This arrangement is still rare in even

high-end laptops, and unknown to phones and tablets. The Surface RT is in a minority by including two-antennae Wi-Fi, whereas most such devices are fitted with a single aerial.

Those routers broadcasting simultaneously on the 2.4- and 5GHz radio bands may have their nominal ratings summed in the manufacturer's product description, with the 2.4GHz band's 300Mbps added to the 5GHz band's 450Mbps, to justify an impressive-sounding N750 name that paints performance far above reality.

In the new world of 802.11ac, you'll also see routers labelled 1750, which is an optimistic addition of 802.11n's 450Mbps to 802.11ac's 1,300Mbps.

### New features

Besides measurably better transfer speeds, 802.11ac routers use other tricks such as beamforming. This helps them maintain performance at long range by channelling the radio beams at specific devices in space.

At present, all 802.11ac routers follow much the same wireless design, and use chip maker Broadcom's radio chipsets. Other chip specialists are also developing technology for the emerging 802.11ac standard, which is still in draft form, but likely to be ratified in early 2013.

Marvell has indicated that it's 802.11ac chips, likely to appear in consumer devices around the middle of the year, will be able to deliver close to the vaunted gigabit transfer speed by offloading more of the high-speed data juggling to a dedicated ARM processor. The next generation of 802.11ac may also make use of 4x4 MIMO setups, with added antenna diversity to aid consistent performance.

By then, laptops should be available with 802.11ac Wi-Fi built in. Until then, you're limited to using a static wireless bridge unit as a remote relay to jack into, or a USB dongle in your laptop. The latter is hardly ideal, though, since it will be throttled by USB 2.0 restrictions to 280Mbps.

Whether you want to take the plunge as an early adopter of the next-generation wireless, or just need the best 802.11n performance available today, read on to discover what this assembly of top-spec 802.11n and 802.11ac routers can offer.



Tested by Hardware.info





# wireless routers



Photography by Dominik Tomaszewski





Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★



## ASUS RT-AC66U

**£200** inc VAT • [uk.asus.com](http://uk.asus.com) • [tinyurl.com/bu79w64](http://tinyurl.com/bu79w64)

Asus' RT-AC66U is easy to confuse with the identical-looking and similar-sounding RT-N66U. The subtle naming difference is due to the former having an 802.11ac module, and the latter supporting 802.11n.

The RT-AC66U bucks the industry trend of hiding its antennae inside the enclosure, providing three removable and upgradable dipole antennae that you can reposition to deliver the best wireless performance. The router can lie flat, sit vertically on the provided stand, or be mounted to the wall.

There are two USB 2.0 ports, so you can attach both a USB hard drive and a printer, then share them over the network.

Asus is working on an Android and iOS app that will enable users to sync, access and store data on an attached hard drive over the internet. It's less comprehensive than Cisco and D-Link's services.

Whether you plan to use your router to stream media, host files or download files using P2P services, the RT-AC66U has you covered. It offers DLNA and iTunes servers for video and music, FTP and Samba servers for file hosting, a VPN passthrough for secure remote network access, and a program called Download Master for downloading Torrent files to a storage device, bypassing the host PC.

This dual-band router can simultaneously run a 450Mbps 802.11n network at 2.4GHz and a 1.3Gbps 802.11ac network on the 5GHz band. These are only sync speeds, not transfer speeds, of course.

We like the management interface, and the graphical start screen is very well-organised. To see which devices are connected to the router, all you have to do is to click on a button. Our only minor complaint is that there seems to be a problem with the name Asus assigned to the web interface. Instead of entering the router's IP address, you can type 'asusnetworks.net'. If you're connected to the internet when you do this, this name sometimes doesn't work and instead results in a web search.

The RT-AC66U's 802.11n performance is excellent, while the 457Mbps we recorded over 802.11ac is very good, but some 30Mbps slower than that of the D-Link.

**VERDICT:** It's possible that firmware updates will improve performance, and the adjustable, replaceable antennae are a boon. As an all-round 802.11ac package, the RT-AC66U is a fine choice.



Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

## BELKIN AC 1200 DB

**£180** inc VAT • [belkin.com/uk](http://belkin.com/uk) • [tinyurl.com/brLf7sm](http://tinyurl.com/brLf7sm)

If you're wining at the cost of buying both an 802.11ac router and a bridge, Belkin offers a less expensive alternative. With a street price of £130 (RRP £180), the 1200 DB represents a decent saving when compared to most 802.11ac routers.

However, it also has a lower specification. The AC 1200 DB supports only two spatial streams on each frequency band. As a result, the nominal figures are 867Mbps and 300Mbps for 5GHz and 2.4GHz wireless respectively.

The network cables come labelled and already connected to the router's WAN port, making the Belkin quick and easy to set up. Wireless security is also pre-configured, so you can start using it as soon as the quick setup wizard has finished. Note that there's no built-in ADSL modem (in common with all the routers on test), so you'll need one if you have ADSL broadband.

We like the glossy, modern styling of the AC 1200 DB. It sits vertically, which should return better range than routers that sit flat on a surface, even though its antennae are hidden inside. A pair of USB 2.0 ports on the device's rear support a shared printer and network-attached storage.

We noticed in testing that the AC 1200 was much slower than other 802.11ac routers when writing both large- and small files to an attached USB hard drive. It was also pretty slow at reading those files from the attached drive.

This Belkin router provides a DLNA-compliant media server, Norton-branded parental controls that let you block access to unseemly websites, and a rudimentary quality-of-service engine that Belkin dubs Intellistream. There are no manual settings for this, and it didn't work too well in our tests.

The AC 1200 delivers disappointing performance at close range, and was even slower than the D-Link in our tests. It matched that router at 10m on 2.4GHz, but outstripped it and matched other rivals at this distance on 5GHz. Testing 802.11ac throughput was disappointing, though, as it couldn't break the 400Mbps barrier.

**VERDICT:** Belkin's AC 1200 DB wireless router is lighter on specs, features and performance than its rivals. The value of its twin USB ports is diminished by its frustratingly slow read/write speeds, too.





Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

**PC ADVISOR  
BEST BUY**

## CISCO LINKSYS EA6500

**£200** inc VAT • [cisco.co.uk](http://cisco.co.uk) • [tinyurl.com/awyopyx](http://tinyurl.com/awyopyx)

The 'EA' in the Cisco Linksys EA6500 stands for Enabled App, which means this 802.11ac router runs the Cisco Connect Cloud firmware. The number of available apps is still very limited, but the service is relatively young. Cisco says that developers are working on this.

When it launched, the Connect Cloud firmware caused a stir as Cisco reserved the right to track your internet use. This is no longer the case, and you can also choose to use a version of the firmware without the Connect Cloud functionality. You know which version you have by its colouring: light blue is local, and dark blue is cloud.

As well as four gigabit ethernet ports, you get two USB 2.0 ports to use the Cisco Linksys EA6500 as a file- or print server.

The router's interface looks good, even if you sometimes have to search around for certain features. Several customisation options are available, and you can even tweak what information is shown on the home- and subsequent screens. The success of the new interface will largely depend on the apps that become available, of course. If these don't provide enough additional value, looks alone will not cause people to use Cisco's new environment.

If you need effective QoS (quality of service), the EA6500 should appeal. It automatically indexes all devices connected to the router, after which you can drag-and-drop them into the order you want. Adding applications and online games to the QoS list is equally straightforward.

An interesting extra feature is SimpleTap. Cisco includes with the router a card with an NFC chip. To use it you have to install the Connect Cloud app on an NFC-enabled Android device, and also enable the feature in the router interface. Once you've done that, when you hold the smartphone or tablet against the card it will automatically connect to the router's wireless network. Oddly, this feature isn't available for the guest network.

Performance is outstanding on 5GHz with both 802.11n and 802.11ac, but on 2.4GHz some of its rivals here are faster.

**VERDICT:** Cisco has clearly spent a lot of time and effort on the EA6500's interface, and listened to customer feedback. It's full of excellent features and is great for setting QoS rules. The EA6500 is an excellent 802.11ac router, but it isn't the cheapest.



Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

## D-LINK DIR-865L

**£140** inc VAT • [dlink.co.uk](http://dlink.co.uk) • [tinyurl.com/c8Ltdvh](http://tinyurl.com/c8Ltdvh)

Also known as the Wireless AC 1750 Dual Band Cloud Router, the DIR-865L is D-Link's flagship 802.11ac model. You get a lot of router for your money, and this is one of the cheaper 802.11ac options.

It doesn't have the designer looks of some of D-Link's other routers, such as the DIR-657 and the DIR-857, perhaps because it wants to be taken seriously. The built-in stand means you can't mount it any other way than upright, and it has internal antennae.

The front of the router has a WPS button and two LEDs that indicate whether it is still connected to the internet: if so, it's blue; if not, it's orange. On the back you'll find four gigabit ethernet ports, one USB 2.0 port and an on/off switch.

The interface is largely the same as we've seen with previous D-Link routers, and it isn't as user-friendly as Asus or Cisco's. We've no complaints about the features on offer, but configuring a guest network takes too many clicks, for example.

D-Link has gone cloud crazy, though. You can access the DIR-865L over the internet and configure certain things, including the guest network, online at Mydlink or via apps for both Android and iOS. Here you can also operate IP cameras and view the footage. Not much is possible for changing the router settings yet.

The DIR-865L's performance scores paint the same picture in both our 3m and 10m wireless tests: this router certainly isn't the fastest you can buy. When connected to three laptops, the D-Link's performance was unremarkable.

However, if all you're concerned about is 802.11ac performance, the speeds are exceptionally high. Even at 10m the D-Link DIR-865L managed just under 490Mbps, which is outstanding.

It's curious that, as was the case with the Asus RT-AC66U, these scores were achieved with a Netgear R6300 in bridge mode. When we instead used a second DIR-865L as the bridge, wireless speeds did not exceed 400Mbps.

**VERDICT:** The D-Link DIR-865L is the fastest 802.11ac router we've tested with the emerging standard, but performance in combination with 802.11n clients is generally not that impressive. Its better 802.11ac performance is not yet of much use in the real world, though, so you may still prefer to buy a faster 802.11n router.





Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

## NETGEAR R6300

**£200** inc VAT • [netgear.co.uk](http://netgear.co.uk) • [tinyurl.com/8s55k7w](http://tinyurl.com/8s55k7w)

The Netgear R6300 was one of the first 802.11ac routers available to buy in the UK. It stands as the company's flagship 'ultimate performance' home router, and offers most of the features you'd expect from a comprehensive home hub. It's a dual-band 802.11ac router with a four-port gigabit switch and gigabit WAN port.

The R6300 is also the largest router we've ever tested, standing at more than 8in tall and stretching even wider to 10in. Unlike some routers that are as at home on their sides, the Netgear R6300 is designed to stand upright on its integral flat foot.

On the right side is a handy Wi-Fi on/off switch, and a button for WPS, for automated pairing to devices.

On the front glows the Netgear name, and we couldn't find any way to switch off the company's always-on advertising.

Two USB ports are available, one on the side, one behind. Like most router manufacturers, Netgear has scrimped by providing the slower USB 2.0 version.

Again, like others, Netgear has moved to a more user-friendly graphical look for its admin interface, which it calls Netgear Genie. From here you can readily find the setup wizard to first configure the router, and the various settings for QoS, port filtering, port forwarding, security and other optional admin settings.

There's a good iPhone app, and a proper iPad version that allows useful feedback on router status, plus some configuration options.

We tested the performance in 5GHz 802.11ac mode at a short range of 3m, as well as over a 10m span. At 3m, the R6300 could average data transfers of around 466Mbps. This is well below the advertised speeds of up to 1,300Mbps, but it's in line with other 802.11ac routers on the market.

Tested at the 10m range, the Netgear R6300 lost a little speed. We saw an average of 362Mbps. Used in 5GHz 802.11n mode, the Netgear allowed strong connections to be made, and was a good performer compared with its 802.11ac rivals.

**VERDICT:** The R6300 is a well-featured home wireless router with good performance in 2.4GHz and 5GHz 802.11n modes. In 802.11ac mode it is decent, although those expecting gigabit speed will still be disappointed. It's also more expensive than some of its rivals.



Build	★★★★★
Features	★★★★★
Performance	★★★★★
Value	★★★★★
Overall	★★★★★

## TP-LINK TL-WDR3600

**£65** inc VAT • [tp-link.com](http://tp-link.com) • [tinyurl.com/d79m8eq](http://tinyurl.com/d79m8eq)

TP-Link is known for providing a lot of bang for your buck. The WDR3600 is a dual-band 802.11n router that is listed as capable of 600Mbps bandwidth on 2.4GHz plus 5GHz.

It's well priced: the similar WDR4300 is identical, but it costs £20 more and has three, rather than two, detachable antennae. Both models have four gigabit ethernet ports, two USB 2.0 ports, a WPS button and a handy switch for turning on and off Wi-Fi.

You can connect a printer and hard disk to the USB ports to share these devices among your PCs and handheld devices. The WDR3600 can act as an FTP server and a media server.

The TP-Link is secure out of the box - you need only enter the pre-defined password to wirelessly connect your devices.

The interface is generally well-organised, and includes help information in the righthand panel. Features are pretty limited, however. There is no QoS, and it's not possible to create a guest network. QoS is supposed to shape your network traffic so that lag-sensitive applications such as games, video and VoIP receive higher priority than insensitive operations, such as Torrent downloads.

A peculiar menu option is 'Dual Band Selection', which lets you configure whether you want to use both bands at the same time. You can do this on many routers, but to dedicate a whole page for this is a bit over the top.

Performance, surprisingly, was noticeably better than the more expensive WDR4300, hence our decision to review the WDR3600 instead of the pricier model. However, it's not on the same level as 802.11ac routers. Still, it should offer a step up from your current router and, if you have Wi-Fi devices capable of operating on 5GHz, such as an iPhone 5, you can join the less congested band.

Unlike older and inexpensive dual-band routers, the WDR3600 can operate on both 2.4GHz and 5GHz at the same time, so you can have older 2.4GHz Wi-Fi devices connected to the internet at the same time as newer 5GHz products.

**VERDICT:** TP-Link has created two virtually identical routers with the TL-WDR3600 and TL-WDR4300. The WDR3600 is a fine choice if you're looking for a reasonably priced dual-band router with gigabit ports. Performance is very good, given the price.



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## How we test

Hardware.info (uk.hardware.info) tests performance using the IxChariot tool by Ixia, the industry standard for measuring transfer rates over a network. They install a so-called endpoint on all the systems on the test network. This software uses a test script to measure the number of megabits that are sent per second from one endpoint to another.

Wireless speed is measured in both directions, from LAN to WLAN and from WLAN to LAN. They use a system that is connected to a LAN port on the router that is being tested. To wirelessly connect with the router they use a BTO laptop with an Intel Centrino Ultimate-N 6300 WLAN chip and three antenna connections.

They run a 10m line-of-sight test, and one from 3m to simulate real-life scenarios. They also connect three BTO laptops (all with Intel Centrino Ultimate-N 6300 chips) to the router. This gives an impression of how the router fares when it is in heavy use, and what the bandwidth is for the different laptops. They test the wireless speeds at two different time intervals, reducing the chance that transitory environmental factors influenced the router's test results.

With 802.11ac routers it's also important to measure how fast a router is on the new standard. They perform the 802.11ac test from the same distances as the other tests, and also in both directions.

## Conclusion

Before getting too excited about 5GHz and 802.11ac, don't overlook the fact that it won't necessarily improve the maximum range of the Wi-Fi signal your current 2.4GHz 802.11n delivers. The speeds you'll see will be determined by the construction of your walls, and the distances involved. Use the speeds in the table below as a guide.

Although there are a few 802.11ac routers to choose between, it's still early days for the standard. No devices have built-in 802.11ac Wi-Fi, so you'll need to buy a router and an 802.11ac bridge.

As well as decent performance on the new standard, then, it's important for an 802.11ac router to have good 802.11n speed. This is one reason why the Asus RT-AC66U is a good choice. Plus, it has an easy-to-use interface and can double up as a NAS if you attach a USB hard disk. Add to that the potential for decent cloud-based features, and it wins our Recommended award.

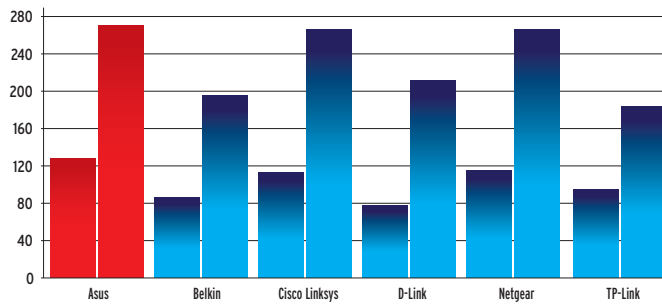
From our experience, the RT-A66U isn't as stable as the Cisco Linksys EA6500, though. The EA6500 offers fantastic 5GHz performance, and is also impressive at longer distances on 2.4GHz. It's reliable, has a great administration interface and an interesting NFC feature. It's also available online at lower cost than the Asus, and easily deserves our Best Buy award. ☒

	<b>ASUS</b> <b>£200 inc VAT</b> ★★★★★ <b>PC ADVISOR</b> <b>RECOMMENDED</b>	<b>BELKIN</b> <b>£180 inc VAT</b> ★★★★★	<b>CISCO LINKSYS</b> <b>£200 inc VAT</b> ★★★★★ <b>PC ADVISOR</b> <b>BEST BUY</b>	
Model	<b>RT-AC66U</b>	<b>AC 1200 DB</b>	<b>EA6500</b>	
Product code	RT-AC66U	F9K1113AS	EA6500-EW	
Wireless standard	802.11ac	802.11ac	802.11ac	
Antennae	3 external	Internal; number not specified	6 internal	
Frequency modes	2.4GHz/5GHz	2.4GHz/5GHz	2.4GHz/5GHz	
Firewall	NAT/SPI	NAT/SPI	NAT/SPI	
Ethernet ports	Gigabit WAN, 4x gigabit LAN	Gigabit WAN, 4x gigabit LAN	Gigabit WAN, 4x gigabit LAN	
64/128/256bit WEP	✓✓✗	✓✓✗	✓✓✗	
WPA/WPA2/WPS	✓✓✓	✓✓✓	✓✓✓	
Guest network	✓	✓ 2.4GHz only	✓	
MAC filtering	✓	✓	✓	
WMM/WDS support	✓✓	✓✗	✓✗	
DHCP/DMZ/VPN	✓✓✓	✓✓✓	✓✓✓	
Remote management	✓	✓	✓	
USB ports, application	2, Print, file, BitTorrent	2, Print, file	2, Print, file	
Dimensions	207x149x36mm	241x371x81mm	Not specified	
Warranty	2-year return-to-base	1-year return-to-base	1-year return-to-base	
Power consumption	9W	9.1W	10.2W	
Throughput 3m <sup>1</sup>	127, 270	87, 196	112, 266	
Throughput 10m <sup>1</sup>	80, 199	77, 190	109, 195	
Throughput 3 laptops <sup>1</sup>	78, 187	86, 188	84, 173	
Throughput 802.11ac	457	396	471	

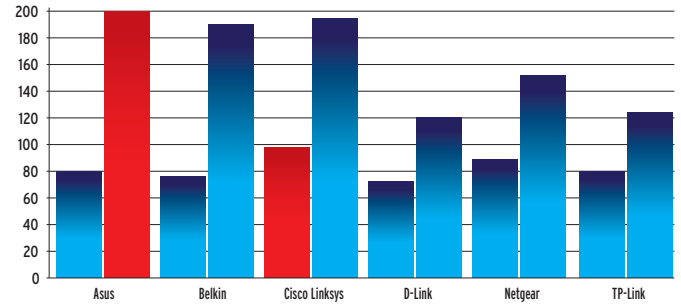
<sup>1</sup>Throughput tested using the 2.4GHz and 5GHz bands respectively, measured in Mbps



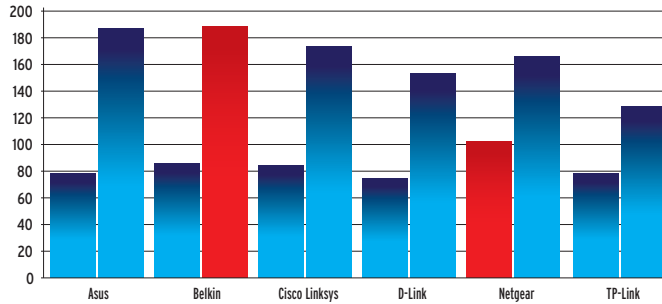
Throughput at 3m (2.4, 5GHz)



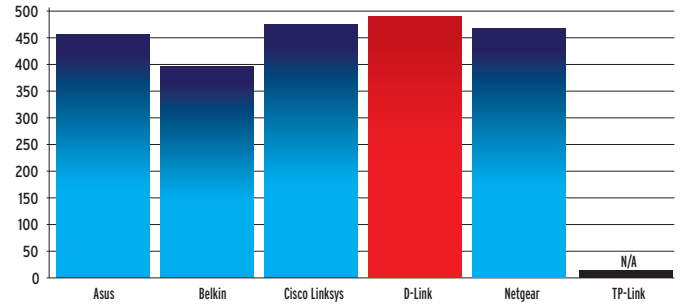
Throughput at 10m (2.4, 5GHz)



Throughput with three laptops (2.4, 5GHz)



Throughput 802.11ac



	<b>D-LINK</b> £140 inc VAT ★★★★★	<b>NETGEAR</b> £200 inc VAT ★★★★★	<b>TP-LINK</b> £65 inc VAT ★★★★★
	<b>DIR-865L</b>	<b>R6300</b>	<b>TP-WDR3600</b>
DIR-865L		R6300	TP-WDR3600
802.11ac		802.11ac	802.11n
6 internal		6 internal	3 (external)
2.4GHz/5GHz		2.4GHz/5GHz	2.4GHz/5GHz
NAT/SPI		NAT/SPI	NAT/SPI
Gigabit WAN, 4x gigabit LAN		Gigabit WAN, 4x gigabit LAN	Gigabit WAN, 4x gigabit LAN
✓✓×		xxx	✓✓×
✓✓✓		✓✓✓	✓✓✓
✓		✓	×
✓		✓	✓
✓×		✓✓	✓✓
✓✓✓		✓✓✓	✓✓✓
✓		✓	✓
1, Print, file		2, Print, file	2, Print, file
165x249x71mm		205x255x77mm	243x161x33mm
1-year return-to-base		2-year return-to-base	3-year return-to-base
9.2W		8.7W	4.1W
77, 212		114, 267	86, 183
71, 120		89, 151	80, 123
76, 153		102, 165	78, 128
487		466	N/A



Give yourself a front-row seat with a home-theatre PC that can hold all your music, films and photos, and even double as a PVR for recording and pausing live TV. Paul Monckton tests a range of media-centre PCs

**M**odern smart TVs and media streamers are the easiest and most convenient way to play music and video on a large screen. But a PC can make an excellent and considerably more powerful multimedia entertainment centre: recording, storing and playing back all your media from a single place, with an easy-to-use interface.

Replace the standard PC monitor with a TV or projector and you'll be able to enjoy live TV, music, DVD and Blu-ray films from the comfort of your sofa. There's the bonus that you may be able to run your favourite PC programs, too.

Whereas basic streaming units such as the WD Live TV rely on external networked devices to store all your content, a multimedia PC has such functions built-in. It can even act as a server for other streaming receivers in your home.

Carefully choose your hardware and you'll also be able to play PC games, taking advantage of your big screen and home-cinema sound system.

Just about any PC hardware is capable of running media-centre software, but a really good system will embody very different design criteria from a traditional desktop PC.

## Design

The usual level of noise that emanates from a Windows PC is entirely unwelcome in an entertainment scenario. You'll want to remove those loud, whirring fans and silence those crunching hard disks, especially if you're intending to run the PC around the clock as a server. In which case, power consumption is also important.

Large tower cases with flashing lights are another unwanted distraction. The PC should blend in with your living-room décor, and remain quiet as a mouse during operation.

Custom-made PC housings designed for media-centre use cost considerably more than run-of-the mill PC cases. Unlike the latter flimsy boxes, however, you can expect to find decent build quality and, in many cases, integrated heatsinks for passive cooling (letting you minimise or do away with the noisy fans).

Their smaller size typically means they will be fitted with a smaller motherboard, either a Micro-ATX or Mini-ITX type.

Chillblast and Quiet PC have both chosen the ultra-compact FC8 Evo fanless chassis from StreaCom. It's an all-aluminium design and entirely fanless, making these two PCs all but silent.

Apple's Mac mini is even smaller, thanks to its custom-designed aluminium case and laptop-class components inside. It won't be as easy to upgrade as the competing systems, mind, since there's no expansion slot for internal cards such as a TV tuner.

For maximum customisation potential, look for a larger case. The Silverstone Micro-ATX cases selected by Arbico and CyberPower provide far more internal space, while maintaining a horizontal format and relatively un-PC-like looks. These lack the passive-cooling features of the StreaCom FC8 Evo, however, so you'll have to resort to noisy fans.

## Entertainment

If you want to watch TV, the tidiest solution is to add an internal tuner card. A dual-channel version is preferable, allowing you to record one channel while watching another. Make sure you get a model with Freeview HD support if you want to take full advantage of today's HD terrestrial broadcasts.

To operate the PC from the sofa a decent remote control is essential. Most media PCs are still based on Windows and come with some sort of Microsoft-compatible Media Center remote control. But you'll need more than that when you want to surf the web and use other applications.

A wireless keyboard is a must, but don't settle for a standard desktop PC model. Some now include a built-in pointing device such as a trackpad, so you can comfortably operate the cursor from your lap without having to find the mouse and a surface on which to glide it.

## Hardware

Your CPU choice is crucial. Most systems here use low-power processors or, in the case of the Mac mini, a mobile processor designed for the ultra-low power environment of a laptop.

You won't need a huge amount of processing power, but consider a chip with integrated Intel HD Graphics 4000 if you want to play casual games. You'll get better gaming framerates from an AMD APU, but these aren't so quick in general use.

Certainly, unless you want your media PC to double as a games console, you won't be needing a separate graphics card. Integrated graphics solutions are adequate for media-centre use, and even light gaming. More powerful graphics cards typically demand noisy cooling fans or are simply too large to fit inside a compact system case.



# Media PCs



Photography by Dominik Tomaszewski



## APPLE MAC MINI (LATE 2012)

**£795** inc VAT • [apple.com/uk](http://apple.com/uk) • [tinyurl.com/d2dazbq](http://tinyurl.com/d2dazbq)

Apple's tiny Mac mini doesn't claim to be a media-centre PC. However, once configured as such, its small dimensions, minimal power consumption and flawless design make it a tempting choice.

At only 197x36x197mm, the mini is by far the smallest PC reviewed here. This has been made possible with a custom-built motherboard and laptop-class components.

Our review model was fitted with a 2.3GHz Intel Core i7-3615QM quad-core mobile processor, 4GB of DDR3 RAM and a 1TB 2.5in hard drive. You can tweak this specification at the Apple store, or open the chassis and upgrade the Mac mini's components yourself.

The use of mobile componentry has a beneficial effect on power consumption. Under full load, the Mac used just 50W - the least amount in this group. More impressively, its 11W requirement when idle is less than half that of its nearest rival. Despite the built-in fan, we heard not a peep out of the Mac mini during testing.

Overall performance was good, although the Mac recorded a comparatively low 3,038-point score in PCMark 7. For a media centre, though, this is adequate, and the mini scored much closer to the competition in PCMark's Entertainment sub-test.

Connectivity options include dual-band 802.11n Wi-Fi and gigabit ethernet; you also get four USB 3.0 ports, FireWire 800, Thunderbolt, HDMI, Toslink digital audio and an SDXC card slot.

If you wish to run Windows Media Center you'll need to install Windows via Boot Camp; alternatively, free software such as XBMC



**PC ADVISOR**  
**RECOMMENDED**



or Plex are compatible with Mac OS X. Add a TV tuner if you want to watch live TV, and an external drive for playing Blu-ray movies. Note that you'll first need to rip these or install Mac Blu-ray Player.

**VERDICT:** If you're prepared to do a bit of software setup and buy extra accessories, such as a TV tuner, optical drive and remote control, the Mac mini makes an attractive media-centre PC. It's the most lounge-friendly design by far, and is very economical to run.

## ARBICO EXCEL A2540 MEDIA CENTRE

**£699** inc VAT • [arbico.co.uk](http://arbico.co.uk) • [tinyurl.com/cjbmrDL](http://tinyurl.com/cjbmrDL)

Arbico's eXcel A2540 Media Centre is housed inside a Silverstone Grandia GD04 small-form-factor PC case. At 440x150x323mm, it's reasonably compact, but larger than most of the competition.

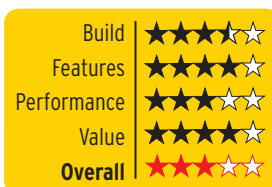
The GD04 is designed to blend in with your existing audiovisual equipment, and its minimalist, brushed-aluminium fascia is better looking than a standard Windows PC. Only a pair of front-facing USB 3.0 ports betray its true function. The front panel is also home to power and reset buttons, along with a tray-loading Blu-ray writer.

Inside is a dual-core AMD A6-5400K Black Edition processor, with integrated Radeon HD 7540D graphics. It's not the most powerful of chips in terms of general performance, but AMD's integrated graphics offer faster framerates than the Intel equivalent. This processor is appropriate for a media-centre system.

The Arbico feels responsive in use, which is largely due to the 120GB SSD that complements the 2TB hard disk.

A single-tuner Freeview HD card is included. The usual selection of outputs includes HDMI, audio line-out and S/PDIF audio. Arbico has provided a Windows Media Center remote control and a Logitech K400 Wireless Touch Keyboard. This incorporates a 3.5in touchpad, so you can comfortably operate the PC on your lap.

Although adequate for media-centre use, performance isn't great. PCMark returned an overall score of 3,332 points, but in the Entertainment sub-test the Arbico recorded a disappointing 2,395. Low benchmark scores are not terminal, but this disappointing



result comes despite continuous and conspicuous fan noise. The Arbico is quieter than a standard PC, but chances are it will make its presence known in your lounge.

**VERDICT:** The Arbico eXcel offers some great features, including a Blu-ray writer, a capacious 2TB hard disk and a speed-boosting 120GB SSD. However, its processing performance is lacklustre, and audible fans make it undesirable when quiet systems are available.



## CHILLBLAST VACUUM MINI 2

**£999** inc VAT • [chillblast.com](http://chillblast.com) • [tinyurl.com/csfadgv](http://tinyurl.com/csfadgv)

Chillblast's powerful-yet-compact Vacuum Mini 2 is a significant update to the original Vacuum Mini ([tinyurl.com/bqm62qh](http://tinyurl.com/bqm62qh)). It's faster, offers better connectivity and, for the most part, operates silently.

The system's compact good looks come courtesy of the Streacom FC-8 Evo fanless chassis. Made from smart black extruded aluminium with a matt sandblast texture, the Chillblast looks classy and expensive. Its built-in passive-cooling system utilises a row of external fins, rather like high-end audio power amplifiers. This heatsink is connected internally to the CPU cooler via four heat pipes, and can cool processors rated at up to 95W TDP without a fan.

A slot-loading Blu-ray reader is included, which is the only noise-generating component in the system, along with a pair of front-facing USB 3.0 ports. At 240x100x250mm, it's larger than a double-stack of Mac minis, but it remains one of the smaller cases.

Chillblast has selected a powerful Intel Core i7-3770T, a low-power version of a 2.5GHz quad-core chip that includes Intel HD 4000 graphics. It delivers excellent performance, which falls just short of Quiet PC's very similar machine. The Chillblast managed 5,749 points in PCMark 7, with a strong Entertainment sub-score of 5,070 points.

There's no hard disk inside, but a large 240GB Intel SSD should provide ample storage for the OS and software. A larger media library could be accessed via 802.11n Wi-Fi or gigabit ethernet.

A preinstalled dual-tuner Freeview HD card means you can watch one channel while recording another.



**PC ADVISOR  
BEST BUY**



Rather than bundling a remote control, Chillblast has supplied a Xebec HTPC mini keyboard. This incorporates a multitouch trackpad and thumb-friendly cursor and media-transport controls.

**VERDICT:** This silent and compact PC performs well and looks good. Premium features such as Blu-ray support and a dual-channel TV tuner card are included. It's pricey, but still around £200 less than Quiet PC's very similar system, which doesn't support Blu-ray.

## CYBERPOWER ULTRA HTPC

**£749** inc VAT • [cyberpowersystem.com](http://cyberpowersystem.com) • [tinyurl.com/bLotLc7](http://tinyurl.com/bLotLc7)

Powered by an AMD FM2 A10-5800K processor, this media PC from CyberPower delivers the fastest graphics of any reviewed here.

The system is housed in a Silverstone SST-GDO6B Micro-ATX case, which is very similar to the Grandia GDO4 selected by Arbico. It features a lockable hinged front panel, which conceals a pair of USB 3.0 ports, two removable drive caddies and a Blu-ray writer.

The latter makes it easy to back up your media or utilise extra storage space without having to delve into the case itself. If you play a lot of Blu-ray discs, the door may become annoying, but the rest of the time it gives the PC a tidy, living-room-friendly look.

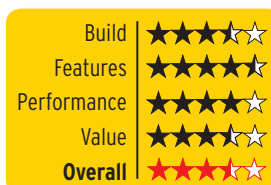
Inside the case is a 120GB Kingston SSD for speed, and a 1TB Seagate hard disk for bulk storage. The Compro Dual S800F tuner doesn't support Freeview HD, but can simultaneously receive terrestrial and satellite broadcasts and features a built-in FM radio.

Gigabit ethernet and 802.11n wireless networking are included, along with line-in/-out, S/PDIF and headphone audio connections.

In our lab tests the Ultra HTPC performed well, but not as well as the two Intel Core i7-based systems. It scored 4,113 points in PCMark, with 3,512 in the Entertainment sub-test.

Nothing here can touch it for gaming, though. This CyberPower won't suit hardcore gamers, but with some tests hitting 66fps you can be sure of getting playable framerates in most popular titles.

CyberPower uses a cooling fan on the CPU, with additional fans built into the case. Combined with the spinning hard disk, the noise



generated can be a nuisance. Given the performance on offer, though, some users might endure its rumblings.

A Xebec wireless keyboard and touchpad is supplied along with a separate media-centre remote, so you can use it like a TV or a PC.

**VERDICT:** Clean, tidy looks and excellent performance make this CyberPower a compelling system. But it's far from quiet, consumes the most power and offers only standard-definition TV facilities.



## QUIET PC FC8 FANLESS MINI PC

**£1,198** inc VAT • [quietpc.com](http://quietpc.com) • [tinyurl.com/d2cfdas](http://tinyurl.com/d2cfdas)

Quiet PC's FC8 shares many features with Chillblast's Vacuum Mini 2, including a stylish Streacom fanless box and a low-power Core i7 quad-core chip. This is the faster of the pair, though - in fact, it's the fastest machine on test for general performance.

In PCMark 7, this Quiet PC achieved a very good 5,928 points overall, and 5,317 score in the Entertainment sub-test.

That same performance isn't available in games, though, in which the Quiet PC is one of the slower systems here. Nevertheless, it offered playable framerates in our Stalker tests.

We've come to expect super-silent machines from Quiet PC, and the FC8 Evo gets around the need for noisy fans with heat pipes and passive external heatsinking. But inside is a 1TB spinning hard disk, complementing the storage capacity offered by the 120GB SSD. It's a relatively quiet drive, however, and the power-management settings allow it to spin down when not in use.

A dual-channel TV tuner can simultaneously receive two Freeview HD channels, but there's no Blu-ray drive for HD movies.

A good selection of connections is available, including four USB 3.0 ports, optical S/PDIF and HDMI. Quiet PC also throws in a spill-resistant wireless keyboard, mouse and remote control.



**VERDICT:** The FC8 Fanless Mini PC is compact, looks good and performs silently in most situations. It offers strong overall performance, but better systems are available for gaming. We think the similar Chillblast offers better value: it lacks Quiet PC's generous storage capacity, but is complete with a Blu-ray drive.

	<b>APPLE</b> <b>£795 inc VAT</b> ★★★★★	<b>PC ADVISOR</b> <b>RECOMMENDED</b>	<b>ARBICO</b> <b>£699 inc VAT</b> ★★★★★
Model name	Mac mini (Late 2012)		eXcel A2540 Media Centre
Processor	2.3-3.3GHz Intel Core i7-3615QM quad-core		3.6GHz AMD A6-5400K Black Edition APU dual-core
CPU cooler	Apple cooling fan		Scythe Shuriken
RAM	4GB DDR3 1,600MHz		8GB DDR3 1,600MHz
Storage	1TB HDD		120GB SSD + 2TB HDD
Power supply	85W Apple		Xigmatek 400W
Motherboard	Apple Mac Mini board		Asus F2A85-M LE
USB ports	4x USB 3.0		2x USB 3.0, 4x USB 2.0
Graphics card	Intel HD Graphics 4000		AMD Radeon HD 7540D
TV tuner	Not supplied		Compro VideoMate T220 DVB-T
Connectivity	Dual-band 802.11n, Bluetooth 4.0, gigabit ethernet		Gigabit ethernet
Audio ports	Toslink, headphone, line-in/-out, HDMI audio		S/PDIF, headphone, mic, line-in/-out, HDMI audio
Other ports	HDMI, Thunderbolt, FireWire 800, SDXC		VGA, DVI, HDMI, PS/2, eSATA
Case	Apple aluminium unibody		Silverstone Grandia GD04
Keyboard & mouse	Apple Magic Trackpad, Apple Bluetooth Wireless Keyboard		Logitech K400 (wireless keyboard)
Remote control	Not supplied (£25 extra)		TV tuner/media-centre remote
Optical drive	Not supplied (£65 extra)		LG GGW-H20L Blu-ray writer/HD DVD reader/DVD±RW drive
Operating system	Apple OS X 10.8 Mountain Lion		Windows 7 Home Premium 64bit
Extras	HDMI-to-DVI adaptor, iLife '11		None
Warranty	2-year parts and labour		2-year labour, 1-year parts and labour
PC Mark Overall	3,038		3,332
PC Mark Entertainment	3,088		2,395
Stalker Med/Ultra (fps)	34/9		39/12
AvP Med/Ultra (fps)	8/5		13/7
Consumption Idle/Load	11W/50W		44W/109W



## Windows 8 and media PCs

Although Windows 8 is now available, it won't have escaped some readers' attention that all these systems were tested running Windows 7. At the time of writing, drivers and Blu-ray software packages for Windows 8 were either not available or unreliable.

Windows 8 no longer includes the Microsoft Media Center application. It's now available as a separate application, but there has been some confusion about how this can be obtained.

Depending on which version of Windows you're running, it may have to be purchased at extra cost. It's possible that you may be able to obtain a free licence key from Microsoft if you apply online before 31 January 2013; otherwise you'll first have to upgrade to Windows 8 Pro.

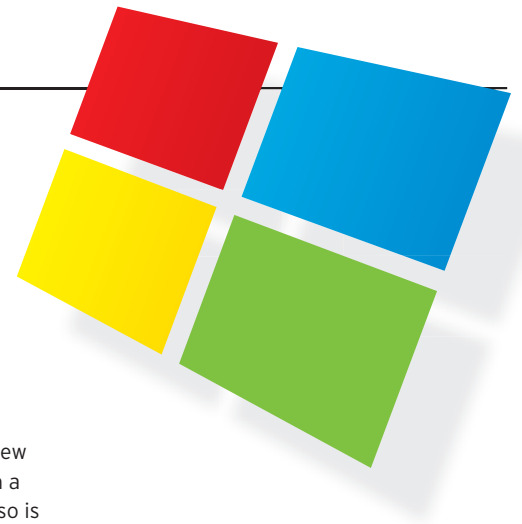
Unlike most versions of Windows 7, Windows 8 does not include the software codecs required to play DVDs - this

functionality has been moved into an optional paid-for Media Center pack.

OEMs can install these codecs before you purchase the system, but it's up to you to check this is the case. Third-party DVD software, such as CyberLink PowerDVD, which is often bundled with optical drives, will do the job, as will free alternatives such as VLC Media Player.

In addition to running Media Center, Windows 8 also offers some new propositions for Media Center use. The new tiled Modern UI interface works nicely on a large screen when viewed at a distance, so is well-suited to use from the comfort of your sofa. Live tiles and Windows apps give you convenient access to many functions over and above traditional media-centre use, too.

If you do decide to go with Windows 8, be sure to check that your TV tuner has updated drivers and supports the new OS.



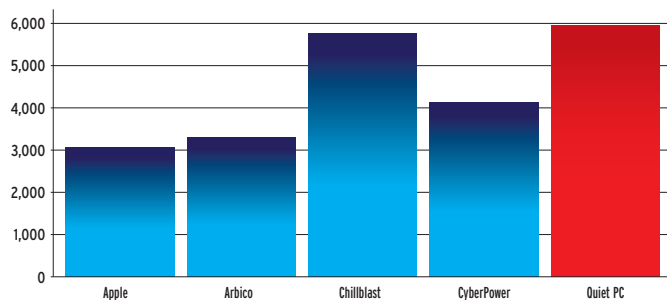
Of course, you can ignore Microsoft's Media Center altogether and go for a free alternative such as XBMC. This can also handle DVD playback without the need for additional codecs and, unlike Microsoft's Media Center, can be skinned and customised to your heart's content.

<b>CHILLBLAST</b> <b>£999 inc VAT</b> ★★★★★ <b>PC ADVISOR</b> <b>BEST BUY</b>	<b>CYBERPOWER</b> <b>£749 inc VAT</b> ★★★★★	<b>QUIET PC</b> <b>£1,198 inc VAT</b> ★★★★★
<b>Vacuum Mini 2</b>	<b>Ultra HTPC</b>	<b>FC8 Fanless Mini PC</b>
2.5-3.7GHz Intel Core i7-3770T quad-core	AMD FM2 A10-5800K quad-core	2.5-3.7GHz Intel Core i7-3770T quad-core
Streacom heatpipe system	Standard AMD cooler	Streacom heatpipe system
16GB DDR3 1,333MHz	8GB DDR3 2,133MHz	16GB DDR3 1,600MHz
240GB SSD	120GB SSD + 1TB HDD	120GB SSD + 1TB HDD
Streacom 150W	Cooler Master 500W	NanoPSU 150W
Asus P8H77-I	Gigabyte F2A85XM-D3H	Gigabyte GA-Z77N-WIFI
4x USB 3.0, 6x USB 2.0	4x USB 3.0, 4x USB 2.0	4x USB 3.0, 4x USB 2.0
Intel HD Graphics 4000	AMD Radeon HD 7660D	Intel HD Graphics 4000
BGT 3620 (dual tuner)	Compro S800F (dual tuner)	TBS 6280 (dual tuner)
802.11n, Bluetooth, gigabit ethernet	802.11n, gigabit ethernet	802.11n, Bluetooth 4.0, gigabit ethernet
S/PDIF, line-in/-out, HDMI audio	S/PDIF, headphone, mic, line-in/-out, HDMI audio	S/PDIF, mic, line-in/-out, HDMI audio
VGA, DVI, HDMI, PS/2	VGA, DVI, HDMI	DVI, 2x HDMI, PS/2
Streacom FC8 EVO	Silverstone SST-GD06B	Streacom FC8 EVO
Xebec HTPC (wireless touchpad and keyboard)	Xebec XEK-100S (wireless touchpad and keyboard)	Gigabyte GK-KM7580 (wireless keyboard and mouse)
Integrated into keyboard	Speedlink Media Centre Remote Control	Streacom Microsoft-compatible Remote Control
Sony slot-load BD-ROM/DVD±RW drive	12x Pioneer BDR-207DBK Blu-ray writer drive	Sony AD-7800H DVD±RW drive
Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit
XBMC	CyberLink PowerDVD 10.0, MS Office Starter 2010	None
2-year collect and return	3-year labour, 1-year parts and labour	2-year collect and return, open-case policy
5,749	4,113	5,928
4,254	3,512	4,410
34/9	66/21	35/9
8/5	24/13	9/5
25W/52W	41W/140W	27W/61W

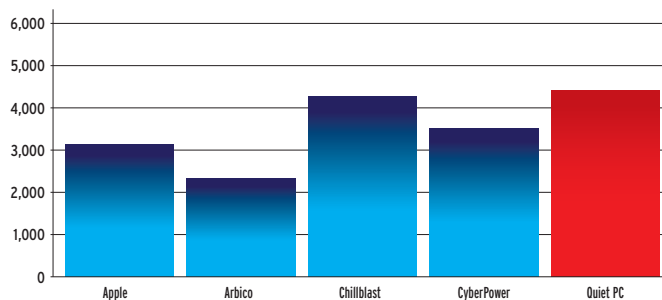
>> How we test and our conclusion



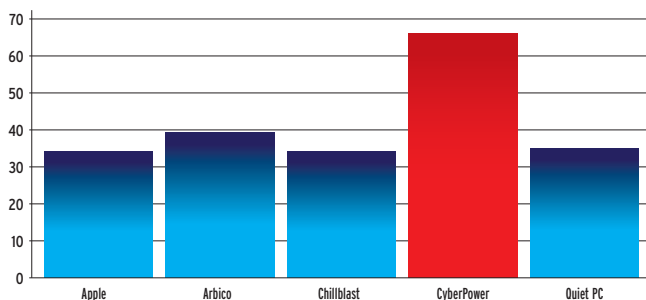
### PCMark 7 Overall



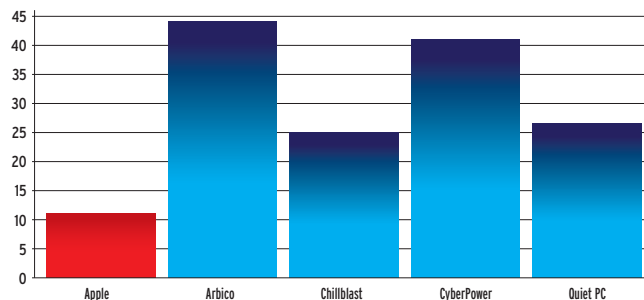
### PCMark 7 Entertainment



### Stalker, Medium quality (fps)



### Idle power consumption (W)



## Conclusion

The media-centre PCs in this group test are a little more expensive than those in our September group test, with prices starting at £699 with the Arbico. This system doesn't cater to your every entertainment need, unable to offer silent operation or a dual-channel TV tuner, but it does support Blu-ray movies and can handle casual gaming.

CyberPower's Ultra HTPC costs only £50 more and comes in a very similar system case, but it delivers considerably better performance, both for general applications and gaming, and twin tuners,

one of which is for satellite use. The trade-off is reduced storage capacity, although this is something that's easily upgraded later.

If you want a smaller system then look to either Chillblast's Vacuum Mini 2 or Quiet PC's FC8 Fanless Mini PC. Both are housed in Streacom's FC8 EVO Mini ITX system case, which should fit just about anywhere - perhaps even on a bookshelf.

Both machines offer fanless cooling, making them entirely silent unless an optical drive or, in the case of the Quiet PC, a hard disk is in use.

Although the Quiet PC delivers better performance and more storage than the Chillblast, it lacks the latter's Blu-ray drive. And, given the near-£200 price difference, you could buy an external storage drive and still have plenty of change.

The final option is the Apple Mac mini. Hardware-wise it's a brilliant choice for a Media PC: it's quiet, it uses very little power, and it's tiny. However, you'll need to set up your own software to use it as a media-centre system, and separately purchase a remote and Blu-ray drive.

## How we test

### General system performance

Core system performance is measured using PCMark 7, an industry-recognised test suite that uses 25 workloads to measure areas such as storage, computation, image- and video manipulation, browsing and gaming.

As well as the overall PCMark 7 result, typically a point score between 3,000 and 7,000 with current hardware, we have also published results garnered from the suite's Entertainment sub-routine.

The various sub-tests are designed to gauge performance in, for example, creativity and entertainment scenarios, and assess different storage technologies. The latter is an area that impacts perceived speed more than ever, now that even the slowest new CPUs are fast enough for everyday PC duties. PCMark also measures multimedia transcoding performance, which can take advantage of GPU acceleration.

### Gaming performance

As entertainment centres plugged into your TV, media PCs might be used to play games. Power and noise requirements usually prohibit the use of the best graphics cards, so we tested each PC running Stalker: Call of Pripyat at 720p resolution with Medium quality settings, and then at 1080p with Ultra quality settings. We also ran the Aliens vs Predator game with Maximum quality settings at 720p and 1080p resolutions.

### Overclocking

We allow overclocked systems to be submitted only for our dedicated gaming PC reviews. All other components are run at stock speeds, with the exception of factory-overclocked graphics cards designed and sold at boosted speeds. We do, however, allow underclocking for the purposes of reducing power consumption.

### Subjective assessment

We pay close attention to the physical characteristics of each PC, its noise output and its build quality, delving inside the case and taking note of the quality of components, cabling and airflow. Where they are supplied we note the ergonomics of the keyboard and mouse. A media PC also needs a remote control and, preferably, a keyboard that can be easily operated from the sofa.

### Support

Differences in warranty terms can impact our scoring. Long warranties are sought after, but we also look at the terms and conditions - specifically, whether faulty systems must be returned to the vendor at your own cost and if both parts and labour are included. Ensure the vendor offers full software support and preferably a home installation for more complex systems. ☒





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# DIGITISE YOUR LIFE

Mike Bedford explains how to convert your old photos, albums and videos to a digital format that you can keep forever



**T**he ease with which we can access and manipulate digital data is unparalleled, but many of us have a wealth of media that is firmly rooted in the analogue age. From black-and-white prints and negatives we inherited from previous generations, to the vinyl records we collected as kids, slides we captured before migrating to digital photography, and our stash of old VHS tapes, many of these resources are gathering dust and taking up space.

Perhaps the equipment required to view them is in a poor state of repair, or maybe it's just too much hassle to get out that old slide projector. Bring that data into the digital domain and you're far more likely to enjoy it.





Over the following pages we provide practical advice on how to digitise your analogue media, with an emphasis on photographic material, music and video recordings. For photos, we'll look at negatives, slides and prints; for music, vinyl records and cassettes; and for video recordings, VHS tapes. We'll also investigate means of preserving obsolete digital data, such as floppy and Zip disks.

In each case we'll describe a range of options to suit different budgets. Whenever possible we'll include methods that rely on equipment you probably already own, although increasingly more expensive options, including the use of professional services, will ensure ever better results.

It's important to recognise, though, that despite the commonly held view that digital media is of an inherently better quality than its analogue counterpart – a view, incidentally, that is still not accepted by some of the hi-fi community – none of the methods we'll discuss will improve the quality.

Indeed, with the exception of repairing photographs from the effects of scratches, dust, creases and the like, it isn't possible to improve on something by digitising it. You're merely converting it from one format to another, not restoring or enhancing it.

Instead, our aim is to make that data more easily accessible and save it from obsolescence.



## VHS TAPES

VHS tapes offer comparatively low-resolution video to DVDs, let alone Blu-ray. If you've been spoiled by the quality of digital video formats and haven't viewed a videotape in a while, it's worth watching one to check that the quality isn't too painful to bear. After all, digitising your old tapes won't improve their quality.

If you decide you do want to preserve your VHS tapes for posterity, you'll need something on which to play them. If you've already got rid of your VHS recorder then you'll need to borrow or buy one. You can still pick these up, both new and secondhand. The latter will cost next to nothing, but there's no guarantee it will offer acceptable performance.

If you have to buy something, one option to consider is a VHS/DVD combo player. Most such devices will let you directly record from



**A-D CONVERTERS**  
cost from £20-£50

VHS to DVD, which can then be 'ripped' to a digital file on your PC. A similar solution, but one that comes in two boxes, is to connect the video output on a VHS player to the video input of a DVD recorder.

If you don't have a DVD recorder then your PC will provide the means of digitising your VHS tapes and, optionally, burning to disc the output. However, you will need some

additional video-capture hardware and its associated software. Since image quality isn't an issue with VHS tapes (it's inherently poor), factors such as price, ease of use, reliability and quality of support will be the main issues you should consider. Since these aspects aren't immediately obvious, it's a good idea to first read some reviews. Converters range from around £20 for Compro's VideoMate C100 to around £50 for products from more established companies, such as the VHS 2 DVD from Avanquest.

The process of digitising your VHS tapes should be straightforward enough, but do take a good look at your old tapes before you begin. If they've been literally gathering dust, try to clean away as much as you can from the part of the cassette where the tape is exposed. This will prevent the dust being drawn inside when you play

the tape. Also ensure the spindles haven't seized up. If they have, try to get them moving by hand before you play the offending tape.

If you don't want to buy any gear or can't afford the time to digitise all your VHS tapes, there are companies that provide this service commercially. Expect to pay from £5 per tape.



**VIDEOTAPES** are all too easily destroyed



There are some videotapes you'd just really hate to lose...



**VHS/DVD COMBO** players often let you record from VHS to DVD



# AUDIO CASSETTES

Your collection of audio cassettes might have sentimental value, particularly with regard to mixtapes, but audio quality was never a selling point for this type of analogue media. There's little point in spending a lot of money on the kit you'll need to digitise your tapes. Instead, your choice of equipment will be primarily made on the grounds of price, availability and ease of use.

If you still have a cassette deck or Walkman, using this will be the cheapest and easiest solution. If you've not used your player for a while, though, it's a good idea to first use a head-cleaning tape (or a cotton bud) to remove grime and thereby improve the audio quality.

If you don't have a cassette player, you can still buy portable players from around £15. eBay is an ideal hunting ground.

**AUDIO CASSETTES** often hold great sentimental value

Whatever type of player you choose, you should connect its output to the line-in socket on your PC's sound card. The exact type of lead will depend on the output socket on your cassette equipment but, typically, you'll need a 3.5mm minijack-to-minijack cable. These are available from Maplin or your local electronics shop.

Once connected, launch Windows' Sound Recorder (search for Sound Recorder in the Start menu). Make sure you select Line In rather than Microphone before you begin recording. This will digitise your cassette as a WAV file; if you want an MP3 file, which is much smaller and better suited to portable devices, you'll need to use a conversion utility. You could also download Audacity ([tinyurl.com/bmmccvf](http://tinyurl.com/bmmccvf)) and the accompanying Lame MP3 encoder; both are free.

An alternative, if you don't already have a means of playing audio tapes, is a cassette player with a USB interface specifically designed for digitising cassettes. These devices have a built-in analogue-to-digital converter, so they don't rely on your sound card and are instead driven by the bundled software. Most such devices allow you to save the file in

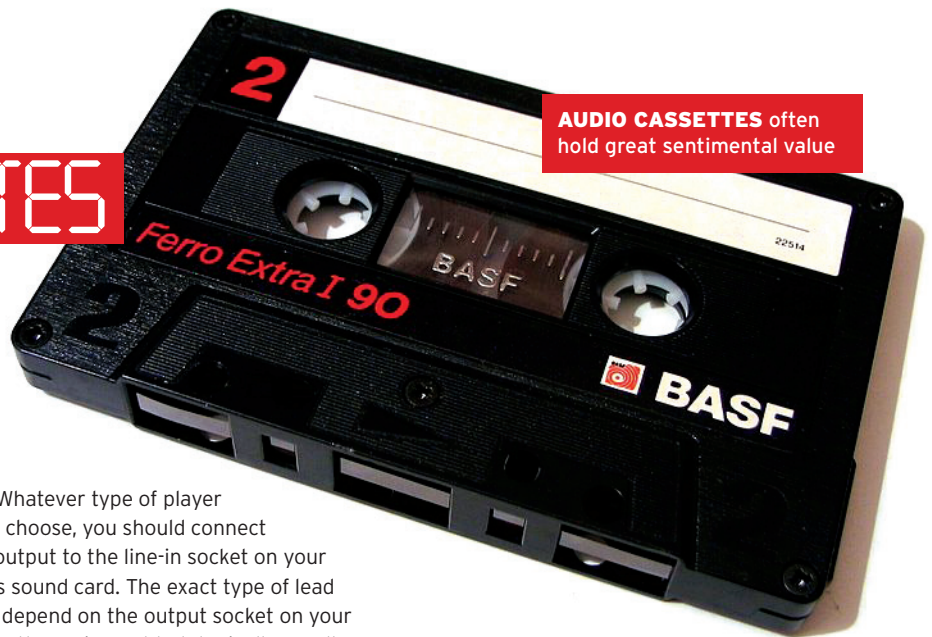


**WINDOWS' SOUND RECORDER** can record audio in WAV format from a connected cassette player

MP3 format, thereby eliminating the need for a separate conversion. This functionality is often provided by integration with iTunes.

One supplier that specialises in equipment for digitising analogue audio is ION Audio. The Tape 2 Go and Tape Express + USB cassette players cost between £25 and £35.

Whatever method of digitising you choose, it would be a good idea to take a good look at your cassettes before spending any time digitising them, especially if they've not been played for some time. While dirt probably won't have worked its way inside the cassette, if there's dust around the area where the tape is exposed it could end up inside when you start recording. Give it a good clean before you begin. Also make sure the spools haven't seized up, manually turning them (a hexagonal pencil is ideal for this) to get them moving if necessary.



**WALKMANS** are still available to buy for as little as £15 on eBay





# VINYL RECORDS

Vinyl records – we're thinking of 33rpm LPs and 45rpm singles – are capable of extremely good audio quality. This being the case, if you're keen to preserve as much of the detail in the music as possible it would be wise to spend some time in choosing your equipment and be prepared to invest financially, too. This is an area in which there's a world of difference between the budget- and top-end conversion products.

The simplest way of digitising vinyl records is to use a USB turntable. These are produced by several companies, with prices starting at around £30.



A good-quality **SOUND CARD** is recommended

USB turntables have a built-in analogue-to-digital converter and are used with the dedicated software supplied.

However, while the quality tends to improve with price, and you could probably get decent results with products from

specialist companies such as ION Audio, the general consensus among audiophiles is that the performance of even the best is not nearly as good as with a medium-priced conventional turntable.

With an analogue turntable you need to connect the output (or perhaps the output from an attached amplifier, depending on signal levels) to the line input on a sound card and use the Windows Sound Recorder (or Audacity) to digitise it.

Before recording, be sure to select Line In rather than Microphone. The Sound Recorder will save your audio as a WAV; if you want to store it as MP3 (we advise against this because the quality will be jeopardised) you'll need to use a separate converter – plenty of freebies are available online.



**USB TURNTABLES** present the simplest solution for digitising vinyl

**VINYL RECORDS** offer extremely good sound quality

The cable you'll need for this job will depend on your turntable or amplifier; you should be able to pick one up online or from your local electronics store. Typically, turntables have a stereo phono (aka RCA) connection, and some have a captive cable.

You can use either your PC's sound card or, for better quality (and this is highly recommended if you're using a good-quality turntable), an audiophile internal or USB sound card such as the £90 Creative Sound Blaster X-Fi HD.

With regard to your choice of a conventional turntable, if you still have one then you'll probably use that, at least initially to find out whether it's capable of the quality you're looking for. If you need to buy a turntable, the bottom line is that you get what you pay for. Prices escalate at the top end, with some devices costing several-thousand pounds. At this level, you need to read reviews before parting with your cash, and you'd be well advised to visit a specialised hi-fi shop for advice and to audition equipment.



# PHOTOGRAPHIC SLIDES

You might be able to digitise your slides by photographing them with a digital camera, although the results won't be as good as if you'd used a dedicated scanner. If you don't already have a scanner, try this method before deciding whether to buy one. Ideally, you'll need to use a camera with a good macro capability, otherwise the slide probably won't fill the entire field of view. You'd then have to crop the resulting image, losing some of the detail.

Attach your slide to a sheet of frosted glass or Perspex with a light source behind it, ideally a bright sky. You should put your camera on a tripod, too. Also make sure your slides are meticulously clean – we'll come to this in a minute.

For most people the technology of choice will be a scanner, but there are a couple of



Find a **SCANNER** that accepts both slides and negatives

things to look out for in choosing a suitable model. First you must choose a scanner that has a film capability (for slides and negatives), otherwise you'll be able to scan only printed photos.

Just as important is the scanner's overall build quality and optics. These are difficult to quantify, so make your decision after reading reviews of scanners (see [tinyurl.com/cs4s6xf](http://tinyurl.com/cs4s6xf)).

A speck of dust becomes significantly more noticeable when a negative is blown up to printed-photo size. Cleanliness is crucial. Before scanning, do all

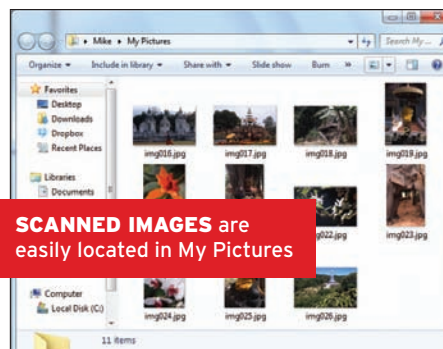
you can to remove dust and hairs. You can use one of the soft brushes with a built-in blower that are available from photographic shops, but compressed air aerosols are even better.

Scanners will cope with most slides, but the automatic exposure could be fooled by scenes containing lots of white (such as a snowy scene) or black. If your whites or blacks come out grey, you'll need to override the automatic

exposure. Having got your scan, take a good look at it onscreen to ensure it isn't marred by dirt that you weren't able to remove from the slide. If you're not happy with it in this respect then you'll need to remove the dust spots or hairs using a photo editor.

For a step-by-step guide to retouching your scans using Photoshop, see page 116.

An alternative to DIY scanning is to use the services of a company that offers a professional scanning service. Not only will you get better results, but you'll save yourself some time, too. Prices start at about 50p per slide, although it gets cheaper if you have lots of slides to scan.



**SCANNED IMAGES** are easily located in My Pictures



Ensure your **NEGATIVES** are free from dust and hair



# PHOTOGRAPHIC NEGATIVES

The cheapest way to digitise your negatives is to photograph them with your digital camera. The end result won't be as good as it would be with a scanner, but you could try this method if you don't already have a scanner that's capable of dealing with negatives.

The negatives will need to be back-lit, so attach them to a pane of frosted glass (your bathroom window may suffice) or Perspex and ensure there's a bright light behind it - a bright sky is best. To avoid camera shake it's wise to use a tripod; also make sure your negatives are really clean.

You'll need to use a camera with a good macro capability so your negative fills the viewfinder. Most compact digital cameras have such a mode and can focus very close to objects, making them well suited to the task.

The software supplied with a scanner will turn your negative into a colour image. If you're using a digital camera, though, you'll have to turn your digitised image into a positive one using photo-editing software. With black-and-white negatives, this is simply

a matter of using the 'Negative' function, although for colour negatives you'll also have to remove the orange cast that will become blue. A photo editor's auto colour correction should be able to sort this out.

A better solution is to use a scanner. All scanners will work with photographic prints, but only those with a film-scanning capability will work with

you a 7.5Mp image from a 35mm negative). The quality of the optics also makes a big difference, so read some reviews ([tinyurl.com/cs4s6xf](http://tinyurl.com/cs4s6xf)).

Before scanning, make sure your negatives are clean - a speck of dust on a negative will be much more prominent when it's enlarged. You could use a combined soft

brush and blower, which are available from photographic shops, although a compressed air aerosol of the type sold by electronic component suppliers is better. Scanning will be straightforward with 35mm, modern medium or large-format negatives, but scanning older negatives might require manual intervention. For negatives with lots of white, such as a snowy scene, or black, you might have to override the scanner's automatic exposure.

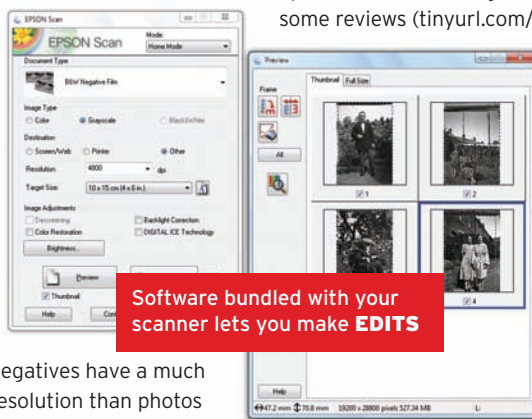
If you aren't happy with the end result, perhaps due to grime on the negative that you couldn't remove, you'll need to clean the scan using a photo editor (see page 116).

If you want to save time in scanning lots of negatives or if you're after better results than with an ordinary scanner, you could consider a professional service. If you have several scans you'll pay around 50p each, or £1-plus for singles.

**NEGATIVES** can be digitised simply by taking a photo of them

Software bundled with your scanner lets you make **EDITS**

A **SCANNER** can convert your negatives to colour images





# PHOTOGRAPHIC PRINTS

**PRINTED PHOTOS** last only as long as the paper on which they're printed

While it's not as easy as using a scanner, and the results won't be as good, you can digitise photographic prints using a digital camera. The best lighting conditions will be outdoors on a bright but overcast day.

Attach your print to a vertical board and mount your camera on a tripod or table. Experiment with the zoom setting: you'll probably find zooming in will reduce distortion, but increase camera shake if you're not using a tripod.

If you've lots of prints to digitise or your camera doesn't provide you with the quality you desire, the most cost-effective method is to use a scanner. When choosing one, decide whether you also want to be able to scan negatives - not all have this functionality.

If you judge a scanner purely on its resolution then pretty much any model will be adequate for scanning prints. The image quality also depends on the quality of the optics, though, which is more difficult to quantify. Read our reviews of scanners within your price range before making a decision (see [tinyurl.com/cs4s6xf](http://tinyurl.com/cs4s6xf)).

Unless your prints are in pristine condition, it would be a good idea to

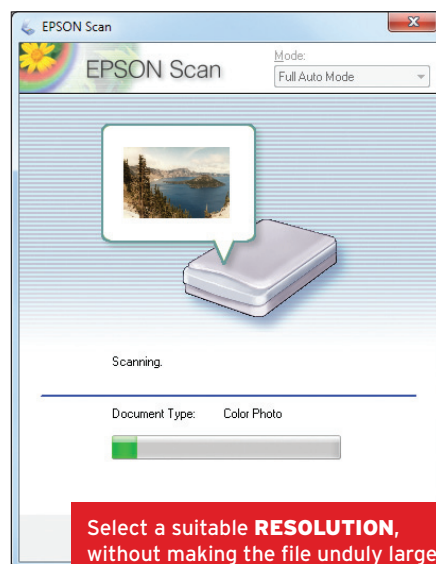
clean them up as much as possible before photographing or scanning them. If they've been stored in a dusty environment then remove as much of the dust as you can. Using a brush is recommended, but you'll need a very soft one to avoid scratching. Better still, use one of the brushes with a

rubber bulb that allows you to blow air while you're brushing. If there are any tears, repair your prints with tape, but apply it only to the back of the print. Any damage that can't be repaired prior to scanning or photographing can be cleaned up using a photo editor.

Scanning should be straightforward, although it would make sense to scan at a lower resolution than the scanner's maximum to keep down file sizes. It's reasonable to assume that a photographic print will have a resolution of about 300dpi, so selecting any greater scan resolution will unnecessarily increase the file size.

Finally, bear in mind that if your print has lots of white (such as in a snowy scene) or black, you may have to override the scanner's automatic exposure function.

Although scanning prints isn't difficult, it can be time-consuming. So, although it won't be cheap, if you have a lot of prints to scan and time is limited, you could choose to take advantage of a professional scanning service. The quality of each scan will probably be better, too, since good companies will use top-notch scanners. Prices start from around 10p per scan.





# OBSELETE DIGITAL MEDIA

We've paid a lot of attention to digitising analogue media such as VHS tapes and photographic negatives as a way of preserving them for posterity. However, digital media can also become obsolete - and, in future, it may be even more difficult to access than analogue media. For example, if you have photographic negatives that date back decades you can still get prints made from them, but retrieving a file from a floppy disk is a problem if you have no hardware that can read it.

Here, we'll look at how to transfer data from various types of digital media that are now - or close to becoming - obsolete. Although we're specifically looking at older media, it's important to recognise that data can also be lost from current media, such as CD-RW discs, simply because they degrade over time. Estimates differ as to how long writable and rewritable optical discs last, but as little as five years has been suggested. The solution is to regularly make new copies of any data that you've archived to optical disc.

Before going to the expense of transferring data from old to new media there's one important thing to consider: whether you'll be able to make use of that data. If the files are purely text data or images there should be no problem; if they're stored in the proprietary format of an obsolete word processor or program intended to run under DOS or an old version of Windows they may be inaccessible with the hardware you have to hand.

The most recent form of floppy disks are 3.5in, but before this we also saw 5.25in and even 8in. Non-standard floppy disks, such as the 3in variant used by some Amstrad computers, were also in active use. For 3.5in floppies you can use an external USB drive, which cost around £8, but you're out of luck



Even **DIGITAL FORMATS** are quickly superseded

for the other sizes. You won't find equivalent hardware and, while you might just be able to find a secondhand internal drive, most modern motherboards don't have an appropriate interface. If you're determined to retrieve your data you'll need to call on a company that provides data-transfer services.

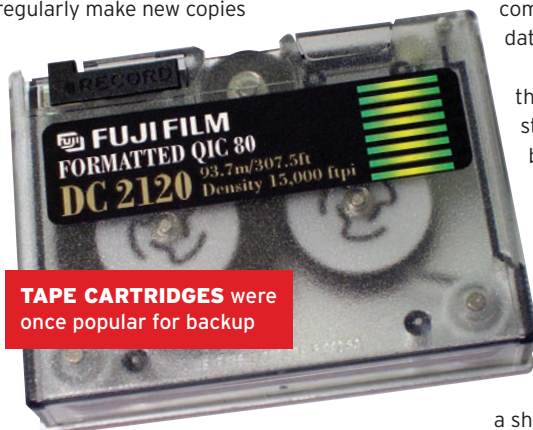
At the time when the amount of storage provided by floppy disks was becoming inadequate, and before writable optical discs really took off, several proprietary external storage products enjoyed a short period of

popularity. The Zip disk from Iomega was a 'super-floppy', and provided a capacity of 100- to 750MB; the Jaz disk, also from Iomega, provided up to 2GB via hard-disk technology. Tape cartridges (read and written to using a so-called tape streamer) were also popular for backup. You might be able to pick up secondhand Zip and Jaz drives and tape streamers, but because each was provided in versions with several interfaces, some of which aren't compatible with today's PCs, using a professional service for salvaging your data would be preferable. Prices for floppies and Zip drives start at about £5

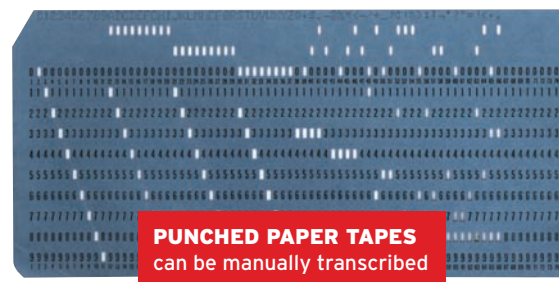
per disk, although you'll pay considerably more for Jaz disks and tapes.

Although the various media discussed accounts for most types of removable storage that were used during the PC era, it's possible that you've inherited digital data from much longer ago. Stacks of punched cards and punched paper tapes come to mind, and even these can still be read. You're not going to be buying equipment to do the job yourself - the hardware is sought after by collectors - so, again, you'll be looking to a company to provide this service.

Given that this is a specialised task, expect to pay a lot more - punchcardreader.com charges 6.5 cents per card, even though they store only 80 characters. However, don't forget that punch cards also print the data along the top, so if it's just a few cards you could manually transcribe them or experiment with scanning them and using optical character recognition software. Punched paper tapes can also be manually transcribed, provided that you understand binary arithmetic. ☒



**TAPE CARTRIDGES** were once popular for backup





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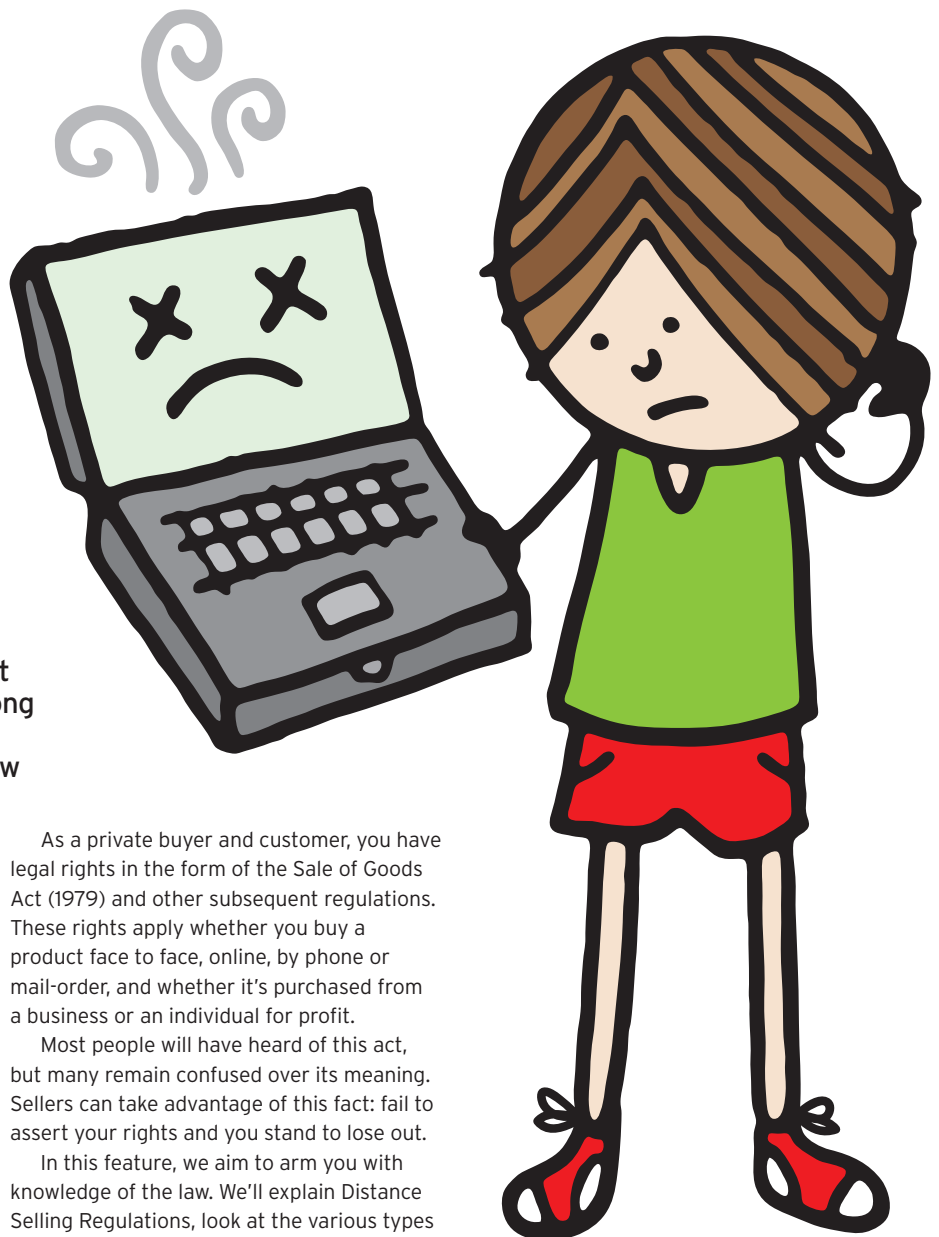
# KNOW YOUR CONSUMER RIGHTS

Tech kit is usually reliable, but what happens when something goes wrong with your purchase? Denis Cutter outlines your rights according to law

**I**f Santa brought you a shiny new tech gadget for Christmas, you're probably still enjoying it and haven't even thought about what you should do if it suddenly becomes faulty.

Computers and other tech gadgets do fail from time to time, so it's important that you know your options. Almost all products come with at least a year's warranty but, depending on exactly when the problem arises, you might need to deal with the vendor or the manufacturer itself.

You might have been unfortunate enough to receive a defective product that was sold through an online retailer, or simply decided you don't want it.



As a private buyer and customer, you have legal rights in the form of the Sale of Goods Act (1979) and other subsequent regulations. These rights apply whether you buy a product face to face, online, by phone or mail-order, and whether it's purchased from a business or an individual for profit.

Most people will have heard of this act, but many remain confused over its meaning. Sellers can take advantage of this fact: fail to assert your rights and you stand to lose out.

In this feature, we aim to arm you with knowledge of the law. We'll explain Distance Selling Regulations, look at the various types of warranty offered and tell you how to make a claim at a Small Claims Court.



**W**hen you buy a product, you enter into a contract with the business or person selling that product. If you live in the UK, the Sale of Goods Act (1979) sets out some basic statutory rights.

If you're not satisfied with a purchase due to a defect or fault, you can ask the person or business that sold it to you to put things



right. The seller can choose whether to repair or replace the item.

You are not obliged to demonstrate that the seller was responsible for the fault. However, you must act quickly, clearly describing the fault and making the seller aware that you know your rights.

There are a couple of things we should mention at the start. Firstly, if you buy from a private individual, whether face to face or through a website such as eBay or Gumtree, the Sale of Goods Act does not apply. However, the seller must not do or say anything that misleads you into buying. If they do, you may have some recourse.

The second item of note concerns products bought as gifts. With Christmas just gone, chances are you've received some. That's the good news. The bad news is it's unlikely that you have any direct rights. These are held only by the buyer: the person who agrees the sale with the seller.

If there's a problem with the gift, ask the person who bought it for the original receipt, or request that they return the product.

From here on in, we'll deal solely with your rights as the purchaser against business sellers.

## Defects and faults

What constitutes a defect or fault? The rules are simple, although it can be difficult to apply them to technology products.

### **The product must match the description.**

What you buy must exactly match the content, specification and quality suggested by advertisements, the sales description and product packaging. If it isn't, you can return the product for replacement or reimbursement of the amount paid. If this is the case, however, it's important that you do not use or interfere with the product, since this action may be interpreted as you having accepted it as supplied. As an example, you wouldn't drink two-thirds of a pint of milk before returning it because "it tastes funny".

### **The product has to be fit for purpose.**

In other words, it has to do what the seller says it will do and, if you have specified to the seller a particular use, it must do that also.



### **The product must be of satisfactory quality.**

Would a reasonable person, who has taken into account the description of the product and its price, find the item acceptable? The product should also work for a reasonable amount of time (taking into account price and usage), and be safe to use.

What is reasonable, though? Hi-tech electrical goods are usually reliable, and any defect or fault that was present from the outset may not become apparent until after some use. Even the best products will eventually begin to fail due to wear and tear.

How long a particular product should last cannot be laid down by law because there are too many variables to consider, including the build quality, and how often and under what conditions it's used. You could ask the seller for an estimate of its useful life at the time of purchase. Alternatively, you can obtain an expert's view of the cause of any failure before you make your complaint.

As a general guide, the seller will need to prove that any faults that develop within the first six months are not due to a manufacturing problem. After this time, it'll be down to you to prove a manufacturing fault is to blame.

Most tech kit will last longer than six months, and we'd expect a laptop, PC or tablet to last considerably longer. In our experience, frequently used laptops in the *PC Advisor* office last around three years before some kind of failure. This doesn't mean that a retailer will repair or replace your laptop if it goes wrong after two years, though. A laptop that's used only on a desk at home and never gets moved is likely to last a lot longer than one that's taken on a daily commute and roughly handled.

If a manufacturing fault is identified or accepted before a reasonable amount of time has passed, the seller must repair or replace the product. The seller is also responsible for reasonable delivery costs associated with the repair or replacement.





## Returns policies

Your rights under the Sale of Goods Act apply only if the product does not match the description, is unfit for purpose or is not of satisfactory quality. You have no right to return an item if you've simply changed your mind or your circumstances have changed.

Some retailers also have their own returns policies, though. Typically, you get a few weeks in which to return an unwanted item for a refund or a credit note. It must be unused and unopened so it can be re-sold.

No retailer can be made to comply with this type of agreement unless their terms

and conditions of sale, which you have accepted, specifically include the right to return unwanted products.

However, if you didn't physically walk into the shop to buy the product, Distance Selling Regulations (DSR) apply. These afford you the right to return a product bought online or via phone or mail-order if you later change your mind - for whatever reason. DSR explains why some shops may have different returns policies for the same products when bought online or in-store.

Under DSR, the seller must advise you (in writing) that you have a cooling-off period (typically seven working days), during which time you can cancel the contract (in writing) and return the product (within 28 days) for a full reimbursement.

This should include the original shipping costs, but it won't cover the expense of returning the product. Unfortunately, if the vendor refuses to pay this charge, all you can do is report it to Trading Standards.

Note that software is covered only while it remains wrapped. Be sure to check the spec before interfering with the packaging.

The seller must deliver the product you ordered within 30 days. If delivery is not made within a reasonable amount of time you can cancel and request a full refund.

## EU warranty regulations



Apple has recently been in the news regarding the EU obligation to advise customers about their right to a minimum of a two-year warranty. The UK's Sale of Goods Act and supporting legislation provides wider and longer-lasting protection. As such, the EU regulation has little or no benefit in the UK and doesn't bind manufacturers supplying goods here.

We don't have the space here to explain in-depth the EU regulation, but suffice to say the nature of the obligation is very restricted.

Indeed, Apple's wording on its website suggests that it's down to the buyer to prove that a fault existed at the time of purchase in order to claim a repair or replacement.

EU law provides no recourse for end users against manufacturers unless the product supplied causes physical injury and/or damage.



## Buying on credit and lenders' obligations

Buying on credit provides additional protection if a product is unsatisfactory. Note that this applies only if it was purchased using a credit card (Mastercard or Visa, for example), and not with a debit card (Electron, Switch/Maestro, Visa Debit, for example).

When you pay for an item costing between £100 and £30,000 on a credit card, your credit supplier is brought into the purchase contract: the bank pays the vendor, and you

pay the bank. You have exactly the same rights against the credit provider as you do the product vendor, which means you can claim back your money through the bank if the supplier suddenly goes bust.

Buying on finance, whereby you get the product now and pay later, can provide similar protection. Your rights here are governed by the terms of the financial agreement you sign. Read the smallprint!





## Manufacturers' warranties

Most technology products come with a manufacturer's warranty that provides a separate agreement between the manufacturer and the buyer. In the event of a manufacturing fault, the warranty will usually offer repair or replacement during a specified period from the date of purchase.

Your rights are dependent on the terms provided by the manufacturer, which can be as wide or restrictive as it likes. Some require the product to be returned to the seller; others may send pre-paid packaging or provide a telephone contact number to discuss your options. All will require proof of purchase, so it's important to keep your receipts – even if they're sent via email.

A small number of companies require the item to be returned in its original packaging, so be sure to keep this for expensive purchases such as PCs and laptops if you have the space available.

It's worth noting that although some manufacturers provide a two-year warranty, the contract is often made with the original buyer only. If you've bought a product secondhand, it's possible that you won't be covered should anything go wrong.

Read the warranty statement included with the product, and note that you may

need to follow some conditions if you ever want to invoke it. Most request that the buyer registers the warranty with the manufacturer by returning a supplied form by post, or by providing their details online or over the phone. In return, some manufacturers extend the warranty period by six- or 12 months.

There may be other benefits, too. Some warranties will extend to any person in legal possession of the product, while others let you transfer the warranty to a new owner.

If the warranty doesn't address this point, it's advisable to check with the manufacturer whether it's possible to transfer the warranty to someone else. If you're buying a used product within the warranty period, you should also check for the right to transfer.

Where a product is still under warranty, it may be easier to claim under this than deal with the original seller. This will be your only option if the seller has gone bust and you didn't purchase the product using a credit card, but it can also be useful if you live some distance from the shop or the seller is purposely being difficult.

Always check whether a warranty requires certain actions to remain valid. For example, you might need to service the product at stipulated intervals (more often applicable to cars, of course), or report a problem within a certain amount of time. Failure to follow all the conditions may invalidate the warranty.



## Products that fail outside warranty

A question we're often asked concerns what you should do if a fault develops just outside the warranty period. The manufacturer has no obligation to assist, but some will take pity on you so it's worth making contact. Stay calm, and be polite and prepared to compromise.

There may be an unadvertised discretion available to customer-service employees to assist in certain circumstances. Some companies operate policies such as this to keep customers happy – if they refuse to help when your warranty expired only a few weeks ago, it's unlikely you'll buy a replacement product from the same manufacturer.

Even if your warranty has expired, you may still have a claim if you can prove that the fault occurred while the product was still under warranty or was due to a manufacturing flaw.

## Types of warranty

Most warranties provide for replacement or the full cost of repair. That is, the cost of parts and the labour involved in fitting those parts. Most are likely to be on a 'return-to-base' (RTB) basis, which means you're responsible for returning the product to the manufacturer (or, in some cases, to the seller). The postage cost may not be included.

You may be offered, particularly when registering the warranty online, an option to improve your level of cover. For example, you might be asked if you want to exchange a 12-month RTB policy for 90-day collect-and-return (C&R) cover, during which a faulty product will be collected, repaired and returned to you. Be warned that you may be forsaking long-term protection for a convenience you are unlikely to need or use.

'Onsite' warranties can also be offered. This means a technician will visit your home or business to carry out product assessments and repairs. Alternatively, it can also mean a



product will be collected and it's replacement delivered simultaneously. In some cases, the replacement product is a temporary loan while your product is being repaired.

Some warranties cover the replacement of parts only. You might be sent these parts and will have to fit them or arrange for professional fitting. 'Labour-only' warranties, meanwhile, cover the cost of a technician fixing the product, but you must pay for the parts. They're often seen supplied with desktop PCs. Such a guarantee has value only if you're unable to personally fit the replacement parts yourself, or you don't have the technical knowledge to determine which parts are defective.



## Extended warranties

Extended warranties are a form of insurance and can be bought for one or more years' cover. By paying the premium, you can rest assured in the knowledge that if something goes wrong you will get help in sorting it out.

Like all insurance products, the policy wordings and the cover provided will vary from company to company - you'll need to carefully read all the policies before deciding which to take. All will have conditions with which you must comply, and exclusions that detail what is not covered. Batteries, for example, are consumables, so will typically not be covered.

Some extended warranties include accidental damage and breakdown, neither of which are likely to be found in a manufacturer's warranty. Although you may have some cover from a home-insurance policy, bear in mind that a claim will increase your premium up when it's time to renew.

## Small Claims Court

The Sale of Goods Act is all well and good, but what can you do if a retailer refuses to repair or replace a faulty product?

The Small Claims Court is a viable option for claims up to £5,000, for which you shouldn't need a lawyer. If you're successful the court will award you damages - in other words, the retailer will be ordered to make a payment to you.

To claim the cost of replacement or repair you'll need an invoice or estimate. If the fault is due to a manufacturing flaw that occurred before a reasonable time had elapsed, you'll probably also need a report from an expert who supports that view.

There are risks involved with taking court action, though. If you lose the case, you'll also lose your court fees, and it's likely that you will have to pay the travel expenses of the seller and the seller's witnesses.

The court will expect you to have already tried to reach an agreement with the seller. For this reason, you should write to the seller giving details of the problem. Include evidence that the fault is a manufacturing fault if the goods are more than six months old, and explain how you would like the matter to be resolved. Also say that if you do not receive a detailed response within a reasonable amount of time (usually 30 days) you will begin legal proceedings.

If the seller recommends that you consider an independent assessment of your claim, sometimes called arbitration or alternative dispute resolution, it's advisable that you do so. Failure to do comply may affect your compensation - even if a court upholds your complaint.



You can start a claim by obtaining and completing a claim form. This is obtainable from a County Court or online at [hmcourts-service.gov.uk](http://hmcourts-service.gov.uk). The form has space in which you can describe your problem, and is provided with a set of guidelines for advice.

The completed form, along with all supporting documents and evidence, should be taken or sent to the court together with the court fee. The amount of the fee should be included in your claim.

The court will send the claim form and documents to the seller (the defendant), who will be required to respond within a fixed period of time.

The seller may respond by making an offer to settle. If so, take time to consider whether the offer is reasonable. If you reject the offer and the court later awards you a smaller amount, you may incur some costs, such as travel expenses for witnesses.

If no offer is made by the seller or you reject its offer, you may both have to attend a hearing and explain your case. In this event there may be a hearing fee, but the court will explain to you what is happening and what you have to do.

If you are successful at the hearing, the court will award you damages and make an order for payment. You should also ask the court to award you your costs so they can be included in the order to pay. ☒



# The ULTIMATE

Don't fall victim.  
With these tips and tools,  
you can protect yourself  
against malware, phishing  
and theft. By Eric Geier

**M**obile malware is getting lots of attention these days, but you can't forget about your PC's security – after all, you probably still use it to pay bills, shop online and store sensitive documents. You should fully protect yourself to lessen the chance of cybercriminals infiltrating your computer and your online accounts, capturing your personal information, invading your privacy, and stealing your money and identity.

You need to guard against viruses, but not all antivirus programs catch all threats – and some do better than others. You have to watch for many other types of threats, too: malware invasions, hacking attacks and cases of identity theft can originate from email, search-engine results, websites and social media.

They can also come in the form of links or advertisements for phishing and scam sites. But with some education on the topic, and the right tools, you can identify such scams and avoid falling victim.

As we said last issue, if your children use your computer you must also protect against inappropriate content such as violent games and adult sites, and you should monitor communication on social networks. Although the best approach is to keep a close eye on your kids while they use the computer, you can employ tools and services to filter content and monitor their web usage when you're not around. Read our guide to protecting your kids online at [tinyurl.com/d925ykb](http://tinyurl.com/d925ykb).

Protecting your data from computer thieves and people who tap into your Wi-Fi signal is also important. Encrypting your computer is the only way to ensure that a thief cannot recover your files, passwords and other data. And unless you password-protect and encrypt your wireless network, anyone nearby can connect to it, monitor your internet usage, and possibly access your computers and files.

Here are the security threats you should watch for, and the tools you can use to protect against them.





# PC security guide





## Viruses and other malware

Viruses, spyware and other types of malware remain prevalent, and cybercriminals are constantly finding new ways to infect PCs. Although adult sites and illegal file-sharing sites have a reputation for harbouring malware, you don't have to browse the shady parts of the web to become infected.

Installing a good antivirus or internet security program should be your first step. However, not all are created equal. While no single antivirus product can protect against all the millions of malware variants, some packages detect (and successfully remove) more threats than others. For strong PC security, choose one of the top performers from our reviews ([tinyurl.com/c8nmp3x](http://tinyurl.com/c8nmp3x)), such as Norton Internet Security or Bitdefender Internet Security.

Although an antivirus package is your primary weapon for fighting malware, you might wish to add other tools to your arsenal for extra security.

OpenDNS ([opendns.com](http://opendns.com)) provides content filtering that blocks many malware-infested sites and phishing scams. You can enable this online service on select computers, or on your router to protect all connected devices.

The free OpenDNS FamilyShield automatically blocks malware, phishing sites, adult content, and proxy sites that try to bypass the filtering, and it requires only a simple setting change on your PCs or router. The OpenDNS Home and Premium DNS offerings filter malware and phishing sites, and lets you customise the settings.

Bufferzone (free, [tinyurl.com/cuyk33o](http://tinyurl.com/cuyk33o)), lets you run your web browser or other



application in a safe mode of sorts to protect against malicious downloads. It does so by running the program in a virtual environment (also known as a sandbox) that isolates it from the rest of your system. Some antivirus or internet security packages come with a sandbox feature, but if yours doesn't (or if it doesn't allow you to manually run programs in the sandbox), consider using Bufferzone - or an alternative such as Sandboxie - when you're browsing risky sites or downloading suspicious files.

Intended to complement existing defences, Malwarebytes ([tinyurl.com/cng57y6](http://tinyurl.com/cng57y6)) works alongside most regular antivirus programs. It may catch malware that your regular

antivirus misses, or remove threats that your standard package can't. The free version does on-demand scans (you manually open the program and run a scan), whereas the paid version has real-time monitoring.

In addition to installing antimalware utilities, you can take other steps to help prevent attacks.

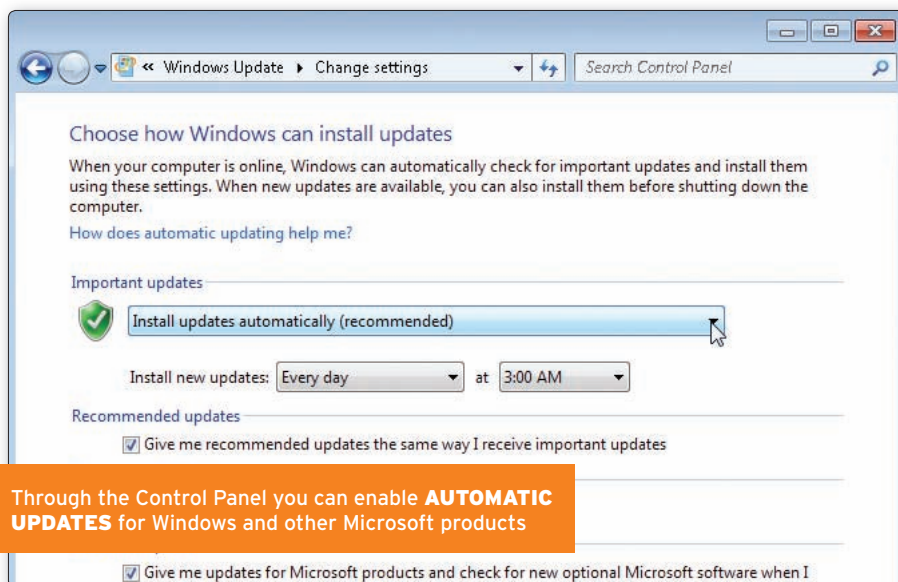
### Enable automatic Windows Updates:

This action ensures that Windows and other Microsoft products regularly receive the latest security patches. You can adjust Windows Update settings via the Control Panel. For the best protection, choose to automatically download and install updates.

Bear in mind that this may mean your PC automatically restarts after installing updates, regardless of whether you've saved any open documents. Our advice is to always save files before walking away from your computer, or set your software to automatically save every few minutes.

### Keep non-Microsoft software up-to-date:

Don't forget to update third-party software, too. Some popular programs and components (including web browsers, PDF readers, Adobe Flash, Java and QuickTime) are bigger targets than others for malware writers, and you should be especially mindful to keep them up to date. You can open the programs or their settings to check for updates, but most will automatically notify you when an update is available. Theoretically, this means you shouldn't have to worry - but only if you give such notifications your full attention.

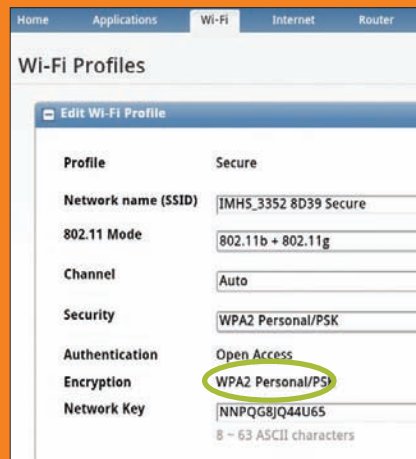






## Turn on Wi-Fi encryption

Most wireless routers don't turn on security by default. Enable encryption to prevent snoopers from entering your network and perhaps capturing your traffic and passwords. For a home- or small office, use at least WPA2-Personal (PSK) security, in which you create a password on the router and then enter it into computers and devices when connecting. For a larger business, choose WPA2-Enterprise security, which uses an authentication server or hosted service and requires users to have unique usernames and passwords.



it's moving over the internet. The site address should begin with https instead of http, and your browser should show some kind of indicator (such as a closed padlock) near the address bar. If a site isn't using encryption for a screen in which it asks you to enter sensitive data, it's most likely a phishing site or scam site. SSL encryption isn't a guarantee of safety, but you ought to make a habit of looking for that lock icon.

**Use a web browser add-on:** Many web browser add-ons can help you identify phishing scams and other dangerous sites. Typically, these plug-ins use badges or other indicators to show whether a site is safe, unsafe or questionable. Most antivirus programs offer these types of add-ons, but if yours doesn't or you don't like it, consider using Web of Trust (mywot.com), an independent site-reputation tracking service.

## Hacking and intrusions

A determined cybercriminal can get inside your PC by directly hacking into it, and some malware can steal your data and passwords, returning the information to home base.

This is where a firewall comes in handy: it serves as a gatekeeper, permitting safe traffic (such as your web browsing) and blocking bad traffic (hacking attempts, malicious data transfers and the like).

Windows includes a firewall, appropriately named Windows Firewall. It's set by default to block malicious traffic from coming into your computer, but it isn't set to keep an eye on data going out. It's unlikely that this utility alone will detect any malware attempts to transmit your data to cybercriminals.

Although you can enable the firewall's outgoing protection in Windows Vista and later versions, this isn't easy for the average user to set up or configure.

For the ultimate in PC security, you should use a firewall that by default protects your machine from both incoming and outgoing malicious traffic. First, find out whether your antivirus utility or internet security package has a firewall component, and whether it offers full protection. If it doesn't, consider a third-party firewall such as ZoneAlarm Firewall (tinyurl.com/cnLpufv) or Comodo Firewall Free (personalfirewall.comodo.com).

## Phishing and scam sites

One method that cybercriminals use to steal your passwords, money or identity is commonly called phishing (a play on the word fishing). Attackers try to get you (the fish) to hand over your information or money. They do so by hooking you with an email message, IM or some other form of communication

(the bait), which looks as though it came from a legitimate source, such as a bank or an online shopping site.

Phishing isn't a new tactic, but people still fall for it. Here are some precautions you can take to keep phishers from reeling you in.

**Don't click links in email:** Scammers often put links to fake login pages in convincing-looking email messages in an

## Social network safety

Facebook, Twitter and other popular social networks have given cybercriminals additional avenues in which to try grabbing your personal data. For example, scammers might create a malicious Facebook app that attempts to harvest your information for



attempt to steal your personal information. With that in mind, if an email asks you to click a link to log into a site and enter your username and password, don't do it. Instead, type the URL directly into your browser, or search Google for the site.

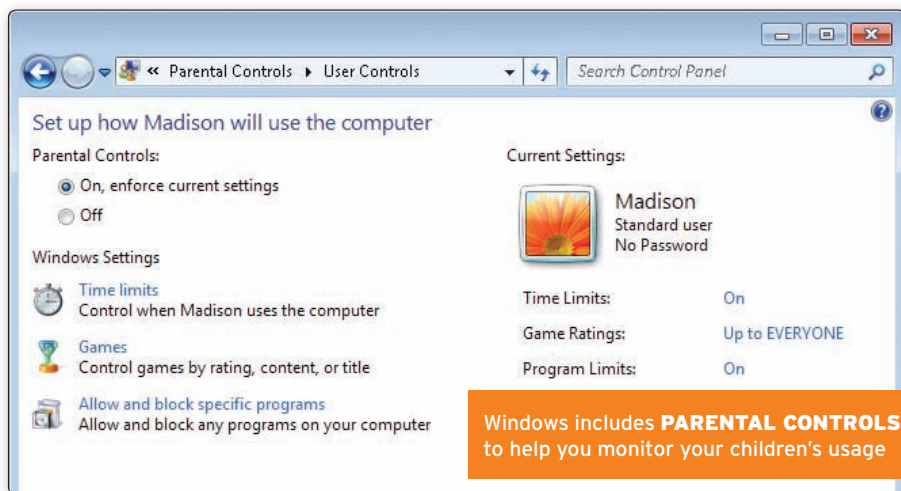
**Check for SSL encryption:** Before entering sensitive information, make sure the website is using encryption to secure those details as

their financial gain, spreads tainted links, or hijacks other people's profiles. Below are a few measures that you can implement to protect yourself on social networks.

## Tighten your security and privacy settings:

Although security and privacy features vary across social networks, they can help to protect you and your account data. You must set them up, however, for them to work





effectively. For instance, both Facebook and Twitter allow you to encrypt your connections so that other people can't hijack your account when you're connecting from public Wi-Fi hotspots. And Facebook offers a feature to monitor and track the computers and devices that log in to your account, to help identify unauthorised logins.

**Be careful who you friend or follow:** Before you add someone as a Facebook friend, or follow them on Twitter or Google+, ask yourself whether you really know the person. Cybercriminals often set up fake profiles to spread spam and malicious links.

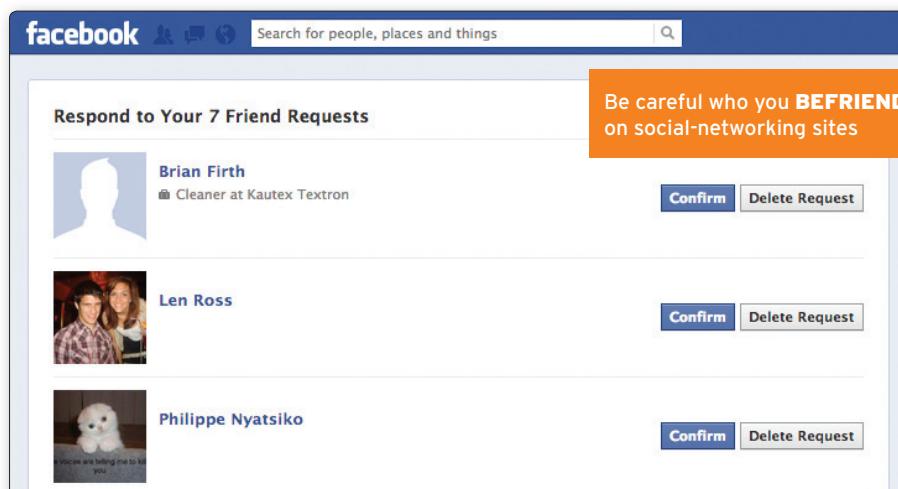
**Watch for phishing attempts, scams and hoaxes:** If something sounds fishy or too good to be true, it probably is. Two widespread Facebook scams, for instance, promote apps that claim to tell you who has viewed your profile, or promise to change your Facebook profile layout or theme, even though neither capability exists. Think before you click on these types of links or apps, as they could steal your information, hijack your account, send spam to your friends or cause other damage. To learn more about social network security, see [facecrooks.com](http://facecrooks.com).

**Check app permissions:** If you're thinking of giving a Facebook app permission to access your profile information, first check out the types of information it wants. If you think a particular app should not be

Twitter lets apps access account information, too. Go to [twitter.com/settings/](https://twitter.com/settings/) applications and review which apps and services can access your profile. If you no longer want to use a particular app or service, you can disable it from this page.

**Use apps to help detect malicious activity:** A number of apps can tell you if your social network accounts are vulnerable to attack, or if you're sharing too much personal data. Two good apps are Bitdefender Safego ([safego.bitdefender.com](http://safego.bitdefender.com)) and MyPageKeeper ([apps.facebook.com/mypagekeeper/](https://apps.facebook.com/mypagekeeper/)), both of which monitor your profile's feeds and comments and alert you and other users to any malicious links they encounter. Note that MyPageKeeper works only with Facebook.

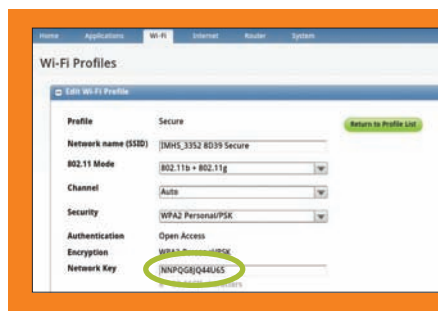
If you operate your own Facebook Fan Page or blog, consider using a service such as Websense Defensio ([tinyurl.com/dxbeLLd](http://tinyurl.com/dxbeLLd)), which filters comments for spam messages, malicious content and profanity.



able to access certain details, don't allow it. Also periodically check the apps you've authorised to see whether any of them look suspicious. You can find your installed apps at [facebook.com/bookmarks/apps](https://facebook.com/bookmarks/apps).

### Inappropriate content

If children use your computer, you should look at ways to block inappropriate content and online predators. Even if children aren't searching for unsuitable content, they could



## Use a strong Wi-Fi security password

Even if you decide to set up WPA2-Personal (PSK) security on your wireless router, you're still at risk if you make a weak password that can be cracked. To ensure that malicious parties can't break into your Wi-Fi, use a complex password. You can use up to 63 characters, including lower- and uppercase letters, numbers and symbols. Don't use any recognisable words or phrases; gibberish such as `a8F#wMl(C9*!q$JyP@i^` is ideal. And so you don't forget it, you might write it on a sticky note and attach it to the bottom of your router, or save it on your desktop PC in a Word or plain-text file.





still stumble across it in searches, find it via links or advertisements, or even access it directly by mistyping a site address.

**Enable Parental Controls in Windows:** With the parental controls in Windows Vista and later versions, you can determine when your kids can use the computer, which games and applications they can run, and the types of websites they can visit. The feature also provides activity reporting.

**Activate OpenDNS for web filtering:** In addition to stopping malware and phishing sites, OpenDNS can block adult-oriented sites and other online material that may be inappropriate for children.

Even if you use Windows' built-in Parental Controls, OpenDNS is worth trying, since it provides a second layer of protection. OpenDNS can also safeguard all computers and devices on your network when you configure the service on your router. You can

## Password-protect your phone & tablet

Don't forget about the security of your mobile devices. Losing your smartphone or tablet can cost you time, money and, more importantly, your privacy. Your first line of defence should be to set a lock-screen PIN or password on your phone or tablet so that other people can't use it if you lose it. And if your smartphone or tablet supports encryption, you should turn on the feature so that a thief can't retrieve your personal data from the device without considerable effort.



public and private posts, photos, friends and so on to alert you to anything that might compromise their online safety.

For more advice on keeping your kids safe online see our in-depth feature at [tinyurl.com/d925ykb](http://tinyurl.com/d925ykb).

### Device and data theft

Not all security risks come by way of the internet: you never know when a thief might

your Windows password (which isn't difficult) and log into your Windows account, boot your computer into Linux (which bypasses Windows completely), or remove the hard drive and connect it to another computer.

Encrypting your drive will prevent those types of attacks. A thief could still delete your data from an encrypted drive, but the crook wouldn't be able to view it. If you're using an Ultimate or Enterprise edition of Windows Vista or later, you can use Windows BitLocker to encrypt your drive; to learn more, see [tinyurl.com/cLzj93b](http://tinyurl.com/cLzj93b). If you're using another version or edition of Windows, check out the open-source DiskCryptor utility, available at [sourceforge.net/projects/diskcryptor](http://sourceforge.net/projects/diskcryptor).

An alternative to encrypting your entire hard drive is to encrypt only your most sensitive files, such as financial reports and confidential work documents. You won't be able to protect some data (such as saved browser passwords) under this scheme, but taking this approach is better than nothing.

If you're running a Professional, Business, Ultimate or Enterprise edition of Windows, you can use the built-in Encrypting File System feature, which you can turn on through the properties of a file or folder. If you're on a Home edition of Windows, or if your computers do not all run the Premium editions, you might turn to Cryptainer LE ([tinyurl.com/bkmhf](http://tinyurl.com/bkmhf)) to encrypt the files or folders you want to protect (to learn how to use the utility, see [tinyurl.com/c9sk3xL](http://tinyurl.com/c9sk3xL)). ☒

## Add security to your phone & tablet

No-cost, easy-to-use security utilities such as Avast Free Mobile Security, AVG Mobilation Anti-Virus Free and Bitdefender Mobile Security can help you locate and secure your smartphone or tablet if it's lost or stolen. Most of these apps let you log into a website where you can see the location of your lost device on a map, make it scream or sound an alarm, lock it in case you don't have a PIN or password, and even wipe the data if you think you won't be getting it back. These apps also have antivirus features to help block mobile malware, an emerging threat.



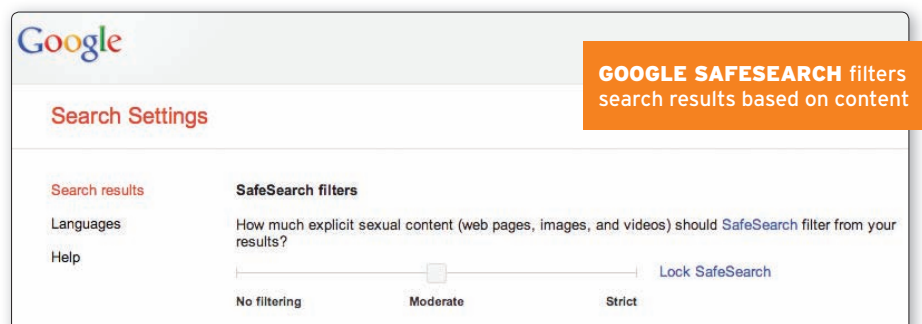
use the free OpenDNS FamilyShield service without even creating an account, but you'll need to create one if you wish to selectively block certain content categories. See next issue for our step-by-step guide.

**Enable search engine filtering:** Since children can encounter all sorts of inappropriate content in searches, consider enabling filtering for the popular websites. For Google, go to [google.com/preferences](http://google.com/preferences) to turn on search filtering. For Yahoo, go to [search.yahoo.com/preferences](http://search.yahoo.com/preferences). And for YouTube, click the Safety Mode link.

**Use SocialShield for social network monitoring:** Avira's free SocialShield service ([socialshield.com](http://socialshield.com)) helps you keep an eye on your children's Facebook, Twitter, Google+ and MySpace accounts. It analyses their

try to steal your equipment. Although this is obviously more of a concern for laptops and mobile devices, theft is one of the simplest, yet most damaging, threats.

Even if you have set a Windows password, thieves might still be able to access your personal files and passwords, as well as other bits of sensitive data. They could remove







# DiskStation DS213air NAS server

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## Maintenance matters

Owning a PC is a bit like owning a classic car: both need regular maintenance. It's a good idea to uninstall programs you never use, and disable programs that start with Windows and cause your computer to boot up slowly.

In Troubleshooter (page 104), you'll find in-depth advice on how to go about diagnosing why your computer is crashing - it could be something as simple as its cooling fans are clogged up with dust. We'll show you how to put things right.

A great way to speed up your PC is to use a RAM disk (see page 118). If your computer has 4GB or more of RAM, you should be able to spare some of this memory to boost the speed of web browsing or running other commonly used applications.

To accompany our feature on digitising your old photos and slides (page 80), we've included a guide on restoring and retouching those memories once they're on your computer (page 116). Plus, if you have a big photo collection, you'll want to organise everything so you can easily find the pictures you're after. Find out how to rename, rate and tag your photos on page 112.

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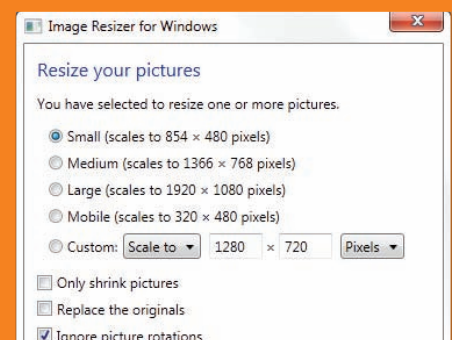


## QUICK TIP: RESIZE IMAGES IN WINDOWS EXPLORER

Photos stored in Windows' Pictures folder will typically have come directly from your digital camera and still be in their original resolution. Depending on your camera, each snap can vary in size from around a megabyte for a Jpeg to 10-plus times this if you shoot in RAW. Such images aren't ideal for emailing to friends and family, especially if you want to attach several photos to the same message.

The easiest way to resize photos is to install a free utility such as ImageResizer (head to [imageresizer.codeplex.com](http://imageresizer.codeplex.com)). Once installed, you simply select an image (or several images) in a folder. You then right-click one of them and choose Resize pictures from the contextual menu.

A pop-up window prompts you to specify the image size. Your original image will be unaffected, with ImageResizer saving a smaller copy in the same folder. As a guide, the Medium option is the best size for viewing on laptops, while Large is best for PCs. ☒





# Why is my PC crashing?

If you're struggling with a computer that crashes, it can be tricky to work out what's causing the problem. **Mike Bedford** offers some helpful pointers

**I**n the realm of desktop computing, few things are more disturbing than when your PC unexpectedly crashes. Thoughts immediately turn to the valuable data you might have lost and that backup you intended to do, but never did.

In practice, things are rarely as bad as they first appear. Unless you've suffered a hardware failure, specifically a hard disk crash, your data will probably be intact. Here we'll show you how to find out what's gone wrong and recover from it. Our emphasis is on software-related issues, so before we start it would be a good idea to ensure the problems you're experiencing aren't due to a hardware fault.

If nothing happens when you try to turn on your PC - no lights come on and the fan doesn't start - either the fuse in the plug has blown or there's a hardware fault with the PC itself, probably in the power supply. The chances are you won't have lost any data, but you may need to enlist professional help to repair your PC if you're not comfortable with swapping out PSUs.

Alternatively, if the lights come on and the fans start, but nothing appears onscreen or you get a Bios error message, the fault is probably connected to the motherboard, processor or memory.

If your PC makes clicking or unhealthy noises, or if you see a Bios error relating to the hard disk, it could well be the dreaded disk crash. Take no chances: this could result in data loss. Turn off your PC and contact a data-recovery company, such as OnTrack.

Of course, it may just be an intermittent fault. We'll provide some advice on this later, but if it doesn't solve your problem then you'll need to seek expert assistance.

## Consider what's changed

If your PC is behaving erratically or crashing, consider whether you've recently made any changes to your system. If the problems started



**BLUE SCREEN OF DEATH**

immediately after installing some new hardware and its associated drivers, for example, this would be a prime suspect.

In fact, if the crash is associated with the 'Blue Screen of Death', there might be a clue in the error message as to what's happened - it might even list an offending driver.

Conversely, if Windows always crashes or hangs while you're running the same software, especially if it's a package you've recently installed or upgraded, that's a likely candidate.

Windows Event Viewer (search for Event Viewer in the Start menu) is a



**SAFE MODE**

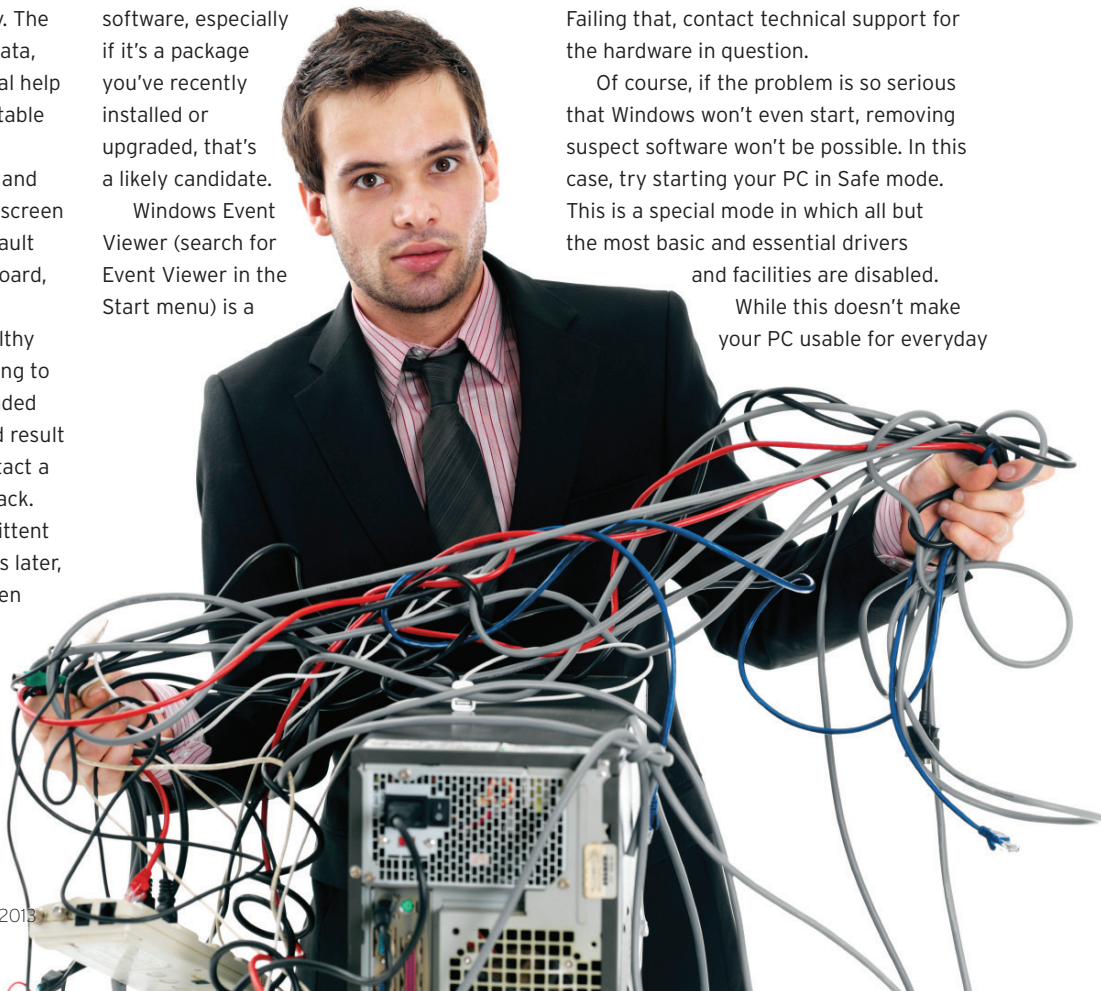
useful utility that could shed some light on what's gone wrong, but it's tricky for the uninitiated to get to grips with. For more information, see [tinyurl.com/2md3n9](http://tinyurl.com/2md3n9).

If the change is something you can reverse - uninstalling the new hardware and its driver, for example - try that. If it corrects the problem, look online to see whether there's a newer driver you could use instead. Failing that, contact technical support for the hardware in question.

Of course, if the problem is so serious that Windows won't even start, removing suspect software won't be possible. In this case, try starting your PC in Safe mode. This is a special mode in which all but the most basic and essential drivers

and facilities are disabled.

While this doesn't make your PC usable for everyday





**CPU COOLER**

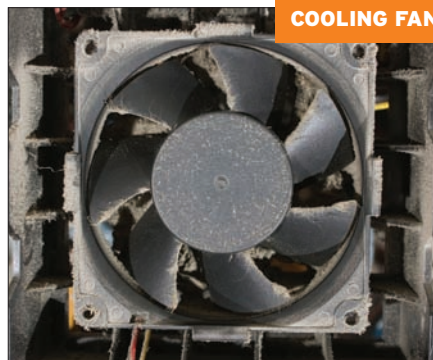
tasks, it will often run when Windows won't start normally, allowing you to diagnose and cure system faults.

To start Windows in Safe mode, turn on your PC and repeatedly hit F8 before Windows loads. Select Safe mode from the Advanced Boot Options menu that appears.

### System Restore & Windows Update

It won't always be obvious what change has caused Windows to become unstable, but there are measures you can take to resolve the matter. Each time you make a substantial change to your system, and also at regular intervals, Windows stores the state of the system as a restore point. You can use one of these to return the system to an earlier working state. Be assured that the process won't delete any of your files, although recently installed software may be removed. Search for System Restore in the Start menu and follow the onscreen instructions.

Something else to check, if you're suffering occasional failures, is that Windows is up to date. If you have enabled automatic

**COOLING FAN**

Windows updates then your system should be up to date; if you don't, it's a good idea to check for updates now.

Search for Windows Update in the Start menu, then click Change Settings. Select the option to 'Install updates automatically (recommended)'.

Many free third-party utilities are available that can identify out-of-date drivers on your system. UpdateStar is one such example, available from [updatestar.com](http://updatestar.com). Some may offer to update only a handful of these drivers without you purchasing the full version of the software, but they can at least give you a heads-up on what requires action.

### Hardware maintenance

Although replacing or repairing faulty hardware might be beyond your capabilities, there are a few hardware-related problems that you can deal with. These problems will often result in intermittent PC crashes and, while there are no guarantees, they're so easy you might as well give them a try.


The first of these problems is the accumulation of dirt. If this clogs up the fans, the processor or other sensitive components could overheat, leading to occasional system crashes. What's more, some types of dust can act as a partial conductor of electricity, with the obvious consequences if it lands on the motherboard or expansion cards.

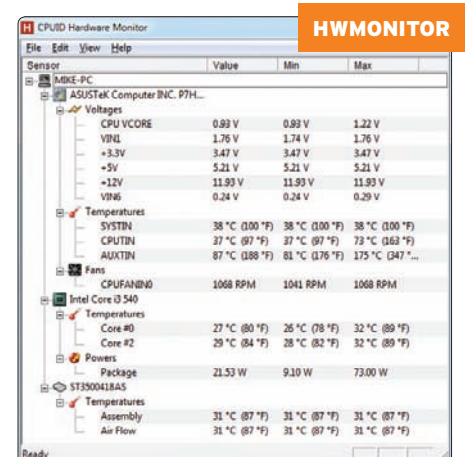
You can probably unblock the PC's main fan without taking apart your PC, and you

can safely do this with an ordinary vacuum cleaner. However, if you open up your PC to clean the insides, you need to not only take care to switch off the PC from the mains and earth yourself before you begin, but be aware of the risk of static damage.

Don't touch any of the internal parts with your fingers or a brush, since this could cause a static build-up. It's been reported that mains-powered vacuum cleaners also generate static electricity. The best thing to use is a compressed air aerosol specifically intended for this job; failing that, use a handheld battery-powered vacuum cleaner, but be sure to keep it at least a few inches away from any electronic components.

Check that all the components are properly seated in their sockets, since poor connections can cause intermittent crashes. Graphics cards, memory modules and the connections to your hard drive and optical drive can all be unplugged and reinserted. Do not touch the pins or electrical contacts on the components and, ideally, wear an antistatic wrist band.

You might find it helpful to use a software utility to monitor the health of your system hardware. This can help you to spot problems such as high temperatures and fans not running correctly. HWMonitor ([cpuid.com](http://cpuid.com)) is one such example. 







## YOUR QUESTIONS ANSWERED

# Expert computing advice

We tackle readers' hardware and software conundrums

### BLACK BORDERS ON MONITOR

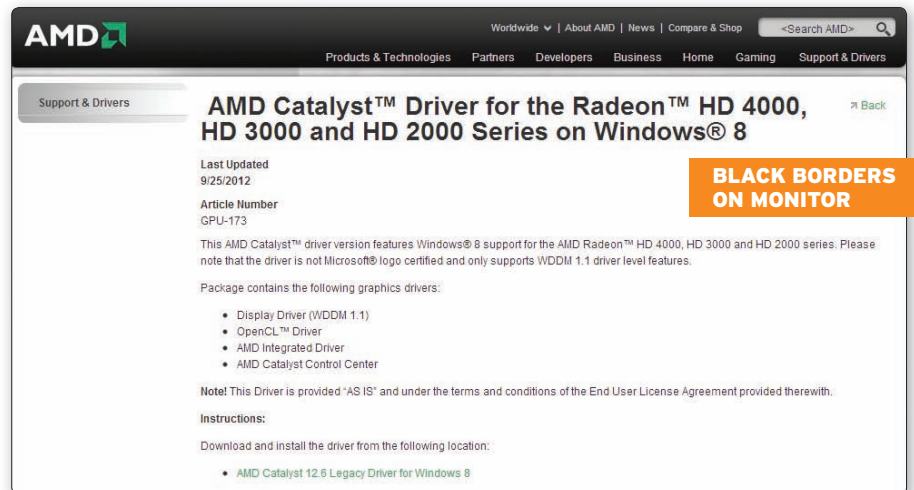
**Q** I followed your instructions in the previous issue for removing the black border around the edge of my desktop when using my AMD Radeon HD 4000 graphics card, but I've now upgraded to Windows 8 and the Catalyst driver doesn't run on the new operating system. The built-in Microsoft driver works, but doesn't give me the option to adjust the overlay. What can I do?

AMD has more recently made available a legacy driver for Windows 8, which will enable the Catalyst Control Center and allow the overscan setting on older graphics cards to be adjusted. You can download it from [tinyurl.com/d4znggj](http://tinyurl.com/d4znggj).

### UPDATING AN OLD SATNAV

**Q** I bought an old Navigon PNA Transonic 6000 from a charity shop and would like to update its maps, but the manufacturer no longer supports the device. I found and downloaded a UK map file, but the satnav won't read it. I suspect this is because its software is out of date. I think I've found a newer version of the software on torrent sites, but any help you can give me on installing it will be a bonus.

The PNA 6000 won't work with the latest map file because it's based on WindowsCE 4.2 and MobileNavigator 5, whereas the current software uses WindowsCE 5 and MobileNavigator 7. The latest version you can use is MobileNavigator 6, but we weren't able to find a legitimate site from which you can download it. We recommend contacting the manufacturer to see whether it can help.



### MEDIA STREAMER WITH HDD

**Q** My father wants to buy a media streamer such as the WD TV Live Hub, but he also wants to be able to store all his media on his home network. Is there a single device that provides both these functions, which isn't more expensive than the price of buying two separate devices?

Being a manufacturer of hard drives, Western Digital is well placed to produce such a combination device, so you'll be pleased to know that a version of the WD TV Live is available with a built-in 1TB drive for media storage.

### ENCRYPTING A FILE IN XP

**Q** I'm running Windows XP on my computer. I wish to password-protect some of my documents, but I can't find how to do so in the help files. Can you give me some guidance?

How you achieve this will depend on which version of Windows XP you're using. If you're running Windows XP Professional then you can use the built-in file-encryption function. Be aware, though, that this is designed to protect your files from access by other users' accounts on the system. If all users are signing in under the same account, this method won't afford any protection.

In Windows Explorer, right-click the file or folder you want to protect and select Properties. Now click on Advanced and select 'Encrypt contents to secure data'.

Windows XP Home doesn't have this option by default, but you can enable it with the TweakUI utility, available from Microsoft at [tinyurl.com/bmqjunix](http://tinyurl.com/bmqjunix).

In TweakUI, go to the Explorer section and select 'Show Encrypt on context menu' to enable the Encrypt function.

In Windows XP Home, you can right-click the folder you want to encrypt, select Properties, choose the Sharing tab, and click 'Make this folder private'.

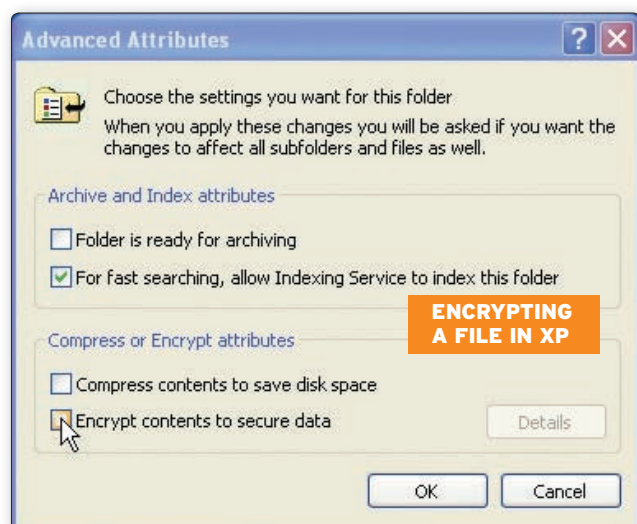
This option works only for folders in your personal folder (C:\Documents and Settings\[Your user name]\ where C is the drive containing the Windows system). You can read more about encrypting files in Windows XP at [tinyurl.com/6s9udc](http://tinyurl.com/6s9udc).

Note that these methods require you to be using the NTFS file system rather than FAT32, and that decryption is tied to an Encrypting File System (EFS) certificate stored elsewhere in the system. If these keys

### MEDIA STREAMER WITH HDD







become lost or deleted, you won't be able to access your encrypted files. To back up your EFS certificate, you can follow the instructions given at [tinyurl.com/d24ffzw](http://tinyurl.com/d24ffzw).

To password-protect individual files in such a way that even the file owner must enter a password to access them, you will require some third-party encryption software, of which numerous examples are available.

Depending on the types of files you wish to encrypt, you may like to use a simple compression utility to compress your folder

and apply to it a password. A good example of this is WinRAR. If it's textual data you wish to protect, you could save it in a format such as Microsoft Word, which supports its own password protection.

Taking Word as an example, you could paste your information into a document and then save it with password-protection enabled. The exact steps may vary depending on what version you're

using; typically, you should select Save As, then click the Tools option in the resulting dialog box. Next, choose General options, and you'll find an option that will let you specify a password that will be required to read the file. Optionally, a password can also be required to make changes to the file.

## WASHED-OUT GRAPHICS

**Q** I recently began using an HDMI rather than DVI cable to connect my monitor to my PC, which allows me to

use its built-in speakers. However, I've found that the picture quality is reduced and graphics appear washed out. I tried using a different HDMI cable, but the results were the same. Can you help?

We suspect you're probably using an nVidia graphics card in your PC. These treat HDMI and DVI connections differently, and make assumptions about what sort of device you're connecting them to.

In this case, nVidia will be assuming that you're connecting your PC to a TV rather than a PC monitor (as would be the case with a DVI connection), and is therefore applying a different set of default values for the black and maximum brightness levels. An HDMI connection with HDMI audio enabled seems to be the trigger for this.

This issue can be difficult to fix, depending on your exact hardware setup. However, some users have reported that using a DVI-to-HDMI adaptor on that port (if their card supports audio via the DVI port) will allow HDMI audio plus the correct brightness levels.

If this doesn't work, you can try (at your own risk) a handy utility that lets you toggle between full- and limited-range TV output when using an HDMI connection with an nVidia card. Get it from [tinyurl.com/cuuukbu](http://tinyurl.com/cuuukbu).

## DUAL-BOOT WINDOWS 7 AND 8

If you want to run Windows 8, but you'd rather hang on to your existing Windows 7 installation, it's relatively easy to install both operating systems on your PC with the option to select between them at boot time.

Note that you'll need to purchase a full version of Windows 8, rather than the cheaper upgrade option, to do this.

A good place to start is with the Windows 8 Upgrade Assistant ([tinyurl.com/adj4Lma](http://tinyurl.com/adj4Lma)), which will check your PC for compatibility before you commit to buying the new OS. It also gives you the option to purchase Windows 8 directly as a download, and the

ability to create a bootable USB flash drive or DVD from which you can install it.

Having bought and downloaded the full version of Windows 8, and created your bootable installation medium, you can prepare your hard drive to accommodate the additional

operating system. To do this you will need at least 20GB of free storage space; in fact, we recommend you have substantially more available – perhaps 10 times this amount.

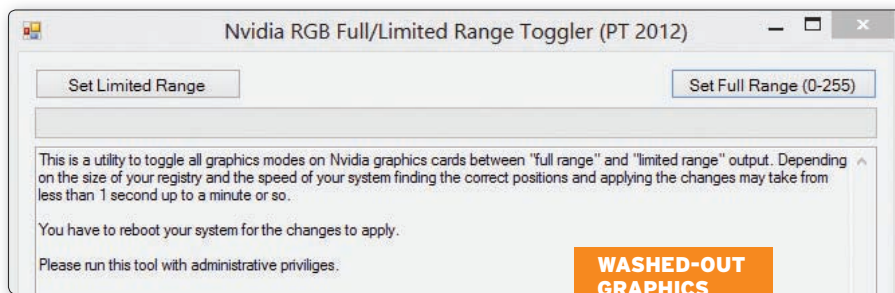
You will now need to shrink your system volume to make space for a Windows 8 partition. Go to the Control Panel, then open Administrative Tools, Computer Management, Disk Management. Right-click the drive on which you wish to install Windows 8, then select Shrink volume. You should now enter an amount by which you wish to shrink the volume – at least 20GB.

Having set up your hard drive partition, you can now boot your installation media to begin the installation process. Specify that you want to make a custom install, then select your newly created partition as the installation location for Windows 8.

Once the installation is complete, Windows will allow you to choose between Windows 7 and Windows 8 at boot time.







## I NEED AN XP LAPTOP

**Q** I need to buy a Windows XP laptop, preferably a new one, so I can run a specific embroidery program and, on occasion, connect to the laptop my sewing machine. This isn't possible in Windows 7 or 8. Can you help me find a suitable laptop, please?

No doubt you are having trouble finding a new laptop running Windows XP, although some refurbished models can be found if you search for 'Windows XP laptops' in Google. For example, you'll find some advertised at Amazon.co.uk for around £120. As to which is best, this will depend on your personal requirements more than anything else, and be determined by the performance potential, size, portability and battery life. Of course, although new to you, these aren't technically new laptops.

The alternative is to buy a new laptop, and either make use of Windows XP Mode to run your legacy software (although there's no guarantee these models will also support

your sewing machine), or downgrade to XP. The problem you'll find with the latter suggestion is that, although the OS will be compatible with modern laptops, many will run into difficulties where older drivers are not available for the newer hardware.

Newer hardware often doesn't work too well with XP, which is unable to access all the installed memory and may have problems coping with a modern hard drive. You may also need to make some changes to the Bios settings, for example changing the SATA drive mode from ACHI to Compatibility Mode, to enable XP to work.

For this reason, we wouldn't recommend spending a significant amount of money on a brand-new laptop, which has features and hardware you won't be able to enjoy under XP. When choosing a model, look at laptop manufacturer's support site for the presence of XP-specific software downloads; if these are available, you can reasonably expect that XP will run on that model.

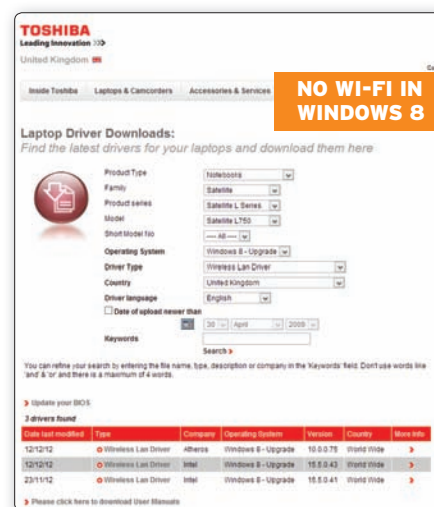
Another thing to take into account is the cost of an XP licence, which you will need to be comfortable with installing yourself.

## NO WI-FI IN WINDOWS 8

**Q** I've just upgraded to Windows 8 on my Toshiba Satellite L750. However, I now have a problem: Toshiba said my laptop was ready for the OS, but following its installation the Wi-Fi no longer works. I suspect that the driver doesn't support Windows 8, and Toshiba was unable to provide me with a newer version.

These may, of course, have been added since your conversation with Toshiba, but there are in fact Wi-Fi drivers available for your laptop on Toshiba's support site. However, two types of driver are offered - one for an Atheros wireless adaptor, and another for an Intel model. You will need to ensure you install the correct version for your specific model's specification. If you can't easily find out which adaptor is installed, it won't hurt to try both and stick with the one that solves your problem.

You'll find the driver download page at [tinyurl.com/3my86y](http://tinyurl.com/3my86y). Select your laptop specifics from the drop-down menus, and be sure to select 'Windows 8 - upgrade' as the required operating system.



## WHICH BUDGET GRAPHICS CARD?

**Q** My grandson has a Dell Inspiron 530 with an ATI Radeon HD 2600 XT graphics card. This is fine for normal use, but the graphics card struggles with some of the games he plays, often producing blocky images. He is anxious to upgrade this component but, at 14, he can't afford to spend too much. Can you suggest some sub-£100 graphic cards that will solve his problem?

Without knowing which games your grandson plays and the resolution of his monitor, it's difficult to say which card he should choose to enable smooth gaming framerates. However, with a £100 budget, this is certainly possible. Just how much of a boost he can get will depend not only on the





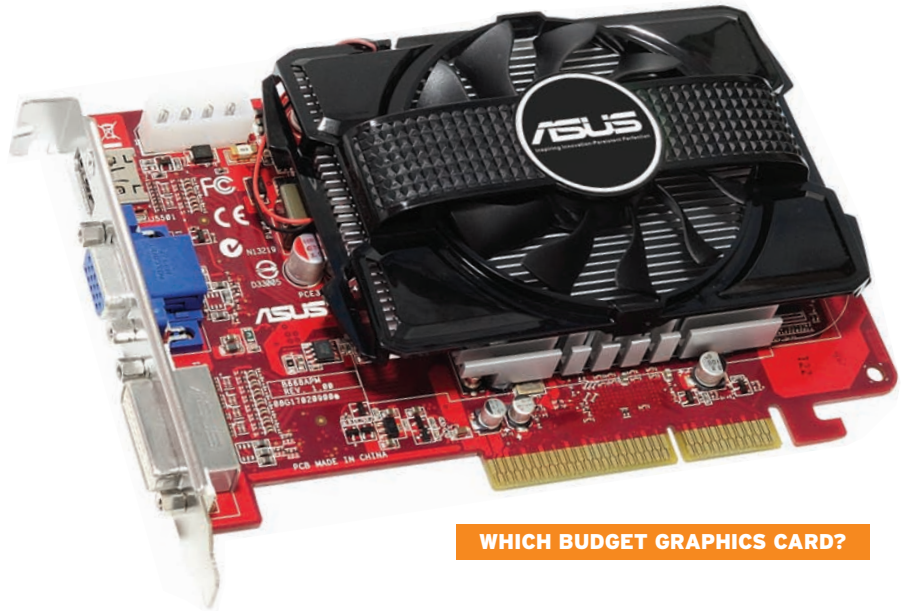
graphics card, but on whether or not he's willing to also upgrade the PC's 300W PSU.

Assuming that he will keep the existing PSU, we'd recommend that he tries something like the AMD Radon HD 4650 or, at a push, and depending on what other power-hungry components might be installed in the system, a Radeon HD 4670.

You should be able to find a Radeon HD 4650 for less than £50, while the Radeon HD 4670 costs just over this amount. The latter should deliver around twice the performance of the Radeon HD 2600 XT graphics card currently installed in his PC, and also add some extra features.

A new PSU would certainly be required to push the system any further beyond this. Fortunately, a replacement model will be relatively easy to find, since the 530 uses a standard AT-X PSU. You will simply need to ensure that the PSU is rated up to 500W and has a six-pin PCI Express connector.

Replacing a PSU isn't difficult, but it does require more effort than swapping in a new graphics card because you will have to disconnect and reconnect several cables wired throughout the system. It's advisable that, for either upgrade, you or another adult are present to ensure he takes the necessary safety precautions. Instructions for replacing the PSU on the Inspiron 530 can be found at [tinyurl.com/mn87nw](http://tinyurl.com/mn87nw).



#### WHICH BUDGET GRAPHICS CARD?

Having replaced the PSU, he'll be able to fit a faster graphics card than the HD 4650 or 4670 we recommended earlier. We'd suggest looking to the Radeon HD 6850, which offers at least double the speed of the 4670, and can be found online for just under £100. Combined with the price of the PSU this will push him over budget, so it's important he decides whether he's likely to want more power later. See our budget graphics card reviews at [tinyurl.com/bL8s3sx](http://tinyurl.com/bL8s3sx).

#### SSD CONFUSION

**Q** Looking at the PC performance results in your reviews, it seems I really need an SSD to get the best from my system. There are so many different specs to compare. Can you help me choose a model, please?

An SSD will almost certainly deliver a very noticeable improvement in your PC's performance, not just when copying

[Continues >>](#)

## TECH JARGON BUSTER

**MHL:** Mobile High-Definition Link is a standard for connecting mobile and portable devices to HD displays such as TVs and monitors. Like HDMI, it uses a single cable to transmit 1080p HD video and up to 7.1 surround audio, but it also adds the capability to power and charge the mobile device.

MHL commonly uses a micro USB connection at one end and an HDMI connector at the other, although others can be used as no specific physical connectors are mandated by the standard. This sometimes leads to incompatibility, as is the case with Samsung's Galaxy S II and Galaxy S III phones, which require different MHL cables to work.

**Wireless charging:** Also known as 'inductive charging', wireless charging uses magnetism to charge a battery without a cabled connection between the charger and the device. It works by creating a magnetic field in a coil located in the charger, which then induces a similar field in a coil in the device and is converted into power. A newer technique called 'resonance charging' also uses a pair of coils, but can operate over a distance of a few centimetres rather than requiring physical contact.

**Resolution:** In terms of displays, the screen resolution is a measure of the amount of detail which can be shown.

Either in terms of the absolute number of pixels in an image, such as 1920x1080 or in terms of the number of pixels contained within a certain area - often expressed as pixels per inch (ppi). Apple's Retina displays offer a resolution high enough to exceed the resolution of the human visual system, thereby rendering individual pixels invisible and making screen elements appear smooth rather than blocky.

**Multitouch:** A touch-input system that supports multitouch is capable of detecting a touch from more than one figure at a time, enabling features such as pinch-to-zoom and gestures that involve swipes.





SSD CONFUSION

files around, but also in general responsiveness and boot times.

Almost any SSD will deliver a sizeable boost, but choosing the right SSD for you will come down to compatibility with your PC's motherboard and your budget.

First, you should consider the available interfaces on your motherboard. Most recent SSDs support SATA 3, which runs at a maximum speed of 6 gigabits per second (Gbps). However, if your motherboard doesn't support SATA 3, you can buy a less expensive (and slower) SSD designed for the SATA 2 interface, which is capped at 3Gbps. This would also enable you to spend some of your budget on getting more storage space.

Some motherboards also have slots for mSATA SSDs, which plug straight in like a standard memory chip. The advantage of these is that they are simple to install and don't require a drive bay. A disadvantage

could be that if you decide to upgrade your PC or motherboard you may no longer have access to an mSATA slot.

The capacity you require will depend on how you intend to use the drive. If you intend to install Windows directly on to the SSD and boot from it, we'd suggest 120GB as a minimum. You can certainly install Windows on a smaller drive, but over time it will fill up as files are often by default installed on the system volume.

If your motherboard supports Intel Smart Response Technology you can select a lower-capacity SSD (up to 64GB), then add it to your system as a cache volume. This increases the performance of your existing hard disk. It won't give as great a performance boost, but it's a lower-cost option that comes with the added benefit that you won't need to reinstall Windows or copy any files from one drive to another. ☒

## CONTACT US



Email your Helproom questions to [helproom@pcadvisor.co.uk](mailto:helproom@pcadvisor.co.uk). Please use 'Helproom' as the subject header and give your full name, the operating system you're using and other product details. We will let you know by email if your query has been selected for inclusion in these pages. If your query is urgent, you may find it useful to visit our forum at [pcadvisor.co.uk/helproom](http://pcadvisor.co.uk/helproom).

Helproom aims to give you the best assistance possible. But, given the

limitations of this type of advice, we can't guarantee what we say will work and we can't accept responsibility for any damage arising as a result.

Always back up your system before you make any changes, including software installations.

Please note that we are unable to respond to letters or telephone requests, but we will endeavour to answer queries submitted by email or via our Helproom forum.

For more PC help go to:  
[pcadvisor.co.uk/helproom](http://pcadvisor.co.uk/helproom)



SEARCH THE  
PC ADVISOR FREE  
ONLINE HELPROOM

The *PC Advisor* online Helproom contains an indispensable database of answers to common questions regarding all aspects of PC problems. This ranges from general Windows issues to problems with specific apps, and covers all types of PC hardware and software, including system components and peripherals.

Alternatively, you can ask for help from the experts on our online forums. Sign up to be a registered user - which is free - and then browse to one of the discussion forums. In the Helproom your first stop should be the searchable database of frequently asked and previously answered queries. With more than 1.5 million forum posts, you'll almost certainly find your answer in this archive of queries - just enter a few keywords.

If our online database can't solve your problem, try posting a question in the Helproom forum, where more than 200 queries are answered every day. The forum is manned by our team of Helproom Angels, who are ready and willing to lend a hand with anything from system crashes to virus alerts.

[helproom@pcadvisor.co.uk](mailto:helproom@pcadvisor.co.uk)  
[pcadvisor.co.uk/helproom](http://pcadvisor.co.uk/helproom)



# THE ULTIMATE BUYERS' GUIDE TO THE BEST TABLETS

ALL NEW  
2013  
EDITION

**TabletWorld**  
NEW FOR 2013 • EVERY TABLET TESTED

100  
Pages  
of expert  
advice



- 🍏 Best full-size, mini and kids' tablets tested
- 🌿 Android vs iOS vs Windows 8 tablets
- 📺 Includes 10 video reviews: iPad, Nexus & more

IDG | UNITED KINGDOM

iPad 4 | Nexus 10 | Surface RT | Galaxy Tab 2 10.1 | iPad mini | Nexus 7 | Kindle Fire HD | Nook HD



Available in digital format via Apple Newsstand & Zinio





# Organise your digital photo collection



Rosemary Hattersley explains how to create a photo workflow that allows you to easily find your snaps, and perform some quick fixes on those that need attention



If you're anything like us, the number of photos you take has probably multiplied since you got a digital camera or a smartphone with a decent built-in camera. But our busy lives leave little time for sorting everything into folders, weeding out the bad shots, sharing the good ones with our friends and family, and even printing out our favourites for displaying on the wall or in a frame.

Depending on how trigger-happy you are, you could have thousands of photos through which to sift. Identifying the keepers from the so-so snaps is an arduous task, but necessary if you want to be able to show off some of the most memorable moments. A curated set of photos summarising the past year could also lend itself to becoming a personalised calendar or photo album.

To make manageable this potentially mammoth task, we've called on the services of some invaluable photo-organising and -editing software. Our aim here is to

show you how to create a workflow that allows you to organise your photos, tagging them to make them easy to find in the future, as well as performing quick fixes on those that need attention.

Once you're in the habit of tagging and sorting photos, it should become second nature.

You'll find useful media organisers in Adobe Photoshop Elements and the free Google Picasa, but the editing tools in the latter are basic. Nonetheless, it's a good choice if you don't want to spend any money. We will also look at how to manually rename batches of folders and photos, and apply crucial edits to bring your shots up to scratch.

For more rigorous editing options - and some slick organisational tools - we've chosen CyberLink PhotoDirector 4.0 Ultra. It has many tools geared toward organising and labelling your photo library, and a powerful image editor that can bring out the best in your portrait and landscape shots.

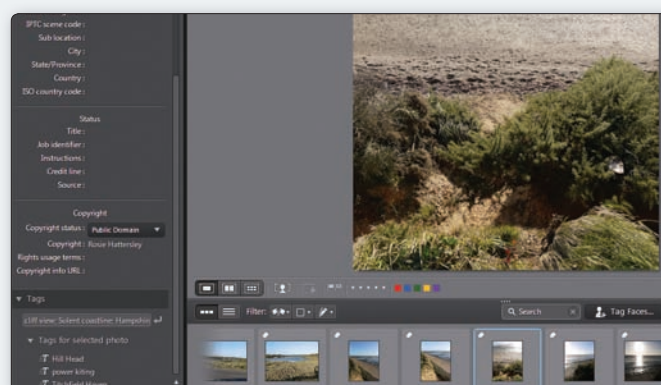
## ORGANISE YOUR PHOTOS WITH CYBERLINK PHOTODIRECTOR



**START** Use the Import menu to browse to a folder, select a photo or import shots directly from your camera. A preview pane displays thumbnails of those selected. Windows will automatically import photos if you click this option in AutoPlay.

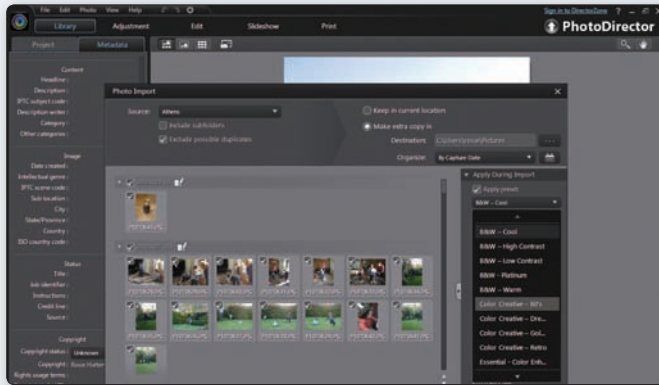


**4** Once imported, images appear as scrollable thumbnails along the bottom of the screen. Click on an image to have it appear in the middle of the screen, where you can make adjustments. Right-click within an image to assign it a star rating or label.

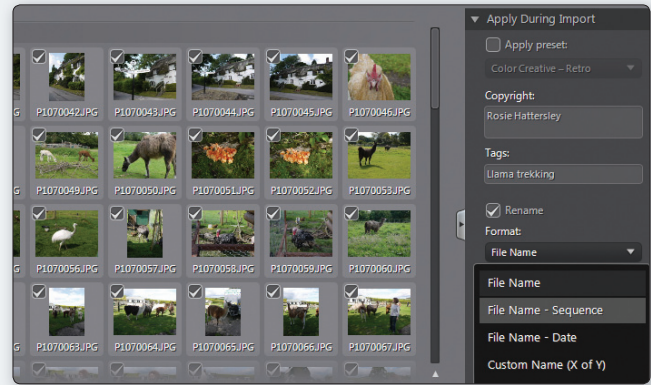


**7** You can add tags such as location, extra people in the photo and any copyright restrictions by clicking on the Metadata tab. At the bottom you'll see any tags that are associated with the photo, plus a drop-down list of tags relating to other photos in the batch.

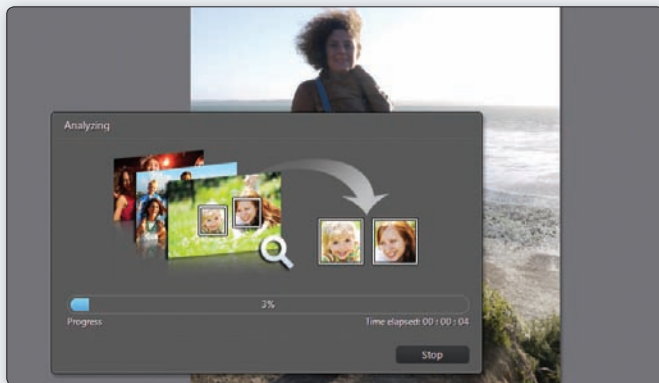




**2** Deselect any photos in a folder you don't require. Images are arranged by date, so you can select or deselect photos from a particular day with a single click. Once imported, you can delete images from PhotoDirector without deleting them elsewhere.



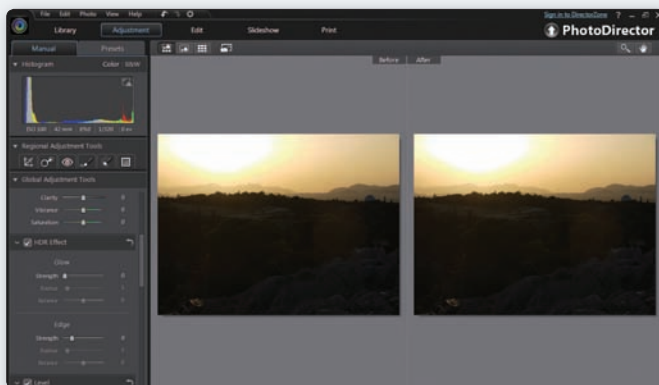
**3** To the right of the Import screen are options to add copyright details, tags and other information to your photos. You can also batch-rename or -edit your photos. This is ideal if you want to produce a black-and-white photo album, for example.



**5** The Tag Faces feature analyses the photo library, asks you to name each person, then automatically recognises them thereafter. Now you can filter your library to show only shots of your mum or your brother, for example.



**6** You might find it useful to give photos a coloured label, making them easier to find for showing to a friend or editing later. This way you can quickly work through a whole photo album without getting bogged down in editing.



**8** Useful edits include boosting the contrast and adding HDR effects. To see the effect of such changes, click the two-pane layout view just below the main PhotoDirector editing screen. You can now see before and after versions of your photos.



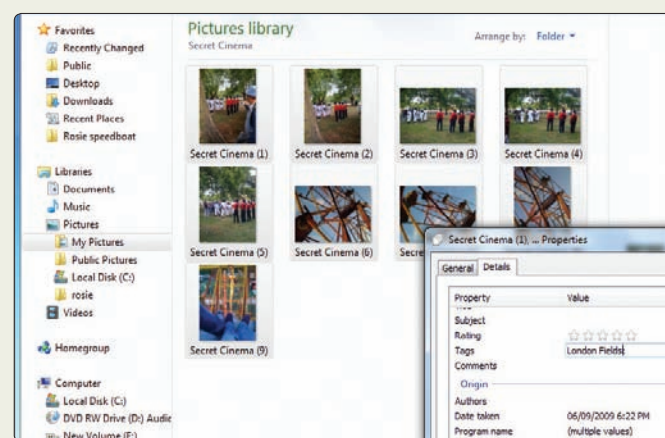
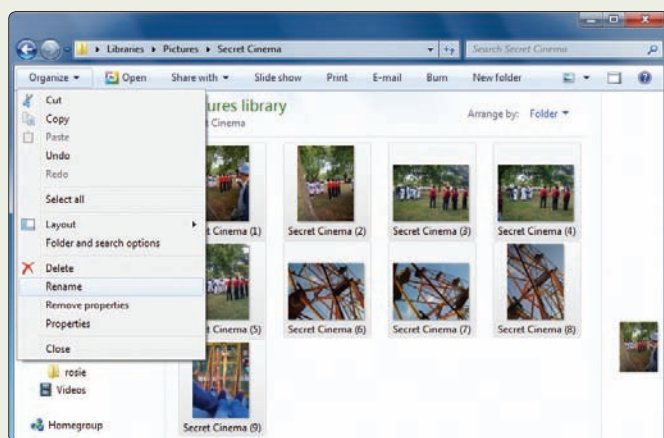
**9** You can directly share your images with Flickr; there's also an Export option. Tagged and star-rated items come into their own, since you can automatically publish those. Be sure you've added a watermark or copyright protection first. ☒



## ORGANISE & EDIT YOUR PHOTOS FOR FREE: WINDOWS 7

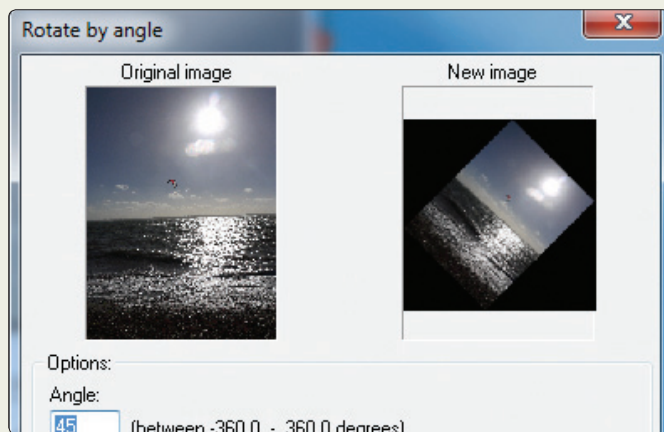
It's possible to organise your photos in Windows 7 using its built-in tools and a couple of free utilities. As a first step to getting to grips with your burgeoning photo collection, we recommend naming

each folder of photos if you haven't already done so. Select a folder, press F2 and type in something more memorable than Windows' auto-assigned name.

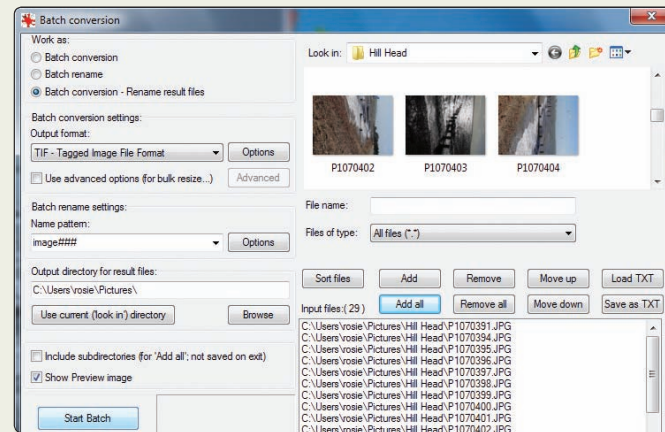


**START** To batch-rename photos simply select all and choose Rename in the Organize menu (File menu in Windows 8). Type in a name for the first photo, press Enter and Windows will rename and number all the photos in sequence.

**2** Again select all your photos, but this time right-click and choose Properties, Details. Click in the area to the right of a listing to enter a tag or other information in the now-active field. You can also edit the already associated tags in Windows 7.



**3** If your needs extend to resizing and grouping images in a particular manner, download IrfanView ([tinyurl.com/d2rx6jq](http://tinyurl.com/d2rx6jq)). In the Edit menu you'll find options for fine-tuning the orientation. Just enter a value to rotate the image that number of degrees.



**4** You can also batch-convert file formats for various uses. Use the File, Batch Conversion/Rename menu, ensuring that you elect to create copies of your files rather than overwriting them. Click Add All and specify a destination folder. ☒

## RESCUE BLURRY PHOTOS

How many well-composed photos have you consigned to the Recycle Bin because they're blurred? Unintended action shots have always been something that even the most powerful photo editors are unable to fix. Adobe has been working on this issue for some time

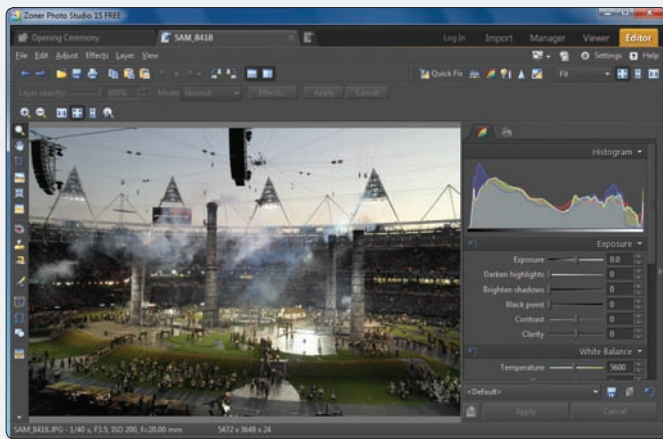
and hopes to build a fix into the next versions of Photoshop and Photoshop Elements. Meanwhile, if you're patient enough to allow it to work its magic, the free Smart DeBlur tool ([tinyurl.com/dypkLg](http://tinyurl.com/dypkLg)) aims to salvage images that are out of focus or blurred by movement.



## ORGANISE & EDIT YOUR PHOTOS FOR FREE: ZONER PHOTO STUDIO

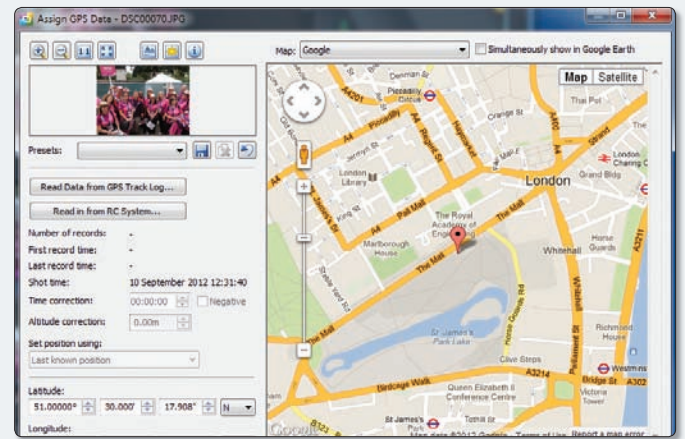
If you're after a good free photo-editing application, Zoner Photo Studio 15.0 is a strong contender. You can get a 10-day trial of all its features, including batch-editing and high dynamic range (HDR),

or a 30-day trial of its standard version. We found plenty of use in the Free version, which you can select once installed. Head to [free.zoner.com](http://free.zoner.com) to download the software.



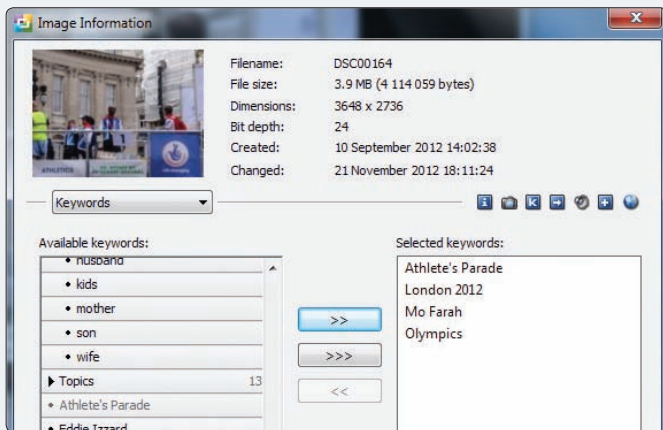
**START**

Zoner scans your hard drive for photos and serves up a folder for easy browsing. The Editor tab offers comprehensive editing tools, and you can simultaneously add information to multiple shots using the Properties, Details tab.



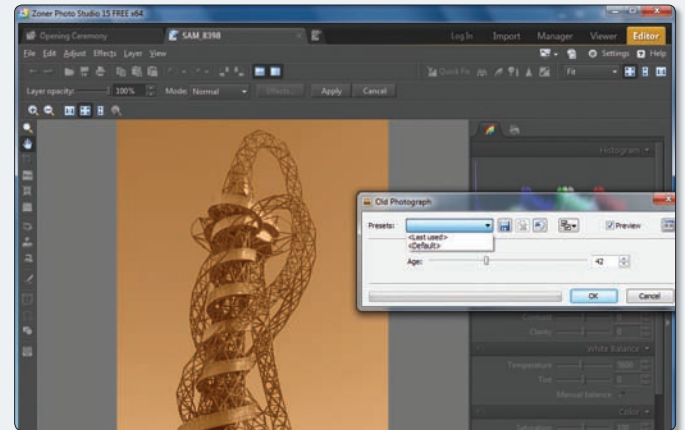
**2**

Photos captured by location-aware devices reveal this information in Information, GPS, 'Show GPS Information'. You can add this detail using 'Assign GPS Information', and batch apply that information to several photos taken at the same place.



**3**

Right-click an image and choose Properties to assign keywords. Zoner has fields for People, Events and Topics. To bring up photos of an event or a particular person, use the Filter or Search options in the menu at the top of the screen.



**4**

It's a cinch to apply the same effect to a series of images. In Editor view click Effects, then select an effect. When you open the next image to edit, use the same menu and Zoner will use the 'last used' setting and apply it to successive shots. ☒

## ALTERNATIVE SOFTWARE

We like Phototheca's iPhoto-like import and organisational setup. When you import folders of photos, the first image automatically becomes the identifying thumbnail. To change this, click on your preferred photo and choose Events, 'Set Cover Photo'.

Folders of photos can be subdivided into events, and you can flag images that are to be associated with an event. Phototheca also creates a new event each time you import a group of images. A Duplicates feature helps you root out copies of images.



# Restore old photos



Mike Bedford explains how to use a photo-editing application to clean up and generally improve your scanned photos and negatives



If you've been inspired by our *Digitise your life* feature (page 80) to bring your old photos and negatives into the digital age, you may have already begun scanning various snaps. After all, scanners have never offered better value for money: for less than £100 you can buy a model that's able to reproduce negatives, slides and prints at up to 4800dpi. But however good your scanner's quality, the results won't look great if your source material is in a poor state.

Chances are time has already taken its toll on your precious pictures. Although digitising them now will prevent further deterioration, the act in itself will not restore their former quality. The good news, though, is that a digital photograph is much easier to restore than its analogue counterpart.

In the following workshop, we explain how to reverse the most common types of damage that occurs to photos. In the main, photographic

prints, negatives and slides degrade in three ways. First, they pick up dirt in the form of dust, hairs and even coffee stains. Second, they suffer physical damage, such as scratches, creases and tears. And third, they degrade chemically, which can result in fading or discolouration.

Some of this damage can and should be repaired before the photo or negative is scanned, leaving fewer digital alterations to be required. See *Film care and repair* (right) for some useful tips.

Scanners are typically bundled with dedicated software that can go some way to help restore damaged photos. You might also find similar software bundled with your digital camera.

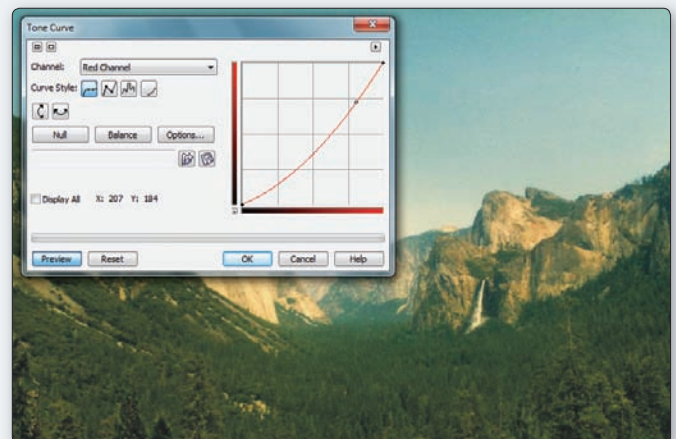
Alternatively, you can use a third-party photo editor. We've used Corel Photo-Paint ([tinyurl.com/8kya932](http://tinyurl.com/8kya932)), but any reasonably well-equipped photo editor will include largely similar functionality and should do the trick. For a free alternative, try [pixlr.com](http://pixlr.com).

## GET THE BEST RESULTS FROM NEGATIVE AND PHOTO SCANS



**START**

Marks on the original photo will appear on your scan as black or white lines and dots. You can overwrite these pixels using the Clone tool, which copies pixels from one area of a photo to another. Use transparency or feathering to avoid a hard edge.



**4**

Ramping up the colour saturation can tackle fading, but you may see a colour cast where some colours have faded faster than others. An automatic colour correction tool may be effective, or you can manually adjust each colour channel.

## FILM CARE AND REPAIR

Although photo editing can work wonders for damaged photos, it pays to do as much as you can to repair any damage to your photographs before scanning them. If they're dirty, it's far easier and more effective to physically remove dust and hairs than edit them out later. Be careful that you don't scratch the photo, though. Use a very soft brush, ideally of the type that also includes an air blower. Better still, use a compressed air aerosol. Both are available from [hama.co.uk](http://hama.co.uk) or from high-street photographic shops.

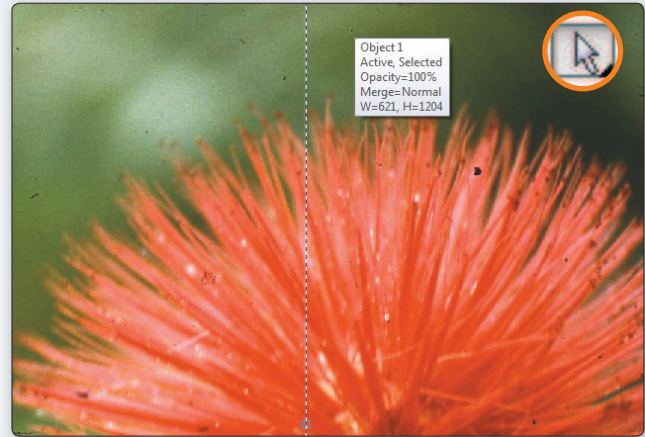
Stains caused by liquid are more difficult to remove without causing more damage, since they need to be wiped or washed off.



## Tech Help



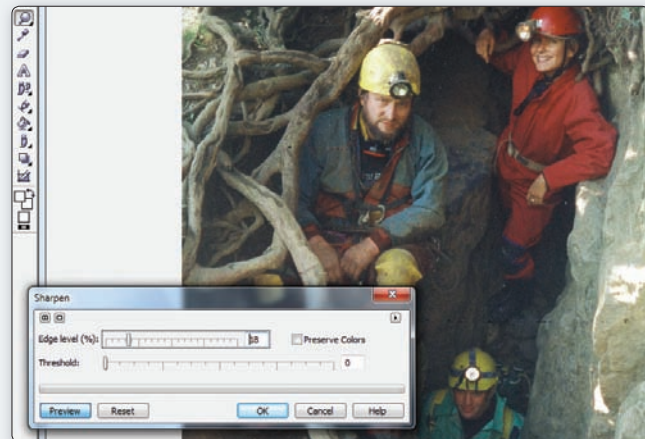
**2** Using the Clone tool to remove a long, but very thin scratch can be time-consuming. Since this type of scratch is usually parallel to one edge of the photo, there is an easier method. First select the area of the photo immediately to one side of the scratch.



**3** Copy your selection and paste it on to a separate layer. Gently nudge the layer enough that it conceals the scratch, but doesn't obviously alter the image. Merge the layers, then use the Crop tool to delete the small repeated strip at the image edge.



**5** Even if an old photo's contrast was good to start with, this can also degrade over time. If you feel your photo lacks impact, consider increasing the contrast – just don't overdo it. Often this is bundled with a tool for adjusting the brightness.



**6** Increasing the sharpness won't add missing detail, but your photo will look crisper. Again, don't overdo it or the photo will look grainy. Your image editor probably has several modes of sharpening – use the Unsharp Mask tool if one is present. ☒

The best course of action if the photo in question holds significant value to you is to seek professional help on removing the stain.

If a negative or slide is torn, the best you can do is ensure that it lies as flat as possible during the scanning process. For torn photos, apply some tape to the rear of the print to hold it together.

After cleaning, repairing and scanning your photos, consider their ongoing care. We doubt you'll want to throw them away and, if you later invest in a better-quality scanner, you may wish to rescan your snaps. It's important that further deterioration is prevented. The number-one rule is to store your photos in the dark to prevent fading. High temperatures should also be avoided.

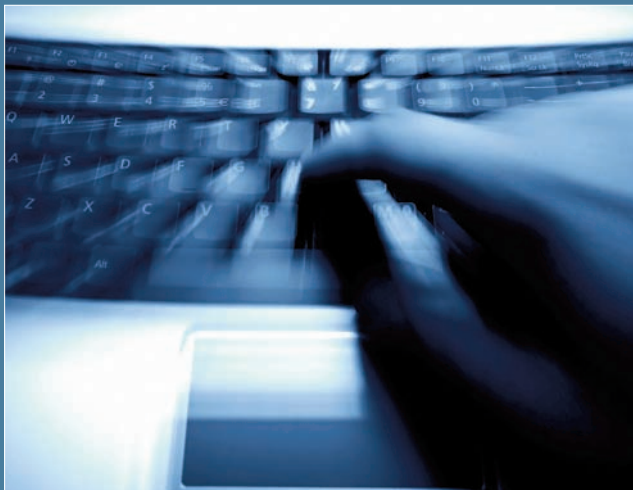




# Utilise spare RAM for a quick speed boost



A RAM disk is faster than a traditional hard-disk drive. Roland Waddilove explains how you can use your PC's memory to speed up your browser and other apps



How would you like a faster, more reliable PC for free? Of course you would. The trick is to use a RAM disk. In other words, you use your system memory as a hard drive.

Whether your PC has a traditional hard disk (HDD) or a solid-state drive (SSD), you can benefit from a RAM disk.

An HDD uses a mechanical arm to read or write to the magnetic coating of a rapidly spinning disk. Although modern HDDs are faster than ever, the process remains significantly slower than reading and writing to the computer's memory.

Software isn't run directly from the HDD on which it's stored. Rather, it's transferred to memory (RAM), which is much, much faster, but erased when the PC is switched off.

If you have a generous amount of RAM installed inside your PC – some of the systems we test have as much as 16GB – then part of this can be used as a disk drive. It will appear to Windows as a standard HDD, but it'll be much faster.

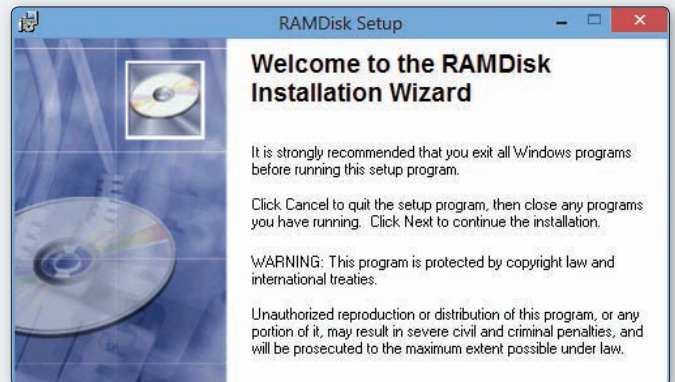
One use for a RAM disk is to store the temporary files created by your browser as you surf the web, thus speeding up page-load times. If you have a large enough RAM disk, you can also store complete applications.

Portable apps, software that's designed to run from USB memory sticks, are ideal candidates. Many portable apps are available, including LibreOffice, Google Chrome and Mozilla Firefox. For a guide on using portable apps head to [tinyurl.com/c6utk8k](http://tinyurl.com/c6utk8k).

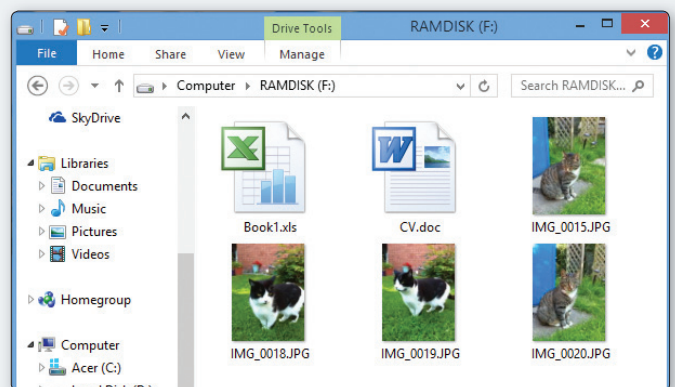
SSDs are 10 or even 20 times faster than HDDs, and offer a great performance boost. However, flash memory can be written to only a certain number of times before it wears out. Add into the mix a RAM disk and you'll extend the life of your SSD, increasing its reliability.

In the following tutorial we explain how to create a 1GB RAM disk on a PC fitted with 4GB of memory. Larger-capacity RAM disks are possible, should you have more memory to spare.

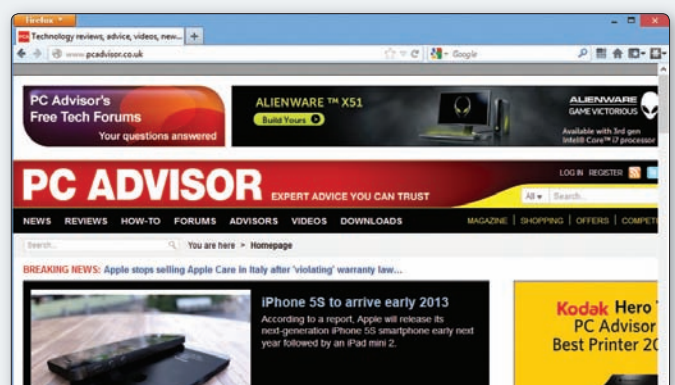
## CREATE AND USE A RAM DISK



**START** Head to [tinyurl.com/ydb4z49](http://tinyurl.com/ydb4z49) to download and install the free version of RAMDisk. Locate the resulting file in your Downloads folder, then run the Dataram\_RAMDisk program. Installation is straightforward: simply follow the prompts.

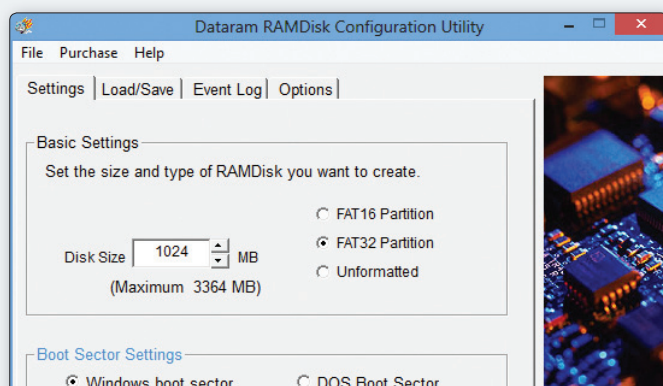


**4** Your RAM disk will appear as a standard HDD within Windows. Double-click its icon to launch an Explorer window and add or browse files. Although files stored in memory are usually deleted at Shutdown, files stored on your RAM disk will be saved for later use.

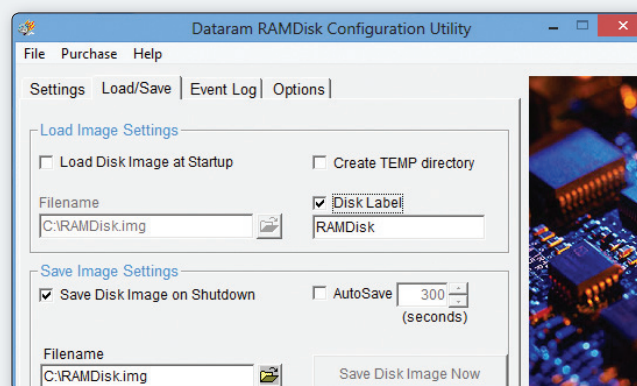


**7** Quit Firefox. The next time you launch the browser you should find it runs a little faster, since it will automatically access the RAM disk. To stop this behaviour, enter in the browser `about:config`, right-click the value you created and select Reset.

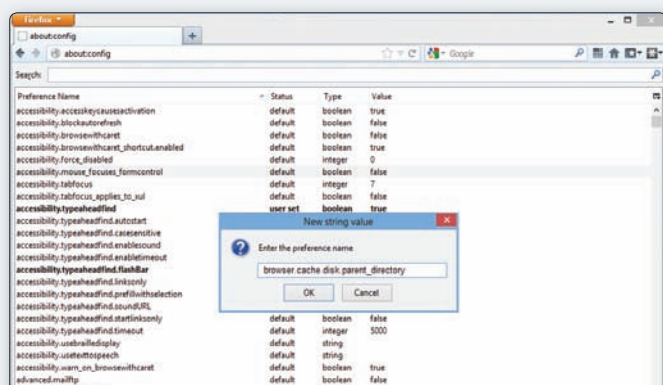




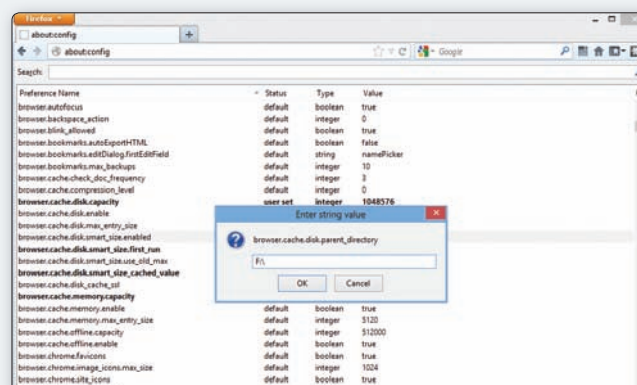
**2** Find the Dataram RAMDisk Configuration Utility in the Start menu. You can use this app to configure the size and other parameters of your RAM disk. Enter a capacity in megabytes, leaving at least 2GB (2000MB) for Windows. Select the FAT32 Partition.



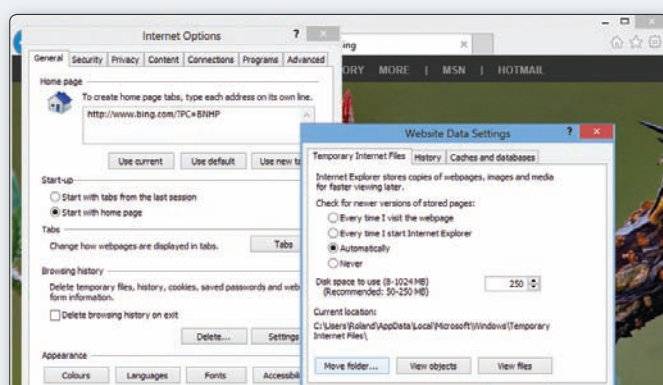
**3** Open the Load/Save tab and enable 'Save Disk Image on Shutdown'. Hit Start RAMDisk, then click through the messages that appear. Wait a minute, then click Stop RAMDisk. Enable 'Load Disk Image at Startup' and it's ready to use.



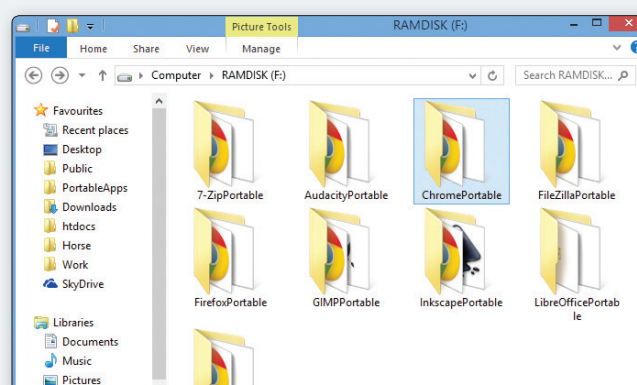
**5** Now we can set up Firefox to use the RAM disk. Launch the browser and enter into the Awesome bar (URL field) `about:config`. Click through any warning messages to reveal a list of settings. Right-click within them and select New, String Value.




**6** Enter `browser.cache.disk.parent_directory` for the name, and you'll then be prompted to enter the value. This should be the drive letter that RAMDisk uses on your computer, as visible in Explorer. In our case, the value must be F.



**8** This process is even easier if you use Internet Explorer. Open the browser, then select the gear icon and choose Internet Options. Click Settings under Browsing history. Click Move Folder, then select the RAM disk or the folder to use on the RAM disk.



**9** Some programs are available as portable versions that can be installed anywhere, such as on a USB flash memory drive. You could also put them on the RAM disk so they run faster. You'll find a useful collection at [portableapps.com](http://portableapps.com). 



# Store and stream music in the cloud



Google Music has finally opened its doors to a UK audience, letting you access your favourite music anytime, anywhere. Marie Brewis explains how to get started



Google offers services for just about everything you can think of, from mapping and webmail to cloud storage and online video, but one thing that's been missing – for UK and European users, at least – is a music-streaming service. Until now, that is. Google Music opened its doors to the UK and EU in mid-November.

In common with iTunes, Google Music is an online audio store from which you can buy single tracks and complete albums, then stream or download said files to any Android device or Windows, Linux or Mac PC for playback anytime, anywhere.

Taking a nod from iTunes and its Match service, Google automatically pairs digital audio files bought elsewhere or ripped from CD with those on its own servers, making available on any device your entire music collection. You can store up to 20,000 tracks (maximum file size 250MB) in Google Music for free.

A separate Music Manager utility is used to upload tracks to Google Music from a PC or Mac. All versions support MP3, but only the Windows

program can handle WMA. AAC, Ogg and Flac files are transcoded to 320kbps MP3, but there's no support for Apple Lossless audio.

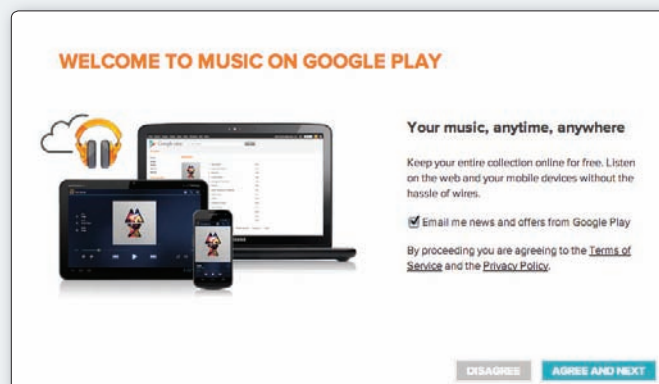
Some neat functionality includes Instant Mix, which lets you rediscover long-forgotten tracks in a mammoth music collection, and music recommendations that are based not only on the tracks you buy, but those you listen to. Plus you can share via Google+ full versions of the music you buy, and YouTube videos of other tracks.

Prices are in line with alternative music stores, and Google is also said to offer hundreds of free tracks – although it isn't obvious where to find them.

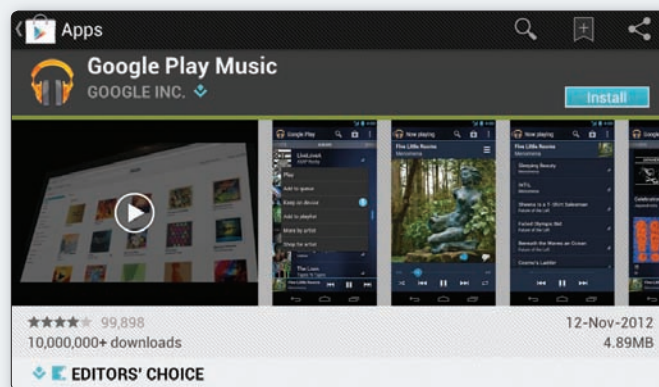
Not only does Google Music eliminate the hassle of remembering what music is stored on what device, it puts a firm tick in the backup box. Whatever happens to your gadgets, your music collection sits pretty in the cloud.

Here we explain how to set up Google Music and get started with storing and streaming your music.

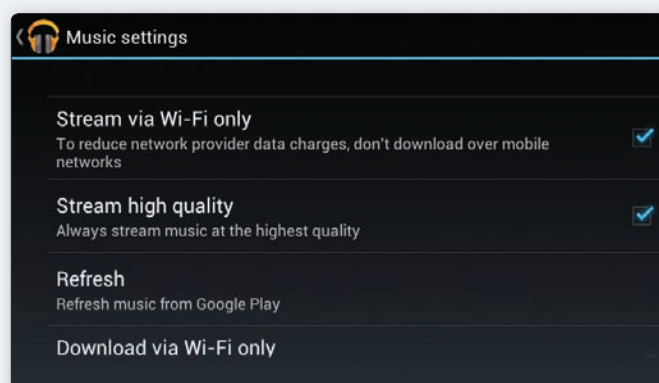
## GET STARTED WITH GOOGLE MUSIC



**START** Since most of your music will be stored on your main computer, it makes sense to start there. Head to [music.google.com](http://music.google.com) on your PC or Mac and sign into your Google account. You'll be prompted to download and install Google Play Music Manager.



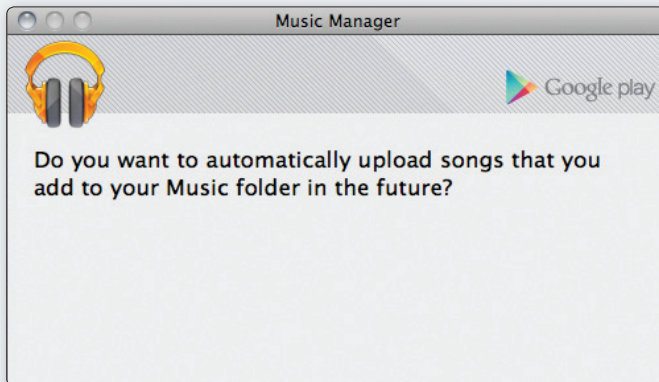
**4** Google Music is also accessible on any tablet or smartphone running Android 2.2 or later. You'll first need to download the Google Music app: tap the Google Play icon, then search for, download and install the software.



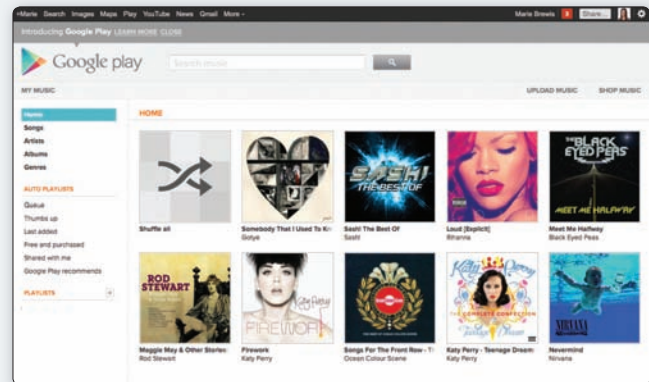
**7** Before you start streaming or downloading audio to your device, it's worth checking both data-intensive activities take place only over Wi-Fi. Tap your device's Options button and choose Settings, then enable the relevant options.



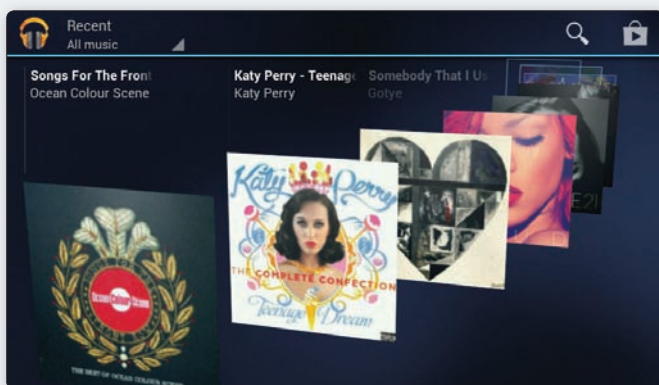
# Tech Help



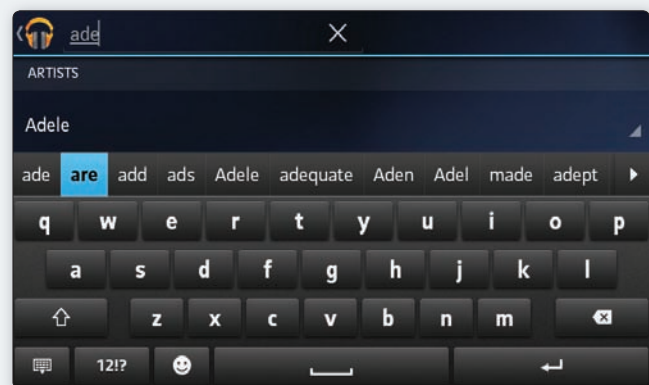
**2** Music Manager will ask in which folder you keep your music collection, then upload to its servers any tracks stored there. At your request, Music Manager will automatically upload songs that are later placed in this folder.



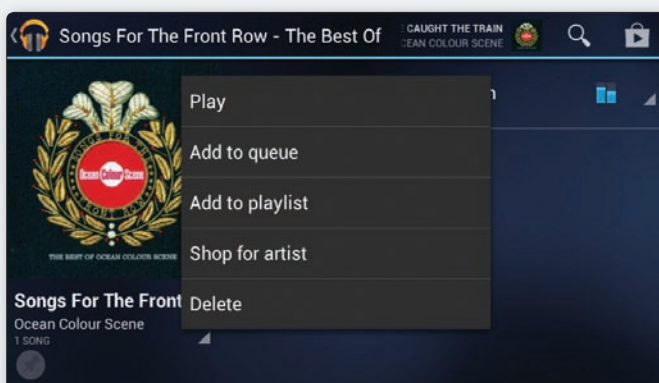
**3** The next time you visit Google Music in your web browser, you'll see that the Home screen has been populated with your music. You can filter tracks by songs, artists, albums and genre, and play, rate, share, or create a playlist of your music.



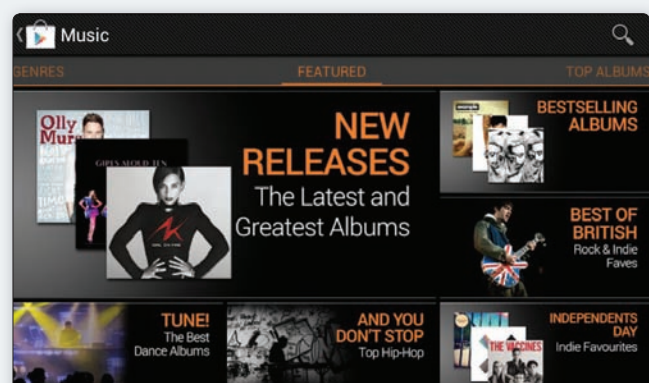
**5** In landscape mode the album artwork for recent tracks is displayed in a carousel. You can use the Recent drop-down menu to filter tracks by albums, artists, songs, playlists or genres; in portrait mode, the same is achieved by swiping to the left or right.



**6** Given that up to 20,000 songs can be uploaded to Google Music for free, it's reasonable to assume your collection could be rather large. A magnifying glass icon at the top of the screen lets you search for tracks or artists in your collection.



**8** Tap on a song to open the file. The pin icon at the bottom left lets you download the track for offline listening, or you can open the drop-down menu to access options for playing the track, adding it to a playlist or shopping for more from that artist.



**9** New music can be bought from Google Music; tap the Play icon at the top right of the screen to access the store. Prices vary, but expect to pay between 79p and £1.29 for a single, and £4.99 and £8.49 for an album. ☒



# Get on top of your busy workload



Your time is a valuable commodity. Sandra Vogel explains how to use it wisely with help from a free utility called Task Coach



Life is busier than ever these days, and we all have a huge list of things to do in any one day. We also have longer-term commitments that can be difficult to keep on top of.

A hectic workload can weigh us down to the point where we procrastinate and become daunted rather than get on with things. Task-management software might appeal, but learning a new application when we're already short on time can be off-putting.

Task Coach has a very simple appearance, behind which lies enough functionality to help you manage the bulk of whatever it is you do every day.

It can help you break down large complex activities into small manageable tasks, which become less daunting and easier to complete.

You can make a simple task list or a complex schedule with sub-level tasks, reminders, priority levels and even progress monitoring.

If you're using Task Coach for paid work, you can monitor budgetary information, and even keep track of effort, matching this against revenue to help with money management and invoicing.

While Task Coach is an accomplished application with lots of options, we suggest you keep it simple to start with and explore the more complex features over time. Stick to using it for a few simple tasks at first, spending your energy on getting things done rather than understanding a load of features you may not need.

Task Coach isn't a true project-management program in the sense that you can't manage multiple people on a single project. For personal use, though, this free utility is well worth a download.

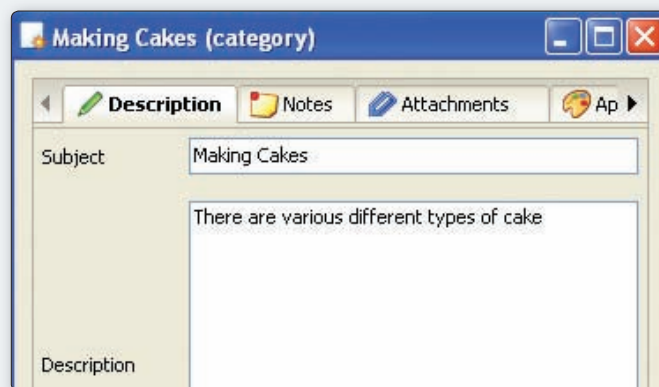
One feature we'd like to see added to Task Coach is the ability to store tasks in the cloud and sync them with other devices. Here's hoping for a future update.

## BETTER TIME-MANAGEMENT WITH TASK COACH

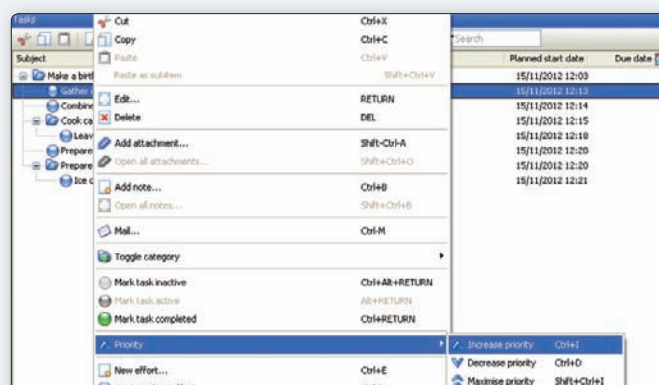
### Download Task Coach



**START** Head to [taskcoach.org](http://taskcoach.org) and download the software for your device. During installation you can configure Task Coach to launch at startup on a Windows PC. This may be convenient, but note that lots of startup apps can slow down your PC.



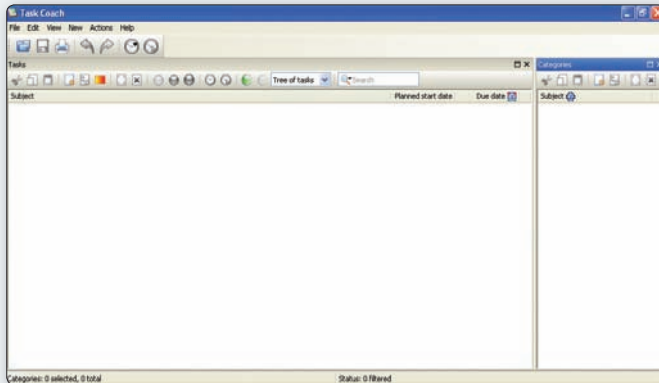
**4** Click the Categories tab, then click the New icon (fourth from the left). You can also add a category name and a description if you like. It's possible to add notes and attachments to category descriptions, and change their appearance.



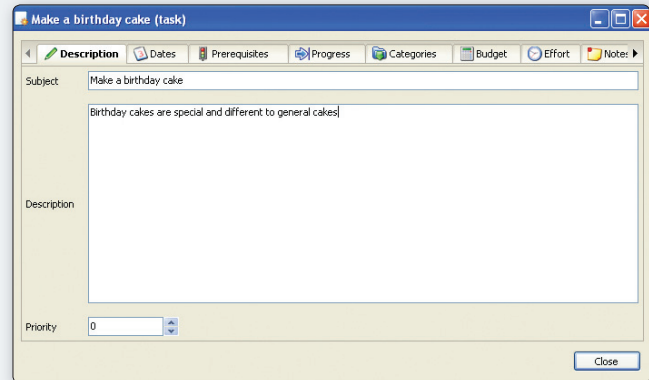
**7** You can drag-and-drop tasks to re-order them, or right-click them to access various options that include marking the task as complete. Create new categories and sub categories in the righthand pane as required.



# Tech Help



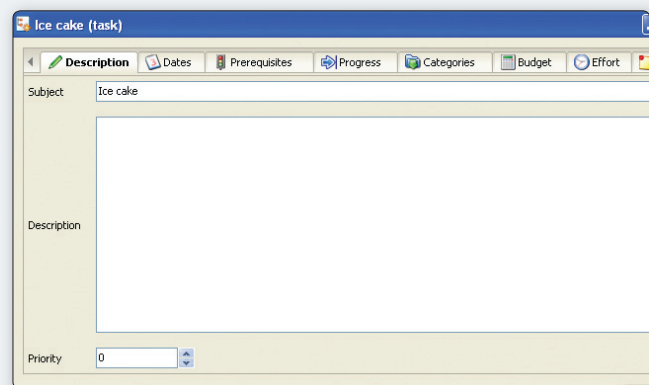
**2** Open the application. The main window is where future tasks will be listed, while the smaller pane on the right is reserved for categories. There are two menu bars: the lower one lets you define and manage tasks, the upper bar offers higher-level functions.



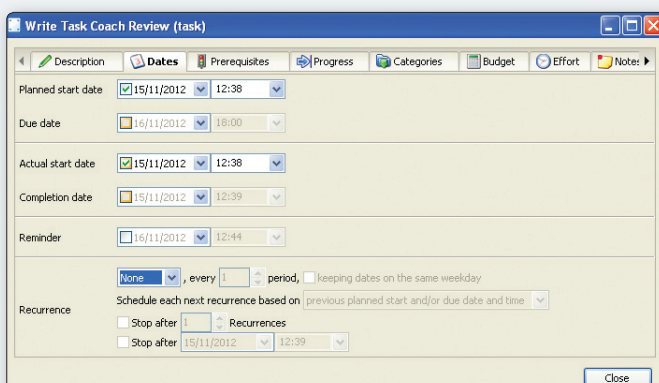
**3** Click the New Task icon (fourth from the left on the bottom menu bar) to add a task. You can add to each task a range of information, which gives you some idea of the complexity of activities Task Coach can manage.



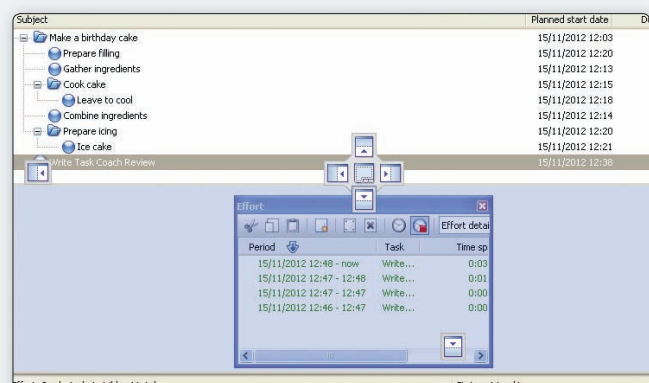
**5** Click the Appearance tab and select a colour and font for the category. You can also assign an icon, and Task Coach includes a library of artwork. Assigning to categories colours, fonts and icons can enhance the process of task management. Close this window.



**6** Edit your task's appearance and assign it to the new category using the Appearance and Categories tabs, then close the window. Click 'New sub-item' in the bottom menu bar and add individual tasks, personalising their appearance as before.



**8** Add a deadline date to a task by right-clicking to enter a new task then choosing the Dates tab. You can monitor a planned start date against the actual start date, and schedule reminder alerts and recurring tasks.



**9** Use the Effort tracker in the View menu to see how long you spend completing a task. Drag the window over the screen orientation you want. Let go and it drops into place. Close a window as usual by clicking on the red cross. ☒



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LETITIA AUSTIN



## Panda Antivirus Pro 2013

FULL PROGRAM (SIX-MONTH LICENCE)

ONLINE  
REGISTRATION  
REQUIRED

### Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 21\ Panda Antivirus Pro 2013 and open the install file

### Online registration

**required:** follow the links during installation before 6 Feb 2013

### System requirements

300MHz processor; Windows XP/Vista/7/8; 128MB RAM without TruPrevent, 512MB with TruPrevent (1GB recommended); 265MB drive space; Internet Explorer 6.0 or later; CD-ROM

Panda Security was the first IT security company to harness the power of cloud computing with its Collective Intelligence technology. This innovative security model can automatically analyse and classify thousands of new malware samples every day, guaranteeing clients the most effective protection against internet threats with minimum impact on system performance.

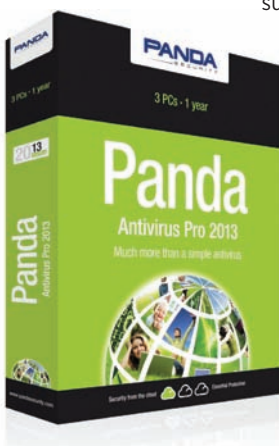
The Panda 2013 range promises to offer the best user experience, with easy installation, an updated interface and improved detection capabilities. Plus, the Panda 2013 Range offers compatibility with all the current Windows operating systems, including Windows 8.

### What do you want?

Let us guess: you probably want your antivirus to be simple, not cause computer slowdowns and offer complete, hands-free protection against all threats. And you want to enjoy essential, hassle-free protection at an unbeatable price.

### The solution

- Just install it and forget about viruses, spyware, rootkits, hackers and online fraud
- Read your favourite blogs and surf the web with peace of mind



- Connect with other people on the internet, without fear of nasty surprises: chat, share photos and videos, and more
- Set up your home network and protect all your PCs
- Relax. Panda's technical support service is there to help you

### Main features

- Antivirus & firewall
- Panda USB vaccine
- Plus! Safe browser
- Virtual keyboard
- Multimedia/gaming mode
- Home network manager

### Benefits

- **Easy:** 'Install and forget' software
- **Light:** All processes take place in Panda's cloud
- **Secure:** Includes everything you need: antivirus, firewall, Wi-Fi protection...
- **Complete:** Includes free first-class technical support ☑

Visit our website for more software special offers: [pcadvisor.co.uk/special-offers](http://pcadvisor.co.uk/special-offers)



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## Serif DrawPlus Starter Edition

### FULL PROGRAM

**PHONE  
REGISTRATION  
REQUIRED**

#### Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 212\ Serif DrawPlus Starter Edition and open the install file

#### Online registration

**required:** phone the number listed on the disc interface

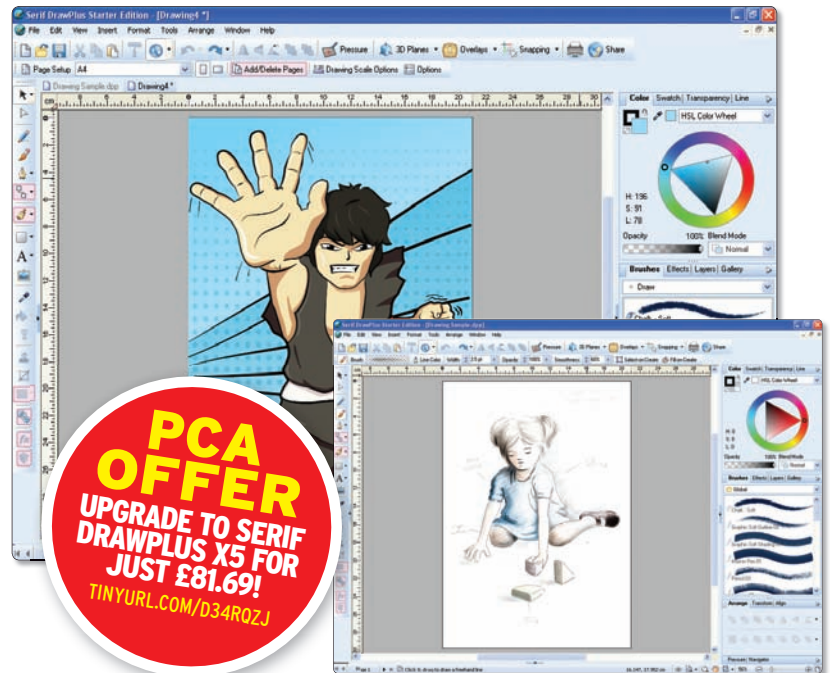
#### System requirements

Windows XP/Vista; 512MB RAM; 250MB drive space; 1024x600 screen

DrawPlus Starter Edition is a free version of Serif's award-winning vector-illustration and painting program. Ideal for creating attractive artwork, logos, web graphics, animations and charts, DrawPlus Starter Edition is a versatile program whatever your artistic ability.

#### Features

- Get creative with powerful tools, Quickshapes and artistic text
- Paint with natural-looking, pressure-sensitive brushes
- Correct common photo problems such as lighting and red-eye
- Experiment with blend modes
- Written- and video tutorials ☒



## Ashampoo Burning Studio 2013

### FULL PROGRAM

**ONLINE  
REGISTRATION  
REQUIRED**

#### Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 212\ Ashampoo Burning Studio 2013 and open the install file

#### Online registration

**required:** follow the links during installation before 6 Feb 2013

#### System requirements

300MHz processor; Windows 98/2000/XP/ Vista/7/8; 1GB RAM (2GB for Blu-ray); 350MB drive space (additional storage required for content); Windows Media Player 9.0 or later; DirectX 9.0

Ashampoo Burning Studio 2013 is a burning application that requires less time to start up and launches modules almost instantly. To further boost your productivity, the user interface has been restructured to improve clarity and readability.

With Ashampoo Burning Studio 2013 you are well-equipped for all burning tasks, whether they involve movies, music or other files. Create backups or data discs, rip music and create audio CDs, or archive your movies to Blu-ray - the improved usability and sleek design make Burning Studio 2013 the ideal choice for all burning-related tasks.

#### Features

- Burn data to CD, DVD and Blu-ray
- Back up files across several discs
- Rip audio CDs to multiple formats
- Burn music to popular formats
- Create HD and full-HD video discs
- Duplicate CDs, DVDs and Blu-rays



- Create and burn disc images
- Erase rewritable discs

- Create modified copies
- Design, print covers and booklets ☒



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## Abelssoft FileWing Pro 2.3

### FULL PROGRAM

**ONLINE  
REGISTRATION  
REQUIRED**

#### Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 212\ Abelssoft FileWing Pro 2.3 and open the file

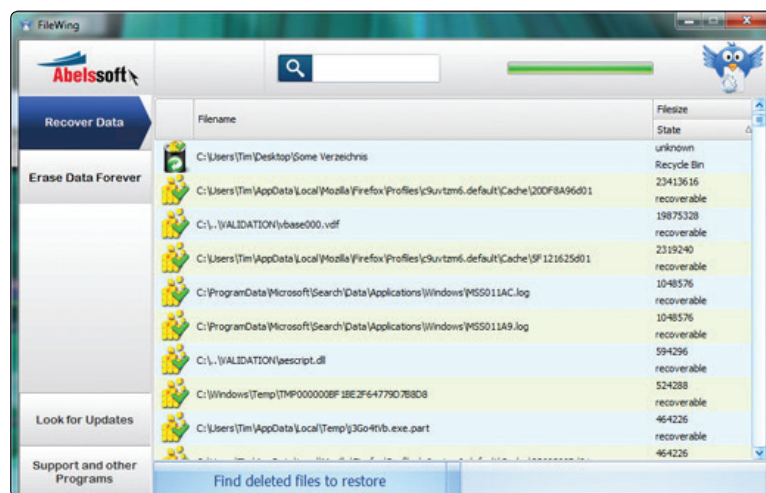
**Online registration required:** follow the links during installation before 6 Feb 2013

**System requirements**  
1.5GHz CPU; Windows XP/Vista/7/8; 1GB RAM

FileWing Pro can recover your accidentally deleted files. Simply specify the folder from which you want to resurrect data and FileWing Pro will do the rest.

If you know what type of file you're looking for, FileWing Pro's filters let you narrow down the search to only pictures, music, video or documents. You can also set your own filters by entering specific file extensions.

Alternatively, use FileWing Pro to securely delete your files. Up to seven different algorithms for overwriting your data ensure it can never be recovered. ☒



## Stegano OkayFreedom - Premium Flat

### FULL PROGRAM (THREE-MONTH LICENCE)

**ONLINE  
REGISTRATION  
REQUIRED**

#### Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 212\ Stegano OkayFreedom and open the install file

**Online registration required:** follow the links during installation

**System requirements**  
Windows XP/Vista/7/8; 1GB RAM; 50MB drive space

OkayFreedom is an easy-to-use virtual private network (VPN) service that protects your privacy by encrypting your web connection, and encourages freedom of the web by lifting country-specific censors.

OkayFreedom recognises the content, video and sites restricted in your country - for example, YouTube is restricted in many countries, while Hulu is available in the US only - and uses Chrome and Firefox browser extensions to automatically direct you to a server over which the data is accessible (users of other browsers must manually select a server). The



software uses a network of VPN servers in the US, Switzerland, Germany and UK.

You can use OkayFreedom with any program that requires an internet

connection, with the exception of desktop email clients.

*PC Advisor* is offering readers a three-month Premium Flat (unlimited traffic) licence. ☒

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Place disc in drive. Open the file 'Click here to begin.pdf' for extra information.

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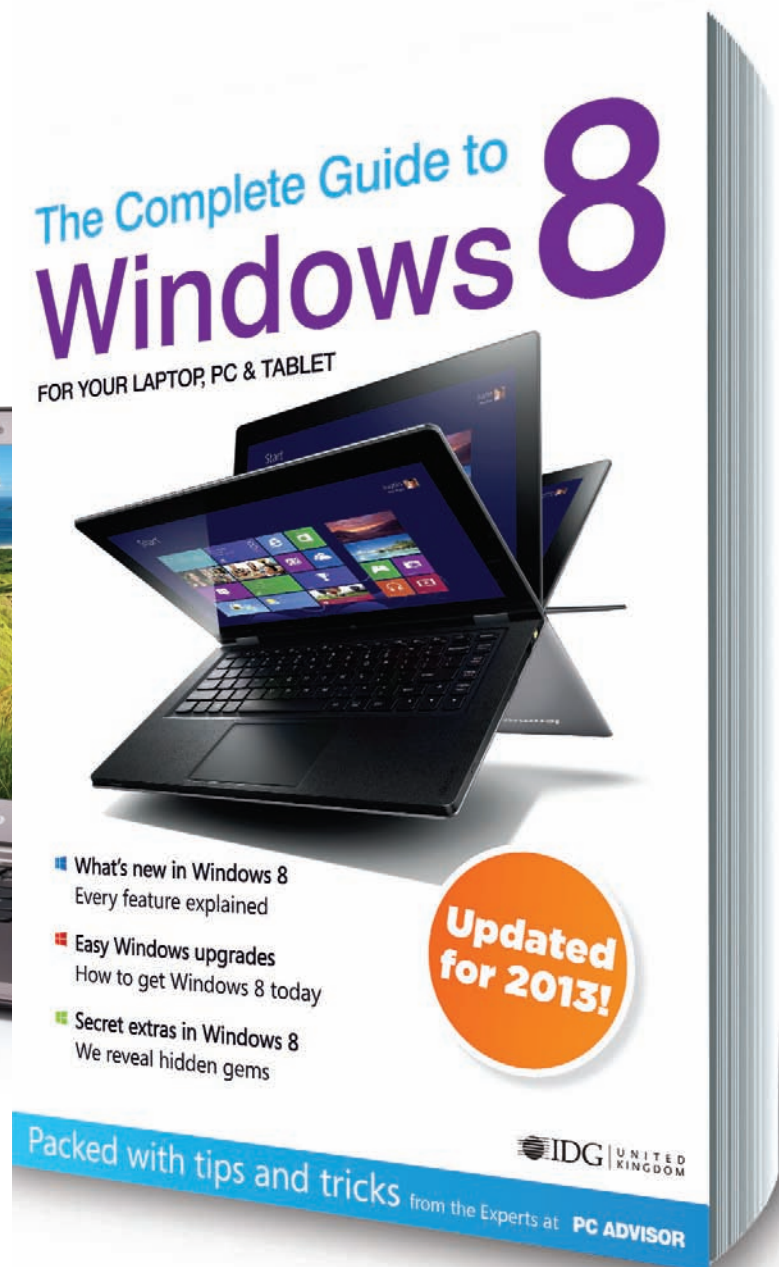
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Laptops



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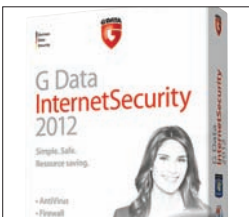
Family PCs



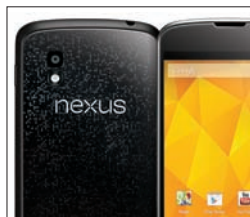
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**£501 to £1,000**  
**£1,001 and over**

### Printers

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**£151 and over**

### Graphics cards

**Graphics cards under £150**  
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**Flat-panels under £200**  
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<div> <div>Ultraportable laptops</div> <div>      </div> </div>					
	1	2	3	4	5
	Apple MacBook Air 13in	Samsung 900X4C	Apple MacBook Air 11in	Asus Zenbook UX32A	Lenovo IdeaPad U410
Price	£1249 inc VAT	£920 inc VAT	£849 inc VAT	£750 inc VAT	£649 inc VAT
Website	Apple.com/uk	Samsung.com/uk	Apple.com/uk	Uk.asus.com	Lenovo.com/uk
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	1.8GHz Intel Core i5-3427U	1.7GHz Intel Core i5-3317U	1.7GHz Intel Core i5-3317U	1.7GHz Intel Core i5-3317U	1.8GHz Intel Core i3-3217U
RAM	4GB DDR3L	8GB DDR3	4GB DDR3L	4GB DDR3	4GB DDR3
Storage	256GB SSD	128GB SSD	64GB SSD	500GB HDD + 24GB SSD	500GB HDD + 24GB SSD
Screen size	13.3in	15in	11.6in	13.3in	14in
Screen resolution	1400x900	1600x900	1366x768	1366x768	1366x768
Graphics	Intel HD Graphics 4000	Intel HD Graphics 4000	Intel HD Graphics 4000	Intel HD Graphics 4000	nVidia GeForce 610M
Video memory	N/A	N/A	N/A	N/A	1GB
Wireless	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n	802.11a/b/g/n	802.11b/g/n
Ethernet	Via adaptor only	Gigabit	Via adaptor only	N/A	Fast
Bluetooth	✓	✓	✓	✓	×
USB	2x USB 3.0	2x USB 3.0, 1x USB 2.0	2x USB 3.0	3x USB 3.0	2x USB 3.0, 2x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	✓	×	✓	×	×
DisplayPort	✓	×	✓	×	×
HDMI	×	✓ (Micro HDMI)	×	✓	✓
DVI	×	×	×	×	×
VGA	×	×	×	✓	×
eSATA	×	×	×	×	×
Media card slot	✓	✓	×	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Speakers, headphone jack, mic	Speakers, headphone jack, mic
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	HD webcam, multitouch trackpad, backlit keyboard	Webcam	HD webcam, multitouch trackpad, backlit keyboard	Webcam	Webcam
Operating system	Mac OS X 10.8 Mountain Lion	Windows 7 Home Prem 64bit	Mac OS X 10.8 Mountain Lion	Windows 8 64bit	Windows 8 64bit
Bundled software	iLife 11	Samsung Recovery Solution	iLife 11	Asus utilities	CyberLink YouCam, VeriFace
Fear (Max detail)	29fps	28	28fps	27fps	49fps
Battery	50Wh lithium-ion	62Wh lithium-ion	35Wh lithium-ion	48Wh lithium-ion	48Wh lithium-polymer
Battery life	8 hrs 20 mins	8 hrs 3 mins	6 hrs 10 mins	7 hrs 8 mins	5 hrs 35 mins
WB 6/PC Mark 7 score	132/4,497	125/not tested	129/not tested	123/2,519	95/2,265
Dimensions	325x227x4-17.5mm	375x237x15mm	300x192x3-17mm	325x223x7-18.7mm	344x235x21mm
Weight	1.34kg	1.67kg	1.07kg	1.5kg	1.8kg
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year return-to-base
Verdict	<ul style="list-style-type: none"> <li>Decent turn of speed</li> <li>Stunning battery life</li> <li>Nice 256GB SSD</li> <li>Faster framerates</li> <li>Ultra quiet</li> </ul>	<ul style="list-style-type: none"> <li>Sleek and stylish</li> <li>Good matt screen</li> <li>Comparatively fast</li> <li>Great battery life</li> <li>Lots of memory</li> </ul>	<ul style="list-style-type: none"> <li>Reasonable price tag</li> <li>Very light and compact</li> <li>Strong performance for size</li> <li>Good graphics</li> <li>Great build quality</li> </ul>	<ul style="list-style-type: none"> <li>Premium build and feel</li> <li>Decent speed</li> <li>Large, responsive trackpad</li> <li>Playable framerates</li> <li>Not all models have the SSD</li> </ul>	<ul style="list-style-type: none"> <li>Attractive laptop</li> <li>Sensible price tag</li> <li>Quick resume from standby</li> <li>Reasonable battery life</li> <li>Not particularly fast</li> </ul>
FULL REVIEW	TINYURL.COM/8C7LYCO	TINYURL.COM/6VZ5TOG	TINYURL.COM/CCPOANM	TINYURL.COM/D54NZ7F	TINYURL.COM/CJL7QN9

## >> Buying advice



### Ultraportable laptops

Apple's MacBook Air sets the standard for thin-and-light laptops, which are usually referred to as Ultrabooks or ultraportable laptops.

Most run fast and silent SSDs for storage, which can partly explain their higher retail price, but some manufacturers are now fitting slim 7mm hard disks.

All Ultrabooks run Intel CPUs (AMD variants are known as Sleekbooks), often a low-power version identifiable by its U suffix. The 1.7GHz Intel Core i5-3317U is a popular example.

Beware of cheap glossy panels with poor contrast and colour gamut and, if possible, judge in person the screen quality and viewing angles before you buy.

Ports are limited due to space constraints, but look for built-in ethernet or dongles that allow full-size ports to be connected.

A smaller chassis means a smaller, often non-removable battery. Expect six-plus hours of life.

There's no room for an optical drive, but you can always connect an external USB version.

READ MORE: [TINYURL.COM/CEAHEZK](http://tinyurl.com/CEAHEZK)



Sub-£500 laptops	    				
	Acer Aspire V3-571	Toshiba Satellite Pro L850	Samsung RV511	Lenovo IdeaPad S205-1038	Acer V5-571
Price	£450 inc VAT	£475 inc VAT	£450 inc VAT	£350 inc VAT	£480 inc VAT
Website	Acer.co.uk	Toshiba.co.uk	Samsung.com/uk	Lenovo.com/uk	Acer.co.uk
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★★	★★★★☆	★★★★☆	★★★★★	★★★★☆
Processor	2.5GHz Intel Core i5-2450M	2.3GHz Intel Core i3-2350M	2.53GHz Intel Core i3-380M	1.6GHz AMD E450	1.4GHz Intel Core i3-2367M
RAM	6GB DDR3	6GB DDR3	6GB DDR3	4GB DDR3	8GB DDR3
Storage	500GB hard drive	750GB hard drive	640GB hard drive	500GB hard drive	500GB hard drive
Screen size	15.6in	15.6in	15.6in	11.6in	15.6in
Screen resolution	1366x768	1366x768	1366x768 pixels	1366x768 pixels	1366x768
Graphics	Intel HD Graphics 3000	Intel HD Graphics 3000	nVidia GeForce 315M	AMD Radeon HD 6310M	Intel HD Graphics 3000
Video memory	N/A	N/A	1GB	N/A	N/A
Wireless	802.11a/b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	1x USB 3.0, 2x USB 2.0	2x USB 3.0, 1x USB 2.0	3x USB 2.0	3x USB 2.0	1x USB 3.0, 2x USB 2.0
FireWire	x	x	x	x	x
Thunderbolt	x	x	x	x	x
DisplayPort	x	x	x	x	x
HDMI	✓	✓	✓	✓	✓
DVI	x	x	x	x	x
VGA	✓	✓	✓	✓	✓
eSATA	x	x	x	x	x
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Speakers, headphone jack
Optical drive	8x DVD±R	8x DVD±R	8x DVD±R, 4x DVD±RW, 8x DVD-ROM	N/A	8x DVD±R
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Windows 7 Home Prem 64bit	Windows 7 Pro 64bit	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit
Bundled software	Microsoft Office Starter	Microsoft Office Starter	None	None	Microsoft Office Starter
Fear (Max detail)	16fps	15fps	33fps	18fps	16fps
Battery	48Wh lithium-ion	48Wh lithium-ion	48Wh lithium-ion	48Wh lithium-ion	37Wh lithium-ion
Battery life	5 hrs 18 mins	5 hrs 46 mins	5 hrs 15 mins	5 hrs 38 mins	5 hrs 2 mins
WorldBench 6 score	123	107	105	53	84
Dimensions	380x253x33mm	380x242x34mm	382x256x34mm	290x168x29mm	382x253x21-23mm
Weight	2.6kg	2.3kg	2.4kg	1.5kg	2.3kg
Warranty	1-year collect-and-return	1-year carry-in	1-year return-to-base	1-year return-to-base	1-year collect-and-return
Verdict	<ul style="list-style-type: none"> <li>• Strong general performance</li> <li>• Not much gaming potential</li> <li>• Excellent trackpad, keyboard</li> <li>• Reflective screen</li> <li>• Decent battery life</li> </ul>	<ul style="list-style-type: none"> <li>• i3 processor isn't the fastest</li> <li>• Anti-glare matt screen</li> <li>• Capacious hard drive</li> <li>• Keys lack depth</li> <li>• Windows 7 Professional</li> </ul>	<ul style="list-style-type: none"> <li>• Solid performance for an i3 CPU in WorldBench 6</li> <li>• Good hard-drive capacity</li> <li>• Light gaming potential</li> <li>• Reflective screen</li> </ul>	<ul style="list-style-type: none"> <li>• Extremely portable</li> <li>• More powerful than a netbook</li> <li>• Glossy screen</li> <li>• Rather slow</li> </ul>	<ul style="list-style-type: none"> <li>• Slower Core i3 chip</li> <li>• 8GB of RAM</li> <li>• No ethernet</li> <li>• Onboard graphics</li> <li>• Decent battery life</li> </ul>
FULL REVIEW	<a href="http://TINYURL.COM/CQKL4PD">TINYURL.COM/CQKL4PD</a>	<a href="http://TINYURL.COM/CYH2F5H">TINYURL.COM/CYH2F5H</a>	<a href="http://TINYURL.COM/5TVT8AE">TINYURL.COM/5TVT8AE</a>	<a href="http://TINYURL.COM/6G5EKQK">TINYURL.COM/6G5EKQK</a>	<a href="http://TINYURL.COM/CABAX8Z">TINYURL.COM/CABAX8Z</a>

## >> Buying advice



## Sub-£500 laptops

Budget laptops are quick enough for most people, but economies are often made in build quality.

At the top end of the category you should find a highly capable Intel Core i-series processor. This will probably be a second-gen Sandy Bridge chip (ix-2xxx part number), but look out for a newer Ivy Bridge model (ix-3xxx).

Windows 7 and 8 run on 2GB of RAM, but 4GB or more is useful.

Hard disks are the norm at this price, with 250GB enough for most people. If you're a video hoarder look for 500GB or more.

Wi-Fi is standard, but Bluetooth is not a given at the price.

The bodywork and display are the main areas in which costs are cut. Expect creaky plastic bodies,

bendy frames and faux-metal paint jobs. Keyboards and trackpads are also likely to feel cheap and erratic.

Gloss screens hide inferior image quality. Colours are vivid, but the contrast may be poor. Check the visibility at an angle.

Some laptop manufacturers scrimp on the battery. Look for a rating of 48Wh or more.

**READ MORE:** [TINYURL.COM/CA9EXZ6](http://TINYURL.COM/CA9EXZ6)



£501-£1,000 laptops		1  PC ADVISOR BEST BUY	2 	3 	4 	5 
		Lenovo G570	HP ProBook 4530s	Sony Vaio SVS1311N9E	Lenovo IdeaPad Z580	HP Envy 6 S1eekbook
Price		£505 inc VAT	£562 inc VAT	£849 inc VAT	£730 inc VAT	£599 inc VAT
Website		Lenovo.com/uk	Hp.com/uk	Sony.co.uk	Lenovo.com/uk	Hp.com/uk
Build rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor		2.5GHz Intel Core i5-2450M	2.3GHz Intel Core i5-2410M	2.5GHz Intel Core i5-3210M	2.1GHz Intel Core i7-3612QM	2.1GHz AMD A6-4455M
RAM		6GB DDR3	4GB DDR3	4GB DDR3	8GB DDR3	6GB DDR3
Storage		750GB hard drive	640GB hard drive	500GB hard drive	1TB hard drive	500GB hard drive
Screen size		15.6in	15.6in	13.3in	15.6in	15.6in
Screen resolution		1366x768	1366x768	1366x768	1366x768	1366x768
Graphics		AMD Radeon HD 6370M	AMD Radeon HD 6470M	Intel HD Graphics 4000	nVidia GeForce GTX 630M	AMD Radeon HD 7500G
Video memory		1GB	1GB	N/A	2GB	N/A
Wireless		802.11b/g/n	802.11b/g/n	802.11a/b/g/n	802.11b/g/n	802.11b/g/n
Ethernet		Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth		✓	✓	✓	✓	✓
USB		4x USB 2.0	4x USB 2.0	2x USB 3.0, 1x USB 2.0	2x USB 3.0, 2x USB 2.0	2x USB 3.0, 1x USB 2.0
FireWire		x	x	x	x	x
Thunderbolt		x	x	x	x	x
DisplayPort		x	x	x	x	x
HDMI		✓	✓	✓	✓	✓
DVI		x	x	x	x	x
VGA		✓	✓	✓	✓	✓
eSATA		x	x	x	x	x
Media card slot		✓	✓	✓	✓	✓
Audio		Headphone jack, mic	Speakers, mic	Speakers, headphone jack, mic	Speakers, mic	Beats Audio
Optical drive		BD-ROM, 8x DVD±R drive	8x DVD±R drive	8x DVD±R drive	BD-ROM, 8x DVD±R drive	None
Extras		Webcam	Webcam, ExpressCard/34	Webcam	None	None
Operating system		Windows 7 Home Prem 64bit	Windows 7 Pro 64bit	Windows 8 Pro 64bit	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit
Bundled software		None	ArcSoft Total Media Suite	Sony utilities	CyberLink PowerDVD 10.0	None
Fear (Max detail)		32fps	42fps	27fps	79fps	51fps
Battery		48Wh lithium-ion	47Wh lithium-ion	49Wh lithium-ion	48Wh lithium-ion	59Wh lithium-ion
Battery life		5 hrs 1 min	4 hrs 44 mins	7 hrs 10 mins	5 hrs 49 mins	6 hrs 40 mins
WorldBench 6 score		96	115	124	153	82
Dimensions		377x250x35mm	374x256x32mm	331x225x24mm	376x245x35mm	374x253x21mm
Weight		2.6kg	2.36kg	1.7kg	2.44kg	2.1kg
Warranty		1-year return-to-base	1-year collect-and-return	1-year return-to-base	1-year return-to-base	1-year collect-and-return
Verdict		<ul style="list-style-type: none"> <li>• Superb price</li> <li>• Blu-ray drive</li> <li>• Good overall performance</li> <li>• Some gaming capability</li> <li>• Now has a Core i5 CPU</li> </ul>	<ul style="list-style-type: none"> <li>• Reasonably rugged build</li> <li>• Solid performance</li> <li>• Screen has a matt finish</li> <li>• No USB 3.0 ports</li> <li>• Fingerprint reader</li> </ul>	<ul style="list-style-type: none"> <li>• Lengthy battery life</li> <li>• Fingerprint reader</li> <li>• Poor viewing angles</li> <li>• Touchpad takes some getting used to</li> </ul>	<ul style="list-style-type: none"> <li>• Blu-ray playback</li> <li>• Strong overall performance</li> <li>• Stylish casing</li> <li>• Good complement of RAM</li> <li>• Screen a little too glossy</li> </ul>	<ul style="list-style-type: none"> <li>• Almost qualifies as an Ultrabook</li> <li>• Good quality keyboard</li> <li>• Slow performance</li> <li>• Fairly good value price</li> </ul>
FULL REVIEW		TINYURL.COM/6FZZ4XE	TINYURL.COM/84BFM4X	TINYURL.COM/CFRZSE3	TINYURL.COM/92GOLXY	TINYURL.COM/BMM7XYU

## >> Buying advice



## £501-£1,000 laptops

If you're prepared to pay more than £500, you can get a laptop with a better selection of internal components, a higher-quality build, and faster performance.

Most laptops at this price have 15.6in widescreen displays, but beware of budget panels with a coarse resolution - 1366x768 pixels is wide, but creates fuzzy text and

images. Look for anti-glare matt panels over glossy screens.

Intel introduced its third-gen Core chips in 2012, aka Ivy Bridge, which offer integrated GPUs capable of half-decent gameplay. You'll also find 2011's Sandy Bridge chips, identifiable by a leading 2 rather than 3 on the part number.

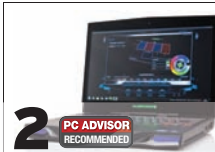

Battery life can stretch to six hours, but don't take it as a given.

Expect at least one USB 3.0 port, which allows for faster data transfer with compatible peripherals. Gigabit ethernet is now standard, and you may find even faster ports such as eSATA or Thunderbolt at this price.

Look for 4GB of RAM, and an SSD if you don't mind offloading media files to external storage.

READ MORE: [TINYURL.COM/BUHSEAR](http://TINYURL.COM/BUHSEAR)



£1,001+ laptops		 <b>1</b> PC ADVISOR GOLD	 <b>2</b> PC ADVISOR RECOMMENDED	 <b>3</b>	 <b>4</b>	 <b>5</b>
		Apple MacBook Pro Retina	Alienware M14x	Dell Latitude E6330	Samsung Series 7 700G7C	Toshiba Qosmio X870-11Q
Price		£1,799 inc VAT	£1,350 inc VAT	£1,375 inc VAT	£1,350 inc VAT	£1,520 inc VAT
Website		Apple.com/uk	Alienware.co.uk	Dell.co.uk	Samsung.com/uk	Toshiba.co.uk
Build rating		★★★★★	★★★★★	★★★★☆	★★★★☆	★★★★☆
Features rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating		★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating		★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor		2.3GHz Intel Core i7-3615QM	2.66GHz Intel Core i7-3720QM	2.9GHz Intel Core i7-3520M	2.3GHz Intel Core i7-3610QM	2.3GHz Intel Core i7-3610QM
RAM		8GB DDR3L	8GB DDR3	6GB DDR3	16GB DDR3	16GB DDR3
Storage		256GB SSD	64GB SSD, 500GB HDD	128GB SSD	1.5TB HDD	128GB SSD, 1TB hard drive
Screen size		15.4in	14.1in	13.3in	17.3in	17.3in
Screen resolution		2880x1800 pixels	1600x900 pixels	1366x768 pixels	1920x1080 pixels	1920x1080 pixels
Graphics		nVidia 650M, Intel HD 4000	nVidia GeForce GT 650M	Intel HD Graphics 4000	nVidia GeForce GTX 675M	nVidia GeForce GTX 670M
Video memory		1GB	1GB	N/A	2GB	3GB
Wireless		802.11a/b/g/n	802.11b/g/n	802.11a/b/g/n	802.11b/g/n	802.11b/g/n
Ethernet		Via adaptor only	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth		✓	✓	✓	✓	✓
USB		2x USB 3.0	2x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0	2x USB 3.0, 2x USB 2.0	4x USB 3.0
FireWire		x	x	x	x	x
Thunderbolt		✓ (2)	x	x	x	x
DisplayPort		✓	✓	x	✓	x
HDMI		✓	✓	✓	✓	✓
DVI		x	x	x	x	x
VGA		x	✓	✓	✓	✓
eSATA		x	x	x	x	x
Media card slot		✓	✓	✓	✓	✓
Audio		Headphone jack, Toslink out	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	2x Harman Kardon speakers
Optical drive		N/A	8x DVD±R, 2.4x DVD-RW, 4x DVD+RW, 8x DVD-ROM	8x DVD±R, 2.4x DVD-RW, 4x DVD+RW, 8x DVD-ROM	6x BD-ROM, 8x DVD±R, 2.4x DVD-RW, 4x DVD+RW	BD-RE/DVD±RW DL
Extras		HD webcam, multitouch trackpad, backlit keyboard	N/A	Fingerprint reader	HD webcam, Dolby Home Theater v4	Webcam, Kensington lock
Operating system		Mac OS X 10.7.4 Lion	Windows 7 Home Prem 64bit	Windows 8 64bit	Windows 7 Home Prem 64bit	Windows 7 Home Prem 64bit
Bundled software		iLife 11	None	Dell Backup	Samsung Recovery	Toshiba Blu-ray Disc Player
Fear (Max detail)		N/A	84fps	N/A	N/A	205fps
Battery		99Wh lithium-polymer	63Wh lithium-ion	60Wh lithium-ion	89Wh lithium-ion	47Wh lithium-ion
Battery life		N/A	5 hrs 7 mins	6 hrs 24 mins	3 hrs	2 hrs 18 mins
WorldBench 6 score		N/A	168	163	123	170
Dimensions		359x247x18mm	337x258x38mm	335x223x25mm	410x285x50mm	417x272x43.7mm
Weight		2kg	2.9kg	1.6kg	3kg	3.5kg
Warranty		1-year return-to-base	1-year in-home support	3-year return-to-base	1-year international	1-year carry-in
Verdict		<ul style="list-style-type: none"> <li>• Gorgeous super-resolution Retina display</li> <li>• Outstanding build quality</li> <li>• Wonderfully light and slim</li> <li>• Effortless to use</li> </ul>	<ul style="list-style-type: none"> <li>• Great gaming system</li> <li>• Stunning WorldBench score</li> <li>• Cool looks</li> <li>• Glossy screen can be difficult to read</li> </ul>	<ul style="list-style-type: none"> <li>• Good Windows speed</li> <li>• Strong battery life</li> <li>• Only 6GB RAM</li> <li>• Save £40 without fingerprint reader</li> </ul>	<ul style="list-style-type: none"> <li>• Not the fastest laptop in general Windows use</li> <li>• Good graphics controller</li> <li>• Vast 17.3in screen</li> <li>• Blu-ray drive</li> </ul>	<ul style="list-style-type: none"> <li>• Desktop-replacement model</li> <li>• Huge 16GB of RAM</li> <li>• Plastic build quality</li> <li>• Active-shutter 3D tech</li> <li>• Good for gaming</li> </ul>
FULL REVIEW		<a href="http://TINYURL.COM/7YGC3KJ">TINYURL.COM/7YGC3KJ</a>	<a href="http://TINYURL.COM/CLGSCMV">TINYURL.COM/CLGSCMV</a>	<a href="http://TINYURL.COM/CBA725B">TINYURL.COM/CBA725B</a>	<a href="http://TINYURL.COM/C93VN8N">TINYURL.COM/C93VN8N</a>	<a href="http://TINYURL.COM/C3F8XP2">TINYURL.COM/C3F8XP2</a>

## >> Buying advice



## £1,001+ laptops

Invest £1,000 or more in a laptop, and you can be reasonably sure of getting a high-quality PC.

Sometimes that money will be spent on getting a thin-and-light laptop, with good performance to boot. Alternatively, you may prefer a rugged laptop that's able to withstand wear and tear on the road, or a performance-first

high-powered workstation.

Whatever your need, accept no compromises in build quality.

The best laptops should offer very good screens. Beware of glossy shiny panels that allow distracting reflections in certain lighting conditions.

Ultratables may have 256GB or more of solid-state storage, but won't have an optical drive or GPU.

Workstation laptops will have faster – often quad-core – CPUs and a mobile graphics processor.

Rugged laptops are engineered for strength, at the expense of light weight and sleek design. Look out for milspec standard ratings, such as MIL-STD-810G.

You'll find a wide range of ports, high-grade components and extras.

**READ MORE:** [TINYURL.COM/CC3KBMM](http://TINYURL.COM/CC3KBMM)



Gaming PCs	1	2	3	4	5
	Chillblast Fusion Firebird	Scan 3XS Performance GTX	Overclockers Primo GTX 660	Dino PC Dark Claw GTX 670	PC Specialist Vanquish XT680
Price	£1,199 inc VAT	£1,849 inc VAT	£643 inc VAT	£1,249 inc VAT	£1,399 inc VAT
Website	Chillblast.com	Scan.co.uk	Overclockers.co.uk	Dinopc.com	Pcspecialist.co.uk
Build rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Features rating	★★★★☆	★★★★★	★★★★☆	★★★★☆	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★☆	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	3.5GHz (4.6GHz) Intel Core i7-3770K	3.4GHz (4.6GHz) Intel Core i5-3570K	3.1GHz Intel Core i5-3450	3.4GHz (4.5GHz) Intel Core i5-3570K	3.4GHz (4.6GHz) Intel Core i5-3570K
CPU cooler	Akasa Nero 3	Thermalright Macho	Standard Intel cooler	Xigmatek Knighthawk	Corsair H60 liquid cooler
Memory	16GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3	16GB DDR3
Storage	120GB SSD + 2TB HDD	240GB SSD + 2TB HDD	60GB SSD + 500GB HDD	120GB SSD + 1TB HDD	120GB SSD + 1TB HDD
Power supply	600W Corsair	600W Corsair GS600	400W PC Power & Cooling	550W Xigmatek	650W Corsair TX650
Motherboard	Asus P8Z77-V	Gigabyte GA-Z77-D3H	Gigabyte H61MA-D2V	Asus P8Z77-V LX	Asus P8Z77-V
USB	4x USB 3.0, 4x USB 2.0	6x USB 3.0, 4x USB 2.0	2x USB 3.0, 8x USB 2.0	2x USB 3.0, 4x USB 2.0	6x USB 3.0, 2x USB 2.0
Screen	23.6in Iiyama X2377HDS (1920x1080)	27in Asus PB278Q (2560x1440)	Not supplied	23.6in Asus VS247H (1920x1080)	27in Iiyama E2773HDS (1920x1080)
Graphics	Palit Jetstream nVidia GeForce GTX 680	EVGA nVidia GeForce GTX 680	Gigabyte nVidia GeForce GTX 660 Windforce 2X	Gigabyte nVidia GeForce GTX 670 OC	Palit nVidia GeForce GTX 680
Graphics memory	2GB	2GB	2GB	2GB	2GB
Sound	Onboard	Asus Xonar DG 5.1	Onboard	Onboard	Onboard
Connectivity	Gigabit ethernet, 802.11b/g/n	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet, 802.11b/g/n
Ports	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	DVI, VGA	2x DVI, HDMI, DisplayPort	DVI, HDMI, eSATA
Case	Corsair Carbide 200R	Corsair Carbide 300R	Xigmatek Asgard II	Corsair Carbide 200R	Cooler Master HAF 912
Keyboard & mouse	Logitech MK260	Corsair K60 keyboard, Corsair M60 mouse	Not supplied	Cyborg V7 keyboard, Cyborg rat3 mouse	Razer Arctosa keyboard, Razer Deathadder mouse
Optical drive	BD-ROM/DVD ± RW	DVD ± RW	DVD ± RW	DVD ± RW	BD-ROM/DVD ± RW
Operating system	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit
Extras	Option Family Software package, card reader	Corsair Vengeance 1300 headset	None	BullGuard security, surge protector	Microsoft Office 2010 Starter Edition
PC Mark 7	6,498	6,485	5,507	6,412	6,413
Hard Reset	156, 138	149, 129	108, 91	150, 131	149, 128
Lost Planet 2	104, 81	93, 77	71, 56	91, 74	92, 75
Stalker CoP	273, 122	254, 121	180, 84	255, 116	265, 116
Alien vs Predator	113, 61	112, 60	82, 43	107, 58	107, 58
Sniper Elite V2	95, 24	94, 23	62, 16	86, 22	88, 22
Warranty	2-year collect-and-return	1-year collect-and-return, 2-year RTB (parts and labour)	2-year collect-and-return	3-year PromoCare	3-year collect-and-return
Verdict	<ul style="list-style-type: none"> <li>Excellent performance</li> <li>Unmatched gaming power</li> <li>High-calibre 23.6in Iiyama IPS monitor</li> <li>Case a little cramped</li> <li>No specialist gaming peripherals</li> </ul>	<ul style="list-style-type: none"> <li>Stunning performance</li> <li>Very good 27in flat-panel</li> <li>Minimalist good looks</li> <li>Comes with lots of gaming goodies</li> <li>Rather expensive</li> </ul>	<ul style="list-style-type: none"> <li>Incredibly cheap price</li> <li>Respectable performance</li> <li>Storage options not great</li> <li>Small and basic case</li> <li>Less versatile motherboard</li> </ul>	<ul style="list-style-type: none"> <li>Only a GTX 670, but overclocked to the max</li> <li>Not as fast overall as the Chillblast</li> <li>Nice 23.6in Asus display</li> <li>Impressive input devices</li> <li>No Blu-ray</li> </ul>	<ul style="list-style-type: none"> <li>Highly overclocked, but not the fastest system here</li> <li>Huge 27in Iiyama display</li> <li>Good all-round features</li> <li>Strong gaming peripherals</li> </ul>
FULL REVIEW	<a href="http://tinyurl.com/cfdnsp9">TINYURL.COM/CFDNP9</a>	<a href="http://tinyurl.com/csvfpth">TINYURL.COM/CSVFPTH</a>	<a href="http://tinyurl.com/d288lkl">TINYURL.COM/D288LKL</a>	<a href="http://tinyurl.com/d9tnxpq">TINYURL.COM/D9TNXPQ</a>	<a href="http://tinyurl.com/coqe5hr">TINYURL.COM/COQE5HR</a>

All gaming scores given at Medium and Ultra settings, measured in fps

## >> Buying advice



## Gaming PCs

Changes in exchange rates and component supply issues mean we can't guarantee PCs listed here will be available as specified. All our prices include delivery charges.

Gaming PCs put performance and upgradability before subtlety and quiet operation. Many run overclocked CPUs to eke out every bit of available speed.

Intel's Core i5-2500K is a popular choice of CPU, but will require a decent cooler and beefy PSU. The HyperThreaded i7-2600K is slightly faster, but dearer.

Cooling is essential for stability. Liquid-cooling systems, dust filters, fan-speed controls and good cable-management can aid airflow.

Most important of all is the graphics card; vendors will often

skimp on storage, networking and other features and throw all their budget at the graphics card.

AMD's Radeon HD 7970 delivers unparalleled performance – but at a price. Cheaper solutions include the nVidia GeForce GTX 560 Ti.

Look for wired peripherals and a headset. Good warranty terms are crucial for overclocked PCs.

[READ MORE: TINYURL.COM/CZXH443](http://tinyurl.com/czxh443)



Family PCs	 1 <b>PC ADVISOR</b> BEST BUY	 2 <b>PC ADVISOR</b> RECOMMENDED	 3	 4 <b>PC ADVISOR</b> BEST BUY	 5
	CyberPower Infinity Achilles Elite	Chillblast Fusion Galaxy	Eclipse Explorer Touch i5357r785	Chillblast Fusion Orb	Quiet PC IcePipe A43 Silent PC
Price	£999 inc VAT	£799 inc VAT	£999 inc VAT	£799 inc VAT	£1,206 inc VAT
Website	Cyberpowersystem.co.uk	Chillblast.com	Eclipsecomputers.com	Chillblast.com	Quietpc.com
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	3.2GHz Intel Core i5-3470	3.4GHz Intel Core i5-3570K	3.4GHz Intel Core i5-3570K	3.4GHz Intel Core i5-3570K	2.8GHz Intel Core i5-3450S
RAM	8GB DDR3	8GB DDR3	16GB DDR3	16GB DDR3	8GB DDR3
Storage capacity	60GB SSD + 1TB HDD	2TB HDD	2TB HDD	1TB HDD + 120GB SSD	223GB SSD
Motherboard	Gigabyte GA-B75M-D3H	Asus P8B75-M LX	Asus P8Z77-V LX	Asus P8B75-M LX	Gigabyte GA-Z77MX-D3H
CPU cooler	Standard Intel cooler	Standard Intel cooler	Standard Intel cooler	Standard Intel cooler	NoFen IcePipe CR-95C
Power supply	500W Cooler Master	700W Chillblast	650W EZCool	700W Chillblast	400W NoFen (fanless)
Screen	23.6in Iiyama PLT2451MTS-B	22in Dell ST2220T	23.6in Iiyama PLT2451MTS-B	23.6in Iiyama	23in Zalman TM-230
Screen resolution	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels
Graphics card	Palit nVidia GeForce GTX 660	VTX AMD Radeon HD 7770	VTX AMD Radeon HD 7850	XFX AMD Radeon HD 6850	Intel Graphics HD 2500
Video memory	2GB	1GB	1GB	1GB	N/A
Wireless	N/A	N/A	N/A	802.11b/g/n	N/A
USB	2x USB 3.0, 6x USB 2.0	3x USB 3.0, 8x USB 2.0	3x USB 3.0, 5x USB 2.0	3x USB 3.0, 8x USB 2.0	3x USB 3.0, 8x USB 2.0
Media card slot	x	x	x	✓	x
Sound card	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	N/A	2x Logitech S220	2x Logitech LS21	Logitech S220 2.1	N/A
Case	Cooler Master HAF912	Xigmatek Asgard Pro	902 Series	Chillblast Vantage	Silent fanless case
Keyboard	Logitech K120 keyboard (wired)	Logitech Cordless MK260	Microsoft Comfort Curve Keyboard 3000 (wired)	Logitech Cordless MK260	Gigabyte GK-KM6150 combo (wired)
Optical drive	Lite-On Blu-ray/DVD combo drive	LG Blu-ray/DVD combo drive	Lite-On Blu-ray/DVD combo drive	Samsung Blu-ray/DVD combo drive	Optiarc DVD drive
Operating system	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit	Windows 7 Home Premium 64bit	Windows 8 64bit
Bundled software	None	CyberLink software	None	CyberLink software	None
Crysis (Low/Medium)	137/101fps	149/104fps	159/108fps	157/109fps	42/20fps
WorldBench 6, PCMark 7	N/A, 5,609	N/A, 3,759	N/A, 3,786	193, N/A	N/A, 5,675
Warranty	3-year RTB (labour only)	2-year collect-and-return	1-year return-to-base	2-year collect-and-return	2-year collect-and-return
Verdict	<ul style="list-style-type: none"> <li>60GB SSD enables blistering performance</li> <li>Superb graphics card for gaming</li> <li>Smart Connect Technology</li> <li>LAN Optimizer</li> <li>Iiyama touchscreen doesn't allow for the full Windows 8 experience</li> <li>Enthusiasts should upgrade to the i5-3570K CPU</li> </ul>	<ul style="list-style-type: none"> <li>The lack of an SSD seriously curtails the PCMark 7 score</li> <li>Dell multitouch display is a high-quality IPS model</li> <li>Decent graphics card for gaming</li> <li>Nice Xigmatek case</li> </ul>	<ul style="list-style-type: none"> <li>Vast storage capacity</li> <li>General Windows performance is a little slow</li> <li>Great gaming graphics card</li> <li>Iiyama touchscreen doesn't allow for the full Windows 8 experience</li> </ul>	<ul style="list-style-type: none"> <li>Great performance</li> <li>16GB of RAM</li> <li>Superb 24in Iiyama in-plane switching screen</li> <li>Wi-Fi and card reader</li> <li>Not the cheapest system</li> <li>Runs Windows 7</li> </ul>	<ul style="list-style-type: none"> <li>Fanless PC is utterly silent in operation</li> <li>High price</li> <li>No touchscreen</li> <li>223GB SSD is generous, but there's no hard drive for additional storage</li> <li>No Blu-ray support</li> </ul>
FULL REVIEW	<a href="http://tinyurl.com/bphy7ow">TINYURL.COM/BPHY7OW</a>	<a href="http://tinyurl.com/bwpsqsv">TINYURL.COM/BWPSQSV</a>	<a href="http://tinyurl.com/d4d8vwg">TINYURL.COM/D4D8VWG</a>	<a href="http://tinyurl.com/8d6n6fu">TINYURL.COM/8D6N6FU</a>	<a href="http://tinyurl.com/cz6a77p">TINYURL.COM/CZ6A77P</a>

## >> Buying advice



## Family PCs

Changes in exchange rates and component supply issues mean we can't guarantee PCs listed here will be available as specified. All our prices include delivery charges.

A family PC needs to offer decent performance in every area, able to cater for the needs of each individual - but there are some areas where you can cut costs.

If you're not itching to play the latest games, opt for integrated rather than dedicated graphics. AMD processors are more adept in this regard, while Intel CPUs offer faster application performance.

Intel's Core i5-3570K will form the core of a powerful home PC, although the older Core i5-2500K may be offered at lower cost and supports easy overclocking.

Consider 4GB of RAM and a 500GB hard drive as the minimum; both are easy to upgrade later.

Screen quality is crucial, with the best displays using IPS tech. A Blu-ray drive will help make the most of a 23.6in full-HD monitor.

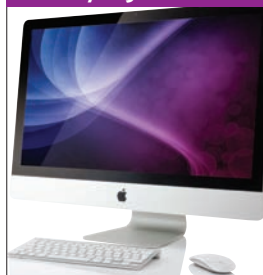
For Skype, watching films and listening to music, decent speakers and a webcam are essential.

**READ MORE:** [TINYURL.COM/BL4UREP](http://tinyurl.com/bl4urep)



All-in-one PCs	1  PC ADVISOR BEST BUY	2  PC ADVISOR BEST BUY	3  PC ADVISOR RECOMMENDED	4  PC ADVISOR RECOMMENDED	5 
	Apple iMac 27in 2.7GHz	Lenovo IdeaCentre A720	HP Z1 (WM429EA)	Asus ET2411NTI	PC Spec PowerGlide Extreme
Price	£1399 inc VAT	£1,299 inc VAT	£2,500 inc VAT	£999 inc VAT	£899 inc VAT
Website	Apple.com/uk	Lenovo.com/uk	Hp.com/uk	Uk.asus.com	Pcspecialist.co.uk
Build rating	★★★★★	★★★★☆	★★★★★	★★★★☆	★★★★☆
Features rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Performance rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Value rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Processor	2.7GHz Intel Core i5-2500S	2.3-3.3GHz Intel Core i7-3610QM	3.5-3.9GHz Intel Xeon E3-1280	3.1-3.5GHz Intel Core i5-3450	3.4-3.8GHz Intel Core i5-3570K
RAM	4GB DDR3	8GB DDR3	8GB DDR3	6GB DDR3	8GB DDR3
Storage capacity	1TB hard drive	750GB hard drive	1TB hard drive	1TB hard drive	2TB hard drive
Screen	27in IPS glossy	27in MVA 10-point touchscreen	27in IPS	23.6in TN 2-point touchscreen	24in TN 2-point touchscreen
Screen resolution	2560x1440	1920x1080	2560x1400	1920x1080	1920x1080
Graphics card	AMD Radeon HD 6770M	nVidia GeForce GT 630M	nVidia Quadro 1000M	nVidia GeForce GT 630M	nVidia GeForce GT 640
Video memory	512MB	2GB	2GB	1GB	1GB
Wireless	802.11a/b/g/n	802.11b/g/n	802.11a/b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	✓	✓	✓	✓	✓
Bluetooth	✓	✗	✗	✗	✗
USB	4x USB 2.0	2x USB 3.0, 2x USB 2.0	2x USB 3.0, 4x USB 2.0	2x USB 3.0, 3x USB 2.0	2x USB 3.0, 5x USB 2.0
FireWire	✓	✓	✓	✗	✗
Thunderbolt	✓	✗	✗	✗	✗
HDMI	✗	✓	✗	✓	✓
Media card slot	✓	✓	✓	✓	✓
Max disc speeds	8x DVD±R, 4x DVD±R DL, 8x DVD-ROM	BD-ROM/DVD±RW	DVD±R	BD-ROM/DVD±RW	BD-ROM/DVD+RW
Extras	Webcam, wireless keyboard	720p webcam, tuner, remote, wireless keyboard and mouse	2Mp webcam, wired keyboard and mouse	1.3Mp webcam, woofer, wireless keyboard and mouse	2Mp webcam, SATA dock
Operating system	Mac OS X 10.7 Lion	Windows 7 Home Premium 64bit	Windows 7 Professional 64bit	Windows 7 Home Premium 64bit	Windows 7 Home Premium 64bit
Power consumption	67W (idle), 180W (under load)	45W (idle), 111W (under load)	82W (idle), 210W (under load)	34W (idle), 93W (under load)	54W (idle), 132W (under load)
Crysis (720p)	133fps	111fps	109fps	104fps	111fps
Crysis (1080p)	12fps	8fps	7fps	7fps	8fps
WorldBench 6 score	147	140	172	163	169
Dimensions	650x517x207mm	650x220x480mm	660x419x59mm	590x461x230mm	571x128x464mm
Weight	13.8kg	11.6kg	21kg	10.8kg	10.5kg
Warranty	1-year return-to-base	1-year return-to-base	3-year onsite	1-year return-to-base	1-year collect-and-return
Verdict	<ul style="list-style-type: none"> <li>Peerless design and build quality</li> <li>Fantastic high-quality 27in screen</li> <li>Excellent gaming speed</li> <li>WorldBench score not as high as some</li> <li>OS X operating system</li> </ul>	<ul style="list-style-type: none"> <li>Sleek and stylish</li> <li>10-point touchscreen</li> <li>Strong software and multimedia features</li> <li>Relatively low WorldBench performance score</li> </ul>	<ul style="list-style-type: none"> <li>Excellent display</li> <li>Not a touch interface</li> <li>Superb all-round performance</li> <li>No Blu-ray support</li> <li>Many ports and connectors are hard to access</li> </ul>	<ul style="list-style-type: none"> <li>Strong build quality</li> <li>Screen has decent colour, but poor contrast and viewing angles</li> <li>Only two touch points</li> <li>Speaker system well above average</li> <li>Doesn't offer the best value</li> </ul>	<ul style="list-style-type: none"> <li>Good gaming performance</li> <li>Uninspiring plastic looks</li> <li>Quad-core Intel i5-3570K packs lots of power</li> <li>Fans are too noisy</li> <li>No preinstalled software</li> </ul>
FULL REVIEW	<a href="http://tinyurl.com/7THNXU8">TINYURL.COM/7THNXU8</a>	<a href="http://tinyurl.com/93EUU4F">TINYURL.COM/93EUU4F</a>	<a href="http://tinyurl.com/CJ8MCMa">TINYURL.COM/CJ8MCMa</a>	<a href="http://tinyurl.com/CHJDOMU">TINYURL.COM/CHJDOMU</a>	<a href="http://tinyurl.com/9K8WGS0">TINYURL.COM/9K8WGS0</a>

## >> Buying advice



### All-in-one PCs

Changes in exchange rates and component supply issues mean we can't guarantee PCs listed here will be available as specified. All our prices include delivery charges.

All-in-one PCs build into a large (21- to 27in) monitor all the components they require to run, making them an excellent and stylish solution for saving space.

However, with limited internal space for cooling, all-in-one machines tend to include less powerful components than traditional desktops. Expect to find integrated or laptop graphics processors and mobile CPUs inside.

All-in-ones aren't usually easy to upgrade, but many are pre-packed with Wi-Fi, Bluetooth, speakers and even Blu-ray players.

Touchscreen displays are likely to become more desirable once Windows 8 is released. If you buy one now, ensure the image quality hasn't been compromised and that it's sufficiently responsive to touch.

The quality of the supplied keyboard and mouse (usually wireless) is critical. TV tuners and HDMI ports are welcome additions.

[READ MORE: TINYURL.COM/87VW5KJ](http://tinyurl.com/87VW5KJ)



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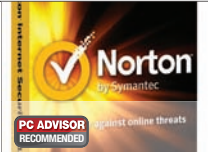



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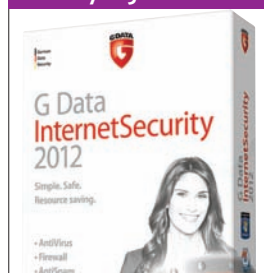


Internet security suites	    				
	G Data InternetSecurity	Norton Internet Security	Bitdefender Internet Security	Kaspersky Internet Security	Trend Micro Titanium IS
Annual price	£34 inc VAT	£49 inc VAT	£29 inc VAT	£39 inc VAT	£39 inc VAT
Licence terms	1 PC, 1 year	1 PC, 1 year	1 PC, 1 year	1 PC, 1 year	3 PCs, 1 year
Website	Gdatasoftware.co.uk	Uk.norton.com	Bitdefender.co.uk	Kaspersky.co.uk	Uk.trendmicro.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Signature-based detection	100 percent	99.9 percent	100 percent	99.3 percent	97.5 percent
Malware blocking (full)	100 percent	100 percent	96.2 percent	100 percent	92.3 percent
Malware blocking (partial)	N/A	N/A	0 percent	N/A	3.8 percent
Clean-up of malware	60 percent	50 percent	90 percent	60 percent	70 percent
On-demand scan speed	109 secs	68 secs	116 secs	71 secs	93 secs
On-access scan speed	116 secs	154 secs	265 secs	280 secs	314 secs
Interface design	Good	Very good	Superior	Very good	Very good
Verdict	<ul style="list-style-type: none"> <li>Excellent detection rates</li> <li>Good value</li> <li>Low impact on resources</li> <li>Confusing interface</li> </ul>	<ul style="list-style-type: none"> <li>Good all-rounder</li> <li>Fast scan times</li> <li>Clean interface</li> <li>Flagged some false-positives</li> </ul>	<ul style="list-style-type: none"> <li>Impacts system resources</li> <li>Very strong malware blocking and removal</li> <li>Intuitive interface</li> </ul>	<ul style="list-style-type: none"> <li>Strong block rate</li> <li>Above-average scan times</li> <li>Can affect PC performance</li> <li>Interface needs tweaking</li> </ul>	<ul style="list-style-type: none"> <li>Set-it-and-forget-it security</li> <li>Flagged some false-positives</li> <li>Reasonable scan speeds</li> <li>Ideal for novice users</li> </ul>
FULL REVIEW	<a href="http://tinyurl.com/7CZT5XB">TINYURL.COM/7CZT5XB</a>	<a href="http://tinyurl.com/CVVDWUR">TINYURL.COM/CVVDWUR</a>	<a href="http://tinyurl.com/75H3WUK">TINYURL.COM/75H3WUK</a>	<a href="http://tinyurl.com/6UEHPMW">TINYURL.COM/6UEHPMW</a>	<a href="http://tinyurl.com/7QTBP6">TINYURL.COM/7QTBP6</a>

GLOSSARY: • IS: Internet Security

Antivirus software	    				
	Norton AntiVirus	Bitdefender Antivirus Pro	G Data AntiVirus	Kaspersky Anti-Virus	Trend Micro Titanium AV+
Annual price	£39 inc VAT	£24 inc VAT	£34 inc VAT	£39 inc VAT	£39 inc VAT
Licence terms	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year
Website	Norton.com	Bitdefender.co.uk	Gdatasoftware.com	Kaspersky.co.uk	Uk.trendmicro.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Signature-based detection	98.7 percent	97.5 percent	99.4 percent	95.7 percent	98.4 percent
Malware blocking (full)	96 percent	68 percent	84 percent	88 percent	88 percent
Malware blocking (partial)	0 percent	20 percent	4 percent	4 percent	8 percent
Clean-up of active malware	80 percent	80 percent	80 percent	80 percent	80 percent
On-demand scan speed	121 secs	126 secs	111 secs	103 secs	187 secs
On-access scan speed	272 secs	327 secs	336 secs	310 secs	249 secs
Interface design	Very good	Very good	Very good	Very good	Very good
Verdict	<ul style="list-style-type: none"> <li>Smooth user interface</li> <li>Large 'Fix Now' button</li> <li>Moderate impact on system performance</li> </ul>	<ul style="list-style-type: none"> <li>Very good performance for malware removal</li> <li>Average scan speeds</li> <li>Three interface tiers</li> </ul>	<ul style="list-style-type: none"> <li>Strong malware detection, blocking and removal</li> <li>Good user interface, but poorly translated</li> </ul>	<ul style="list-style-type: none"> <li>Well-designed interface</li> <li>Easy to use</li> <li>On-demand single-file scans</li> <li>Impacts PC performance</li> </ul>	<ul style="list-style-type: none"> <li>Set-it-and-forget-it security</li> <li>Cloud-based protection</li> <li>Requires web connection</li> <li>Good performance</li> </ul>
FULL REVIEW	<a href="http://tinyurl.com/4P5YCX">TINYURL.COM/4P5YCX</a>	<a href="http://tinyurl.com/66SK77U">TINYURL.COM/66SK77U</a>	<a href="http://tinyurl.com/6BFXWCS">TINYURL.COM/6BFXWCS</a>	<a href="http://tinyurl.com/6HQA2WB">TINYURL.COM/6HQA2WB</a>	<a href="http://tinyurl.com/4HUORV3">TINYURL.COM/4HUORV3</a>

## >> Buying advice



## Security software

Every connected PC should have at least antivirus, antispyware and a firewall, and it's important that each is kept up to date. Avoid installing more than one real-time scanning component.

We work with world-renowned independent security testing lab AV-Test.org to evaluate the effectiveness of security software.

No security software is foolproof, but some are significantly better than others. And factors such as ease of setup, scan speeds, interface design and ability to deal with new threats set them apart.

The best products will offer parental controls, cloud protection, anti-phishing, anti-rootkit, virtual web browsers and keyboards, link

and file scanners, gaming modes, online backup and more.

The best value is usually offered by a three-user licence, but you can save some cash if your household has only one PC.

There are some good free antivirus products but, as in life, you get what you pay for.

[READ MORE: TINYURL.COM/7NR8FSM](http://tinyurl.com/7NR8FSM)



Tablets					
	1 <b>PC ADVISOR GOLD</b>	2 <b>PC ADVISOR GOLD</b>	3 <b>PC ADVISOR GOLD</b>	4 <b>PC ADVISOR RECOMMENDED</b>	5 <b>PC ADVISOR RECOMMENDED</b>
	Apple iPad 4	Google Nexus 7 by Asus	Apple iPad mini	Google Nexus 10 by Samsung	Amazon Kindle Fire HD
Price	£399 inc VAT	£159 inc VAT	£269 inc VAT	£319 inc VAT	£159 inc VAT
Website	Apple.com/uk	Play.google.com	Apple.com/uk	Play.google.com	Amazon.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Platform	Apple iOS 6.0.1	Google Android 4.1 Jelly Bean	Apple iOS 6.0.1	Google Android 4.2 Jelly Bean	Amazon (based on Android 4.0)
Screen size/resolution	9.7in/2048x1536	7in/1280x800	7.9in/1024x768	10.1in/2560x1600	7in/1280x800
Storage/media card slot	16GB/none	16GB/none	16GB/none	16GB/none	16GB/none
Connectivity	802.11a/b/g/n, Bluetooth4	802.11b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4, NFC	802.11b/g/n, Bluetooth 4
Processor	1.39GHz Apple A6X	1.3GHz nVidia Tegra 3	1GHz Apple A5	1.7GHz Cortex A-15	1.2GHz TI OMAP 4460
RAM	1GB	1GB	512MB	2GB	752MB
Claimed battery life	10 hrs	10 hrs	10 hrs	9 hrs	8 hrs
Cameras (front/rear)	1.2/5Mp	1.2Mp/none	1.2/5Mp	1.9/5Mp	1.3Mp/none
Dimensions	241x186x9.4mm	120x199x11mm	135x200x7.2mm	264x178x8.9mm	137x193x10.3mm
Weight	652g	336g	308g	603g	395g
Warranty	1 year	1 year	1 year	1 year	1 year
Verdict	<ul style="list-style-type: none"> <li>• Twice as fast as iPad 3</li> <li>• Superb graphics</li> <li>• Breathtaking display</li> <li>• Supports 4G where available</li> </ul>	<ul style="list-style-type: none"> <li>• Best budget tablet</li> <li>• Strong build quality</li> <li>• Nice screen</li> <li>• Impressive battery life</li> </ul>	<ul style="list-style-type: none"> <li>• 7.9in screen large for a mini</li> <li>• Vibrant but not Retina screen</li> <li>• Decent performance</li> <li>• Very good cameras</li> </ul>	<ul style="list-style-type: none"> <li>• Fastest tablet overall</li> <li>• Highest screen resolution</li> <li>• Excellent value</li> <li>• Can't match iPad on build</li> </ul>	<ul style="list-style-type: none"> <li>• Slick, intuitive OS based on Android 4.0</li> <li>• Vast content available</li> <li>• Excellent value</li> </ul>
FULL REVIEW	<a href="http://TINYURL.COM/CRSTDSK">TINYURL.COM/CRSTDSK</a>	<a href="http://TINYURL.COM/CGBA439">TINYURL.COM/CGBA439</a>	<a href="http://TINYURL.COM/CLJWUVS">TINYURL.COM/CLJWUVS</a>	<a href="http://TINYURL.COM/">TINYURL.COM/</a>	<a href="http://TINYURL.COM/CH6CLNZ">TINYURL.COM/CH6CLNZ</a>

Smartphones					
	1 <b>PC ADVISOR GOLD</b>	2 <b>PC ADVISOR BEST BUY</b>	3 <b>PC ADVISOR BEST BUY</b>	4 <b>PC ADVISOR RECOMMENDED</b>	5 <b>PC ADVISOR RECOMMENDED</b>
	Apple iPhone 5	Google Nexus 4 8GB	Samsung Galaxy S III	Motorola Razr i	HTC One S
Price	£529 inc VAT	£239 inc VAT	£425 inc VAT	£319 inc VAT	£449 inc VAT
Website	Apple.com/uk	Play.google.com	Samsung.com/uk	Motorola.com	Htc.com
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Platform	Apple iOS 6.0	Android 4.2 Jelly Bean	Android 4.0 ICS	Android 4.0 ICS	Android 4.0 ICS
Processor	1GHz Apple A6	1.5GHz Snapdragon S4 Pro	1.4GHz Exynos 4212 Quad	2GHz Intel Atom Z2480	1.5GHz Qualcomm Snapdragon
Storage/media card	16GB/none	8GB/none	16GB/microSDXC	8GB/microSD	16GB/none
Screen size/resolution	4in/640x1136	4.7in/768x1280	4.3in/800x480	4.3in/540x960	4.3in/960x540
Input method	Capacitive multitouch	IPS touchscreen	Capacitive touchscreen	Capacitive touchscreen	Capacitive multitouch
Connectivity	HSPA+, Bluetooth, Wi-Fi	HSPA+, GSM, Bluetooth, Wi-Fi	HSPA+, GSM, Bluetooth, Wi-Fi	HSPA+, Bluetooth, Wi-Fi	HSDPA, Bluetooth, Wi-Fi
Battery life (talk/standby)	8 hrs/225 hrs	Not specified	11 hrs/750 hrs	20hrs in average use	Not specified
Camera	8Mp, 1080p video	8Mp, 1080p video	8Mp, 1080p video	8Mp, 1080p video	8Mp, 1080p video
GPS	A-GPS, Glonass	GPS	A-GPS, Glonass	A-GPS	A-GPS
Dimensions, Weight	59x124x8mm, 115g	69x134x9.1mm, 139g	70x137x9mm, 133g	61x123x8.9mm, 126g	65x130.9x7.8mm, 119.5g
Warranty	1 year	2 years	2 years	1 year	1 year
Verdict	<ul style="list-style-type: none"> <li>• Very fast performance</li> <li>• Superb 4in screen</li> <li>• Beautifully balanced weight</li> <li>• Siri voice-recognition</li> </ul>	<ul style="list-style-type: none"> <li>• Stunning price tag</li> <li>• Exceptional build quality</li> <li>• Keyboard allows fast typing</li> <li>• Not great storage</li> </ul>	<ul style="list-style-type: none"> <li>• Best premium Android phone</li> <li>• Superb 4.8in screen</li> <li>• Strong build</li> <li>• Difficult to use one-handed</li> </ul>	<ul style="list-style-type: none"> <li>• Fast single-core Intel CPU</li> <li>• Edge-to-edge 4.3in display</li> <li>• Very robust build</li> <li>• Very good battery life</li> </ul>	<ul style="list-style-type: none"> <li>• Very good for multimedia</li> <li>• Excellent build quality</li> <li>• Good performance</li> <li>• Sense interface</li> </ul>
FULL REVIEW	<a href="http://TINYURL.COM/CTRJEJD">TINYURL.COM/CTRJEJD</a>	<a href="http://TINYURL.COM/D7HTPFJ">TINYURL.COM/D7HTPFJ</a>	<a href="http://TINYURL.COM/CQ4FM7X">TINYURL.COM/CQ4FM7X</a>	<a href="http://TINYURL.COM/D2XQ94V">TINYURL.COM/D2XQ94V</a>	<a href="http://TINYURL.COM/BSXFL6G">TINYURL.COM/BSXFL6G</a>

## >> Buying advice



## Smartphones

The smartphone you choose to use is a very personal choice - while some prefer a small device that slips into a pocket, others prefer a large-screen handset that's better suited to watching video and typing on an onscreen keyboard.

The screen's resolution is just as important as its size. More pixels mean text and photos look

sharper, and more information can be shown onscreen at once.

Unlike Android, iOS doesn't support Flash. However, HTML 5 is slowly replacing the standard, and Adobe has discontinued development of Flash Player for mobile devices in any case. Mobile apps can also allow you to view sites that still use Flash.


Look for a fast processor and decent graphics if you want to play games or watch video.

It's common to see mobile operators offer expensive handsets free with 24-month contracts. It'll usually work out cheaper to buy the handset outright, however, and it won't be locked to a network.

**READ MORE:** [TINYURL.COM/7SK2AS3](http://TINYURL.COM/7SK2AS3)



Sub-£150 printers	    				
	1	2	3	4	5
	Samsung ML-2955DW	Oki C110	Pantum P2050	Canon MX895	HP Photosmart 7520
Price	£98 inc VAT	£125 inc VAT	£60 inc VAT	£140 inc VAT	£130 inc VAT
Website	Samsung.com/uk	Oki.co.uk	Pantum.com	Canon.co.uk	Hp.com/uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Technology	Mono laser	Colour laser	Mono laser	Colour inkjet	Colour inkjet
Max print resolution	1200x1200dpi	1200x600dpi	1200x600dpi	9600x2400dpi	9600x2400dpi
Actual print speed	B=22.2ppm	B=15.8ppm/C=2.5ppm	B=15.8ppm	B=11.9ppm C=7.3ppm	B=17.6ppm C=7.9ppm
Scan/fax facilities	none	None	None	1200x2400 scans, fax	1200x2400 scans
Supported interfaces	USB 2.0, 802.11b/g/n, ethernet	USB 2.0	USB 2.0	USB 2.0, 802.11b/g/n, ethernet	USB 2.0, 802.11b/g/n, HP ePrint
Cost per page	B=2.7p	B=3.6p/C=5p	B=2.4p	B=2.9p/C=12.5p	B=2.4p/C=4.8p
Media card/auto duplex	✓	✗	✗	✓	✓
Input capacity	251 sheets	100 sheets	150 sheets + manual	150 sheets + 35 ADF	125 sheets + 20 tray + 25 ADF
Dimensions	348x338x197mm	396x380x275mm	380x260x236mm	491x448x218mm	454x551x220mm
Weight	7.2kg	14.4kg	6.1kg	11.7kg	8.6kg
Warranty	1 year	3 years	1 year	1 year	1 year
Verdict	<ul style="list-style-type: none"> <li>Speedy for the price</li> <li>Slim but well-defined text</li> <li>Reasonable running costs</li> <li>Wi-Fi/wired network support</li> </ul>	<ul style="list-style-type: none"> <li>Good value even at £140</li> <li>Performs better than an equivalent inkjet</li> <li>No duplex mode</li> </ul>	<ul style="list-style-type: none"> <li>Low price for a laser</li> <li>Decent design</li> <li>No fancy features</li> <li>Solid running costs</li> </ul>	<ul style="list-style-type: none"> <li>Excellent photo quality</li> <li>Both Wi-Fi and Ethernet</li> <li>Scans and faxes</li> <li>Not the fastest printer</li> </ul>	<ul style="list-style-type: none"> <li>Nice 4.3in touchscreen</li> <li>Separate photo/ADF trays</li> <li>Good speed for an inkjet</li> <li>Competitive running costs</li> </ul>
FULL REVIEW	TINYURL.COM/CCLSZDM	TINYURL.COM/YLNO5RV	TINYURL.COM/C764SZ2	TINYURL.COM/92YQ4SF	TINYURL.COM/98G9XTE

£151+ printers	    				
	1	2	3	4	5
	Kyocera Mita FS-1320D	Kyocera FS-C5250DN	Brother MFC-J4510DW	Kyocera Ecosys FS-4300DN	Brother HL-5450DN
Price	£170 inc VAT	£448 inc VAT	£185 inc VAT	£930 inc VAT	£240 inc VAT
Website	Kyoceramita.co.uk	Kyoceramita.co.uk	Brother.co.uk	Kyoceramita.co.uk	Brother.co.uk
Overall rating	★★★★★	★★★★★	★★★★★	★★★★★	★★★★★
Technology	Mono laser	Colour laser	Colour inkjet	Mono laser	Mono laser
Max print resolution	1200x1200dpi	600x600dpi	6000x1200dpi	1200dpi	1200x1200dpi
Actual print speed	B=26.1ppm	B=24.8ppm/C=18.3ppm	B=18.8ppm/C=12.8ppm	B=41.2ppm	B=32ppm
Scan/fax facilities	None	None	2400x2400 scans, fax	None	None
Supported interfaces	USB 2.0	USB 2.0, ethernet	USB 2.0, ethernet, Wi-Fi	USB 2.0, ethernet	USB 2.0, ethernet
Cost per page	B=1.4p	B=1.2p/C=5.2p	B=2.8p/C=5.7p	B=0.4p	B=1.2p
Media card/auto duplex	✓	✓	✓	✓	✓
Input capacity	250 sheets	500 + 50 sheets	150 + 20 sheet ADF	500 + 100 sheets	250 + 50 sheets
Dimensions	375x393x250mm	390x523x397mm	480x290x185mm	380x416x320mm	371x384x245mm
Weight	12kg	30kg	9.3kg	14.6kg	10.5kg
Warranty	2 years	2 years	2 years	2 years	1 year
Verdict	<ul style="list-style-type: none"> <li>No frills business laser</li> <li>Lacks Wi-Fi and ethernet</li> <li>Modest running costs</li> <li>Auto-duplex support</li> </ul>	<ul style="list-style-type: none"> <li>Blistering speed</li> <li>Huge paper capacity</li> <li>Colour printing isn't perfect</li> <li>Hefty</li> </ul>	<ul style="list-style-type: none"> <li>Can print A3 pages, but not as well as dedicated models</li> <li>Vast feature set</li> <li>Better for text than graphics</li> </ul>	<ul style="list-style-type: none"> <li>High printing speed</li> <li>Excellent paper handling, expandable to 2,600 sheets</li> <li>Stunning running costs</li> </ul>	<ul style="list-style-type: none"> <li>Strong mono print speed</li> <li>Reasonable print costs</li> <li>Solid print quality</li> <li>No LCD display</li> </ul>
FULL REVIEW	TINYURL.COM/6GG9UKV	TINYURL.COM/7QMXVZA	TINYURL.COM/BUE2DMY	TINYURL.COM/9Y9HHT3	TINYURL.COM/96CP7G6

GLOSSARY: • B: mono • C: colour • ppm: pages per minute

## >> Buying advice



## Printers

Most printers are inkjet or laser models, and there are colour and mono flavours of each. Lasers tend to be more expensive to buy, but provide better-quality output, particularly where text is involved.

The price you pay in-store is only the beginning; also consider the cost of replenishing the ink and paper. Duplexing lets you print to

both sides of a sheet, saving paper but slowing output.

Multifunction printers can save you money if you also require scanning facilities; some models include copy and fax functions, too.

A USB port lets you connect a printer to a single PC, but built-in wireless networking allows it to join a home or office network.

A memory card slot will let you bypass a PC for printing.






Never trust a manufacturer's claimed print speeds; we run our own tests to properly assess each printer's performance.

High-capacity paper trays and auto document feeders are also worth looking for.

**READ MORE:** [TINYURL.COM/BUX9QMO](http://tinyurl.com/bux9qmo)



External hard drives					
	1 <b>PC ADVISOR BEST BUY</b>	2 <b>PC ADVISOR RECOMMENDED</b>	3 <b>PC ADVISOR RECOMMENDED</b>	4 <b>PC ADVISOR GOLD</b>	5
	Seagate FreeAgent GoFlex	WD My Passport Edge for Mac	iStorage diskAshur DT 3TB	G-Tech G-Raid Thunderbolt	WD My Book Thunderbolt Duo
Price	£175 inc VAT	£80 inc VAT	£295 inc VAT	£750 inc VAT	£375 inc VAT
Website	Seagate.com	Wdc.com/en	Istorage-uk.com	G-technology.com	Wdc.com
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Capacity tested	3TB	500GB	3TB	8TB	4TB
Capacity range	1TB to 3TB	500GB	1TB to 3TB	4TB to 8TB	4TB to 6TB
Disk size	3.5in	2.5in	3.5in	3.5in	3.5in
Spin speed	7,200rpm	5,400rpm	5,400rpm	7,200rpm	7,200rpm
Transfer speed	94MBps (USB 3.0)	94Mbps (USB 3.0)	155MBps (USB 3.0)	329MBps	223MBps
Encryption	192bit	Password protection	256bit	None	None
Other interfaces	Optional FireWire 800	None	None	None	None
Software	Memo Backup	WD utilities	None	None	WD Drive Utilities
Dimensions	158x124x44mm	112x83x11mm	183x112x40mm	235x130x85mm	165x157x99mm
Weight	1kg	164g	1.2kg	2.3kg	2.2kg
Warranty	2 years	3 years	3 years	3 years	3 years
Verdict	<ul style="list-style-type: none"> <li>Great speed for USB 3.0</li> <li>Great value for capacity</li> <li>Separate storage drive and USB 3.0 dock</li> </ul>	<ul style="list-style-type: none"> <li>Not just for Macs</li> <li>Password protection</li> <li>Faultless build quality</li> <li>Great value</li> </ul>	<ul style="list-style-type: none"> <li>Hardware encryption is difficult to break and requires no software</li> <li>Superb performance</li> </ul>	<ul style="list-style-type: none"> <li>Fast Thunderbolt interface</li> <li>Real-world speed can exceed 200MBps</li> <li>Pricey, but huge capacity</li> </ul>	<ul style="list-style-type: none"> <li>Thunderbolt interface</li> <li>Not as fast as some Thunderbolt Raid drives</li> <li>Quiet and cool operation</li> </ul>
FULL REVIEW	<a href="http://TINYURL.COM/BN2Z92F">TINYURL.COM/BN2Z92F</a>	<a href="http://TINYURL.COM/BMG7SW9">TINYURL.COM/BMG7SW9</a>	<a href="http://TINYURL.COM/BMGKSVY">TINYURL.COM/BMGKSVY</a>	<a href="http://TINYURL.COM/CXEF6MH">TINYURL.COM/CXEF6MH</a>	<a href="http://TINYURL.COM/C6TADAH">TINYURL.COM/C6TADAH</a>

NAS drives					
	1 <b>PC ADVISOR BEST BUY</b>	2 <b>PC ADVISOR RECOMMENDED</b>	3 <b>PC ADVISOR RECOMMENDED</b>	4	5
	Synology DS412+	Zyxel NSA325	Qnap TS-419P II	Netgear ReadyNAS Pro 6	Iomega StorCenter px6-300d
Price	£505 inc VAT (diskless)	£90 inc VAT (diskless)	£400 inc VAT (diskless)	£853 inc VAT (diskless)	£576 inc VAT (diskless)
Website	Synology.com	Zyxel.co.uk	Qnap.com	Netgear.co.uk	Go.iomega.com
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Drive bays	4	2	4	6	6
Processor	2.13GHz Intel Atom D2700	1.6GHz processor	2GHz Marvell 88F66282	2.66GHz Intel Pentium	1.8GHz Intel Atom D525
Memory	1GB DDR3	512MB DDR2	512MB DDR3	2GB DDR2	2GB DDR3
Remote access	✓	✓	✓	✓	✓
eSATA	✓	✗	✓	✗	✗
USB port	2x USB 3.0, 1x USB 2.0	2x USB 2.0	4x USB 2.0	2x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0
Raid options	0/1/5/5+s/6/10/JBOD	0/1/JBOD	0/1/5/6/10/JBOD	0/1/5/6/10	0/1/10/5/5+s/6
Software	DSM 4.0	zPilot	TurboNAS 3.6.1	Netgear RAIDiator	EMC LifeLine, Iomega Link
Dimensions	165x203x233mm	108x205x147mm	177x180x235mm	170x250x285mm	257x176x270mm
Weight	2kg	1.8kg	3kg	7.3kg	4.9kg
Warranty	2 years	1 year	2 years	5 years	3 years
Verdict	<ul style="list-style-type: none"> <li>Superb read/write performance</li> <li>Powerful options</li> <li>Attractive and intuitive</li> </ul>	<ul style="list-style-type: none"> <li>Cheapest drive here</li> <li>Decent performance and features for the money</li> <li>Complex interface</li> </ul>	<ul style="list-style-type: none"> <li>Well priced</li> <li>Robust cabinet construction</li> <li>Solid performance</li> <li>Old but effective interface</li> </ul>	<ul style="list-style-type: none"> <li>Most expensive NAS here</li> <li>Mostly strong performance</li> <li>Internal power supply</li> <li>Complex admin interface</li> </ul>	<ul style="list-style-type: none"> <li>High-quality construction</li> <li>Features suitable for home and business use</li> <li>Decent performance</li> </ul>
FULL REVIEW	<a href="http://TINYURL.COM/6UUL4DE">TINYURL.COM/6UUL4DE</a>	<a href="http://TINYURL.COM/7B9EPW8">TINYURL.COM/7B9EPW8</a>	<a href="http://TINYURL.COM/72N4GBN">TINYURL.COM/72N4GBN</a>	<a href="http://TINYURL.COM/84JD226">TINYURL.COM/84JD226</a>	<a href="http://TINYURL.COM/7AT8HA5">TINYURL.COM/7AT8HA5</a>

## >> Buying advice



### NAS drives

NAS drives are ideal for businesses or home users who require large amounts of dependable and secure storage, accessible to anyone logged into the local wired or wireless network.

Instead of connecting a hard disk directly to one PC, the NAS is connected to a network via a router. Many NAS drives are

typically supplied without disks, letting you add your own selection.

Most NAS drives allow virtual partitions, letting you keep data such as PC backups separate from media files. Home-oriented NAS drives also include media servers to allow easy streaming of content.

To augment data integrity, access speed, capacity, or all

three, individual hard disks can be combined in a number of Raid configurations. Raid 0 'stripes' data across multiple drives to increase access speeds. Raid 1 mirrors the contents of one drive on to another, providing a cloned backup. Raid 5 is available with three-plus drives and combines both advantages.

**READ MORE:** [TINYURL.COM/7H3HCNR](http://TINYURL.COM/7H3HCNR)



Projectors					
	InFocus ScreenPlay SP8600	Vivitek Qumi Q2	Dell M110	ViewSonic Pro8300	NEC NP43
Price	£670 inc VAT	£400 inc VAT	£401 inc VAT	£850 inc VAT	£610 inc VAT
Website	Infocus.com	Vivitek.co.uk	Dell.co.uk	Viewsoniceurope.com/uk	Nec-display-solutions.co.uk
Overall rating	★★★★★	★★★★☆	★★★★☆	★★★★☆	★★★★★
Projection technology	DLP	DLP	DLP	DLP	DLP
Resolution (pixels)	1920x1080	1280x800	1280x800	1920x1080	1024x768
Brightness <sup>1</sup> , Contrast	1,800, 5,000:1	300, 2,500:1	300, 10,000:1	3,000, 4,000:1	2,300, 1,600:1
Image size	300in	30-90in	80in	300in	300in
Supported aspect ratios	16:10, 16:9, 4:3	16:10, 16:9, 4:3	16:10, 16:9, 4:3	16:9, 4:3	16:9, 4:3
Noise levels (dB)	30 (26 eco)	32 (28 eco)	36 (32 eco)	33 (29 eco)	37 (32 eco)
Connections	VGA, HDMI, CM, CP, SV, USB	VGA, HDMI, USB	VGA, HDMI, CM, CP, USB	VGA, HDMI, SV, USB	VGA, SV, USB
Lamp/lamp life	230W/4,000 hrs	LED/30,000 hrs	LED/10,000 hrs	230W/4,000 hrs	200W/1,000 hrs
Dimensions	326x254x104mm	162x102x32mm	105x104x37mm	332x110x264mm	246x72x177mm
Weight	3.4kg	635g	360g	3.9kg	1.7kg
Warranty	5 years	3 years	2 years	3 years	2 years
Verdict	<ul style="list-style-type: none"> <li>• Smooth video playback</li> <li>• Full-HD resolution</li> <li>• Great contrast levels</li> <li>• Bright, colourful image</li> </ul>	<ul style="list-style-type: none"> <li>• Now fantastic value</li> <li>• Lightest model here</li> <li>• DLP-Link enables 3D display</li> <li>• Exceptional lamp life rating</li> </ul>	<ul style="list-style-type: none"> <li>• Ultra-small and -light</li> <li>• Good colour</li> <li>• Long-life LED lamp</li> <li>• Remote control costs extra</li> </ul>	<ul style="list-style-type: none"> <li>• Good brightness levels</li> <li>• Flexible connectivity</li> <li>• Lacks colour depth, and cinematic content suffers</li> </ul>	<ul style="list-style-type: none"> <li>• Portable business model</li> <li>• Strong Auto Focus</li> <li>• Customisable settings</li> <li>• Decent image quality</li> </ul>
FULL REVIEW	TINYURL.COM/3HQANPV	TINYURL.COM/3TXMWPK	TINYURL.COM/77S8D6D	TINYURL.COM/9PU6XJS	TINYURL.COM/62W3796

<sup>1</sup>Ansi lumens GLOSSARY: • CM: component • CP: composite • SV: S-Video

Compact system cameras					
	Panasonic DMC-G3 (14-42mm)	Nikon D5100 (18-55mm)	Sony Alpha NEX-5 (18-55mm)	Canon EOS 600D (18-55mm)	Pentax K-01 (18-55mm)
Price	£350 inc VAT	£530 inc VAT	£490 inc VAT	£590 inc VAT	£425 inc VAT
Website	Panasonic.co.uk	Nikon.co.uk	Sony.co.uk	Canon.co.uk	Pentax.co.uk
Overall rating	★★★★★	★★★★☆	★★★★★	★★★★☆	★★★★☆
Megapixel rating	16Mp	16.2Mp	14.6Mp	18Mp	16.28Mp
Maximum resolution	4592x3448 pixels	4923x3264 pixels	4592x3056 pixels	5184x3456 pixels	4928x3264 pixels
Optical zoom	3x	3x	3.1x	3x	N/A
Maximum aperture	f3.5-f5.6	f3.5-f5.6	f3.5-f5.6	f3.5-f5.6	N/A
LCD size	3in	3in	3in	3in	3in
Media card	SD/SDHC/SDXC	SD/SDHC/SDXC	MS/SD/SDHC	SD/SDHC/SDXC	SD/SDHC/SDXC
Battery/life	1x lithium-ion/270 shots	1x lithium-ion/660 shots	1x lithium-ion/not specified	1x lithium-ion/440 shots	1x lithium-ion/540 shots
ISO range	100 to 6,400	100 to 6,400	200 to 12,800	100 to 6,400	100 to 12,800
Dimensions	115x84x47mm	124x97x79mm	111x59x38mm	133x100x80mm	121x59x79mm
Weight	336g	510g	229g	570g	480g
Warranty	3 years	3 years	1 year	1 year	1 year
Verdict	<ul style="list-style-type: none"> <li>• Great dSLR alternative</li> <li>• Rotating touchscreen</li> <li>• Strong video-capture mode</li> <li>• Very fast autofocus</li> </ul>	<ul style="list-style-type: none"> <li>• Excellent stills and video</li> <li>• Suitable for novice and intermediate photographers</li> <li>• Plenty of lenses available</li> </ul>	<ul style="list-style-type: none"> <li>• Compact</li> <li>• Great performance</li> <li>• Great colour fidelity</li> <li>• Takes clean, sharp shots</li> </ul>	<ul style="list-style-type: none"> <li>• Top-notch photo results</li> <li>• Fully auto/manual modes</li> <li>• Articulated LCD screen</li> <li>• Strong video capture</li> </ul>	<ul style="list-style-type: none"> <li>• K-mount lens</li> <li>• Impressive image quality</li> <li>• No optical viewfinder</li> <li>• Slower than digital SLRs</li> </ul>
FULL REVIEW	TINYURL.COM/7JCXJCR	TINYURL.COM/6UTE9KK	TINYURL.COM/37XOZX5	TINYURL.COM/72STE88	TINYURL.COM/BOAJT08

## >> Buying advice



## Projectors

Projectors designed for home use don't tend to be as bright as office models - anything offering fewer than 1,000 Ansi lumens will be usable only in a dark room. And don't forget that the brightness drops as the image size increases.

The cheapest home-cinema models offer a 720p resolution, but you'll notice the extra detail

of 1080p when watching Blu-ray films on a large screen.

If you can't place the projector square-on to the screen, look for a model with lens shift. Keystone correction is a cheaper alternative, altering the image digitally, but degrading quality in the process.





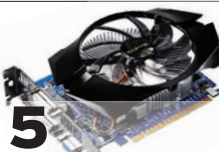
A zoom function offers more flexibility over how far from the






screen you can site the projector. If it's to go in a small room, get a short-throw model that produces a large image over a short distance.

DLP projectors offer better contrast and punchier colours than LCD models, but can suffer from the distracting and sometimes nauseating 'rainbow effect'.

READ MORE: [TINYURL.COM/6MTMWJX](http://TINYURL.COM/6MTMWJX)



Sub-£150 graphics cards					
	1	2	3	4	5
	<b>Sapphire HD 7770 OC</b>	<b>Sapphire Radeon HD 7750</b>	<b>Asus Radeon HD 6670</b>	<b>PNY XLR8 GTX 650 Ti</b>	<b>Gigabyte GeForce GT 640 OC</b>
Price	<b>£105 inc VAT</b>	<b>£80 inc VAT</b>	<b>£60 inc VAT</b>	<b>£130 inc VAT</b>	<b>£96 inc VAT</b>
Website	Sapphiretech.com	Sapphiretech.com	Uk.asus.com	Pnyeuropa.com	Uk.gigabyte.com
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Graphics processor	AMD Radeon HD 7770	AMD Radeon HD 7750	AMD Radeon HD 6670	nVidia GeForce GTX 650 Ti	nVidia GeForce GT 640
Installed RAM	1GB GDDR5	1GB GDDR5	1GB DDR3	1GB GDDR5	2GB DDR3
Memory interface	128bit	128bit	128bit	128bit	128bit
Core/memory clock	1GHz/1,150MHz	800MHz/1,125MHz	800MHz/900MHz	928MHz/1,350MHz	1,050MHz/1,800MHz
Ramdac	400MHz	400MHz	400MHz	400MHz	400MHz
Stream processors	640	512	480	768	384
Power connectors	1x 6-pin	None	None	1x 6-pin	None
Interface	PCI Express	PCI Express	PCI Express	PCI Express	PCI Express
DirectX	11.1	11.0	11.0	11.0	11.0
Digital interface	DVI, HDMI, Mini-DisplayPort	DVI, HDMI, DisplayPort	DVI, HDMI	2x DVI, 1x Mini-HDMI	2x DVI, HDMI
Warranty	3 years	2 years	3 years	2 years	3 years
Verdict	<ul style="list-style-type: none"> <li>• Faster than 7750</li> <li>• Good value at just £25 more</li> <li>• Only 128bit memory</li> <li>• Low sound levels</li> </ul>	<ul style="list-style-type: none"> <li>• Offers better overall value than the GT 640 OC</li> <li>• Some way behind the 7770</li> <li>• Light on power</li> </ul>	<ul style="list-style-type: none"> <li>• Great-value video card</li> <li>• 800MHz core clock memory</li> <li>• 128bit memory limits appeal</li> <li>• Lacks power for some games</li> </ul>	<ul style="list-style-type: none"> <li>• Plenty of performance</li> <li>• Good set of specifications</li> <li>• Hampered by 128bit memory interface</li> </ul>	<ul style="list-style-type: none"> <li>• Costs more than 7750</li> <li>• Falls far behind 7770</li> <li>• The best version of this card</li> <li>• Three digital connectors</li> </ul>
FULL REVIEW	<a href="http://TINYURL.COM/BWJ7BL9">TINYURL.COM/BWJ7BL9</a>	<a href="http://TINYURL.COM/7ZB5OE3">TINYURL.COM/7ZB5OE3</a>	<a href="http://TINYURL.COM/3LM8HGE">TINYURL.COM/3LM8HGE</a>	<a href="http://TINYURL.COM/8Z5BDCZ">TINYURL.COM/8Z5BDCZ</a>	<a href="http://TINYURL.COM/9OSWMK2">TINYURL.COM/9OSWMK2</a>

£151+ graphics cards					
	1	2	3	4	5
	<b>MSI GeForce GTX 670</b>	<b>Zotac GeForce GTX 680</b>	<b>Asus GTX 660 Ti</b>	<b>Asus HD 7870 DirectCU II</b>	<b>XFX 7970 3GB GDDR5</b>
Price	<b>£300 inc VAT</b>	<b>£400 inc VAT</b>	<b>£250 inc VAT</b>	<b>£210 inc VAT</b>	<b>£320 inc VAT</b>
Website	Uk.msi.com	Zotac.com	Uk.asus.com	Uk.asus.com	Xfxforce.com
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Graphics processor	nVidia GeForce GTX 670	nVidia GeForce GTX 680	nVidia GeForce GTX 660 Ti	AMD Radeon HD 7870	AMD Radeon HD 7970
Installed RAM	2GB GDDR5	2GB GDDR5	2GB GDDR5	2GB GDDR5	3GB GDDR5
Memory interface	256bit	256bit	192bit	256bit	284bit
Core/memory clock	915MHz/1,502MHz	1,006MHz/1,502MHz	915MHz/6,008MHz	1GHz/1.2GHz	925MHz/1,375MHz
Ramdac	400MHz	400MHz	400MHz	400MHz	400MHz
Stream processors	1,344	1,536	1,344	1,280	2,048
Power connectors	2x 6-pin	2x 6-pin	2x 6-pin	2x 6-pin	1x 6-pin, 1x 8-pin
Interface	PCI Express	PCI Express	PCI Express	PCI Express	PCI Express
DirectX	11.0	11.0	11.0	11.1	11.1
Digital interface	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	DVI, HDMI, 2x Mini-DP	DVI, HDMI, 2x Mini-DisplayPort
Warranty	2 years	5 years	2 years	2 years	2 years
Verdict	<ul style="list-style-type: none"> <li>• Almost on a par with 7970</li> <li>• Low power consumption</li> <li>• Same memory bandwidth as GTX 680</li> </ul>	<ul style="list-style-type: none"> <li>• Fastest single-GPU card</li> <li>• Low power consumption</li> <li>• Price drop to 7970 weakens this card's value for money</li> </ul>	<ul style="list-style-type: none"> <li>• Faster than 7870</li> <li>• Nicely priced</li> <li>• Can boost clock to 1,058MHz</li> <li>• Compares well to GTX 670</li> </ul>	<ul style="list-style-type: none"> <li>• GTX 660 Ti is better value</li> <li>• Cheaper than GTX 670, but behind on framerates</li> <li>• Modest power consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Good performance</li> <li>• Not as powerful or as efficient as GTX 680</li> <li>• Close to 7870 on value</li> </ul>
FULL REVIEW	<a href="http://TINYURL.COM/CRDW78J">TINYURL.COM/CRDW78J</a>	<a href="http://TINYURL.COM/C6C37QO">TINYURL.COM/C6C37QO</a>	<a href="http://TINYURL.COM/D5BV2NG">TINYURL.COM/D5BV2NG</a>	<a href="http://TINYURL.COM/BUFMAFF">TINYURL.COM/BUFMAFF</a>	<a href="http://TINYURL.COM/6UZRVXC">TINYURL.COM/6UZRVXC</a>

## >> Buying advice



## Graphics cards

The key feature of a graphics card is its GPU. Produced by AMD or nVidia, this determines the quality of images displayed and their refresh speed. The more powerful the GPU the better, but you can get away with a lesser card by turning down a game's detail levels.

Even those on a budget should be able to get at least 1GB of DDR

video memory. Look for GDDR5 rather than GDDR3 RAM. This in effect quadruples the clock speed (GDDR3 merely doubles it).

The memory interface (or bus) governs how much data can be sent at once, so a 256bit interface lets through twice as much data as a 128bit interface. Graphics cards with the best combination of memory interface size and

clock speed should produce the best performance.

DirectX 11.x support is required for advanced, modern games; cheaper cards lack the firepower to do such titles justice, however.

Check that a card will fit inside your PC and you have sufficient connections from the power supply unit before you buy.

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JIM  
MARTIN



## A necessary divide

**M**icrosoft says it designed Windows 8 to work across all devices, from the tiny screen of a smartphone right up to the biggest PC monitor. The tiled interface does this job pretty well but, as I've said before, Windows 8 on the desktop feels like two OSes in one.

I've been using Windows 8 as my main OS for a good five months now, and almost never use the new Start screen. That's partly because there's no need to, apart from launching the odd app for which I don't have a desktop shortcut, and partly due to the fact that there are still no killer apps in the Windows Store.



A bigger issue, though, is that the two halves of Windows 8 on the desktop aren't integrated in any meaningful way. It's obvious that this is a deliberate decision on Microsoft's part, since live tiles could easily have been introduced to the traditional desktop to merge the old and new.

Already hacks are appearing to bring back the old Windows 7 Start menu, but Windows 8 could have had an updated Start menu with live tiles and Charms. Alternatively, live tiles could have been made a part of the desktop itself, or displayed on a sidebar as the old Gadgets were.

This all points to a future where, perhaps even in Windows 9, the desktop will be relegated to history and users will be forced to rely on apps. This may be a mistake, since apps are designed for touch operation.

It seems pretty unlikely that millions of PC users will upgrade their monitors to touchscreens any time soon, or that anyone will really use their new touchscreen laptop or all-in-one PC in the way it was intended once the novelty wears off - and arm ache sets in.

The humble keyboard and mouse will remain the tools people use to interact with their PC. App designers would do well to bear this in mind, as well as to make sure their apps don't deliver only a dumbed-down feature set. PCs are more powerful than a tablet or smartphone and I, for one, don't want a bunch of tablet-style apps that don't offer the power or control existing programs do.

Windows 8 may or may not be a great success on tablets, smartphones and other touchscreen devices, but here's hoping that Windows 9 doesn't drive loyal Windows users to Mac OS instead. ☒

## Next issue

ISSUE 213 ON SALE 7 FEBRUARY 2013

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