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# PC ADVISOR

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MATT  
EGAN



# The crowd in the cloud

Cloud computing could form an important part of your technological life, but you have to know what you're looking for

In conversation with an older relative the other day I was astounded when they casually dropped in the following question: "I see you weren't at CES this year. Was that because it is on the way down, with no Apple and no Microsoft?" Reader, my flabber was gasted. Firstly, that my relative had any idea of what I do and why I have on occasion spent time in Nevada, but also that he was sufficiently aware of CES to have formed an opinion on a tech tradeshow.

For the record, Apple hasn't been to CES in years, and Microsoft's absence may be best for both parties. There was no killer product or product type at CES 2013, but the fact that non-tech fans are even aware of its existence shows both the enduring power of that show, and just how mainstream technology now is. Check out our best of CES special on page 24.

It can be strange to edit a niche publication whose subject is now considered fodder for the mainstream press. On the one hand we have more than 5 million readers, which is nice, and when Windows 8 launched I was quoted in a national newspaper. Unfortunately my nuanced take on Microsoft's latest OS was distilled to just a few words, one of which was 'sexy' (and not in a good way). If computers are now consumer technology goods and tech is for everyone, it's a shame that the way it is covered for- and promoted to the masses is so often dumbed down.

Cloud computing is a classic example. Being able to store files and media on the web has the potential to change forever the way we compute. Combined with the variety of always-connected devices that we increasingly carry, it means we can access our music and movies, or work on documents, wherever we are. This would require an unreasonable amount of local storage, but save things to the cloud and, provided you can get online, you're good to go.

But 'cloud' has become a buzz word, and there is a bewildering range of sites and services from which you can choose. Each has its own pricing structure, pros and cons. And that's just the true cloud services: due to the popularity of the term, vendors of any kind of online service have taken to appending the word 'cloud' to their products. In this issue of *PC Advisor* we aim to address those issues.

There are several different types of cloud-computing service. You can roughly group them as follows: services that let you share and sync files and those that allow you to collaborate on documents; tools with which to send large files, and online backup services; and then there are the fun ones: cloud services that allow you to store and share music and photos.

The whole point about the cloud is it should simplify and make portable your established workflows. So, when choosing a cloud provider, the critical factors are what job you want it to do, and how much that will cost. Factor in what smartphones, tablets, PCs and laptops you wish to use, and you should find a cloud computing client and service to suit you. Turn to page 95 to start your journey into the clouds. ☐



## Regulars & offers

- |    |              |     |                     |
|----|--------------|-----|---------------------|
| 3  | Welcome      | 100 | Win! An Amazon      |
| 3  | Contacts     |     | Kindle Fire tablet! |
| 7  | Inbox        | 122 | Cover Disc+         |
| 12 | News         | 126 | Subscribe!          |
| 24 | New Products | 146 | Next month          |



## 12 News & analysis

- |  |  |
|--|--|
| <b>16 When hacking goes social</b><br>Why you should never let down your guard.  | <b>20 AMD aims for high-end tablets</b><br>AMD hopes Windows 8 will help it rake in the cash in the tablet market. |
| <b>18 Smartphones in 2013: five trends</b><br>Full-HD screens, quad-core CPUs, 13Mp cameras and more.                          | <b>21 HP takes on tablets once again</b><br>HP's back, with the ElitePad 900.                                      |
| <b>19 Intel playing catch-up on mobile CPUs</b><br>The latest chips from ARM and Qualcomm prove a lot for Intel to live up to. | <b>22 802.11ac boosts video streaming</b><br>We look at what the latest Wi-Fi standard has in store.               |

## 30 Reviews



### HARDWARE

- 32 Apple iMac 21.5in (Late 2012)
- 32 Lenovo IdeaTab A2109A
- 33 Sony Vaio Duo 11
- 34 Samsung Chromebook
- 34 Toshiba Satellite P875-31P
- 35 Chillblast Fusion Stealth
- 35 Wired2Fire Diablo Predator
- 36 Toshiba 32HL933B
- 36 Iomega StorCenter ix2-200
- 37 Samsung 840 Series
- 38 Canon Selphy CP900
- 38 Crucial Ballistix Tactical LP
- 39 Sony Reader PRS-T2
- 39 Matias Quiet Pro Keyboard

### APPS

- 42 StumbleUpon for Windows 8
- 42 Xbox SmartGlass
- 43 BBC Sport
- 43 Grand Theft Auto: Vice City 10th Anniversary Edition

### SOFTWARE

- 44 McAfee All Access 2013
- 44 Trend Micro Titanium Maximum Security 2013
- 45 Corel WinZip 17.0 Pro
- 46 DivX Plus 9
- 46 Fieldrunners 2
- 47 Call of Duty: Black Ops 2

### BUSINESS

- 48 Canon i-Sensys MF4890dw
- 48 Canon Pixma MG6350
- 49 Kyocera FS-1061DN

- 49 Samsung CLX-6260FW
- 50 Xerox Phaser 3320
- 50 Xerox 7600i

### GAMING LAPTOPS

- 54 Alienware M17x
- 54 Asus G75VW
- 55 Chillblast Genesis 7970
- 55 PC Specialist Optimus IV
- 56 Schenker Notebooks XMG P502 Pro
- 56 Toshiba Qosmio X870-143

### SMARTPHONES

- 64 Apple iPhone 5
- 64 Google Nexus 4
- 66 HTC Desire X
- 66 HTC Windows Phone 8X
- 68 Nokia Lumia 920
- 68 Samsung Galaxy Note II
- 70 Sony Xperia T

### FAMILY PCs

- 74 Arbico Elite 3565XL
- 74 Chillblast Fusion Lynx
- 75 CyberPower Ultra Scylla SE (MKII)
- 75 Eclipse Solar i5357N66Ti
- 76 PC Specialist Vanquish HD-660
- 77 YoYoTech Piranha Cobalt SE

### WEB-DESIGN PACKAGES

- 82 1&1 MyWebsite Personal
- 82 Jimdo Pro
- 83 Moonfruit Standard
- 83 Mr Site Pro
- 84 Serif WebPlus X6
- 84 WordPress

## On the cover



## 52 Features & group tests

### 52 Gaming laptops round-up

We look at six laptops that are capable of meeting all your everyday computing needs, plus the odd spot of framerate-pumping hardcore gaming.

### 62 Best smartphones

Which smartphone goes into your pocket is an important choice. We review some of the best handsets on the market, running iOS, Android and Windows Phone.

### 72 Family PCs group test

To suit every member of the household, a family PC needs to offer decent performance in every area. We look at six desktop machines that can fulfil all your family's demands.

### 80 Web-design packages

Need to build a website? Look no further than one of these six on- and offline packages.

### 88 Out-of-body experiences

Forget prancing about in front of a Kinect or Wii console, out-of-body computing has the power to change lives. We take a look at the not-so-distant future, in which the humble keyboard and mouse take a back seat.

### 95 Cloud storage superguide

We show you how you can ditch your hard drive and take advantage of the web for the storage, syncing and sharing of your digital files. We look at 20 cloud-storage services, from Dropbox and iCloud to SkyDrive and more.



88

**TEST  
CENTRE**

## 129 Top 5 charts: Buyer's guide

- 130 Ultraportable laptops
- 131 Sub-£500 laptops
- 132 £501-£1,000 laptops
- 133 £1,001+ laptops
- 134 Media PCs
- 135 Gaming PCs
- 136 All-in-one PCs
- 138 Business PCs
- 139 Tablets
- 139 Antivirus software
- 140 Sub-£150 printers
- 140 £151+ printers
- 141 Blu-ray drives
- 141 Wireless routers
- 142 USB drives
- 142 NAS drives

- 143 Projectors
- 143 Compact system cameras
- 144 Sub-£150 graphics cards
- 144 Sub-£150 graphics cards
- 145 Sub-£200 flat-panel displays
- 145 £201+ flat-panel displays

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See page 126

## 101 How to

**Tech  
Help**

Get help with computer problems and learn how to improve your PC setup.

### 102 Troubleshooter

We show you how to upgrade your laptop's memory, and back up your email account.

### 106 Helproom

PC Advisor's team of experts solves the computing problems you pose.



### 112 How to: Windows 8

We look at the revamped Task Manager in Windows 8 and explain the new features.

### 114 How to: Memotoo

It's easy to synchronise your calendar and contacts data across devices. Here's how.

### 116 How to: 1&1 MyWebsite

The quick- and -easy way to build your own website: we offer step-by-step guidance.



### 118 How to: FamilyShield

Protect your kids from net nasties on any PC or web-connected device in the house.

### 120 How to: Resize images

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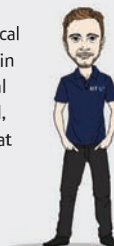
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\*Federation of Small Businesses, referenced by Jeremy Hunt, Media keynote speech, 8 June 2010. \*\*Getting up to speed: making superfast broadband a reality, NESTA policy briefing, January 2009. The speed to upload 30 photos is based on each photo being 2MB (60MB total file size). 8 times faster is based on BT Infinity for business Option 2 maximum speed and UK average broadband speed from Ofcom report, August 2012. Broadband speed can be affected by a number of things: how far your business is from the fibre cabinet as well as the wiring in your building. Not all lines in an Infinity-enabled area can support the service. BT Infinity for business may require a BT line or similar and a fibre compatible router such as the BT Business Hub provided with Infinity. Terms and conditions apply. The speeds provided by BT Infinity for business are more consistent than standard broadband, giving you prioritised traffic with 16Mb assured throughput at 90% of the internet busy period. You'll need to be in range of a BT Wi-fi hotspot, have a wireless device and register for BT Wi-fi. Our Fair Use Policy and terms and conditions apply. £1.15 a day is based on BT Infinity for business Option 2 for £35 a month on a 24 month contract.



# 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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## What month is it?

On New Year's Eve the latest edition of *PC Advisor* dropped through my letterbox. Apparently we're now in March 2013. Come on guys, time flies by quick enough as it is. Happy New Year (or am I three months too late?). **Anon**

*Matt Egan, editor, replies: To an extent I agree that it's a bit of a nonsense, and we were working on '2013' mags in October. The trouble is that by changing it now we run the risk of looking outdated on the newsstand alongside competing publications. The best advice, perhaps, is to look on the cover date as a 'best before' rather than calendar date.*

## Insight into hacktivism

I found the *Hacktivism* article in your March issue (page 16) very interesting, having previously regarded all hackers as the scum of the earth. Keep up the good work! **Tom Harrisford**

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## Windows 8: take it or leave it

There continues to be a huge response to our Windows 8 review ([tinyurl.com/65jxpzL](http://tinyurl.com/65jxpzL)). We think it's a great OS, but not all agree.

"Your review scared the \*&%! out of me! I have thousands of dollars and hours invested in the programs I use in Windows XP. Now you're telling me that not only has the learning curve gone through the roof, but if I downgrade to Windows 8 then my investment in time, money and learning goes in the trash. XP might be an old, unsupported horse, but I'll keep riding it a while longer," wrote *Krash*.

*Fortunately for Krash, support for Windows XP won't end until April 2014, and Windows 8 is backwards-compatible.*

"Microsoft finds itself in a massive struggle for survival," wrote *Henties*. "Whether we like it or not, demand for desktop PCs has been rapidly declining over the past few years - so much so that Apple has overtaken Microsoft.

"Microsoft has been forced to react, and to try to recapture its market dominance. In its quest to reach the top it is going to make mistakes, as is evident in Windows 8."



"The relegation of the Windows desktop to a tile is just the first step toward depreciating the Windows desktop and Windows desktop applications in favour of the Modern UI, something over which Microsoft has complete control," wrote *JasonEnzoD*.

"I think the fellows at Apple designed Windows 8 in order to get folks to switch to a Mac. They did a good job," wrote *BillyG*.

"I don't want to turn my PC into an iPad, and I'm positive Windows 8 will be as much a flop as the Zune. Microsoft should just accept that Apple doesn't want to share its pie with anyone," wrote *Phillip Thorne*.

## Flagged: Star letter

### Anyone actually got a Nexus device?

Google's Nexus line-up places the latest and most desirable technology in the hands of the masses. Or so I keep reading. The Nexus 10 is better than the iPad, and the Nexus 4 than the iPhone... apparently. So why do I have to take other people's word for it? Why is it so difficult to buy one of these devices?

Google has to work harder to make more stock available to consumers. Any manufacturer can grab the public's attention with a shockingly low price tag, but until a device can be bought and held in your hand it's little more than a mythical beast, and a fishy-smelling one at that. *George Austin*

*Marie Brewis, managing editor, replies: With a Nexus 10 at home, and both a Nexus 4 and Nexus 7 within touching distance as I type, I can assure you that Google's Nexus products do exist. Whether the supply issues were planned to generate buzz, or are simply due to unprecedented demand isn't something on which I can comment. However, you raise a valid point: an incredible price tag is irrelevant if the device cannot be bought.*

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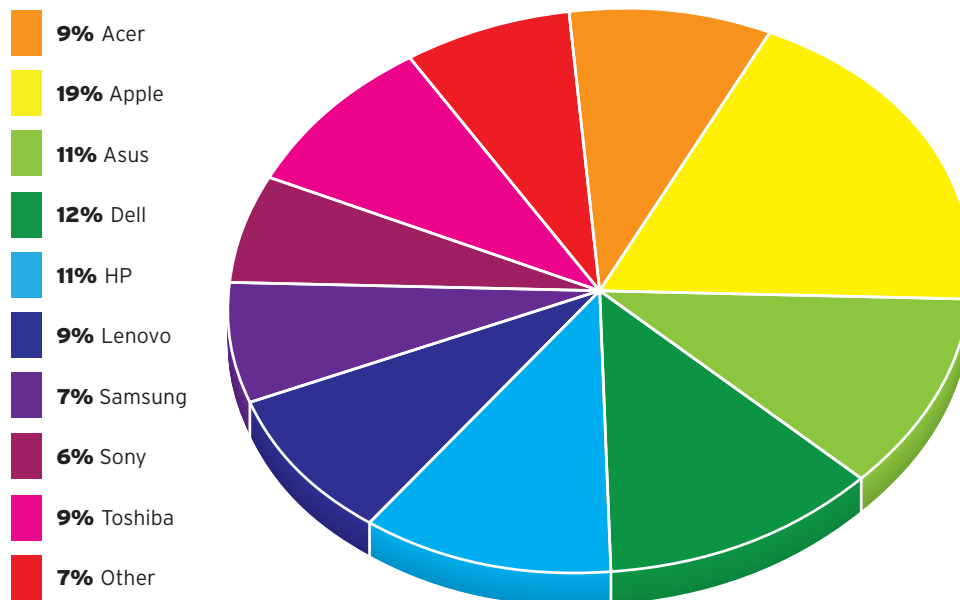
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See page 126

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## Reliability matters

One of the things readers always ask us about is the reliability of particular manufacturers, and many are quick to point the finger to advertising concerns when an answer isn't quickly forthcoming. In fact, it's a question that's impossible to answer without being a customer of said manufacturer, and all big-name vendors will have both happy and unhappy consumers - the latter arguably more likely to vent their feelings on tech forums. So we turned the question to our readers, with the results visible in our poll (left). Here's what they had to say.

**Aitchbee** I would mention the makers of my two workhorse laptops, but that would be tempting fate!

**Nontek** In terms of hardware reliability I'm inclined to think of Novatech, for both build and service.

**Woolwell** I'm not sure I'm in a position to give a good answer. My household has had five laptops, all from different brands, and none has broken due to their own fault.

**Fruit Bat /\O/\** I find most people judge reliability on the system case quality. Personally, I'd recommend HP and Toshiba for laptops.

**john bunyan** My local PC repair shop says parts are easier to source and replace for Asus and Toshiba models.

**Phil Ocifer** I have had only one laptop in the past five years, a Samsung, and it's been okay for me.

**woodchip** Most laptops are rebadged versions of those from about three or four manufacturers in the Far East, so the badge itself doesn't mean a lot. Most also use the same components, other than the motherboard, so it's hit and miss. ☒

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## Universal chargers

O2 is on track to stop selling chargers with new smartphones by 2015, and is urging the industry to follow suit. "This will probably be the norm in years to come," wrote *Jonny Jones*, "but, right now, manufacturers are making phone components smaller and more powerful, and the chargers will most likely have to change to accommodate these".

"I think this is okay, as long as they don't alter the plug itself. I have a few at home, especially for old Nokias, which nobody in the family uses unless their own phone isn't working," said *Keith Bishop*.

"I'm happy to re-use those Micro-USB cables," added *Antony D'Andrea*, "but you can't always mix and match the adaptor. My Nexus 7, for example, takes forever to charge using anything other than the adaptor it came with."

## 5in iPhone

One of the products unveiled at the CES 2013 tradeshow was Sony's Xperia Z, a smartphone with a full-HD 5in screen (read about it on pages 18 and 25). "Let's hope Apple takes the hint and enlarges the iPhone's screen," wrote *Mark Hazelton*.

## Smartphone wars

Apple has recently reduced its parts order in response to reduced demand for the iPhone 5. Of course, the news delighted Android fans. "Oh, it has finally dawned on people that iPhones are all show," wrote *Clare Jane Turner*.

"I prefer Android, and the Samsung Galaxy S III will be my next phone. I used to want an iPhone; now - not a chance," added *Alan McClean*.

Incidentally, Alan's not a fan of Windows Phone 8 either: "I'd rather use two cups attached by a long piece of string than buy a Windows phone," he wrote.

## A new contender

But forget iOS vs Android vs Windows Phone, there's a new rival in the 2013 smartphone market: Ubuntu. And already there are plenty of people who are interested to know more.

"I use Ubuntu on my netbook and would love it on my phone," wrote *Iain Crawford Hart*.

"I'll have some of that. Where does the line start?" asked *Kenneth Wilson*.

"Awesome," said *Rashid Sulahiry*, to which *Ahmad Suhail Sallam* responded: "Yes, very awesome."



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## TECHNOLOGY IS DYING ON THE HIGH STREET



Digital media could signal the end of technology on the high-street as major retailers fall to online rivals

Three of Britain's major high-street retailers have gone into administration in the face of fierce online competition.

In the space of a week, Jessops, HMV and Blockbuster, all big-name retailers of technology and media, each confirmed they were calling in the administrators. More than 1,000 stores are set to close down and around 10,000 jobs are at risk.

The rise of online shopping and digital media streaming is to blame for the collapse of technology on the high street. The increased adoption of web-connected devices such as smartphones and tablets makes accessing these services easy.

Jessops was the first to go. It closed all its 187 stores in the UK, putting 1,370 employees out of work. The camera chain was founded in 1935, but in recent years has found itself increasingly unable to compete against supermarkets and online retailers such as Amazon.

HMV was next to call in the administrators, putting more than 4,000 jobs and 239 stores at risk. At press time administrators Deloitte had closed the website, but kept open stores as it searched for a potential buyer. A likely candidate is Hilco, which bought HMV Canada last year.

The media retailer saw like-for-like sales drop by 10.2 percent in the first half of the financial year, and posted a total loss of £36.1m.

HMV said in a statement: "The board regrets to announce that it has been unable to reach a position where it feels able to continue to trade outside of insolvency protection and, in the circumstances, therefore intends to file notice to appoint administrators to the company and certain of its subsidiaries with immediate effect."

Founded in 1921, HMV has been an iconic brand in the UK, but struggled to adapt its business model to counter the rise in online sales of digital media, such as music and games. More recently, HMV has focused on selling devices, such as tablets, headphones and speakers, but continued to face tough competition from e-retailers such as Apple and Amazon.

Blockbuster was the third high-street retailer to enter administration, putting 528 stores and more than 4,000 jobs at risk.

Administrator Deloitte has also been appointed to Blockbuster, and has kept open stores as it searches for a buyer. Blockbuster will continue to accept gift cards and trade-in credits.

It said: "We are working closely with suppliers and employees to ensure the business has the best possible platform to secure a sale, preserve jobs and generate as much value as possible for all creditors."

Lee Manning, joint administrator at Deloitte, said: "The core of Blockbuster's business is still profitable, and we will continue to trade as normal, in both retail and rental, while we seek a buyer for all or parts of the business."

In common with HMV, the rental firm has struggled to keep up with major shifts in technology and the changing buying habits of consumers. Blockbuster has suffered with the falling price of DVDs and the rise of online gaming and movie-streaming services such as Netflix, LoveFilm and Steam.

"In recent years, Blockbuster has faced increased competition from internet-based providers along with the shift to digital streaming of movies and games," said Manning.

One remaining retailer that continues to perform in this tough market is Dixons Retail, which owns Currys and PC World. Sales in the 12 weeks prior to 5 January were up 7 percent compared to last year.

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## 'UNDERWHELMING' CES KICKS OFF TECH FOR 2013

Apple and Microsoft abstain from the world's biggest technology show

CES, the world's largest technology tradeshow, took place in Las Vegas in January. Notably absent were Apple and Microsoft, and many analysts found the show lacking in exciting new technology. We found a few desirable products on display, however; see page 24 for our round-up.

OLED and Ultra HD (aka 4K, see page 146) are the key developments in TV technology for 2013. Plenty of sets were on display, from vendors including Samsung, Sony, Panasonic, LG, Toshiba and Sharp. OLED promises higher picture quality, while Ultra HD is the natural successor to

full-HD in resolution. Sharp demonstrated a panel with a whopping 8K resolution.

Only a handful of smartphones and tablets was unveiled, with many manufacturers keen to wait for February's Mobile World Congress tradeshow to reveal their 2013 line-ups. Of those we saw, we were most impressed with the 5in full-HD-screen Sony Xperia Z smartphone and gaming-capable Razer Edge tablet.

Also in short supply were Ultrabooks and laptop-tablet hybrid devices running Windows 8; most of these had been announced with the OS in October 2012.

An abundance of phone and tablet accessories made hunting down truly innovative kit more difficult, but we were rewarded with the Belkin Thunderstorm, which brings a decent sound system to the iPad, and Zerochroma's Vario Clear, an iPhone 5 case with a 360-degree adjustable stand.

Popular tech was also found in the wearable and health categories, such as the Pebble Smart Watch and Fitbit Flex.



## Google launches Play Magazines store

Rounds off media content offered to Android users at Google Play

Google has in the UK introduced a digital magazine store to rival Apple's Newsstand.

The introduction of Google Play Magazines completes the company's media content offerings, with users now able to purchase direct from Google apps, books, magazines, music, movies and even devices, with the Nexus 4 smartphone, and Nexus 7 and 10 tablets in popular demand.

A Google spokesperson said: "You can shop a wide selection of titles, from cooking to technology, travel, fashion, sports, photography and so much more. It's never been easier to find a great read

to enjoy on vacation, lounging at home or on your morning commute."

Perhaps more importantly, through Google Play Magazines you can also purchase and read a digital copy of this very magazine on your PC, laptop, smartphone or tablet. A single issue costs £2.49, or you can subscribe for £1.99 a month or £19.99 per year. Simply hit the Magazines tab and search for *PC Advisor*.

Users can also read back issues of their favourite magazines and take advantage of free trials. The reading experience can be customised for Android tablets or phones.

## Samsung sells 100 million Galaxy S-series handsets worldwide

Samsung's hugely popular Galaxy S II and Galaxy S III smartphones top 80 million sales alone

Korean technology giant Samsung has sold more than 100 million Galaxy S-series smartphones worldwide since the first such device launched in June 2010.

This figure relates to channel rather than retail sales, but remains impressive.

A Samsung spokesperson said: "Galaxy smartphones are intuitive and easy to use, display photos and videos on dazzling screens, and deliver a premium user experience with a design that is elegant and feels natural."



The original Galaxy S has sold more than 24 million units since its 2010 launch,

10 million of which occurred in the first seven months. Meanwhile, the Galaxy S II has proven even more popular, with sales reaching the giddy heights of 40 million since April 2011. It reached the 10-million-mark two months quicker than the Galaxy S.

The Galaxy S III trumped both its predecessors with 20 million sales within 100 days of its May 2011 launch. It is the fastest-selling smartphone in Samsung's history, and the iPhone 5 rival now has 40 million sales under its belt.





## Facebook unveils Graph Search

Facebook has announced a new search tool called Graph Search. The utility has been introduced to make easier and more useful searching for content on Facebook. It allows you to search in four main categories: friends, photos, places and interests. Graph Search has launched as a limited beta.

**MORE:** [tinyurl.com/bk2ey2y](http://tinyurl.com/bk2ey2y)

## Orange tops ISP complaints charts

The most frequently complained about broadband provider is Orange, according to Ofcom's latest report. It focused on the main providers, and found Orange had generated the most complaints (0.50 per 1,000 customers). This is possibly the result of the withdrawal of its free broadband offer.

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



## Gmail suffers global outage

Google's Gmail service went down for users around the globe on 10 December. The problem appeared to affect users late in the afternoon. Google estimated that in most cases the problem lasted for 18 minutes.

**MORE:** [tinyurl.com/afksar5](http://tinyurl.com/afksar5)

# MID-CONTRACT PRICE HIKES UNDER FIRE

Ofcom considers an 'exit without penalty' option for dissatisfied consumers

Ofcom has announced plans to protect subscribers to landline, mobile and broadband packages from mid-contract price rises.

The mobile regulator has launched a consultation on how to better protect consumers from unexpected price hikes. Ofcom's favoured approach of those put forward is an 'exit without penalty' rule.

This would allow consumers to leave a contract if their provider introduces a price increase before it has ended.

Ofcom said: "Ofcom would also expect providers to be clear and upfront about the potential for price increases, and of the consumer's right to cancel the contract in the event of any price increase."

The purposed change would address the existing problem that consumers can avoid these price hikes only by paying a charge to prematurely

end their contract. The only exception is where a provider agrees that the price increase would be likely to cause 'material detriment', according to the telecoms regulator.

Three alternative options will be included in the consultation, one of which aims to tackle the lack of transparency around potential price increases.

The other options are to introduce guidance on how providers should interpret and apply Ofcom's rules and consumer-protection laws, and a method whereby consumers would have to actively opt-in to a variable-price contract.

Ofcom has also considered a complete ban on price increases to fixed contracts, but the regulator didn't think it would sit alongside the European legal framework and didn't present it as an option.



## UK 4G SPECTRUM AUCTION GETS UNDERWAY

Telecoms regulator Ofcom got underway the UK's first 4G spectrum auction in January.

Alongside the usual suspects, EE, O2, Vodafone and Three, were three additional bidders: HKT UK (a subsidiary of Chinese holding company PCCW, which owns UK Broadband), MLL Telecom, and Niche Spectrum Ventures (a subsidiary of BT).

Bidders are competing to acquire new capacity in the 800MHz and 2.6GHz spectrum bands. The lower-frequency 800MHz band is ideal for widespread mobile coverage, while the higher-frequency band can deliver the capacity required for faster performance.

Combined, the two bands add up to 250MHz of mobile

spectrum, which is equivalent to three quarters of the amount of spectrum in use today (333MHz), and 75 percent more than was auctioned for 3G in 2000. Ofcom said most users can expect 4G networks to be at least five- to seven times faster than 3G.

The auction is expected to raise around £3.5bn. No results were available at press time.

## EE announces increased rollout of 4G LTE

Super-fast 4G LTE connectivity to arrive in 17 UK cities by the end of March



EE has announced that a further 17 towns and cities across the UK will get 4G LTE coverage.

Still the UK's only 4G network (Phones4U will use its infrastructure to launch a virtual network in March, but it won't be upgraded to 4G until later in the year), EE will switch on 4G mobile broadband in 17 more cities by the end of March. EE brought 4G to Derby, Newcastle and Nottingham in December.

Olaf Swantee, CEO of EE, said: "By the end of the first quarter of 2013, 4G will be available in 35 towns and cities in the UK, and accessible to thousands more customers and businesses every day."

Newly connected areas include Bradford, Chelmsford, Coventry, Doncaster, Dudley, Leicester, Luton, Newport, Reading, Rotherham, St Albans, Sunderland, Sutton Coldfield, Walsall, Watford, West Bromwich and Wolverhampton. ☒



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# WHEN HACKING GOES SOCIAL



**Martyn Casserly explains how hackers are gaining access to your personal data by employing increasingly devious behaviour, with which success depends on catching you off-guard**

**O**ne of the harsh realities of our now digitally interconnected lives is the constant threat of hackers trying to gain access to our systems. In the UK we spend an estimated £100m per year on antivirus software to protect our valuable data, yet still stories of identity theft, compromised email accounts, and social-media hijacking continue. While most of us associate hacking with malicious software that uses brute force to break into our systems, the truth is often a lot more simplistic.

"Whereas software companies are learning how to strengthen programs," explains Christopher Hadnagy, in *Social Engineering: The Art of Human Hacking*, "hackers and malicious social engineers are turning to the weakest part of the infrastructure - the people."

Writing code is complicated and time-consuming, plus there's the distinct possibility that it can be traced to the source, leading the police directly to their criminal. Rather than investing resources in these forms of attack, hackers are increasingly using a technique that hopes to catch you off-guard.

By now we've all seen examples of phishing attacks: emails designed to look as though they were sent from a financial body or popular online shopping portal. They usually arrive in our inbox as a rather ironic warning of a security threat, requesting that we log in using the provided link and alter or confirm our details. The email didn't come from your bank or a high-street store, and the site you click through to is bogus, but the details you enter are genuine. The hacker is then free to go on a shopping spree using your account.

These scams are as old as the internet itself. The danger today is that the information required by hackers to trick us into believing they are the real deal is freely given away on social-media sites, internet forums, and even in casual conversations with seemingly well-meaning strangers. For this, we have only ourselves to blame.

## Loose lips sink ships

"Many of these attacks," writes Hadnagy, "could have been avoided if people were educated, because they could then act on that education. Sometimes just finding out how malicious people think and act can be an eye-opener."

"I was recently discussing with a close friend her financial accounts, and how she was worried about being hacked or scammed. In the course of the conversation we started to discuss how easy it is to guess people's passwords."

"I told her that many people use the same passwords for every account. I saw her face go white as she realised this is her. I told her that most people use simplistic passwords that combine something like their spouses name, his or her birthday, or their anniversary date. I saw her go an even brighter shade of pale. I continued by saying that most of the time people choose the simplest security question, such as their mother's maiden name, and how easy it is to find out that information via the internet or a few fake phone calls."

This combination of real-world conversations and online information gives an enterprising hacker or social engineer a powerful amount of knowledge about their victim - knowledge they can use to accomplish frighteningly penetrative attacks.

## See the bigger picture

In his book, Hadnagy explains the various tactics that social engineers use to ensnare their targets. These include information gathering via the internet, direct phone calls in which hackers pose as a representative from companies used by the victim, and raiding their target's rubbish bin for financial information such as bank accounts and credit-card numbers. All this can be used to build a profile of the target and create a persona or targeted phishing email.



This might sound like something out of a James Bond movie, but these techniques are frequently used, usually with the intent of first gaining access to the target's office machine, and then to their business. This form of elicitation is a skill that social engineers develop to a high degree, so the target often doesn't even know they were responsible for surrendering the information.

"The goal with elicitation is not to walk up and ask 'What is the password to your servers?'" Hadnagy reveals. "The goal is to get small and seemingly useless bits of information that help build a clear picture of the answers you are seeking or the path to gaining those answers."

Armed with these fragments of knowledge, hackers can exploit weaknesses in other parts of the human chain, sometimes with devastating consequences.

### Even experts are caught out

Mat Honan is a senior writer at *Wired* who has written for many of the top tech magazines. He is someone who understands the internet, technology, and the culture that surrounds it. But during the summer of 2012, his digital world was torn apart in the space of an hour when determined hackers employed a variety of tactics to gain access to his accounts. The tech community was shocked at the apparent ease with which this happened, as it highlighted the house-of-cards nature of online security.

A hacker, posing as Mat, called Amazon and said he wanted to add a new credit card to his existing account. The card number was fake, but this didn't matter. Amazon required Honan's billing address, email contact, and the name on the account - all of which was possible to find by a little digging online and some logical deduction. Moments later the hacker called again to say he was locked out of his account.

The operator asked him to confirm the details of his account, including the new credit-card number, and unsurprisingly the details matched. The hacker was issued a replacement password for the account, and could now see the last four digits of any genuine card numbers stored in Honan's Amazon account.

As it turns out, these four numbers are the exact part of the card number Apple uses for its account-verification process.

The hacker next placed a call to the Applecare support line saying he had forgotten the password to his me.com account. He supplied the operator with a billing address and the last four digits of his credit-card number, and was then issued a temporary password to access the email account.

Once inside Honan's email account, the hacker did a quick Google search and made two phone calls. In a matter of minutes he had gained access to Honan's Gmail and Twitter accounts, remotely wiped his iPhone and iPad, then finally his Gmail account.

"In many ways, this was all my fault," wrote Honan. "My accounts were daisy-chained together. Getting into Amazon let my hackers get into my Apple ID account, which helped them get into Gmail, which gave them access to Twitter."

Since the events were made public, both Apple and Amazon have altered their customer-service practices to avoid a repeat occurrence. But the fact these security holes were discovered only after hackers had destroyed Honan's online life is worrying.

Hackers who think beyond the boundaries of code-breaking and malware will always be looking for new ways to draw information from their targets. Until we become aware of these possibilities, they will continue to succeed. With software you can build in complex security defences, but incorporating into people these types of failsafes may take a little longer. ☒





## Smartphones in 2013: five major trends

Full-HD 5in screens, quad-core processors, battery-saving plans, dust- and water-protection, and higher-resolution cameras were all on display in smartphones at CES 2013, writes Mikael Ricknäs

**A** handset will need a 5in full-HD screen and a 13Mp camera to compete in the 2013 smartphone market, if the products unveiled at January's CES are any indication of what's to come. Here are the five main trends seen at CES.

### Full-HD 5in screens

Following in the footsteps of the HTC Droid DNA (Butterfly), Sony's Xperia Z, Huawei's Ascend D2 and ZTE's Grand S, plus handsets from Alcatel One Touch and Vizio, each has a 5in screen with a full-HD (1080p) resolution.

At CES, Huawei also launched the Ascend Mate, which has a 6.1in display. But the screen's resolution is 'only' 1280x720 pixels.

Larger screens are likely to lead to shorter battery life, so in these phones you should also expect to find higher-capacity batteries - the Xperia Z and Ascend D2 have 2,330- and 3,000mAh cells respectively.

### Quad-core processors

Smartphone vendors appear to be going all-in with quad-core processors. The Xperia Z and Grand S are both powered by a Qualcomm Snapdragon S4 Pro chip, while Huawei has built its own quad-core CPU.

Processor makers were also busy at CES 2013: Qualcomm, nVidia and ST-Ericsson all launched quad-core processors.

Snapdragon 800 processors will offer up to 75 percent better performance than the S4 Pro, and have built-in support for 4G LTE and 802.11ac. Phones packing these chips should begin shipping in the second half of 2013.

nVidia's Tegra 4, meanwhile, is the first quad-core processor to use ARM's Cortex-A15 design. A dual-core version of the Cortex-A15 is already used in the Google Nexus 10 tablet.

### Battery-saving plans

The combination of a large high-resolution screen and a quad-core processor doesn't bode well for battery life. In addition to equipping their smartphones with larger batteries, Sony and Huawei have also implemented battery-saving features.

Sony's Battery Stamina mode improves standby time by automatically shutting down battery-draining apps when the screen is off. The more apps you have installed, the more you'll notice the savings.

Huawei lowers battery consumption by automatically turning off the transmitter circuit when data transmission is not in use.

### Protection against dust and water

Sony and Huawei are also hoping to convince users to pick their new smartphones over competing products by offering protection against dust and water.

Provided all ports and covers are firmly closed, the Xperia Z is protected against "low pressure jets of water from all practicable directions, and can be kept under 1m of freshwater for up to 30 minutes", said Sony.

The Ascend D2 has a lower level of water protection, but it can still withstand water sprayed against the device.

Sony and Huawei aren't the first vendors to add protection against dust and water.

For example, Panasonic launched the Eluga smartphone at Mobile World Congress 2012. Whether dust- and water-protection will catch on with users remains to be seen.

### Higher-resolution cameras

The Sony, Huawei and ZTE all share the same camera resolution: each has a 13Mp rear snapper. The Xperia Z and Grand S also have a 2Mp front camera for 1080p video.

Sony has implemented HDR for both video and still images on the Xperia Z. With standard HDR, the camera captures the same image at different exposure levels, which it layers to create a single optimised shot. With video HDR, you can also shoot video clips in front of a window or when the sun is directly behind the subject, the company said.

The Xperia Z also includes a 10-photos-per-second burst mode at 9Mp, and can take still shots during video recording. ☒





# Intel playing catch-up on mobile processors

**Intel makes only incremental smartphone chip improvements, while nVidia and Qualcomm boost power and performance on rival ARM chips, writes Agam Shah**

**I**t's been more than a year since the introduction of the first Intel Inside handset, but the company continues its struggle to break into the smartphone market as rivals nVidia and Qualcomm boost the speed and power-efficiency of their market-dominating ARM chips.

Intel at CES 2013 unveiled a reference design based on its Atom Z2420 chip for low-cost smartphones. Companies including Acer, Lava International and Safaricom will support the chip, which is a slower variant of the original Medfield chip introduced last year. Lenovo also announced the IdeaPhone K900 smartphone, which has a 5.5in screen and runs the dual-core Atom Z2580 chip codenamed Clover Trail+, which is built on the same platform as Medfield.

While Intel's mobile CPU improvements have been incremental, its rivals announced chips that are faster and more power-efficient. nVidia announced the Tegra 4, which is based on ARM's Cortex-A15 core; a version will be available with integrated 4G LTE connectivity. And Qualcomm announced the Snapdragon 800, which is up to 75 percent faster than the Snapdragon S4 Pro.

Intel has been stacking up design wins, but none of its smartphones has been successful. Analysts said Intel has been slow in chip development and modem

implementation, which has hampered its chances to succeed in the smartphone market. By the same token, these few design wins are a sign that x86 smartphone technology is being accepted.

## Intel's challenge: 4G LTE

Right now, Intel's biggest challenge is the lack of an Atom chip with integrated 4G LTE capabilities, said Jack Gold, principal analyst at J Gold Associates.

"That puts it at a disadvantage in the US and mature smartphone markets, in which LTE is becoming a check-mark requirement for new devices," said Gold.

Intel's Infineon wireless communications unit is working on a chip that combines an applications processor and LTE modem, but it's still a few months away. Its introduction could provide a fighting chance for Intel to compete with Qualcomm and nVidia.

"Intel has won some deals for phones in emerging markets because, for them, LTE isn't critical. But Qualcomm does have an integrated chip it can sell, and is doing so to great success," Gold said.

The real test for Intel will come next year, when its processors offer the same connectivity as its ARM rivals, said Gold.

Intel didn't expect overnight success in smartphones, with ARM being the dominant


architecture, said Dean McCarron, principal analyst at Mercury Research.

"My sense is that, given where it started from and where it is now, it's taken Intel time to make a sufficiently interesting product," McCarron said.

Intel may not have made major chip advancements like nVidia or Qualcomm, but the company's position is better with the customer wins and growing software support, McCarron said. Companies including Motorola and Orange offer Intel handsets.

Ultimately, it's market share that matters, so the challenge for Intel will be to unseat the dominant ARM architecture. But this is easier said than done: chips from nVidia and Qualcomm are in many smartphones today, with continuous improvements to performance and power consumption.

## What to expect from Intel in 2013

Intel has promised to develop smartphone chips at a breakneck speed to catch up with ARM. In 2013 it's expected to release new 22-nanometre (nm) Atom chips for budget and high-end smartphones. The latest ARM chips are made using the 28nm process. Intel has also said in 2014 it will release smartphone chips made using the 14nm process, which could give it power-efficiency and speed advantages over ARM rivals. 



# AMD aims for the high end of the tablet market

**Windows 8 tablets running AMD's forthcoming Temash processors will be premium devices, costing in the region of £500, finds Agam Shah**

**A**MD is pinning all its hopes on the success of Windows 8 and premium hardware as it tries to find its bearings in the fast-growing tablet market, shunning cheaper Android devices and the budget market on the whole.

AMD is looking to make a mark in the tablet market at the \$499- to \$599 price point, said Lisa Su, senior vice-president and general manager of global business units. "We're betting heavily on Windows 8," she said.

Windows 8 may be off to a slow start, but AMD expects it to catch on in the future. Windows 8 tablets in many different screen sizes and features will be released, and it's interested in the higher-end devices that can run full applications and graphics.

## AMD's first tablet CPU: Temash

At CES AMD showed off a Windows 8 tablet running a forthcoming processor codenamed Temash, which is the company's first tablet-specific chip. Until now it has simply been repurposing netbook chips for tablets, and only a handful of tablets run on AMD processors.

AMD claims Temash offers balanced performance and long battery life. Tablets are mostly used for content consumption, so the company has an opportunity to fill a void with Temash, said Su.

The quad-core Temash will be able to run a full operating system like Windows 8, while drawing less than 5W of power and providing 10 hours of battery life.

At CES AMD demonstrated a prototype 10.6in tablet made by Wistron that played full-HD (1080p) video. Finished devices running Temash processors are expected to become available in the first half of this year.

## Can AMD take on ARM?

AMD has yet to scratch the surface of the tablet market, which is dominated by ARM. AMD also trails Intel, whose tablet-specific Atom chip codenamed Clover Trail is used in tablets from companies such as HP, Lenovo, Dell, Acer and Asus.

The company is preparing to wage a price war with Intel, which is good news for consumers: it hopes to bring down the price of touchscreen laptops to around \$499.

"We will be able to get higher-quality designs into lower price points," Su said.

## Trinity

As well as Temash, AMD has been busy readying its Trinity processor for laptops. HP has already announced the \$649 Pavilion Touchsmart Sleekbook, which runs Trinity and has a touchscreen. AMD is working with PC makers to bring down prices,

but Su said it could be a little while until the prices reach the \$499 range.

A majority of touchscreen laptops are available with Intel's latest Core processors, but these haven't been selling well - partly due to their high prices. At CES Intel said it hopes to encourage sales by dropping the price of its touchscreen Ultrabooks to \$599 by the end of 2013.

HP is able to offer its Touchsmart Sleekbook at a lower price due to the flexibility in features included in AMD-based laptops. By comparison, Ultrabook laptop makers have to comply with Intel's design rules and include specific features that can add to the price.

## Richland & Kabini

Finally, AMD also introduced at CES new PC processors codenamed Richland and Kabini. Richland will be a follow-up to the existing chips codenamed Trinity, part of the A8 and A10 product line, and will appear in high-end ultraportable laptops and desktop PCs. They will be 20- to 40 percent faster than Trinity.

Quad-core Kabini chips will be added to the A4 and A6 product line, and appear in ultraportable laptops. Kabini delivers longer battery life and 50 percent more overall performance than existing Brazos chips that go into low-power laptops. ☒



# HP takes on tablets once again

After failures with webOS and the original Windows Slate PC, HP is back with a new tablet. Agam Shah investigates the ElitePad 900

**H**P is rebooting its tablet strategy with the ElitePad 900, but faces challenges as it tries to overcome past tablet failures and deal with the slow adoption of the Windows 8 OS.

The ElitePad 900 business tablet was announced in October last year as the first product in HP's retooled tablet strategy, which revolves around Windows. HP has seen many failures in this market, with its Slate and Slate 2 unable to find wide acceptance.

HP's abrupt discontinuation of mobile devices running webOS also raised questions about its commitment to tablets.

HP is now seeking to re-establish itself with Windows 8. In doing so it is mixing business hardware with a consumer OS – a mismatch that could hurt its sales.

## This one has to succeed

The ElitePad 900 was on display at CES 2013. The 680g tablet is 9.2mm thick and has a 10.1in screen with a 1280x800-pixel resolution. Enterprise-specific features include the ability to easily disassemble the tablet to replace components, which may help to reduce hardware and support costs.

HP is putting the ElitePad 900 through extensive testing before it ships in late January, with 3,000 testers that include Emirates Airlines.

The early evaluation program of 200- to 300 units was expanded following growing interest in the product, said Ajay Gupta, director of commercial notebook products at HP. This is one of HP's largest testing programs yet, and the first customers engaged in testing belong to some of the company's big accounts.

"We have been talking to customers, showing them prototypes, ideas and spec choices that we are making," Gupta said. "It's a very important product for HP, there's no denying it."

The initial ElitePad 900 will perhaps go out as it is, but customer feedback will help shape future tablet designs.

## Windows 8

With such an extensive testing program, HP perhaps wants to avoid a repeat of the debacles that surrounded the Slate 2 and webOS, and to ensure that the ElitePad's design and features resonate with clients, said Charles King, an analyst at Pund-IT.

HP's adoption of webOS caused tension with Microsoft, with the software maker upset by HP's development of a tablet with a non-Windows OS. Now that has changed, but the question remains whether customers will buy into Windows 8, which is largely a consumer OS, King said.

"The next few months will provide a litmus test for whether Microsoft and its partners, including HP, can successfully make the case for Windows 8 in the enterprise. Unfortunately, some other issues, including economic conditions, are likely to play wild-card roles in the adoption of Windows 8 tablets and other devices," King said.

The ElitePad 900 testing program seems a little large, given that the hardware isn't cheap, said Roger Kay, president of Endpoint Technologies Associates.

"HP's customers are watching carefully for signs of unsteadiness after a number of mistakes and reversals, but it doesn't face any greater hurdle than other makers trying to popularise Windows 8 tablets," Kay said.

Windows 8 may end up being something just short of a disaster as consumers are confused by the positioning of Windows 8 as a touch-based OS that can also be used with a keyboard and mouse. Businesses are also always cautious with new OSes, and it won't be any different with Windows 8, Kay said.

"The new tablet's options, which include extra storage and integrated broadband and GPS, suggest HP understands that business usage comes in more than one size. It'll be interesting to see whether the customers and markets the ElitePad was designed for react as HP hopes," said King. ☒





# Video streaming gets a boost with 802.11ac

802.11ac-compatible routers promise fast internet speeds, but some exciting products on display at CES 2013 can speed up things still further, writes Mikael Ricknäs

**W**ireless 802.11ac routers launching at CES 2013 promise gigabit speeds and better performance when streaming video.

In the past year, 802.11ac has gone from a new technology to mainstream. The underlying standard remains in development, but this hasn't prevented vendors putting out a growing number of products.

Belkin announced two routers, the \$179 AC1800 DB (pictured) and \$89 AC750. The former is already available in the US, and is Belkin's most advanced router. It offers an integrated media server and a browser-based interface called Simple Start that streamlines the installation process.

D-Link's Gaming Router (DGL-5500) will start shipping in late spring; pricing has yet to be announced. One of the router's main features is Qualcomm's StreamBoost, which prioritises traffic for video streaming and gaming to improve performance.

Linksys' most advanced router is now the Smart Wi-Fi Router AC 1750 HD Video Pro, which has been designed for homes that want to stream HD video and have 10 or more connected devices. To make home networks easier for consumers to monitor and control, Linksys is also introducing a 'smart network map'. This is a visual representation of the home network

that includes information about network connectivity and current bandwidth usage. The router will ship in the spring; no pricing has been announced.

Linksys and Belkin say their best routers are capable of up to 1.3 gigabits per second (Gbps) using the 5GHz band, and 450- and 300Mbps respectively using the 2.4GHz band. What that means in the real world remains to be seen.

Securifi unveiled its Almond+ wireless router at CES, which includes a number of home-automation features with integrated support for Zigbee and Z-Wave. Users will be able to control their home's heating and lighting, and receive a notification when a door or window is opened. It plans to run a campaign on Kickstarter to fund the production of the Almond+, allowing users to buy the product for just \$99.

## 4x4 MIMO

Although 802.11ac is becoming a more mainstream technology, it is still very much under development. These improvements will help boost performance going forward.

Quantenna Communications demonstrated a chipset that uses four separate streams or antennae to send and receive data (a configuration known as 4x4), using 2.4GHz and 5GHz. Sending and

receiving data using multiple antennae is possible thanks to MIMO technology, which is already used in Wi-Fi and LTE networks.

The 4x4 configuration will improve the quality of video streaming, allowing users to send multiple full-HD video streams to anywhere within a Wi-Fi network. The chipset is also a good fit for operators that want to use Wi-Fi to offload their mobile networks.

## Mobile wireless boost

Also at CES, Qualcomm announced Snapdragon 800-series processors, which make possible 802.11ac and LTE in smartphones and tablets. The first devices based on the design are expected to start shipping in the second half of the year.

Qualcomm isn't the only chip maker working to put 802.11ac in smartphones. Last year Broadcom announced the BCM4335 which, in addition to 802.11ac, also supports Bluetooth 4.0 and FM radio. This year, Broadcom announced that it can also integrate 802.11ac into set-top boxes for IPTV, which LG will use in its 2013 TV line-up to improve video-streaming performance.

Sales of WLAN equipment are growing rapidly. Vendors posted revenue growth of 19 percent during the third quarter of 2012 when compared to the same period in 2011, according to Dell'Oro Group. ☒

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CHRIS  
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**special**

Chris Martin picks out the most exciting new products he saw at CES 2013 in Las Vegas



### **Samsung Series 7 Ultra**



#### ***Ultrabook***

The Series 7 Ultra is Samsung's latest Ultrabook to run Windows 8. The aluminium laptop's headline feature is its 13.3in touchscreen, which has a full-HD (1920x1080) resolution. Internal specifications include an Intel Core i5 or i7 processor and an SSD (up to 256GB).

**Price TBC**

**[samsung.com/uk](http://samsung.com/uk)**





### Sony Xperia Z <<

#### Smartphone

Sony's flagship smartphone is the Xperia Z. The high-end handset features a 5in Reality Display with a full-HD (1080x1920) resolution and a tempered glass front and rear casing. The Xperia Z is also dust- and waterproof.

£520 inc VAT

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



### Razer Edge

#### Tablet

Razer claims its Edge tablet is the world's first tablet designed for PC gamers. To this end it comes with a PC-like spec that includes an Intel Core i5 or i7 processor, up to 8GB of RAM and an SSD. A range of accessories add gaming controls, a keyboard and the like.

\$999 (£626)

[razerzone.com/gb-en](http://razerzone.com/gb-en)

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### ⬆ LG 55EM970v

TV

The 55EM970v is LG's first OLED TV to hit the market. It's a slender 4mm thick, and weighs less than 10kg, despite its 55in screen. The LG has a full-HD (1920x1080) resolution, while the OLED technology offers an infinite contrast ratio.

**Around £6,000 inc VAT**  
**lg.com/uk**



### Zerochroma Vario Clear ⬆

*iPhone case*

The Vario Clear is an iPhone 5 case with an integrated kickstand. It's made from clear plastic, so won't detract from Apple's design. The 'theatre-stand' rotates 360 degrees and has 11 angle settings. The Vario Clear comes in four different colours.

**\$45 (around £28)**  
**zerochroma.com**

### ⬇ Huawei Ascend W1

*Smartphone*

The Ascend W1 is Huawei's first Windows Phone 8 smartphone. The handset features a 4in (480x800) IPS touchscreen, a dual-core 1.2GHz Qualcomm Snapdragon S4 processor and a 5Mp camera. The Ascend W1 will be available in black, white, blue and red.

**Price TBC**  
**huaweidevice.co.uk**



### ⬇ Lenovo ThinkPad Helix

*Hybrid laptop/tablet*

Lenovo's latest hybrid Windows 8 Ultrabook is the ThinkPad Helix, which features a 'rip and flip' removable 11.6in full-HD screen. Specifications include an Intel Core i7 processor, up to 8GB of RAM and a 256GB SSD. Lenovo touts a battery life of up to 10 hours.

**\$1,499 (around £940)**  
**lenovo.com/uk/en**



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## << nVidia Project Shield

### Handheld games console

The latest in handheld gaming technology is the Project Shield from nVidia, which uses the firm's Tegra 4 quad-core processor. Project Shield allows gamers to play both Android and Windows games on the 5in (1280x720) display and console-grade controller.

Price TBC  
[nvidia.co.uk](http://nvidia.co.uk)

## >> Polaroid iM1836

### Camera

Polaroid's iM1836 is the first Android-powered camera to feature interchangeable lenses. The device ships with Android 4.1 Jelly Bean and a 10- to 30mm optical zoom lens. Built-in Wi-Fi lets you directly upload photos and video to the internet.

\$399 (around £250)  
[polaroid.co.uk](http://polaroid.co.uk)



## >> Asus Qube

### Set-top box

This little black box is the Asus Qube, a Google TV-powered set-top box. It comes with a remote, but can also be controlled by an Android smartphone or tablet. The Qube supports voice control, and offers access to the Google Play Store and third-party services such as Netflix.

Price TBC  
[uk.asus.com](http://uk.asus.com)



## >> Belkin Thunderstorm

### iPad accessory

Belkin's Thunderstorm case turns the iPad into a handheld home theatre. The Thunderstorm has integrated front-facing stereo speakers and an Audifi sound processor. A free app lets you customise modes for music, games and movies.

£179 inc VAT  
[belkin.com/uk](http://belkin.com/uk)



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Apple iMac 21.5in (Late 2012)

32



32



33



34



ANDREW  
HARRISON

# Network not work

**L**iving without the internet is no fun once you've trimmed your life around its enormous and diverse benefits. But why on earth would you choose to live without anyway? In my case it was nothing to do with a quest for a back-to-basics ascetic Good Life, and everything to do with moving house. I had to wait three weeks for a BT OpenReach engineer to resplice a landline that had been relegated by cable TV years before.

It doesn't need spelling out that after taking for granted online banking, shopping, fact finding, email, Skype, internet radio, you name it, going back to the manual 'analogue' way of doing things can be a chore.

Okay, so I cheated a little. First there was the option of mobile-connected computing, made possible by 3G cellular data. Armed with a tablet and a phone, I thought I could entirely make do for a few weeks without an online PC. Turns out, I can't.


Some things are easier to do on a mobile device, for sure. Checking trains is one - it's much quicker to look up train cancellations and delays after a centimetre of snow through an iPhone than with the full-fat web browser. Most other things, I found, though, are slower, more cumbersome or just plain undo-able.

Thankfully, a new neighbour granted me the keys to the internet kingdom with the help of her Wi-Fi network. But power users need more than simple connectivity - we need to bind MAC addresses, open and forward ports, and mess with ICMP echo requests. Ideally, we need to do so using a proper keyboard and mouse/trackpad for

our man-machine interface. Laptops and desktops are here for a while yet; you can read our round-up of gaming laptops on page 52, family PCs on page 72, and with worthy notebooks and PCs overleaf.

Google doesn't - or rather, didn't, until recently - recognise this condition called 'no internet'. Its Chromebook platform is all about a maintenance-free laptop that has its software bugs silently patched in the background, saves your documents as you go, and is sandboxed to the hilt to prevent a hacker or you from ever breaking it. The platform mandates a continuous connection to Google's online servers when need to use it, though. That model doesn't work in even 21st-century cities yet, and it really falls down when you step outside Blighty and face crippling online roaming charges.

With the latest Chromebooks (we've reviewed Samsung's Series 3 on page 34), Google allows some offline usage, with a limited number of server-side apps also able to run locally. The Chromebook is a slow-burn project for Mountain View, but by giving out a 'free' operating system and promising to take care of all the hassles of maintaining a computer, it has understood the needs of the greater number of modern internet users.

The bigger story is really the chip that drives this laptop. Entirely free of the Wintel legacy, the Chromebook's Linux-based operating system now runs on an ARM Cortex-A15 chip, showing the pathway to the next generation of not just tablets and phones, but PC-like PCs that will run cool and run quiet. And do so for days, not hours, from battery. Now that's what I call an always-on connection. 

## PC ADVISOR TEST CENTRE

### HARDWARE

- 32 Apple iMac 21.5in (Late 2012)
- 32 Lenovo IdeaTab A2109A
- 33 Sony Vaio Duo 11
- 34 Samsung Series 3
- 34 Toshiba Satellite P875-31P
- 35 Chillblast Fusion Stealth
- 35 Wired2Fire Diablo Predator
- 36 Toshiba 32HL933B
- 36 Iomega StorCenter ix2-200
- 37 Samsung 840 Series
- 38 Canon Selphy CP900
- 38 Crucial Ballistix Tactical LP
- 39 Sony Reader PRS-T2
- 39 Matias Quiet Pro Keyboard

### APPS

- 42 StumbleUpon for Windows 8
- 42 Xbox SmartGlass
- 43 BBC Sport
- 43 Grand Theft Auto: Vice City 10th Anniversary Edition

### SOFTWARE

- 44 McAfee All Access 2013
- 44 Trend Micro Titanium Maximum Security 2013
- 45 Corel WinZip 17.0 Pro
- 46 DivX Plus 9
- 46 Fieldrunners 2
- 47 Call of Duty: Black Ops 2

### BUSINESS

- 48 Canon i-Sensys MF4890dw
- 48 Canon Pixma MG6350
- 49 Kyocera FS-1061DN
- 49 Samsung CLX-6260FW
- 50 Xerox Phaser 3320
- 50 Xerox 7600i

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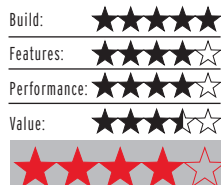
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**Specification**

2.7GHz Intel Core i5-3335S; Mac OS X 10.8 Mountain Lion; 8GB DR3 1,600MHz RAM; 1TB, 5,400rpm hard drive; 21.5in (1920x1080) LED-backlit IPS display; nVidia GeForce GT 640M, 512MB GDDR5 VRAM; 4x USB 3.0; 2x Thunderbolt; dual-band 802.11a/b/g/n; gigabit ethernet; Bluetooth 4.0; SDXC slot; headphone socket/optical digital audio output; stereo speakers; 720p FaceTime HD webcam with twin mics; iLife; 450x528x175mm; 5.68kg



**ALL-IN-ONE PC**

## Apple iMac 21.5in (Late 2012)

Apple is well known for its striking hardware designs, so it's ironic that the new iMac's biggest talking point isn't obvious when you're using it.

At first frontal glance, the iMac is identical to its predecessor. It's only when you peek around the side that you notice the incredibly slim profile.

Getting rid of the DVD drive helps, of course, but a new lamination process has also helped slim down the glass panel. It makes the two-year old iMac in our office look decidedly chunky.

There's a clear improvement in image quality. The screen itself is largely unchanged - a 21.5in in-plane switching (IPS) panel with 1920x1080 resolution - but that lamination process and an anti-reflective coating help reduce glare. Again, the contrast with the old iMac is striking: colours look much brighter and richer.

It also runs a lot cooler. Even with various benchmarking programs thrashing away the rear panel never became more than warm to the touch. We couldn't detect any significant noise from the fan or through the small rear vent either.

Apple has finally updated the four USB ports on the iMac to USB 3.0, and there are now two Thunderbolt ports available, along with an SDXC card slot, ethernet and a headphone jack. This year's model

also says goodbye to FireWire (and hello to the £25 Thunderbolt-to-FireWire adaptor).

It's disappointing that the 2013 iMac is slightly more expensive. We tested the entry-level model, which has gone up £100 to £1,099. This model also gets the Ivy Bridge update for its Intel quad-core Core i5 processor, and a modest speed bump from 2.5GHz to 2.7GHz, along with 8GB of RAM and 1TB hard disk.

That Core i5 processor provides plenty of power for tasks such as photo- and video-editing - aided, of course, by Apple's bundled iLife software suite.

Boot time is a relatively sluggish 40 seconds. Using Boot Camp to install Windows 7, we ran the PCMark 7 benchmark and saw a modest score of 2,487. This test rewards faster solid-state storage with higher performance scores; the iMac's 5,400rpm 2.5in hard disk comes into play here. You can instead opt for a Fusion drive, Apple's hybrid SSD/HDD solution.

The GeForce GT 640M graphics card with 512MB of video RAM is fine for a spot of casual gaming. It managed only 27fps when running the Mac version of Batman: Arkham City at 1920x1080, but a smooth 40fps was possible at 1280x960.



We got an extra 5fps when using the Windows version of Arkham City at similar resolutions (even in DirectX 11 mode), which highlights the difference in performance between the OpenGL and DirectX graphics architectures available to OS X and Windows respectively.

Another 21.5in model is available with faster nVidia GT 650M graphics and a 2.9GHz quad-core CPU. It costs from £1,240.

### Verdict

Treat Apple's iMac as a productivity, multimedia and entertainment system and it's hard to beat. The slim design is superb, as is the improved display; build quality is in a class of its own. **Cliff Joseph**

**TABLET**

## Lenovo IdeaTab A2109A

Lenovo's IdeaTab A2109A is a 9in Android tablet, attractively priced at £199. Do those two inches of screen make it a better buy than the £40 cheaper Google Nexus 7?

In a word: no. But Google's tablet (and similar loss-leaders from Amazon and Barnes & Noble) are subsidised to encourage Android uptake and content sales. In the case of this Lenovo, you mostly get what you pay for.

The design is stylish enough, with nicely rounded edges and a silver-grey aluminium rear panel that feels robust. Lenovo claims a roll cage has been fitted inside, and there's zero creaking in the chassis when pressure is applied.

It feels heavy, though. At 570g, it's approaching the 603g Nexus 10, 652g Apple iPad and 587g Samsung Galaxy Tab 2 10.1. That's a shame, as its smaller dimensions ought to make it more comfortable to hold for extended periods.

It's designed for landscape use. At the top left is a power button, while a volume rocker is found on the left side. Also here is a rotation-lock button and an audio jack; Micro HDMI and a Micro-USB charging port are found on the right.

On the rear is a thin strip that houses twin speakers and a 3Mp camera. It shoots lousy photos, but can handle 1080p video. A microSD slot is also hiding behind this panel,

but good luck getting to it. You also get a 1.3Mp camera on the front, which really struggles in low light.

The screen should make it the better tablet than its 7in rivals, except it's not a great panel. The 168ppi pixel density appears low-res against the Nexus 7's 216ppi. It's perfectly usable and sufficiently responsive, but text has fuzzy edges, colours lack impact and viewing angles are dire.

In common with the Nexus 7 it packs a quad-core 1.3GHz nVidia Tegra 3 processor, 1GB of memory and 16GB of storage. In Geekbench we measured 1,375 points, which is just short of the Nexus 7's 1,452, but faster than the 1,124 of the Kindle

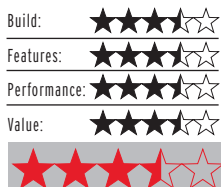
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**Specification**

1.3GHz nVidia Tegra 3; Android 4.0.4 ICS; 9in (1280x800) LED-backlit multitouch TFT; 1GB RAM; 16GB storage; 802.11b/g/n; 164x11.6x237mm; 570g



**£1,499** inc VAT**Contact**■ [sony.co.uk](http://sony.co.uk)■ [Read more](#)■ [tinyurl.com/bj56wek](http://tinyurl.com/bj56wek)**Specification**

1.9GHz Intel Core i7-3517U;  
Windows 8 Pro 64bit;  
8GB DDR3L 1,600MHz  
RAM; 256GB SSD; 11.6in  
(1920x1080) glossy LCD;  
Intel HD Graphics 4000;  
802.11a/b/g/n; Bluetooth  
4.0; NFC; 2x USB 3.0;  
MS/SD slot; 1920x1080  
webcam with mic; stereo  
speakers; headphone  
socket; optical pointer;  
10.5V PSU; 4,960mAh  
lithium-polymer battery;  
320x199x17.9mm; 1.3kg

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

**TABLET-LAPTOP HYBRID****Sony Vaio Duo 11**

Sony's Vaio Duo 11 is one of that strange new breed of hybrid devices running Windows 8 that can be used as either a tablet or a laptop. It's certainly an attractive-looking device, with an excellent HD touch-sensitive screen. However, the method that Sony has chosen for switching between laptop and tablet modes isn't as elegant as it could be.

Prices start at £849 for a model with an Intel Core i3 processor running at 1.8GHz, 4GB of RAM and a 128GB SSD. You can also opt for an i5 for another £100.

We tested the high-end model, which costs a hefty £1,499 with a Core i7 processor running at 1.9GHz, 8GB of RAM and a 256GB SSD.

The outstanding feature of the Duo 11 is undoubtedly its 11.6in screen. This provides 1920x1080 resolution and produces a sharp image with crisp, strong colours. It also works with the tiled interface of Windows 8, responding smoothly and quickly as you flick from app to app with your fingers.

With that i7 processor it scored 4,931 points in the PCMark 7 benchmark, which is in line with similar i7 devices such as Dell's cheaper XPS 12. It will provide more than enough power for tasks such as surfing the web and even running Microsoft Office or video editing. There are HDMI and VGA interfaces



for connecting the Vaio to a larger screen, along with two USB 3.0 ports, an ethernet connection, a headphone socket and a memory card slot - but, of course, no DVD or Blu-ray drive.


The Duo 11 is solidly built, but it measures just 17.9mm thick and weighs only 1.3kg - it's as portable as most Ultrabooks. Even so, it's very heavy for a tablet, and you can't hold the Duo 11 in one hand for as long as you can with a proper tablet.

More compromises become apparent when you switch into laptop mode. The hinge mechanism that allows the screen to lift away from the keyboard looks decidedly low-tech, and it also takes up a lot of room. As a result, the keyboard is reduced in size and pushed to the front of the unit. That leaves no room for a trackpad, so you get a tiny little pointer located on the keyboard instead, and a small set of mouse buttons perched on the front edge of the unit.

You might get used to this arrangement in time, but less nimble-fingered users could find it a real stumbling block. Sony tells us that the Duo 11 also includes a stylus for taking notes, but we weren't supplied with one for our review - and, in any event, that wouldn't make up for the shortcomings of the Vaio's keyboard.

Battery life is respectable, if not outstanding. We got just over 4 hours when streaming video from BBC iPlayer over Wi-Fi. You might stretch that to around 5 hours for lighter web browsing or using simple office software.

**Verdict**

It's certainly nice having the option of using the Duo 11 as a tablet from time to time. However, at this price, the Sony also needs to earn its keep as a workhorse laptop. That baby-sized keyboard will deter many people who need a laptop they can use for work.  **Cliff Joseph**



Fire HD, 1,199 of the Barnes & Noble Nook HD and 752 of the iPad mini.

The Lenovo managed 15fps in the GLBenchmark 2.5 graphics test, which is slower than the iPad mini (24fps) and Nexus 7 (20fps), but faster than the Kindle Fire HD (8fps) and Nook HD (14fps).

The SunSpider test completed in 1,179ms, making this Lenovo faster for web page JavaScript rendering than all its small-screen rivals and even some of the 10in competition (the Nexus 10 recorded 1,329ms).

Lenovo says the battery lasts up to eight hours and, from our own testing, we'd second that claim.


Android 4.0.4 Ice Cream Sandwich isn't Google's latest software, but it's typical for an Android tablet. Lenovo has very slightly tweaked the interface; the lock screen has shortcuts to the camera and Google search.

On the Home screen apps are arranged into Social, Games and Media folders, and there are

widgets for weather, calendar and clock apps, plus a sticky notepad. A GameTanium app offers limited trials for around 40 games.

Lenovo has preinstalled a handful of free apps, including Zinio, Kindle, Skype, ooVoo, Evernote, SugarSync, Documents To Go and a trial of Norton Security. Lenovo's PrinterShare app enables you to operate some printers over the net.

**Verdict**

We were pleasantly surprised with the Lenovo's performance and sound quality. This tablet is solidly built, just not with the best components: both the screen and the cameras are let-downs.  **Marie Brewis**



## LAPTOP

# Samsung Series 3 XE303C12

Since its introduction in summer 2011, the Chromebook has remained a difficult sell for Google and its partners. Previous models have lacked features and quality, with little to offer over a low-end laptop or a tablet. Samsung's latest attempt has an attractive design, a lower price and, importantly, an ARM CPU.

Everything is constantly updated and backed up to Google. Documents never need to be saved. Working in this fashion requires you to put your confidence in

Google; do so, though, and computing becomes a whole lot more



convenient. You could pick up a new Chromebook, log into your Google account, and pick up where you left off. You also get 100GB of free online storage via Google Drive for two years (\$59 per year thereafter).

A 16GB SSD holds the OS and some offline documents and apps, and allows instant wake from sleep.

The Series 3 resembles the 11in MacBook Air, but it's nowhere near as polished. The silver casing is all plastic, which is acceptable at £229, but the form is spoiled by a bulbous screen hinge.

Samsung makes the 1.7GHz Exynos 5, a dual-core ARM chip that's cheaper than an Intel equivalent, with lower consumption and heat output. The unit stays cool without a fan, with a reasonable runtime of 6 hours in our tests.

The 11.6in screen has a 1366x768 resolution, and a matt finish lends it a frosted look. Colours can be bland, although the display itself is bright.

An SD slot and a headphone jack are found on the left; at the rear are two USB (one USB 3.0), a useless SIM slot and HDMI. This output had quirks in YouTube, forcing a reboot before we saw images on the TV.

The keyboard is responsive, comfortable and roomy. The trackpad is good, with sufficient intelligence to ignore stray touch input. It accepts two-finger scrolling and right-clicking. A left-click button is found underneath.

For general tasks - writing, YouTube, social media, basic games - the Chromebook performed fine. For the most part things were efficient and speedy, with a few stutters when many tabs were open.

## Verdict

Google pitches the Chromebook as an inexpensive tablet-like device for people who want a cheap laptop. For perusing Facebook, shopping and writing emails it's a fine choice. If you live in Google's ecosystem it's a great machine. **Martyn Casserly**

**£229** inc VAT

## Contact

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

Read more

■ [tinyurl.com/dxwr5gw](http://tinyurl.com/dxwr5gw)

## Specification

1.7GHz Samsung Exynos 5 Dual (ARM Cortex-A15); Google Chrome OS; 2GB RAM; 16GB SSD; 11.6in (1366x768) matt TN display; dual-band 802.11a/b/g/n; 1x USB 3.0; 1x USB 2.0; HDMI; SD slot; 0.3Mp webcam; 3.5mm headphone jack; one-button, multitouch trackpad; Bluetooth 3.0; 290x209x17.5mm; 1.1kg

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



## LAPTOP

# Toshiba Satellite P875-31P

This laptop is designed to replace a desktop computer, so its bulk comes as no surprise. You're unlikely to move its 3kg, 34mm-thick mass around too often. Yet the chunky Toshiba looks rather stylish in its finely textured silver plastic finish.

A large 17.3in widescreen means there's plenty of room for both a keyboard and a separate numberpad. These are backlit, shiny black, and match the screen bezel. Typing is comfortable on the square, flat keys, which have a decent amount of travel. A sensibly large trackpad supports gestures.

The build quality is adequate, but at this price we expect better. The casing is entirely plastic, with some amount of flex.

The Toshiba's specification is more impressive: hiding inside this laptop is an Intel Core i7-3630QM, a 2.4GHz quad-core processor that extends to 3.4GHz in Turbo mode, plus a whopping 16GB of memory.

Storage is plentiful, thanks to a 1TB hard disk and an 8GB SSD.

In Windows these appear as a single drive, and the SSD should cache the data you use most frequently. The laptop booted up in 16 secs, and rebooted in 31 secs.

In PCMark 7 the Toshiba scored a reasonable 4,357 points. This laptop is also gaming-capable, thanks to its nVidia GeForce GT 640M graphics. Cuda and Optimus technology can increase computing performance and battery life.

In Hard Reset the Toshiba achieved 64fps at 1280x720, Medium detail, and 40fps with Ultra detail. After ramping up the resolution to the laptop's native 1600x900 we recorded 49fps and 29fps respectively.

At 17.3in, the screen is large for a laptop, but small for watching films from across the room. Toshiba has cut costs with a lower than full-HD (1920x1080) resolution.

The screen's glossy finish is reflective, while its quality is



undermined by a sparkly, grainy dither, visible in white or light areas.

The optical drive is able to read and write to Blu-ray, and ports are plentiful. You get ethernet, HDMI, VGA, four USB 3.0, mic and headphone, plus an SDXC card slot. Single-band 802.11b/g/n Wi-Fi and Bluetooth 4.0 are supported, and there's a full-HD webcam for chat.

## Verdict

The Toshiba Satellite P875-31P is a bulky Windows 8 laptop with some powerful components, but it's marred by a low-grade display. Build quality is also wanting, given the high price. **Chris Martin**

**£1,119** inc VAT

## Contact

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

Read more

■ [tinyurl.com/b8t5w8e](http://tinyurl.com/b8t5w8e)

## Specification

2.4GHz Intel Core i7-3630QM; Windows 8 64bit; 16GB DDR3 1,600MHz RAM; 1TB HDD; 8GB SSD; 17.3in (1600x900) glossy TN display; nVidia GeForce GT 640M, 2GB VRAM; 4x USB 3.0; 802.11b/g/n; Bluetooth 4.0; gigabit ethernet; VGA, HDMI; BD-RE optical drive; 2Mp webcam; Harman Kardon speakers; 48Wh lithium-ion battery; 417x273x34.1mm; 2.96kg

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★



**£1,199** inc VAT**Contact**■ [chillblast.com](http://chillblast.com)**Read more**■ [tinyurl.com/bf8rmbd](http://tinyurl.com/bf8rmbd)**Specification**

3.4GHz Intel Core i5-3570K (@4.3GHz); Asus P8Z77-V; 16GB DDR3 RAM; Windows 8 64bit; 2TB Seagate Barracuda 7200rpm hard drive; 120GB Intel 330 SSD; Fractal Design Define R4 case; 680W BeQuiet Straight Power PSU; Asus nVidia GeForce GTX 670 Direct CU II, 2GB VRAM; 6x USB 3.0; 4x USB 2.0; VGA; DVI; HDMI; DisplayPort; 10x BD-ROM/DVD  $\pm$  RW

Build: ★★★★★☆

Features: ★★★★★☆

Performance: ★★★★★☆

Value: ★★★★★☆



## DESKTOP PC

## Chillblast Fusion Stealth

Chillblast's latest system is a tiger wrapped in velvet - immense bite, with a growl so muffled the PC can barely be heard.

Idling, it added just 5dB to the room, and around 8dB when gaming. It's unusually quiet and discreet for a Windows box; it could easily sit quietly in a corner of the living room.

Less surprising was the turn of speed. The Fusion Stealth plays host to the popular Intel Core i5-3570K, with the base 3.4GHz clock speed here boosted to 4.3GHz. Memory is 16GB of 1,600MHz Corsair Vengeance LP. Add a 2TB Seagate Barracuda, combined with a trusty 120GB Intel 330 SSD, and the Stealth's potential is clear.

A PCMark 7 score of 6,422 points is strong, and beats that of most Core i5 PCs. It's just short of Chillblast's own Fusion Firebird's 6,498. This is probably due to the lower-spec graphics card: the nVidia GTX 670 is very capable, but it can't match the Firebird's 680. The Stealth recorded a very decent

241fps in Stalker: Call of Pripyat (Medium settings), and 95fps in Alien Vs Predator.

The Fractal Design Define R4 casing is imposing, a seemingly smooth slab of plastic like a monolith set up to a silicon god. A featureless door, bar a silver Chillblast logo and a single light, opens to reveal, well, very little besides an optical drive.


A second bay sits ready for use; the rest of the tall front is taken up by cooling. A Gelid Tranquillo CPU cooler quietly keeps down the temperature, but it is rather large, and will make upgrades a squeeze.

Another sizeable fan at the rear keeps air flowing. A 680W BeQuiet PSU offers ample power, since Chillblast's cherry-picked components make for a system light on power usage in normal use. The Stealth drew a modest (by gaming PC standards) 61W idling. Gaming is another matter, though, and the system demanded a significant 236W running Stalker.



The LG optical drive will play Blu-ray discs at 10-speed, and write DVDs up to 16-speed. No memory card drive is included, but there are six USB 3.0 (four at the rear) and four USB 2.0 ports.

**Verdict**

For powerhouse gaming Chillblast's Fusion Firebird is a better choice. But for those who wish to work in peace, and let loose and pump pixels, the Stealth silences the competition.  **Robin Morris**

**£899** inc VAT**Contact**■ [wired2fire.co.uk](http://wired2fire.co.uk)**Read more**■ [tinyurl.com/aecxmng](http://tinyurl.com/aecxmng)**Specification**

3.4GHz Intel Core i5-3570K (@4.7GHz); Asus P8Z77-V LX; 8GB DDR3 RAM; Windows 8 64bit; 1TB Seagate Barracuda 7200rpm hard drive; 120GB Corsair Force 3 SSD; Xigmatek Asgard Pro case; 600W Corsair CX600 PSU; 2GB GeForce GTX 660; 3x USB 3.0; 6x USB 2.0; VGA; 2x DVI; HDMI; DisplayPort; 8x BD-ROM/DVD  $\pm$  RW

Build: ★★★★★☆

Features: ★★★★★☆

Performance: ★★★★★☆

Value: ★★★★★☆



## DESKTOP PC

## Wired2Fire Diablo Predator

The Diablo Predator is a clever PC that knows when to hold back, and when to drive home its advantage. Rather than specifying the most powerful components in every department, Wired2Fire has carefully selected on which areas to go for broke.

At first glance, 8GB of memory might be hinting at compromise, but the Corsair XMS3 are strong chips for the money. In tandem with a 3.4GHz Core i5-3570K overclocked to 4.7GHz, the Diablo can offer very impressive performance.

In PCMark 7 we saw 6,376 points, which is an excellent figure at this price. Wired2Fire hasn't skimped on the 1TB storage drive, and the 120GB Corsair Force 3 SSD drive is a factor in that superb result.

The nVidia GeForce GTX 660 with 2GB memory delivers good framerates. We saw 176fps in Stalker: Call of Pripyat (Medium), which is almost up there with four-figure gaming rigs. Our Alien vs Predator test recorded similarly strong scores;

78fps in the fastest mode is a tidy little tally.

The Xigmatek Asgard Pro isn't the most upmarket case we've seen. It feels lightweight, although it does look serviceable from above, with the grills revealing a fiery orange CPU cooler spinning inside.

A single drive is built into the front, and there are two spare 5.25in bays ready for upgrades. It's not a tall case, and the Xigmatek Achilles CPU cooler dominates.

Power demands of the 600W Corsair CX600 PSU are decent. When idling, the PC runs at 69W. The lighter graphics card means even in Stalker we saw only around 209W.

An added sound level of almost 11dB above ambient isn't silent, but neither is it uncomfortable.

The LG optical drive doesn't offer BD-R writing facilities, but it offers eight-speed read performance for Blu-ray film playback.




Nine USB ports are included, but only three are USB 3.0. No memory card reader is included.

The supplied keyboard has a stiff action that grates. Along with the Logitech mouse, these are areas where the Diablo feels the pinch.

The AOC i2352VH is a smart choice of flat-panel, though. Its IPS panel does an excellent job of rendering crisp and vivid images.

**Verdict**

Performance is fantastic, and the screen an inspired choice. As sub-£1,000 PCs go, the Diablo is a wonderful choice.  **Robin Morris**

32in TV

## Toshiba 32HL933B

The Toshiba 32HL933B is a straight-faced 32in, 1080p, edge-lit LED flatscreen TV boasting a rather good USB media reader. Untroubled by faddish 3D or network smarts, it changes hands for an entirely reasonable £320.

The set's design is smart, but anonymous, with the non-reflective panel set off against a slim glossy black bezel. There are just two HDMI inputs (one of which side-mounted), along with Scart, VGA, component video and USB 2.0.

Digital audio is output via coaxial rather than the more common Toslink optical connection. Stereo speakers parp from the base of the set, which bulges slightly to

accommodate the drivers. On the rear edge of the screen you'll find some onbody controls.

There are some significant caveats, not least the fact that the tuner is standard-def Freeview. We'd recommend using this screen with an HD source, be it Sky+HD, Virgin Media, TiVo or similar. The slabby remote control is also hideous.

The Toshiba may employ a basic 50Hz panel, but there's a surprisingly large selection of picture parameters to tweak. Presets comprise Standard, Mild, Movie, Game, User and Dynamic, and there's variable backlight and noise reduction adjustment in addition to contrast, brightness, colour and sharpness controls.

The set may lack the ability to receive streams from across your

network, but its USB media reader is up to snuff, thanks to a DivX HD licence. AVI, MKV, VOB, DivX and Mpeg4 content all play.

Audio tracks are illustrated by a blocky peak meter reading rather than a display of album art. Format support covers MP3, AAC/M4A and WAV.

The TV's main user interface follows the KISS

design principle, with icons for Picture, Sound, Setup and so on. The TV listing is a basic, single-channel timeline.

HD images from external sources appear sharp and vibrant. Motion resolution is surprisingly good for such a budget screen, delivering around 850 lines (at 6.5ppf). There's no subjective loss of detail and motion artefacts are non-existent. The opening sequence to *The Dark Knight* sparkles with incidental detail and clown-mask textures; it's a very cinematic picture.

Just make sure you dial back the sharpness gauge to avoid artificial-looking edge enhancement. Colour fidelity is generally good, with plenty of deep reds in evidence.

The set's black-level performance is solid, but not plungingly deep. Relatively smooth edge back-lighting helps, as it doesn't impose overtly glowing puddles over dark scenes. There's a fine sense of gradation, with shadow detail retained.

### Verdict

The Toshiba 32HL933B is an affordable flatscreen television that doesn't disappoint. Although it doesn't come with a DVB-T2 tuner, its HD performance is terrific and images don't dissolve into a sludgy mess when the action picks up. **Steve May**



£320 inc VAT

#### Contact

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

Read more

■ [tinyurl.com/bse33jf](http://tinyurl.com/bse33jf)

#### Specification

32in LCD TV; 1920x1080 pixels; stereo speakers with 2x 5W amp; Freeview tuner; 8-day EPG; 2x HDMI; Scart; Component/stereo audio; D-Sub VGA; coaxial digital audio output; headphone jack; 1x USB 2.0; CI slot; 76W average power consumption; 457x736x47mm (without stand); 8.5kg



£180 inc VAT

#### Contact

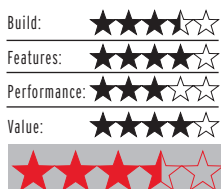
■ [go.iomega.com](http://go.iomega.com)

Read more

■ [tinyurl.com/bz2dk38](http://tinyurl.com/bz2dk38)

#### Specification

1.6GHz ARM Marvell 6282; 256MB DDR3 RAM; two 3.5in hard disk bays (6TB max); Raid 0/1/JBOD; gigabit ethernet; 1x USB 2.0; 202x99x149mm



### NAS DRIVE

## Iomega StorCenter ix2-200

The Iomega StorCenter ix2-200 is a two-bay NAS drive with 2-, 4- or 6TB of storage. Photos and videos can be automatically uploaded to Facebook, YouTube and Flickr, plus there's a built-in Torrent client, automatic backup with various cloud services, and a video-recorder function for IP cameras on your network.

Like many consumer NAS units it's a compact box, but sold prefilled with disks. It will happily sit on a desktop and operate unobtrusively. White and blue LEDs indicate power and storage status, and a door pops off to reveal the disks inside.

It includes gigabit ethernet, plus USB 2.0 for expanding the storage or hooking up a digital camera.

Our 2TB sample had a pair of Seagate 1TB Barracuda disks spinning at 7,200rpm. Iomega's site lists a limited range of drives certified for use with this unit.

Performance breaks no records when transferring files from a PC. We measured 48MB per second (MBps) when writing a large file to the disk, which is reasonable, if slightly slower than Zyxel's NSA325.

CrystalDiskMark showed scores of 28MBps sequential reading and 9.9MBps writing, with the latter especially unimpressive.

Running the Intel NAS Performance Toolkit for a more thorough assessment of the drive under multiple loads again indicated

middling performance. In the HD video test we saw 17.6MBps, rising to 24MBps at 4x playback.

NAS units of the past served as little more than networked disks, and were designed to share data only with computers connected to the same router. Vendors are now offering facilities to directly share over the web content from the NAS. You can bypass the tedium of using Facebook's website to upload hundreds of holiday snaps, and the Torrent functions negate the need to constantly leave your PC turned on.

The admin interface isn't particularly attractive, but its layout and labelling make sense. A nifty slideshow of images greets you



**£140** inc VAT**Contact**■ [samsung.com/uk](http://samsung.com/uk)**Read more**■ [tinyurl.com/afzhjdf](http://tinyurl.com/afzhjdf)**Specification**

250GB SSD; 2.5in;  
SATA 6Gbps; 512MB  
DDR2 cache; Samsung  
3-core MDX controller  
(ARM Cortex R4F);  
21nm Nand flash; Trim  
support; auto garbage  
collection algorithm;  
100x70x6.5mm; 53g

Build: ★★★★★

Features: ★★★★★

Performance: ★★★★★

Value: ★★★★★

**SSD****Samsung 840 Series**

Samsung may have been a little late to the solid-state upgrade party, but it's made a deep impression in only three or four generations of SSD. The Korean semiconductor specialist has long experience with flash and controllers, of course. But it wasn't until the 470 Series, then 2011's 830 Series, that it directly targeted consumers, rather than selling silicon for repackaging by other brands.

The latest Samsung 840 Series pitches more aggressively than ever into the mêlée of fast storage, with two similar but distinct models. These are the standard 840 and the 840 Pro, aimed at the entry-level and enthusiast audiences.

The regular 840 Series SSD is the first outing for a new type of flash, one that takes three stacked layers of memory cells. Originally, Nand flash used single-layer cell (SLC) technology, and offered excellent write performance and good longevity. Then came multilayer cell (MLC), best known as two layers stacked, which introduced larger capacities and lower prices at the expense of write speed and lifespan.

The 840 Series uses three-layer cell (TLC), which allows further reductions in price and adds a bigger question mark over longevity: it's believed that TLC storage won't have the staying power of even MLC.

Samsung backs the Pro with a five-year warranty; this version of the 840 Series gets just three.

Capacities offered are 120-, 250- and 500GB. We tested the 250GB version, of which 232GB is reported to be available in Windows.

Partly fulfilling Samsung's stated aims to sell to a wider demographic is its SSD Magician software for Windows, this utility allows you to test performance, adjust over-provisioning (Pro only) and update firmware. Samsung's allegiance to Microsoft computing is exclusive, though. To help upgrading a Data Migration Tool can copy an old Windows C drive to a new SSD.

The 840 showed read speeds up to 560MBps in the ATTO benchmark, but much lower write speeds of 263MBps. This was as expected: TLC flash is known to have 50 percent slower latency, due to the added complexity of program/erase writing to deeply buried cells.

CrystalDiskMark demonstrated little difference in sequential speeds between compressible and incompressible data, which is a worthy asset not found with SandForce SSDs. Media files such as Mpeg and Jpeg will be written at the same speed as other files.




The headline speeds in this test were 509MBps read and 256MBps write. In the small-file tests we saw some differences. For example, we recorded 30MBps when reading 4kB zeroes or ones, but 22MBps for random data. Random 4kB write speeds were much faster at 88MBps.

In the AS SSD test we saw similar numbers overall. Sequential reads and writes were 519- and 251MBps, and 4kB read/writes 19- and 75MBps. With stacked-up data the Samsung performed very well, hitting 290- and 209MBps reads and writes in the 64-thread 4kB test.

Translated into IOPS, the Samsung 840 measured 74k for reads and 53k for writes.

**Verdict**

We'd like to see support outside Windows, and we can't comment on TLC's longevity, but the Samsung 840 Series offers very competitive performance.  **Andrew Harrison**



when you log in, taken from a folder stored on the NAS drive.

Giving your content to Facebook, Flickr or YouTube is a doddle. You enter your account details on the Settings page, and create a share for each service. This appears on the network as a top-level folder; you


then drop into it pictures or videos for automatic uploading.

lomega's Personal Cloud sharing system is another good idea. With a unique username and an email address, anyone to whom you grant access can view the content on your NAS in a browser, or using an lomega Link app for iOS and Android. You can also add to another person's personal cloud your NAS as a trusted device, although we were unable to test this.

Three cloud backup providers are supported: Amazon S3, Mozy and EMC backup (the latter provided by lomega's parent company). There are also the usual DLNA and iTunes media servers, Microsoft Active

Directory integration and a number of tools, such as Smart information about the disks, an event log and temperature sensors. This is all standard fare for most NAS devices, but we're pleased to see lomega hasn't left out anything obvious.

**Verdict**

The lomega StorCenter ix2-200 is let down by its relatively slow file-transfer speeds. Although the software features are good, those who need a NAS only for backup and storage would benefit from a faster unit with simpler software. But if any of the ix2-200's sharing functions appeal, slightly longer transfer times may be excused.  **Orestis Bastounis**

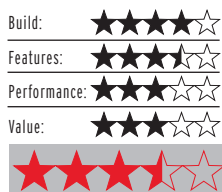
£99 inc VAT

Contact

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

Specification

Portable photo printer;  
300x300 maximum  
resolution; 18-sheet  
maximum input capacity;  
USB 2.0; 802.11b/g;  
178x127x60.5mm; 810g



PRINTER

## Canon Selphy CP900

While the printer market is flooded with medium-size colour multifunction- and single-function mono machines, it's more difficult to find small-format printers dedicated to photos. It's this niche that Canon fills with the Selphy CP900.

Ideal for stowing in a small suitcase, the CP900 measures an ultra-compact 178x127x60.5mm. Yet it feels robust and chunky, at 810g.

Styled in chic matt black, this is a mini-printer that proves you can be sexy as well as practical.

The design is very similar to its predecessor, the CP800, with a tilting 2.7in colour LCD centrally positioned on top and a row of clearly labelled buttons in front.

The supplied paper cassette slots into the open front panel. Immediately above this is an SD slot for direct printing from a memory card.

On the left side is a USB port for flash drives and PictBridge-enabled cameras, as well as a standard USB output for hookup to a PC.

The main difference between the CP900 and its predecessor is its Wi-Fi connectivity, which allows printing via a computer, tablet or a smartphone.

A certain amount of onboard editing and effects can be performed via the Edit menu, while Photo Print software is supplied.

In our tests, the Selphy lived up to its maker's claims - that is, around 47 seconds per postcard-size image, with credit-card-size images and various sets of mini-stickers slightly quicker to appear at 30 seconds each.

Colour vividness and photo sharpness are impressive for a dye-sublimation thermal transfer system. Colour brightness, tone, image optimisation and a 'smooth skin' effect are available if you don't have immediate access to photo-editing software.

The all-in-one ink cartridge slides neatly into the side of the machine,



and each pack comes with 36 postcard-size sheets. The best-value pack contains three 4x6in ink and paper sets for £34, or 31p per photo. If you splash out on an optional battery pack (an additional £74), each charge is good for 36 sheets.

Verdict

Canon's latest ultra-compact thermal dye photo printer adds Wi-Fi connectivity to its simple controls and flash drive/SD card instant processing. Print quality is also good. Martyn Clayden

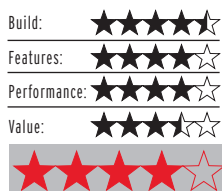
£86 inc VAT (16GB)

Contact

■ [crucial.com](http://crucial.com)  
Read more  
■ [tinyurl.com/9woyyuz](http://tinyurl.com/9woyyuz)

Specification

16GB reviewed (8/32GB also available); 1,600MHz;  
DDR3 PC3-12800; 240-pin;  
8-8-8-24 timing;  
unbuffered; non-ECC;  
1.35V; Low Profile;  
133x8x25mm



MEMORY

## Crucial Ballistix Tactical LP

Crucial has unveiled its smallest desktop memory chips yet. The Ballistix Tactical LP - for low profile - are very low indeed.

Nestling in a socket, these chips rise only 20mm in the air. Typical alternatives rise 25mm or more. The difference may seem small but, in a heat-packed case, air blockage could lead to a baked PC.

We tested the chips at their default 1,600MHz and timings, and compared them to Corsair Vengeance Performance memory. This costs around £12 less for 16GB.

The Crucial memory chips were just faster in all our tests. In WorldBench 6, for instance, the Crucial chips recorded a one-point higher score, with 207 points.

In Stalker: Call of Pripyat, they edged out their Corsair rival by 3.1fps, notching up 207.7- to 204.6fps. And in Geekbench 2, the Corsair memory averaged 15,548 points, versus Crucial's 15,573.

PCMark 7 saw the Crucial score 6,413 points, ahead by 31 points,

while the Crucial completed the Super Pi memory benchmark in 7 minutes 55 seconds - just one second faster than the Corsair.

At its default settings, the Crucial RAM is just measurably faster than some of the competition. However, the great advantage of these chips is that they're overclockable.

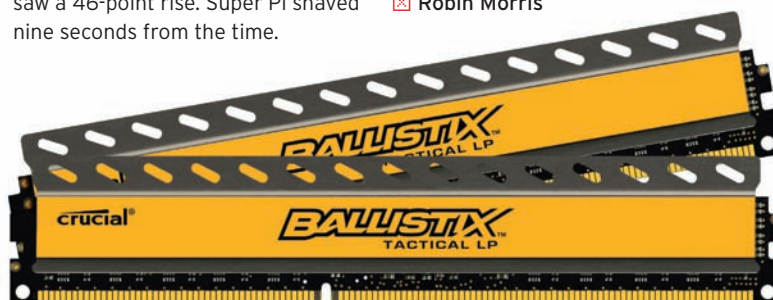
On the Asus P8Z77-V we were able to push up the chips to 1,866MHz without changing the memory timings. This yielded instant benefits, adding 1 point in WorldBench, and 1.3fps in Stalker.

Geekbench's point-score increased by 265, while PCMark 7 saw a 46-point rise. Super Pi shaved nine seconds from the time.

Fiddling with the timings, we pushed up the memory clock to 2,133MHz. The PC wasn't as stable at this speed; nor were there large improvements. Alien Vs Predator saw a mere 0.2fps added to the framerate. We were rewarded with another WorldBench point, and 184 more in Geekbench, plus a further five secs trimmed from Super Pi.

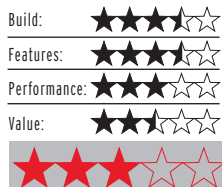
Verdict

The low height of Crucial's Ballistix LP chips is practical for small-form-factor or gaming PCs equipped with oversized CPU coolers. There is some overclocking potential, too. Robin Morris



**£119** inc VAT**Contact**■ [sony.co.uk](http://sony.co.uk)**Read more**■ [tinyurl.com/aumvmwo](http://tinyurl.com/aumvmwo)**Specification**

6in E Ink (600x800) screen; 16-level greyscale; two-point multitouch; 2GB flash storage; microSD slot; supports ePub/PDF/TXT; Wi-Fi; Micro-USB; 2-month battery life; 110x173x9.1mm; 164g

**E-READER****Sony Reader PRS-T2**

At £119, the Sony Reader PRS-T2 is cheaper than the T1 e-reader it replaces, but expensive compared to the competition – especially without a built-in light. The Kindle Paperwhite is £10 cheaper, while the Kobo Glo is £20 less.

A key difference from the T1 is the restyled buttons on the front; thankfully, most navigation is via the touchscreen. There are no physical page-turn buttons to the left or right of the screen, just two arrows below. A handy swipe function turns the page just as easily – simpler, in fact.

It comes in three colours: black, red and white. We preferred the shiny piano-finish plastic bezel of our red sample, despite the fingerprint smudges it attracts.

In common with the £69 Kindle, the PRS-T2 uses a 6in Pearl E Ink display with a 600x800 resolution. At 164g, it's about the same weight, too. The pointed ends of the Sony are slightly uncomfortable if you prefer to cradle the device in just one hand, however.

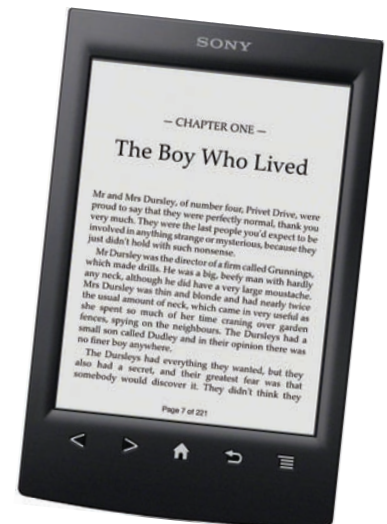
Page turning is as slow as with all E Ink screens, with an appreciable delay compared to LCD. We found the text easy to read, but not as clear as that presented by the Kindle Paperwhite and Kobo Glo, with their 768x1024 resolution. Pinch-to-zoom is awkward and caused a lot of screen flickering, so we changed the font size through the menu instead.

We missed the lack of a progress bar at the screen bottom. To jump to a chapter you have to click the menu button and access the Navigate Page function, bring up the progress bar, then 'Table of Contents'.

Images are well rendered, but with text ghosting from the previous page. The book cover is displayed onscreen in sleep mode.


Our favourite feature is notetaking, using our finger (or the included stylus) to press and highlight a paragraph. A menu pops up allowing you to send the lines to Evernote or Facebook.

The browser is fast, if you ignore the slow screen refreshing.



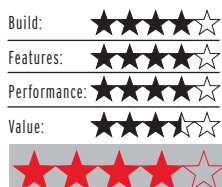
Claiming a free Harry Potter e-book was complicated, and we found navigation of the Reader Store and the PC sync software awkward. The range of books is limited compared to Amazon.

**Verdict**

This Sony Reader offers an improved menu and apps over its predecessor. The selection of books can't match Amazon, but the biggest problem is the high price.  **Mary-Ann Russon**

**£118** inc VAT**Contact**■ [matias.ca](http://matias.ca)**Read more**■ [tinyurl.com/bbqn9sv](http://tinyurl.com/bbqn9sv)**Specification**

Qwerty PC keyboard; 1.83m fixed USB cable; anti-ghosting; 3x USB 2.0; 460x165x35mm; 1.28kg

**WIRELESS KEYBOARD****Matias Quiet Pro Keyboard**

You can't beat a good mechanical keyboard. These often allow faster, more satisfying typing, although key clatter can be distracting – if not to you then at least to your colleagues.

The Matias Quiet Pro is a premium mechanical keyboard that's designed to be more acoustically acceptable in quiet workplaces and homes, while still offering the feel of a clicky keyboard. Matias uses its own switches in place of Cherry MX, instead inspired by an Alps design.

The feel of this switch is something like the Cherry MX Brown – the 'low-noise' Cherry – but with a slightly more positive action. Bite point to print characters is still near the top of travel, while the follow-through has gentle resistance.

The experience of typing is very good – perhaps not as engaging as some noisier types, but with better precision than Cherry Black or Red, which can lack tactile feedback.

The noise level is much lower than the lauded Cherry Blue – yet it's far from silent. These keys make

perhaps as much noise as a common membrane-switch keyboard, which is to say not much.

The construction is reassuringly heavy, with the Matias a chunky 1.2kg. The body appears to be ABS plastic, all black and finished in high gloss, while the keys are matt-textured with shallow finger dips.

There are no logos or markings on the top whatsoever. Key legends are white and laser-etched, so characters shouldn't fade with use.

Our sample was designed for Windows use, featuring one Windows key between Ctrl and Alt, to the left of the spacebar. A US layout means the 3 key is marked with the # symbol, but it will print £ in a UK OS.


We understand from distributor The Keyboard Company that a UK Windows model should be available by March 2013. There's also a silver US-only Mac version.



As a full-size keyboard, there's a numberpad to the right. Less conventionally it replaces the Num Lock or Clear key above the 7 with a Tab key to assist spreadsheeters.

A simple USB 2.0 hub gives three regular Type A ports. A pair of feet hinge out from below to raise the profile by 16mm at the rear, which we found comfortable in use.

**Verdict**

It isn't entirely quiet, but the Matias makes a lot less racket than most switched keyboards we've tried. If you need a high-quality mechanical keyboard, the Quiet Pro will serve you admirably.  **Andrew Harrison**





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ENTERTAINMENT APP

## StumbleUpon for Windows 8

**Free**

**Contact**

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

**Read more**

■ [tinyurl.com/afu42ca](http://tinyurl.com/afu42ca)

**System requirements**

Windows 8;  
5.7MB storage

**PC ADVISOR**  
**RECOMMENDED**



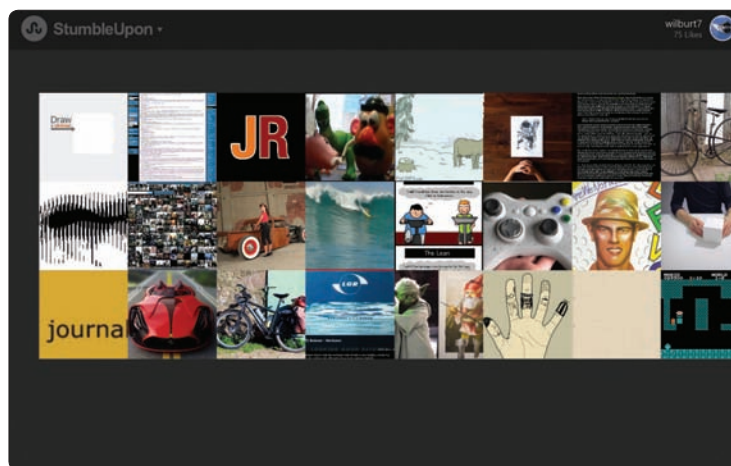
StumbleUpon embraces Windows' Modern UI, presenting content in a neat manner that's easy on the eye. Drawing on the things it knows you like, it aims to personalise your internet experience.

StumbleUpon will work better the more you use it. Once you've selected your areas of interest, the more you like and dislike content that's suggested for you the better the app will get to know you.

It's not complicated enough for you to need it, but a quick tour can help you get acquainted with the interface. You'll first have to log in using your StumbleUpon or Facebook account.

Navigation is extremely simple. The home screen provides a wall of content tailored to your likes and interests. Tap a tile to open the image, video or article.

Scroll to the right and you'll see sections for trending content, friends' activity and the things you've liked. The only oddity is that we could find no way of



refreshing the content displayed on StumbleUpon's home screen.

When you aren't opening tiles from the home screen, navigation is mostly completed via a drop-down menu. From here you can go direct to the home screen, trending or other content, plus specific areas of interest you've flagged. At any point you can bring up the Options menu and hit the Stumble button to load a random piece of content.

It's easy to share content using Windows 8's Charms bar rather than the app itself.

Your username, icon and number of likes are displayed in the top right corner of the screen, but you can't interact with this - editing your interests is possible through the Options menu.

### Verdict

This Windows 8 app is visually pleasing, and offers a simple way to use StumbleUpon. We like the minimalist interface, simple navigation and the fact it's free. Our only quibble is the lack of a refresh button. **✗ Chris Martin**

ENTERTAINMENT APP

## Xbox SmartGlass

**Free**

**Contact**

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

**Read more**

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

**System requirements**

iOS 5.0 or later; 37.1MB storage; Android 4.0 or later; 16MB storage; Windows 8; 17MB storage; Microsoft Xbox 360

**PC ADVISOR**  
**RECOMMENDED**

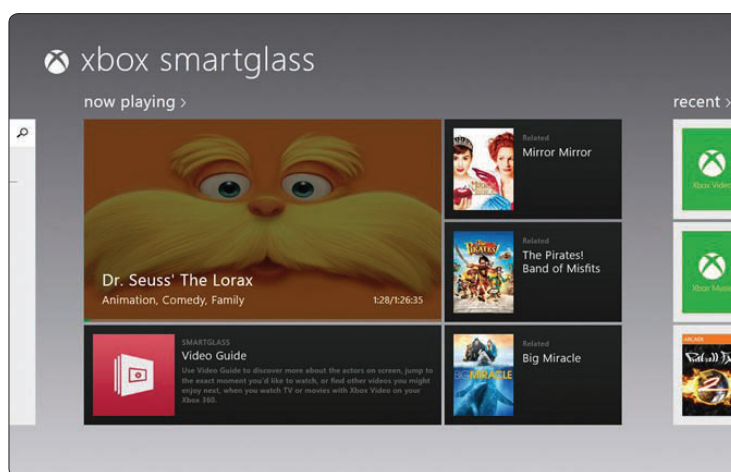


Microsoft's SmartGlass turns a phone or tablet into an Xbox 360 controller, and provides a second screen when playing games.

The first time the app is opened you'll be prompted to log in and connect to your console. Your Xbox 360 must be switched on and logged into your Xbox Live account. Having established a connection, a confirmation will pop up on the TV screen. The Xbox 360 and companion device must both be connected to the web, but not necessarily on the same network.

The SmartGlass home screen will now appear on the phone or tablet. It looks like a less comprehensive version of the Xbox dashboard, and enables you to search the Xbox catalogue, see your achievements, look over your saved games library, and edit your profile or avatar.

To take control of the Xbox, tap the Dashboard option in SmartGlass. A mobile control pad will appear. The interface is simple, and navigation is possible via swiping. The usual



B, X and Y buttons are located in the corners of the screen; tapping the main section is equivalent to pressing the A button.

Using this pad, you can navigate the Xbox 360 and all its features, browse the internet, and play and control media, including DVDs, videos and music. You can also use the onscreen keyboard to type into the Xbox, which is a darn sight quicker than the regular method.

You can't actually play Xbox games with SmartGlass, but the app provides additional second-

screen content with certain games. For example, you get a map view in Forza Horizon and, in Dance Central, you can select the next song and make playlists, without the hassle of the regular controller.

### Verdict

SmartGlass offers Xbox users convenience. While it can interact with only a handful of games during play, it makes using the Xbox dashboard and playing media a lot easier, especially where typing is required. **✗ Nermin Bajric**



## SPORTS NEWS APP

## BBC Sport

Free

## Contact

■ [bbc.co.uk](http://bbc.co.uk)

## Read more

■ [tinyurl.com/bLyyg9o](http://tinyurl.com/bLyyg9o)

## System requirements

iOS 4.0 or later;

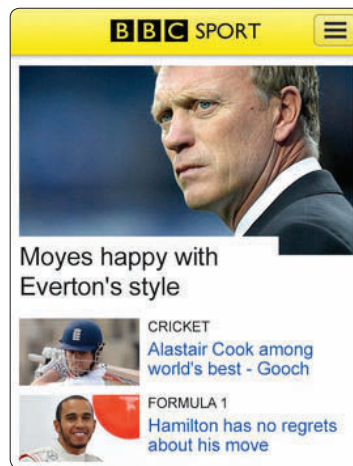
4.2MB storage

The BBC's Sport app has been a long time coming, and it wasn't worth the wait. It feels poorly executed and is missing key features found in other sport- and radio-themed apps.

The app strongly resembles the mobile version of the BBC's Sport website. Navigation is basic, but intuitive, with the option to view headlines across a range of sports and dig deeper by selecting links for football, rugby, cricket, tennis, golf and other sports.

These links can be customised to add and delete sports, and select stories concerning England, Scotland, Northern Ireland or Wales. Despite this regional option, finding sporting news from your particular area of the UK is hard work; in fact, we struggled to find any way to search news stories.

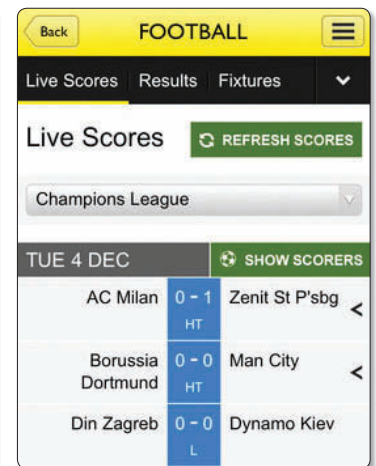
While the BBC lets users share those stories you stumble across via email, Facebook and Twitter, BBC Sport lacks any real interaction. During live coverage of an FA Cup game, the 'Get involved, contact us'



link to Twitter simply opens a Twitter page from within the app.

Push Notifications, offered by other apps such as Eurosport, also appear to be lacking. Bizarrely, you can't simultaneously listen to the live commentary provided by Radio 5 Live, read a text-based update and selected Tweets. Try to listen to the radio in the background as you check your emails, for example, and the audio suddenly stops.

BBC Sport streams Radio 5 Live and, when broadcasting, sister station Radio 5 Live Sports



Extra. Due to rights issues the app lacks the option to tune into local sports coverage, while the ability to listen to podcasts is also non-existent. Video is also sorely lacking, although the BBC says it will be introduced soon.

## Verdict

The BBC has scored a virtual own goal here, with an app that's not fit for purpose. We can only hope that BBC Sport's shortcomings are fixed sooner rather than later.

✗ Nick Spence



## GAME

## Grand Theft Auto: Vice City 10th Anniversary Edition

**£2.99** inc VAT (iOS)  
**£3.74** inc VAT (Android)

## Contact

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

## Read more

■ [tinyurl.com/a62n68s](http://tinyurl.com/a62n68s)

## System requirements

iOS 4.3 or later; 1.07GB storage; Android 2.3 or later; 1.4GB storage

The best of the Grand Theft Auto series comes to iPhones, iPads and Android devices some 10 years after hitting the PC and consoles.

Not too much has changed when compared with the original release of Vice City. We are, though, looking at the game in which Rockstar's notorious driving and murdering series really found its groove.

The soundtrack's the main thing, all Billie Jean, Judas Priest, Human League, Tears For Fears, Megadeth and Foreigner, but the neon excess of an exaggerated Miami is just as much the star of the show.

It's all present and correct in the mobile version, and running at a higher, sharper resolution than the original. We can also attest to it running smooth as you like on an iPad 3, although buildings and cars do pop into existence rather than be drawn at huge distances.

Alas, there have been no other changes to the game's appearance: characters are block-faced monsters, even if the rainbow lighting is a treat.



More seriously, despite a bit of polish in the controls department, it's as much of a pig to aim guns and drive cars as was GTA 3's mobile port. While mucking about in the open world is easy and satisfying enough, the simultaneous precision-shooting and racing required by some missions is all but impossible.

Android players can hook up a gamepad, and jailbreakers will likely seize finer control of the iOS version. Even so, casually playing on train, bus or porcelain throne will be a frustrating affair. GTA Vice City

simply wasn't made for - and doesn't adapt well to - touch input.

## Verdict

It's lovely to revisit this bona fide classic, and simply cruising around the streets listening to 'Gold' and 'Kids In America' is a true pleasure. There is a nagging sense, though, that this is either a just-because release or a cynical moneygrab - or both. At least the relatively low price reflects the fact that control issues keep it from being a must-have mobile title. ✗ Alec Meer



SECURITY SOFTWARE

## McAfee All Access 2013

**£74** inc VAT (1 user)

**Contact**

■ [mcafee.co.uk](http://mcafee.co.uk)

**Read more**

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

**System requirements**

Windows XP/Vista/7/8;  
Mac OS X 10.6 or later;  
Android 2 or later; iOS 5  
or later; BlackBerry 4.5  
or later;

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★



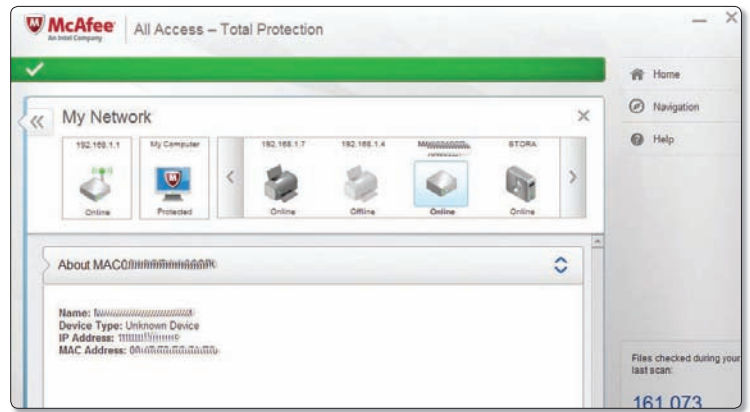
A few years ago, most people would have only a couple of devices to protect against malware. Today, many users have a Windows PC or Mac, a laptop, a tablet and a smartphone. Each is vulnerable to attack, so McAfee has devised All Access to protect them all.

To do the job properly, McAfee All Access 2013 allows unlimited licences for one person to protect all their kit. So, you're still covered if you have both an Android smartphone and an iPhone, a Windows laptop and an iPad.

The interface isn't inspiring, with large panels covering Virus and Spyware protection, and Web and Email protection. There are similar panels for Updates and Subscription, awarding the patching and money-making features undue prominence.

You get data protection and 2GB of online backup, parental controls and home network tools. There's also a very good network viewer, which picks up details of each device on your network, and Quick clean, which removes unneeded Registry entries, cookies and temporary files. The final utility looks for driver- and application updates, in an effort to improve system stability.

The Windows version of the suite works on machines running XP through to Windows 8. The Mac version, which claims on the pack



**MCAFFEE ALL ACCESS** can protect your PC, laptop, smartphone and tablet

to work with OS X 10.5 and above, actually works only with 10.6 Snow Leopard onward.

The Windows program took just over 23 minutes to scan our usual 50GB basket of test files. It analysed just 9,428 files, and the resulting 6.7 files-per-second scan rate is pretty slow. A second run gave similar results, suggesting little in the way of fingerprinting (whereby the software won't scan an unchanged file twice) is being deployed here.

With the program running a system scan in the background, a file-copy test was slowed by around 18 percent. In real terms, the copy took 1 minute 31 seconds, which is a lot longer than the 40- to 50 secs we've seen with similar products.

Independent testing lab AV-Test awarded McAfee Internet Security 2013 12 points out of a possible 18,

and placed it in 20th position in a group of 25 in a recent round-up. This result isn't particularly good, although McAfee did receive certification from the lab.

Breaking down the score into the three main areas of testing, it scored 4.5 out of six points for Protection, which is the ability to protect a system from zero-day attacks, and 4.5 out of six for Usability, which includes its impact on system resources and false positives. The biggest let-down was Repair, though, in which it scored just three points.

### Verdict

The concept of having a security product that can protect all your devices is appealing, but McAfee is not the only company to fulfil this need. Nor is its software the most effective. ❌ **Simon Williams**

SECURITY SOFTWARE

## Trend Micro Titanium Maximum Security 2013

**£70** inc VAT (3 PCs)

**Contact**

■ [trendmicro.co.uk](http://trendmicro.co.uk)

**Read more**

■ [tinyurl.com/a9uea73](http://tinyurl.com/a9uea73)

**System requirements**

1GHz processor; Windows  
XP/Vista/7/8; 256MB RAM;  
500GB drive space

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★



Trend Micro's 2013 security product is available in three versions: AntiVirus +, Internet Security, and the expensive Maximum Security edition reviewed here. This top-of-the-range product covers three OS X or Windows PCs, plus one mobile.

The Home screen is a modest affair, with five tabs at the top and a small option bar toward the bottom that offers access to scans and program settings. You can brighten up the control panel using skins - the first time we've seen this option in an anti-malware program.

The tabs are labelled Home, PC/Mobile, Privacy, Data and Family.

PC/Mobile provides PC and Internet Security, the PC Tuner

and a Rescue Disc, as well as links to online Mac and Android support information. The tuner covers wasted drive space, unwanted startup programs and Registry errors. It recovered 6.3GB in just 1 minute 27 seconds on our test PC.

The Privacy tab offers the Facebook Privacy Scanner, a new feature that inspects your Facebook privacy settings and suggests where improvements could be made.

The Data tab deals with theft prevention and the virus vault, but also offers Trend's DirectPass and SafeSync. DirectPass is an encrypted password system, which generates random passwords and keeps them in a secure vault.

SafeSync offers 5GB of online storage, shared among the three machines covered by the licence. Simple backups can be scheduled and, once data is in the cloud, it can be securely accessed from any machine running your copy of Trend Titanium Maximum Security 2013.

Scanning our 50GB basket of mixed files took 9 mins 55 secs. Trend checked 17,396 files, giving a middling scan rate of 29.2 files per sec. By comparison, Trend Micro's 2012 security product could scan just 6.8 files per sec.

We ran the same test a second time and, although Maximum Security checked the same number of files, it did so a couple of minutes

## FILE-COMPRESSION UTILITY

## Corel WinZip 17 Pro

**£43** inc VAT (1 PC)**Contact**■ [corel.com/uk](http://corel.com/uk)**Read more**■ [tinyurl.com/ahyddgd](http://tinyurl.com/ahyddgd)**System requirements**

Windows XP/Vista/7/8

Let's dispense with the obvious question first. Since Windows has been able to open and create Zip files for many years, why would you spend money on a separate utility? Although most of WinZip's features involve compression, it can also be used to enable other things, such as backup, uploading files to the internet, securing files in the cloud and sending stuff to social networks.

Corel highlights seven new features of importance: direct connection to cloud services SkyDrive, Dropbox and Google Drive; ZipShare for sending files to Facebook, Twitter and LinkedIn; the sending of large files over email; converting files to PDF as they're zipped; adding watermarks to images; auto-resizing photos; and backing up files to zips.

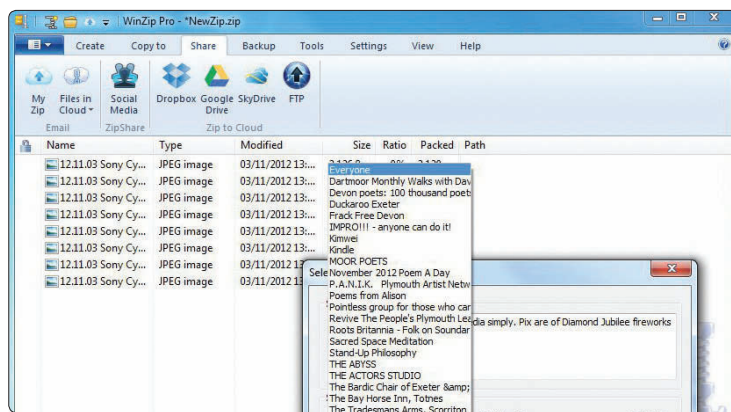
WinZip's ribbon interface is easy to use. Files can be dragged-and-dropped for direct compression, or added through a traditional Add Files dialog. Adding PDF conversion, a watermark or encryption, and resizing photos, is as simple as checking a box in this ribbon when creating a new zip archive.

PDF conversion is restricted to Word, Excel and PowerPoint files, while photo resizing works with BMP, DIB, EXIF, GIF, Jpeg, PNG and Tiff images, reducing them to one of six preset sizes, such as 800x600.

Usability: ★★★★★

Features: ★★★★★

Value: ★★★★★



**WINZIP 17 PRO** does an awful lot more than open and create Zip folders

Sending out files as PDFs makes them more difficult to alter, and therefore more secure. Resizing photos, meanwhile, makes them more convenient to share online.

Integration with SkyDrive, Dropbox and Google Drive is useful. Files can also be shared with the three main social-media networks using ZipShare.

The new backup tool is basic, but it offers pre-defined jobs to zip and save, for example, all Windows Libraries, or your emails and documents. There's a basic scheduler, too, which enables daily, weekly or monthly runs of each job.


The default destination for these jobs is the My WinZip Files folder, created in the Documents folder on the main Windows drive. Most backup programs specifically exclude storing a backup on the

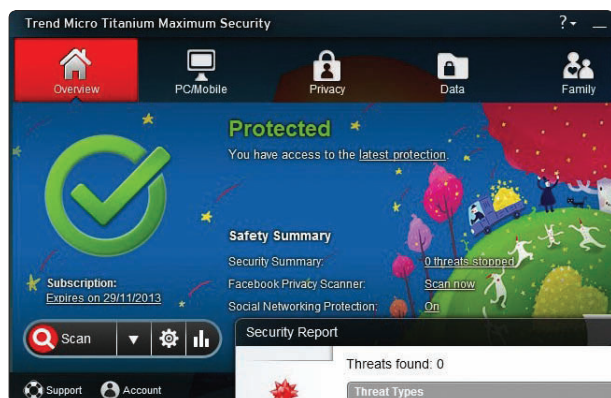
drive holding the source files: if that drive fails, you lose both.

Compression rates can vary widely, depending on whether a file is already compressed or not. We saw just 1 percent on a 700MB Mpeg4 video, which took 1 hour 30 minutes to compress, but 37 percent on an 18MB Tiff image.

Remember that most media files are already compressed and won't reduce much when zipped. With the current low cost of local storage, file size is important primarily when sending or storing stuff via the web.

**Verdict**

WinZip remains useful in this mobile age. Many of the utility's new facilities are cloud-focused, and provide valuable new ways to use file compression. It is rather expensive, though.  **Simon Williams**

**TREND MICRO MAXIMUM SECURITY**

**SECURITY** is the first security product we've seen that lets you customise its interface with skins

faster. The number of files scanned would suggest fingerprinting (whereby only altered files are scanned to save time) isn't being used, although the process was faster second time around.

Also in Maximum Security's favour is a small resource footprint,

and we found a scan running in the background slowed our 1GB file-copy test by just 2 percent.

Independent testing lab AV-Test awarded Trend Micro's 2013 security engine at 14.5 out of 18 points. This is a good score, and not far behind the front-runners. Plus, Trend Micro is the first security software we've seen to achieve the full six points in the Protection category.

This performance wasn't matched in AV-Test's remaining categories. Trend Micro was awarded four points (out of six) for the detection of established malware and system repair after attack.


Trend Micro argues that this category isn't as important, since

a good security product won't let malware on to the system where it can make changes in the first place.

Trend Micro scored 4.5 out of six points for Usability, with a surprisingly poor score in the system slowdown sub-test - this doesn't match our own results.

AV-Test has not tested the OS X version for detection efficacy or slowdown of system performance.

**Verdict**

Trend Micro Titanium Maximum Security 2013 provides strong protection on a variety of platforms. Its Windows antivirus is a versatile, well-designed suite, with a light resource hit.  **Simon Williams**



## VIDEO UTILITY

### DivX Plus 9

**Free**

**Contact**

■ [divx.com](http://divx.com)  
 Read more  
 ■ [tinyurl.com/ahsvvub](http://tinyurl.com/ahsvvub)

**System requirements**

Windows XP/Vista/7/8

Usability: ★★★★★☆

Features: ★★★★★☆



DivX Plus 9 is a desktop media player. And a video converter. And a browser plug-in. And a codec pack. And a DLNA server for streaming video to compatible devices. In short, there's not much this free app can't do when it comes to video, and it handles most tasks very well.

As a media player, DivX Plus is easy to use and attractive. It features a sleek black and grey design that looks more modern than the orange scheme of its rival VLC. The design is busier, though; whereas VLC tends to fade into the background, DivX Plus is more difficult to ignore. A column (collapsible) along the right side of the window reminds you that you can do more than just watch video, with icons for streaming or transferring video to another device.

We had problems streaming video to a networked Samsung TV. DivX Plus led us through the process of turning on sharing and identifying which folders we'd like to share, but it didn't provide much additional



**DIVX PLUS 9** is useful for most tasks concerned with video conversion

guidance. We would have liked some notification that the files were being correctly shared, as we were never able to view them on the TV.

We had more luck with the DivX To Go feature, for transferring videos to DivX devices. You select the video you'd like to transfer, and what kind of device you'll be viewing it on. Decide whether to burn it to DVD or save to USB drive, and DivX Plus handles the transfer. The process wasn't fast, but it worked.

The DivX Plus Converter allows you to convert almost any video file to DivX, DivX Plus or Mpeg4. Video

conversion is claimed to be up to 10 times faster in this version.

We were impressed by how easy it was. You can drag-and-drop a video on to the main window, or you browse to find the file you want. You then select the output profile, and click Start to begin conversion.

#### Verdict

DivX Plus is a full-featured video application that's (mostly) easy to use. If your video needs include DLNA streaming and transferring videos to other devices, DivX Plus is for you. **Liane Cassavoy**

## GAME

### Fieldrunners 2

**PC ADVISOR**  
**RECOMMENDED**

**£6.99** inc VAT

**Contact**

■ [subatomicstudios.com](http://subatomicstudios.com)  
 Read more  
 ■ [tinyurl.com/bd3pndj](http://tinyurl.com/bd3pndj)

**System requirements**

2.2GHz processor  
 Windows XP/Vista/7/8;  
 1GB RAM; 550MB drive  
 space; graphics card  
 with OpenGL 1.5 support  
 and 256MB VRAM

While iPhone-land is full of remakes of untold classics from PC gaming's history, it's rare for the reverse to be so successful. Touch-games rarely feel natural when played using a keyboard and mouse. Yet Fieldrunners 2 is an impressive upscaling of a best-selling tower-defence game from iOS.

This game was quietly spectacular to behold on the smallest screen. With you now free to sprawl its colourful worlds of death-marching cartoon men and fire-spewing turrets on a larger monitor, Fieldrunners 2 is a real sight to behold.

The user interface is completely redone, so you'll find yourself naturally clicking all over the shop and hitting keyboard buttons rather than poking your screen. There's a graphical step-up too, and as a result Fieldrunners 2 expertly hides its mobile origins.

It's a cracking tower-defence game, tending to treat its maps as fiendish puzzles rather than simply



**FIELDRUNNERS 2** is the best tower-defence game, on iPhone or Windows

spamming your rows of turrets with more and more enemies until you either triumph by attrition or give up in exhaustion.

But that cutesy cartoon look is at odds with how demanding the game can be, especially in later levels or the unforgiving three-star difficulty setting. It's not the hardest tower-defence game in town, but you definitely need to bring your brain to the party.

Where Fieldrunners 2 falters is in character. Yes, it's mega-colourful, and the size of the hordes with which it swamps the screen is spectacular, but there's something

oddly bland about it. It carries itself like a humorous game, with its loading screen puns and squeaky death sounds, but it's not funny.

Nonetheless, it's amazing how comfortable the game seems on a PC, to the point that this is definitely the best version of the game.

#### Verdict

Fieldrunners 2 is an expert iPhone-to-PC conversion, and thus lays claim to being one of the best tower-defence games ever. It could do with more edge to its humour, but you're only there to kill dozens of little men anyway. **Alec Meer**



## GAME

## Call of Duty: Black Ops 2

**£39** inc VAT

## Contact

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

## Read more

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

## System requirements

2.6GHz processor;  
Windows XP/Vista/7/8;  
2GB RAM (4GB 64bit);  
16GB drive space; nVidia  
GeForce 8800 GT with  
512MB RAM or faster;  
DirectX 11; soundcard;  
broadband connection



Another year, another Call of Duty, and another two games under one name. Well, three in fact, as the Call of Duties that aren't subtitled 'Modern Warfare' also include the well-loved zombies mode.

So, while different people will buy Black Ops 2 for different reasons, it's perhaps important to consider it as a package rather than its individual parts. These parts in essence bring the same experience we've been playing for the past half-decade, but with tweaks, polish and a few more ambitious changes.

## Single-player

Let's start with the single-player campaign. Although it's the most short-lived inclusion, it's also the first port of call for much of COD's enormous audience. In many ways it's the usual 'American soldiers save the world from sinister foreigners' nonsense, but it does at least try to do something more. With a script by Hollywood screenwriter David S Goyer, it splits its time between the 1980s and 2025, with a sizeable, rotating cast of playable characters.

Despite efforts to give its soldiers personalities and motivations, the script tends to devolve into angry, foul-mouthed men, which makes it difficult to feel much for the game's ostensible heroes. One setpiece level from the villain's perspective winds up making him, for a while, the most sympathetic character in the game.

With the characters so throwaway, including the original's returning stars Mason and Woods, the real star of the show is the rapidly changing setting. A phenomenal amount of money has clearly been spent on Black Ops 2 and, while there's not much in the way of meaningful



**COD: BLACK OPS 2** is more of the same, but it's undoubtedly spectacular

evolution, it does strive to upstage everything in its field.

From dense jungles, exploding cities and tranquil Christmas-time suburbs to a vast, floating futuristic hotel, Black Ops 2 is a visual treat.

There's something sad about the fact all you can do in these amazing environments is run through small corridors while shooting people.

It does at times offer a little more freedom than before, however. There's now the option to choose your preferred weapon load before each mission, and some levels provide a few different, if still linear, routes to best take advantage whether you're an in-your-face fighter or something of a sniper.

Once in a while the game offers a moral choice, having you decide the fates of certain characters with eventual consequences upon the game's ending. Granted, these choices tend to involve 'kill or subdue' or 'shoot in the head or the legs' but, for a series that has so far consisted only of bang bang bang/cutscene/bang bang bang/cutscene, it's a more significant step forward than it first appears.

## Multiplayer

Multiplayer, on the other hand, is rather less progressive. This is about tweaking and refining Call of Duty's wildly successful online formula, so few risks are taken.

There are new maps, weapons and special abilities, some of which have slightly sci-fi leanings, but still don't depart far from the tried and tested. Probably the most significant change is the loadout system. Whereas formerly you'd have to stick with specific sets of killing tools, now you get to pick 10 things with which to equip yourself. There are hundreds of possible combinations to cater to individual

tastes. The game's community is wasting no time in finding the most powerful/efficient combinations - and, indeed, how to most brutally turn the elaborate maps to their advantage. For the more casual player, it's a welcome opportunity to play with more toys.


While multiplayer isn't as visually spectacular as the sheer excess on display in the single-player, it's comfortably the best-looking of all COD's online modes. There's a concerted departure from grey-brown urban areas into colourful and exaggerated settings. Assuming you're not too busy hiding behind the large collection of small walls, crashed fuselages and futuristic billboards to notice, it's definitely more colourful than the series has been for a while.

## Zombies

The once-throwaway co-op Zombies mode sees a little more progress, moving from unrelated individual levels to a sort of campaign structure of its own. It's a meatier offering, and getting closer to the point where it becomes its own game rather than a slightly silly sideshow. It doesn't feel anywhere near as slick as the single-player proper; on the plus side you don't keep getting interrupted by cutscenes and quick-time events.

The tendency to dismiss Black Ops 2 as more of the same is strong, but it has worked hard to be more spectacular and a little less restrictive than its predecessors.

## Verdict

The sheer spectacle of the single-player campaign makes the unpleasant characters and nonsense plot more fun than they deserve to be. As a package, there's an awful lot crammed in here.  **Alec Meer**

The **ZOMBIES** mode is now a meatier offering



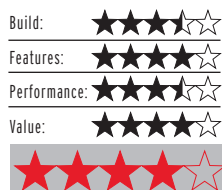
£232 ex VAT  
£279 inc VAT

#### Contact

■ canon.co.uk  
Read more  
■ tinyurl.com/ac6ak2n

#### Specification

Multifunction mono laser printer; 128MB memory; 600x600 maximum resolution; 25ppm specified speed; 300-sheet maximum input capacity; USB 2.0 interface; Wi-Fi; 10/100 ethernet; 390x445x360mm; 13.4kg



#### PRINTER

### Canon i-Sensys MF4890dw

Canon's i-Sensys MF4890dw is a compact multifunction mono laser printer with a good feature set. Styled in ubiquitous cream and black, this is a lightweight printer that won't take up much space on a work surface.

It features full multifunctional capabilities, including fax, and an optional handset can be attached. Connectivity extends to Wi-Fi, USB and ethernet, making this unit flexible for office needs. Noticeable omissions are a front USB port for flash drives and any form of memory-card slot - the latter is rarely found on business printers.

The MF4890dw's sturdy build extends to the front control panel, which swings upward and firmly clicks into place.

The main paper feed holds 250 sheets of A4. A useful dust cover can be lowered on to this, where it forms part of the base of a separate manual feed.

On top of the printer is an automatic document feeder (ADF)

for the copier, which holds a further 50 sheets. Up to four sheets can be printed on to a single page.

A five-line blue-and-white LCD is used to navigate the menu. It's brighter and clearer than those we've seen on rival models from Brother.

Three buttons on the far right of the control panel let you send scanned documents to two registered computers, and organise preset copies. However, the function of a number of buttons is not immediately made clear by the icons printed on to them; some extra labelling would be helpful here.

Print speeds are impressive, with 20 pages per minute (ppm) the average for a page of text. This dropped to 15ppm in duplex mode, while the Quiet mode is slower still.

Scanned colour images remained faithful to the originals. We also found deep blacks in printed documents. However, mono copies



of our images were several shades darker than the originals.

A 2,100-page cartridge is available for this printer, which works out at around 2.9p per page. This isn't extravagant, but decent mono lasers that cost less than 2p per page can be found.

#### Verdict

Canon's i-Sensys MF4890dw combines a broad range of features with fast performance and good print quality, if unexceptional running costs. Martyn Clayden

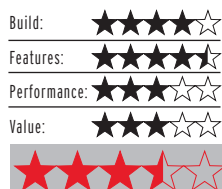
£140 ex VAT  
£169 inc VAT

#### Contact

■ canon.co.uk  
Read more  
■ tinyurl.com/aeL8dds

#### Specification

Colour inkjet printer/scanner/copier; 9600x2400 print resolution; six ink tanks with ChromaLife100+; up to 2400x4800dpi scanning; flatbed scan 48bit input/24bit output; 802.11b/g/n; USB 2.0; full duplex; CD/DVD printing; AirPrint; 466x369x148mm; 8.4kg



#### PRINTER

### Canon Pixma MG6350

Canon's MG6350 is a multifunction inkjet printer that includes scanning and copy facilities. This sleek, low-profile unit is available in glossy black or cool white, with an approachable 3.5in colour touchscreen.

Two paper trays hold 125 A4- and 20 4x6in photo sheets. The output tray has a neat support bar that automatically extends in use.

Eco-friendly features include the ability to save paper with duplex (two-sided) printing, and power, by the printer automatically turning on when required and off after a set period. You can even save ink: the use of six individual colour tanks means you need to change only that which has run dry.

We found black output dark and sharp at the Canon's default setting, and even crisper in its best mode. Colour adopts an orange tint on standard paper, but is crisp and accurate, if slightly cool, when using Canon's photo paper.

Photo prints are available at an impressive 9600dpi resolution, but

in our tests some output displayed banding.

Mono pages printed at 8.4ppm in Windows and 7.7ppm on a Mac.

Photo prints were available at 2.7ppm with standard paper, and almost 1ppm using glossy stock. Full-page photos printed at 0.6ppm on the Mac.

Copy and scan times were fast, too. The A4 flatbed scanner lacks an ADF for longer documents, but the scanner lid telescopes to accommodate thicker materials.

All the latest protocols are supported, including Apple AirPrint for printing from an iDevice. Cloud Link utilises the printer's touchscreen to let you browse and print photos from online albums at the Canon iImage Gateway or Picasa.

We found Canon's My Image Garden software utterly unintuitive, and its online manual unhelpful.



We recommend you stick with Photoshop Elements or a similar consumer photo editor.

Direct on-disc printing can be invaluable. You can also copy from one disc and directly print to another. The results were great, but the process demands the use of the My Image Garden software.

Standard ink cartridges cost around £10, but nominal yield varies with each colour. The resulting price per page is in excess of 10p.

#### Verdict

We like the Canon's design, intuitive menu system, print quality and speed, but the unhelpful software and steep running costs are offputting. Simon Jary



**£120** ex VAT  
**£145** inc VAT

#### Contact

■ [kyocera.co.uk](http://kyocera.co.uk)  
Read more  
■ [tinyurl.com/bgjnfk3](http://tinyurl.com/bgjnfk3)

#### Specification

Mono laser printer;  
390MHz ARM processor;  
1800x600 print  
resolution; quoted print  
speed: 25ppm (A4); actual  
print speed: 20.7ppm; USB  
2.0; 10/100 ethernet; 250-  
sheet input tray + 1 sheet;  
32MB memory; auto  
duplex; toner cost: £42;  
print yield (pages): 2,100;  
358x276x241mm; 6.7kg

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

#### PRINTER

### Kyocera FS-1061DN

**PC ADVISOR**  
**RECOMMENDED**

Kyocera has a reputation for large, powerful and effective printers. The sub-£150 FS-1061DN is quite a departure. It looks like a larger model that's been placed in a miniaturisation machine, then dressed in the usual business-like dull cream/charcoal scheme.

It's one of the smallest lasers we've seen, just 358mm across; only Samsung's ML-2955DW is narrower, if bulkier in depth and height.

The paper tray is covered with a protective cover but, taking into account its front-loaded design, the printer's depth is closer to 400mm than the stated 276mm.

The input tray allows up to 250 sheets, plus there's a single-sheet manual feed. Paper is fed into the top, and the system worked well at catching sheets. We experienced no paper jams, so Kyocera's vaunted reliability looks to be present here.

Besides USB 2.0, the Kyocera offers ethernet for wired networks. You can't plug in USB drives or memory cards, though.

The control panel is rather simplistic, but Kyocera has a cunning software interface. It's reasonably logical, but it wasn't easy to find the best-quality settings.

Out of the box, the Kyocera's print was too faint. We saw better results after tweaking the drum settings. Output was then dark yet easy to read, and text reasonably crisp. Some legibility was lost at small font sizes, but the Kyocera competes well against its rivals.

It doesn't like printing images, and greyscale depth was lacking in our tests. Pictures also suffered from banding, and the overall tone was overcast. For text, though, the Kyocera edges out the Samsung.

The Kyocera is fast, producing output at a very capable 20.7ppm. In auto-duplex mode this dropped to a still pleasing 12.2ppm.


The printer added around 30dB to the ambient sound level during



normal jobs. This is odd, but typical for a laser printer; a Quiet mode reduces this to a mere 16dB. The down side is 5ppm off the speed.

Consumables offer excellent value for money, with the Kyocera's toner working out at a very economical 2p per page.

#### Verdict

In common with most sub-£150 mono laser printers, the Kyocera finds the Samsung ML-2955DW a difficult act to follow. However, the FS-1061DN provides fast performance, pleasing text quality and excellent running costs.  **Robin Morris**

#### PRINTER

### Samsung CLX-6260FW

The CLX-6260FW colour laser has some class: its appearance and controls, output and even software are first-rate. The device wakes up quickly and performs tasks with skill. Alas, its upkeep will cost you dearly.

This multifunction has all the usual connectivity options: Wi-Fi, USB and gigabit ethernet. The unit is controlled via a 4.3in touchscreen, and menus and options are intuitively arranged. A numeric keypad is present for dialing phone numbers and entering four-digit secure-printing PINs.

An Eco button switches the printer into economy mode, in which it uses less toner.

Software supports all the copy/fax/print/scan chores, as well as email and internet printing. You can also scan directly to social media sites and convert documents to e-book format.

The standard paper capacity is low even for a small office. The bottom cassette holds 250 sheets, and the multipurpose tray that

folds down just above holds 50.

The output tray claustrophobically situated below the scanner holds 100 sheets. A 520-sheet, bottom-mounted auxiliary tray is available, and increases the total capacity to 820 sheets. An ADF holds 100 sheets. Duplex printing and scanning are fully automated.

Mac users win the print-speed game, for once. The Samsung posted better-than-average speeds on our Mac, but middling speeds in Windows. Text and monochrome documents exit at an aggregate 12.6ppm in Windows, and 12.9ppm on the Mac. Snapshot 4x6in photos printed at 3.3ppm to plain paper, and 1.3ppm to glossy paper. On the Mac, our colour PDF newsletter printed at 6.4ppm, and a full-page colour photo at 1.6ppm. Copies exited at 4.5ppm, and scan speeds were also decent.


Black output is sharp, and as good - if not better - than you see from any printer in the Samsung's class. Colour output is exceptional



for a laser, with a realistic, albeit slightly subdued palette.

The £40 standard 2,000-page black toner works out at a tolerable 2p per page, but the 1,500-page colour refills cost a whopping £57 each. This means you'll pay over 11p for a colour page.

#### Verdict

It's a truly excellent multifunction printer, with decent speed, output and features, but the Samsung CLX-6260FW is very expensive to run.  **Jon Jacobi**

**£500** ex VAT  
**£600** inc VAT

#### Contact

■ [samsung.com/uk](http://samsung.com/uk)  
Read more  
■ [tinyurl.com/bcdeo7c](http://tinyurl.com/bcdeo7c)

#### Specification

Fax/copier/printer/  
scanner; 4.3in  
touchscreen; 9600x600  
print resolution;  
1200x1200dpi copy  
resolution; auto duplex;  
1200x1200 scanner optical  
resolution; 300-sheet  
standard (820-sheet max)  
capacity; 802.11b/g/n Wi-Fi;  
gigabit ethernet; USB 2.0;  
60,000 monthly duty  
cycle; SD card slot;  
469x453x504mm; 26.7kg

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

## PRINTER

### Xerox Phaser 3320

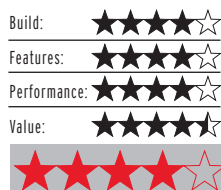
£195 ex VAT  
£234 inc VAT

#### Contact

■ [xerox.co.uk](http://xerox.co.uk)  
Read more  
■ [tinyurl.com/arcLm4j](http://tinyurl.com/arcLm4j)

#### Specification

Mono laser printer;  
128MB standard memory;  
1200x1200 max printing  
resolution; 35ppm  
specified speed;  
300-sheet standard input  
capacity; 820-sheet  
maximum input capacity;  
recommended duty  
cycle up to 80,000  
images/month; 10/100  
ethernet; Wi-Fi; USB 2.0;  
366x368x257mm; 10kg



Xerox's latest entry-level mono laser printer, the Phaser 3320, will appeal to no-nonsense SMEs and home businesses that need only basic printing functions and no frills.

Styled in the company's usual two-tone blue and cream, the Phaser's footprint is reassuringly small at just 366x368x257mm. Neither is it an effort to move around, with an unboxed weight of 10kg. Although it's clearly a compact model, the Phaser 3320 feels robust and solid, with no flimsy elements.

The main purpose of this unit is to produce printed documents at great speed. As you'd expect, the printer's controls have been pared down to the minimum. A two-line text LCD linked to a control dial handles system setup, layout and paper requirements, and the printer slips into Sleep mode soon after you've finished using it.

The paper capacity is substantial, with 250 sheets accommodated by the base tray and a further 50 in the drop-down Bypass tray at the front.

If your print volume needs are greater, an additional 520-sheet paper tray (available for around £194) can be attached to the bottom of the unit. The 128MB of memory can also be bolstered by 256MB for an extra £208.

If you're limited in terms of where in the office you can position a printer, the Phaser 3320 has useful connectivity options, with built-in Wi-Fi, USB 2.0 and ethernet.

Xerox claims its printer is capable of up to 35ppm; from the results of our own tests, this figure could well be believed. Single-side A4 pages emerged at an average rate of 33ppm, and duplex copies at 16ppm.

Print quality is very good, particularly when printing graphics. These manage to avoid the overly dark errors of several more expensive printers we've seen.

Two types of toner cartridge are available for the Phaser 3320:



a 5,000-page standard tank or an 11,000-page high-capacity version. The standard cartridges work out at a very good 1.8p per page, which can be reduced to 1.6p using the high-capacity option.

#### Verdict

The Xerox Phaser 3320 is a fine mono laser printer if your printing needs are centred on speed and volume. Additional perks include duplex printing and Wi-Fi connectivity. Perhaps more importantly, this printer boasts low running costs. [✉ Martyn Clayden](#)

## SCANNER

### Xerox 7600i

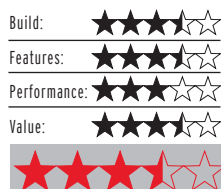
£54 ex VAT  
£65 inc VAT

#### Contact

■ [xeroxscanners.com](http://xeroxscanners.com)  
Read more  
■ [tinyurl.com/bck44yv](http://tinyurl.com/bck44yv)

#### Specification

A4 flatbed scanner;  
contact image sensor;  
1200dpi optical resolution;  
24bit colour; USB 2.0;  
USB bus power; 200-  
sheet daily duty scan;  
Twain/WIA compliant;  
256x400x43mm; 1.62kg



For a modest £54, the 7600i is a flatbed scanner that raises its lid for quicker scanning than your standard multifunction printer.

At just 1.62kg, it's one of the lightest A4 flatbeds we've tested, and powered from a USB connection. It lacks the compactness and automation of a sheet-fed scanner, but the 7600i is still one of the more portable options.

The Xerox is shorn of fancy features. The only controls are three front buttons, the first two of which are pre-programmed to work with emails and to start a simple copy. Any button can be assigned to other tasks, such as quick one-touch access to your scanning software.

Unlike Plustek's OpticBook range, the Xerox doesn't have any features for working with books or thick brochures, such as extendable hinges, although you can remove the lid from the back of the scanner to accommodate thicker material.

The 7600i is all about speed. It required just 14 seconds to turn

out a 300dpi A4 image, stretching to 83 secs at the highest resolution of 1200dpi. This makes it a faster model than the scanning components found on many multifunction printers, where 20 seconds or more is typical for 300dpi scans.

When scanning a standard photo, these times fell to just 7 secs at 300dpi, and 31 secs at 1200dpi.

The quality isn't amazing, though. In general, our test results were pleasing, and certainly superior in quality to the scans we've seen from previous sub-£100 models. But there was a lack of fizz in some scans, and the device didn't bring out the requisite depth at the extremes of the spectrum.

The software bundle includes Nuance OmniPage, which is one of the better and more accurate OCR packages. We were able to scan and convert a number of documents with near-perfect accuracy.



PaperPort 12.0 is also present, ready to organise your scan collection (plus other documents and photos). PaperPort has good PDF support, plus features for working with forms. It can be a bit temperamental, though.

#### Verdict

While the Xerox 7600i isn't going to win awards for its colour quality, its output is palatable, and is generated in a surprisingly short time. It won't be troubling the £100-plus models, but for those who'd like to improve upon the rather sluggish or even lower-resolution scans from their multifunction printers, the 7600 will be £54 well spent. [✉ Robin Morris](#)



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# GAMING LAPTOPS

Cliff Joseph rates six laptops capable of serving your mobile-computing needs, plus the odd spot of framerate-pumping hardcore gaming

**W**indows laptop makers spent most of past year encouraging us to buy Ultrabooks. They're very nice, both light and portable, with batteries that can last half a working day, but the one thing they can't do – nor laptops in general – is play games.

The vast majority of laptops now on sale rely on a variant of Intel's integrated graphics solution to handle the visual eye-candy. Although the latest HD Graphics 4000 chip built into Ivy Bridge CPUs can cope with HD video and casual games at their lower quality settings, they're not up to the graphics of the latest action games.

In the past, those of us who wanted to play such immersive games would usually have both a laptop and a desktop PC, mitigating the problem. But desktops are increasingly passed over for do-it-all laptops that can perform all the basics of a home PC. So, in among all those slimline Ultrabooks, most PC makers also have at least one machine that has the graphical horsepower demanded by serious gaming.

A powerful CPU is a good starting point, and most of the gaming laptops reviewed here include a quad-core Intel Core i7 processor. An i5 chip can also handle most gaming action, provided that it's fitted in conjunction with a decent graphics card.

Casual gamers who just fancy a bit of shoot-'em-up action can get away with a mid-range graphics processor, such as nVidia's GeForce GTX 660M. This can handle most games perfectly well, provided that you don't mind turning down the resolution and graphical detail.

However, hardcore gamers will want at least full-HD (1920x1080), with all the added effects made possible by DirectX 11. The nVidia GeForce GTX 670M, AMD Radeon HD 7970M or anything more powerful can meet this demand.

Unfortunately, building a separate graphics processor into a laptop inevitably involves compromises. Most of these gaming laptops can manage only two- to three hours away from the mains.

We didn't experience any problems with overheating during our testing of these laptops, but it's worth ensuring the machine has good heat management, and can stay cool without noisy fans driving you to distraction.

Screen size is an issue, too. Obviously a larger screen is better for playing games, but this will also add bulk to the laptop and more quickly drain its battery. You usually need to also decide whether to opt for a 15in-screen model, which will still be at least semi-portable, or a larger 17in laptop that will live at home and act as a desktop replacement.

Look out for the ability to switch between the separate graphics processor and the integrated graphics when you're not playing games.

Also pay attention to build quality and the construction of the chassis. The big-name brands design and make their own, while the small UK/European brands here all use the same chunky generic chassis made by Clevo.





Photography by Dominik Tomaszewski



|             |       |
|-------------|-------|
| Build       | ★★★★★ |
| Features    | ★★★★★ |
| Performance | ★★★★★ |
| Value       | ★★★★★ |
| Overall     | ★★★★★ |

**PC ADVISOR**  
BEST BUY

## ALIENWARE M17X

**£1,749** inc VAT • [dell.co.uk](http://dell.co.uk) • [tinyurl.com/7n7r6t3](http://tinyurl.com/7n7r6t3)

Alienware may have lost some of its street cred since it was taken over by Dell, but it still turns out some pretty impressive gaming gear.

The Alienware M17x certainly looks the part. It's built like a tank - big, sturdy and heavy, with the gratuitous glowing lights and glaring speaker grills that form Alienware's trademark. The 17.3in screen pushes the weight of the unit well over the 4kg mark, so you won't be carrying it around too often.

The M17x is well-designed and comfortable to use when you're settling in for a long gaming session. The large screen provides a full-HD resolution of 1920x1080, with excellent image quality, although the glossy, reflective coating can be annoying.

The size of the screen also means there's plenty of room for a large, comfortable trackpad and keyboard, along with a handy set of media-playback buttons. There's also a button for activating the AlienFX utility, which provides a range of customisation options.

The M17x ran cool and quiet in our tests. We were disappointed with the speakers, though, which are loud, but sound tinny.

Plenty of build-to-order options can be found on Dell's website, allowing you to specify AMD or nVidia graphics. Our £1,749 review sample has a quad-core Intel Core i7-3610QM running at 2.3GHz, 8GB of RAM, a 500GB hard disk and a 64GB SSD. Dell has since given this processor a speed bump to 2.4GHz (now an i7-3630QM).

The i7 chip includes Intel's integrated HD Graphics 4000, and our unit was also fitted with an AMD Radeon 7970M. This graphics processor produced the best all-round results in our various performance tests, with the M17x capable of 57fps in Batman: Arkham City (1920x1080, High). This laptop also hogged the limelight in our Stalker, Hard Reset and PCMark 7 benchmarks.

Battery life isn't pitiful, given the size and power of the M17x. We measured 2.5 hours when streaming video over Wi-Fi, but you could extend this by toggling on the integrated graphics for non-gaming tasks. Note that this requires a reboot.

**VERDICT:** There's no doubt that the M17x is one of the most powerful gaming laptops available. However, it's also one of the most expensive. The machine's sheer size and weight may deter anyone looking for anything remotely portable.



|             |       |
|-------------|-------|
| Build       | ★★★★★ |
| Features    | ★★★★★ |
| Performance | ★★★★★ |
| Value       | ★★★★★ |
| Overall     | ★★★★★ |

## ASUS G75VW

**£1,699** inc VAT • [uk.asus.com](http://uk.asus.com) • [tinyurl.com/a247opb](http://tinyurl.com/a247opb)

Although it's now recognised for its lightweight Ultrabooks, Asus has long had a sideline in gaming with its Republic Of Gamers range. The G75VW is an impressive laptop that goes gung-ho for 3D action.

It's another beast of a laptop - even bigger and heavier than the Alienware M17x, weighing in at a mighty 4.4kg. It's very much intended as a homebound desktop-replacement system.

The Asus' most striking feature is its 17.3in screen, which has a 1920x1080 resolution and a non-reflective matt finish. It's the best screen in this group, and benefits from nVidia's Lightboost technology to increase its brightness and widen viewing angles.

Audio quality is good, too. Its three-speaker system isn't as loud as that of the Toshiba Qosmio, but the third bass speaker helps to produce a fuller, more rounded sound.

The G75VW also supports nVidia's 3D Vision 2 technology. One pair of 3D glasses is supplied and, in games that support it, you can toggle on stereoscopic 3D mode at the press of a button.

Gaming performance is good, if not up to the standard set by the Alienware M17x, trading a few frames per second for that 3D tech. This particular model is primarily sold through Amazon in the UK, for around £1,699, and includes a quad-core Intel Core i7 processor running at 2.3GHz, 8GB of memory, twin 1TB, 5,400rpm hard disks and an nVidia GeForce GTX 670M graphics processor.

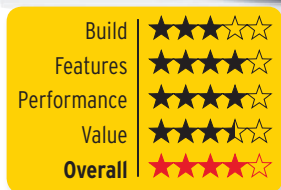
This specification scored a comparatively modest 2,913 in PCMark 7.

The graphics processor is a mid-level component, capable of good performance, but not as fast as the AMD Radeon 7970M. Switching to stereoscopic 3D reduces the framerate, and we recommend operating games at 720p in this mode. The Asus recorded a respectable 33fps in Batman: Arkham City (1920x1080, High).

Battery life is a short 2 hours 20 mins with the GeForce card, and an onscreen icon allows you to switch to the integrated graphics and preserve battery life on the fly. The Asus runs warmer than its rivals - not uncomfortably so, but you should keep clear the rear of the laptop to ensure good ventilation.

**VERDICT:** The G75VW is an impressive and attractive gaming laptop, but you may prefer to swap the 3D specs for a more powerful graphics card to ramp up the gaming framerates.





**PC ADVISOR**  
RECOMMENDED

## CHILLBLAST GENESIS 7970

**£1,199** inc VAT • [chillblast.com](http://chillblast.com) • [tinyurl.com/9wtg6mp](http://tinyurl.com/9wtg6mp)

The Genesis 7970 isn't the most attractive laptop we've set eyes on, taking the same low-cost, generic Chinese chassis as the Schenker P502 Pro. However, it performs well and is one of the more reasonably priced gaming rigs in this group.

That cheap-and-cheerful design doesn't make a great first impression, both looking and feeling plasticky. The keyboard rattles as you type, and the trackpad and mouse buttons are smaller than we'd have liked – not helped by the inclusion of a fingerprint scanner between the two. You will probably plug in a gaming mouse anyway.

The Windows key is over on the right side of the keyboard, which some gamers prefer as it prevents them accidentally hitting the key while playing. We've never experienced this problem during our many years of gaming, so moving the key from the left just irritated us.

The build is otherwise good and, at 3.3kg, you could carry the Chillblast in a backpack when required. Battery life is also above average for this group, and we saw three hours of video streaming over Wi-Fi when using the power-hungry Radeon 7970M graphics.

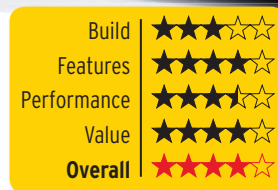
The Genesis ran cool and quiet during our tests, so we had no worries about the Intel Core i7 overheating. We appreciate the ability to switch between dedicated and integrated graphics on the fly, too.

The 15.6in screen provides a bright and clear image with 1920x1080 resolution, marred only by a glossy screen coating. The speakers aren't terribly impressive, sounding rather thin and weedy.

But if its exterior is unimpressive, the internal setup is a different story. The 2.7GHz Core i7 provides plenty of raw horsepower, while a fast AMD Radeon 7970M graphics card is paired with Intel's integrated HD 4000 solution. Plus you get 8GB of memory and a 750GB Seagate Momentus XT – a hybrid drive that combines a conventional hard disk with an 8GB SSD.

The Genesis took second place behind the Alienware M17x in most of our tests, despite its HDD/SSD combo offering lower performance than the larger SSD fitted to the M17x. We recorded a superb 45fps in Batman: Arkham City (1920x1080, High).

**VERDICT:** It's a shame Chillblast opted for such a mediocre chassis, since it takes off the edge from what is otherwise an appealing gaming proposition. It has lots of power, though.



**PC ADVISOR**  
RECOMMENDED

## PC SPECIALIST OPTIMUS IV

**£799** inc VAT • [pcspecialist.co.uk](http://pcspecialist.co.uk) • [tinyurl.com/abqb6qp](http://tinyurl.com/abqb6qp)

It might not be the most powerful gaming rig in this group, but the £799 Optimus IV from PC Specialist is a versatile and affordable all-round laptop that provides enough horsepower for the casual gamer.

In fact, that £799 price tag really is the stand-out feature, as it includes a quad-core Intel Core i7 processor running at 2.4GHz, 8GB of memory, and an nVidia GeForce GTX 660M with 2GB video memory. Storage is covered by a 1TB hard disk and an additional 120GB SSD. Throw in an attractive 17.3in display and Blu-ray reader, and the Optimus IV looks like excellent value for money.

This combination allowed a solid 4,572 points in PCMark 7, confirming the Optimus IV's abilities as a strong all-round performer. However, in gaming performance it isn't in the same league as its rivals here, and the GeForce GTX 660M struggled to cope with our Batman: Arkham City and Hard Reset tests at full-HD resolution. It could cope with Stalker at 1920x1080, High, though.

A number of build-to-order options are available for the Optimus, but if you need more flat-out gaming power you should look to PC Specialist's Vortex range of laptops, which cost closer to £1,200.

The Optimus IV performs better in other areas. Its 17.3in screen has a 1920x1280 resolution, and an anti-glare finish that produces an attractive image, free of glare and reflections. It'll be great for watching films and video, with the help of the built-in Blu-ray player.

Battery life is poor, but above average for this group. The Optimus IV lasted just under three hours when streaming video over Wi-Fi using the GeForce GPU. It ran cool and quiet during all our tests, and is also the lightest of the 17in models reviewed here, at 3.3kg. It's about as portable as a gamestation of this size is likely to get.

We do have a few minor complaints, though. The speakers sound distinctly thin and wiry and, although the keyboard is large and comfortable, the trackpad is unnecessarily small. The buttons on the trackpad aren't particularly responsive, and right-clicking requires a firm prod to prompt a response.

**VERDICT:** A laptop costing £799 isn't going to provide the same sort of gaming horsepower as its £1,000-plus rivals. However, the Optimus is a good all-round entertainment laptop, which can also handle more than casual gaming action, and comes at a price that's hard to beat.



|             |       |
|-------------|-------|
| Build       | ★★★★☆ |
| Features    | ★★★★☆ |
| Performance | ★★★★☆ |
| Value       | ★★★★☆ |
| Overall     | ★★★★☆ |

## SCHENKER NOTEBOOKS XMG P502 PRO

**£1,441** inc VAT • [mysn.co.uk](http://mysn.co.uk) • [tinyurl.com/bez9fpn](http://tinyurl.com/bez9fpn)

Although the P502 Pro uses the same Clevo chassis as Chillblast's Genesis, German company Schenker has made a real effort to customise the laptop with some attractive extra features.

The P502 looks almost identical to the Genesis, right down to the fingerprint scanner squashed between the buttons on the undersized trackpad. The keyboard feels more solid, though, and the Windows key remains in its traditional location to the left of the Spacebar.

Even better is the fact Schenker has opted for a 15.6in screen with a 1920x1080 resolution and a non-reflective finish. The matt screen makes a noticeable difference, providing a bright, colourful image, with none of the annoying reflections that mar its shiny rivals. It even has a Blu-ray burner, which might come in handy for backing up the enormous downloads when you buy games via digital download.

The stereo speakers were disappointing, though, and we didn't find a third speaker made much difference to the rather thin sound.

Build-to-order options on Schenker's site allow you to customise most aspects of the laptop. Our £1,441 sample had a 2.4GHz Core i7 processor, 4GB of RAM, a 750GB hard drive and a 256GB mSATA SSD. The GeForce GTX675MX graphics sport 4GB of video memory.

Schenker also includes a few unusual extras, including a wireless adaptor that automatically prioritises bandwidth-heavy tasks such as gaming for maximum performance. Software utilities let you fine-tune your network performance, and overclock the CPU.

The P502 Pro does pretty well with its basic setup, though. It managed a strong score of 4,765 points in PCMark 7.

It topped 100fps with Stalker at the highest HD resolution and quality settings, and hit a very respectable 40fps when running Batman: Arkham City (1920x1080, High). It fell a few frames behind the Radeon 7970M used by Alienware and Chillblast, but the graphics card is one of those components you can customise.

Battery life is about average for this group, at just over 2.5 hours, and we experienced no problems with noise or overheating.

**VERDICT:** It's far from perfect, but the P502 Pro is a powerful and versatile gaming laptop at a competitive price. The ability to fine-tune performance and build will make it particularly attractive to more experienced users who like to customise their system.



|             |       |
|-------------|-------|
| Build       | ★★★★☆ |
| Features    | ★★★★☆ |
| Performance | ★★★★☆ |
| Value       | ★★★★☆ |
| Overall     | ★★★★☆ |

## TOSHIBA QOSMIO X870-143

**£1,199** inc VAT • [toshiba.co.uk](http://toshiba.co.uk) • [tinyurl.com/b7t43o5](http://tinyurl.com/b7t43o5)

Toshiba's Qosmio X870-143 isn't an all-out, hardcore gaming machine. But it is a comprehensive entertainment system, which is powerful enough to turn its hand to a spot of gaming when required.

The Qosmio stands out with its bright, bold 17.3in screen, which provides a 1920x1080 resolution for full-HD video and gaming. Its Harmon Kardon speakers are a cut above average, too - in fact they're the loudest speakers we've ever heard on a laptop. So we were surprised to find a DVD rather than Blu-ray drive supplied.

The Qosmio is solidly built, with a large, comfortable keyboard and an unusually large trackpad. A 17in-screen laptop is never going to be particularly portable but, at 3.4kg, the beefy Qosmio is just lighter than the Alienware M17x and Asus G75VW.

Battery life is about 2 hours and 40 mins with the GeForce graphics card, and you can switch to the integrated Intel HD 4000 graphics if you need to squeeze out some extra juice for other tasks.

We'll admit that we weren't expecting too much from the Qosmio when we saw its spec sheet; this £1,199 laptop has a relatively modest dual-core i5 processor, 8GB of memory and a 1TB hybrid drive that includes a small 8GB SSD. However, the i5 processor is paired with a GeForce GTX 670M graphics card and 3GB of video memory, and could produce respectable results in our tests.

Stalker and Hard Reset are perfectly playable at 1920x1080 resolution and high-quality settings. Batman: Arkham City presents more of a challenge, but we recorded 27fps at 1920x1080, High; you can bump that past 40fps if you drop to 1280x720, Medium.

That might not satisfy hard-core gamers who want the latest full-HD, DirectX 11 eye-candy, but it'll be more than adequate for casual players who enjoy the occasional evening of gaming action.

A separate model called the X870-11R is fitted with a 2.3GHz quad-core i7 processor for an extra £100, which might be worth considering if you're looking for a lighter, cheaper alternative to the hulking 17in Alienware M17x.

**VERDICT:** The Toshiba Qosmio X870-143 is more of an all-round entertainment system than a dedicated gaming rig. But, at £1,199, it's a good option if you want a large-screen laptop that can handle music, video and the occasional gaming session.



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## Conclusion


If you're on a tight budget then the Optimus IV from PC Specialist deserves a Recommended award for its sheer value for money. It's far from being the top performer here, so you may have to settle for running your games at a lower than native screen resolution, and with reduced rendering quality. However, at £799, it's less than half the price of the Alienware and Asus laptops, yet manages to provide perfectly adequate performance for casual gamers who are hoping to enjoy some first-person-shooter action.

The same is true for Toshiba's Qosmio X870-143, although that laptop is more expensive and more of an all-round entertainment system than a dedicated gaming rig.

If you want to enjoy your games in stereoscopic 3D, Asus' G75VW is the obvious option here. It's expensive, though, and with the added

cost of its bundled active 3D glasses, Asus has compromised on the graphics. The mid-range GeForce GTX 670M can't match the AMD Radeon 7970M preferred by Alienware and Chillblast.

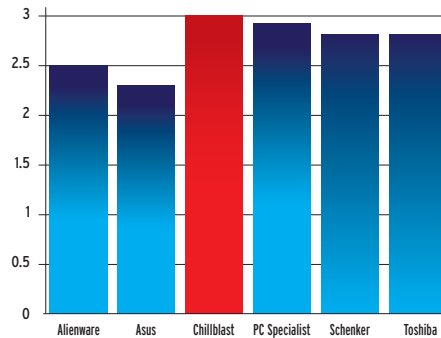
It's a shame that Chillblast has opted for such a poor chassis for the Genesis, as it mars the feel and comfort of the unit - especially during long gaming sessions. Even so, it provides strong performance at a more attractive price than the Alienware M17x, and on that basis earns a Recommended award.

However, it's the Alienware M17x that stands out in this group. It's expensive, of course, but it took top spot in all our benchmarks - often by some margin. It's this uncompromising gaming performance and high-quality design that earns the Alienware M17x our Best Buy award for gaming laptops. 

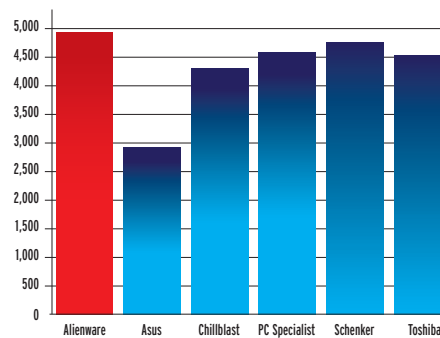
|                                       | <b>ALIENWARE</b><br><b>£1,749 inc VAT</b><br> <b>PC ADVISOR</b><br><b>BEST BUY</b> | <b>ASUS</b><br><b>£1,699 inc VAT</b><br> | <b>CHILLBLAST</b><br><b>£1,199 inc VAT</b><br> <b>PC ADVISOR</b><br><b>RECOMMENDED</b> |  |
|---------------------------------------|--|--|--|--|
| Product name                          | <b>M17x</b>  | <b>G75VW</b>   | <b>Genesis 7970</b>  |  |
| Processor                             | 2.3GHz Intel Core i7-3610QM, quad-core (3.3GHz Turbo)  | 2.3GHz Intel Core i7-3610QM, quad-core (3.3GHz Turbo)  | 2.7GHz Intel Core i7-3740QM, quad-core (3.7GHz Turbo)  |  |
| Graphics                              | AMD Radeon HD 7970M, 2GB VRAM<br>Intel HD Graphics 4000  | nVidia GeForce GTX 670M, 3GB VRAM<br>Intel HD Graphics 4000  | AMD Radeon HD 7970M, 2GB VRAM<br>Intel HD Graphics 4000  |  |
| Display                               | 17.3in (1920x1080) glossy LCD  | 17.3in (1920x1080) matt LCD  | 15.6in (1920x1080) glossy LCD  |  |
| Operating system                      | Windows 7 Home Premium 64bit   | Windows 7 Ultimate 64bit   | Windows 7 Home Premium 64bit   |  |
| Storage                               | 500GB HDD + 64GB SSD   | 2x 1TB HDD   | 750GB hybrid HDD/SSD   |  |
| Memory                                | 8GB DDR3 1,600MHz  | 8GB DDR3 1,600MHz  | 8GB DDR3 1,600MHz  |  |
| Connectivity                          | Gigabit ethernet, 802.11n, Bluetooth 4.0   | Gigabit ethernet, 802.11n, Bluetooth 4.0   | Gigabit ethernet, 802.11n, Bluetooth 4.0   |  |
| Ports                                 | 4x USB 3.0, eSATA, VGA, HDMI, Mini DisplayPort, 3.5mm jack, S/PDIF, mic  | 4x USB 3.0, VGA, HDMI, Mini DisplayPort, 3.5mm jack, S/PDIF, mic   | 3x USB 3.0, 1x USB 2.0, eSATA, FireWire, DVI, HDMI, DisplayPort, 3.5mm jack, S/PDIF, mic   |  |
| Speakers                              | Klipsch stereo speakers  | 2.1 speakers   | Onkyo stereo speakers  |  |
| Optical drive                         | Blu-ray/DVD ± RW combo   | Blu-ray/DVD ± RW combo   | Blu-ray/DVD ± RW combo   |  |
| Trackpad                              | 97x55mm, two-button  | 100x60mm, two-button   | 86x46mm, two-button  |  |
| Bundled software                      | Alienware Command Centre   | None   | None   |  |
| Other                                 | 1080p webcam, security slot  | 720p webcam, SD/MMC/MS card slot, Kensington security slot   | 720p webcam, nine-in-one card reader, Kensington security slot   |  |
| Battery                               | 90Wh lithium-ion, removable  | 74Wh lithium-ion, removable  | 76.9Wh lithium-ion, removable  |  |
| Dimensions                            | 410x304x44.5mm   | 415x320x52mm   | 376x256x43mm   |  |
| Weight                                | 4.26kg   | 4.5kg  | 3.3kg  |  |
| Warranty                              | 1-year onsite  | 1-year RTB   | 2-year   |  |
| Battery life                          | 2 hours 30 mins  | 2 hours 20 mins  | 3 hours  |  |
| PCMark 7 score                        | 4,924  | 2,913  | 4,333  |  |
| Batman: Arkham City <sup>1</sup>      | 60, 57   | 60, 33   | 59, 45   |  |
| Stalker: Call of Pripjat <sup>1</sup> | 176, 128   | 109, 74  | 107, 87  |  |
| Hard Reset <sup>1</sup>               | 102, 56  | 60, 27   | 102, 52  |  |

<sup>1</sup>Framerates measured at 1280x720, Medium quality and 1920x1080, High quality respectively, measured in fps

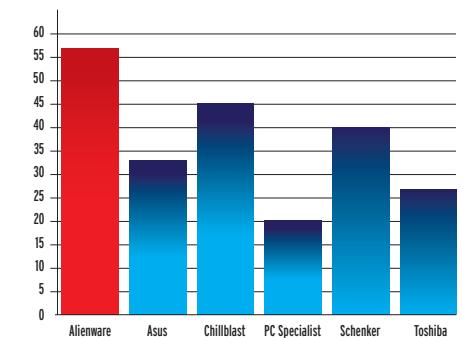
Battery life (hours)



PCMark 7 score



Batman: Arkham City (High, 1080p)



## PC SPECIALIST

£799 inc VAT



**PC ADVISOR**  
RECOMMENDED

### Optimus IV

2.4GHz Intel Core i7-3630QM, quad-core (3.4GHz Turbo)

nVidia GeForce GTX 660M, 2GB VRAM  
Intel HD Graphics 4000

17.3in (1920x1080) matt LCD

Windows 8

1TB HDD + 120GB SSD

8GB DDR3 1,600MHz

Gigabit ethernet, 802.11n, Bluetooth 4.0

3x USB 3.0, 1x USB 2.0, eSATA, VGA, HDMI, 3.5mm jack, S/PDIF, mic

Onkyo stereo speakers

Blu-ray/DVD ± RW combo

92x46mm

None

1080p webcam, nine-in-one card reader, Kensington security slot

76.9Wh lithium-ion, removable

405x270x50mm

3.3kg

1-year parts and labour, 3-year labour RTB

2 hours 55 mins

4,572

36, 20

108, 65

66, 25

## SCHENKER NOTEBOOKS

£1,441 inc VAT



### XMG P502 Pro

2.4GHz Intel Core i7-3630QM, quad-core (3.4GHz Turbo)

nVidia GeForce GTX 675MX, 4GB VRAM  
Intel HD Graphics 4000

15.6in (1920x1080) matt LCD

Windows 7 Home Premium 64bit

750GB HDD + 256GB SSD

4GB DDR3 1,600MHz

Gigabit ethernet, 802.11n, Bluetooth 3.0

3x USB 3.0, 1x USB 2.0, eSATA, FireWire, DVI, HDMI, DisplayPort, 3.5mm jack, S/PDIF, mic

Onkyo 2.1

6x Blu-ray writer

86x46mm, two-button

Nero Essentials

1080p webcam, nine-in-one card reader, security slot

76.9Wh lithium-ion, removable

376x256x43mm

3.3kg

2-year RTB

2 hours 40 mins

4,765

55, 40

158, 106

99, 42

## TOSHIBA

£1,199 inc VAT



### Qosmio X870-143

2.5GHz Intel Core i5-3210M, dual-core (3.1GHz Turbo)

nVidia GeForce GTX 670M, 3GB VRAM  
Intel HD Graphics 4000

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# Smartphones **group test**

Which smartphone should go into your pocket is an important choice. Matt Egan compiles our reviews of the best smartphones you can buy

**T**he iPhone wasn't the first smartphone, but its arrival in 2007 changed things beyond recognition. Designer gadget and utilitarian tool, the iPhone wrapped existing features and functions into one desirable package. It's taken the rest of the world five years to catch up, but catch up it has. Now there are multiple top-quality handsets, on various platforms and at a range of prices.

Which handset you opt for will be a matter of personal choice. The iPhone 5 remains at the pinnacle, but it is joined there by Android handsets such as the Nexus 4 and the Samsung Galaxy S III, as well as Windows Phone 8 devices such as the Nokia Lumia 920 and HTC Windows Phone 8X. Each offers excellent build and performance, and a full range of features from email and web browsing through to multimedia playback, apps and games.

There are differences in storage and screen size, and one man's ugly brick is the next chap's statement-making slab. One thing we can all agree on is that price is a key consideration, especially if you are buying a handset outright and sourcing your SIM elsewhere. This can be the most cost-effective way of purchasing a phone.

Often, your choice of phone will come down to platform. And with apologies to RIM and Canonical, until we see what BlackBerry 10 and Ubuntu Mobile have to offer the choice for all but BlackBerry addicts is iOS, Android or Windows Phone.

Remember that if you are moving from one platform to another you will have to replace the paid-for apps you use, which will add additional cost to your purchase. In most cases - and especially when moving to Android - you should have no problem moving across your music and movie collections.

iOS benefits from being the longest established of the big players in the smartphone OS world. iOS 6 is beautiful, easy to use, stable and secure. And although Android has as many apps, the iPhone remains the phone of choice for developers. Whatever you want to do on your iPhone, there's an app for that.

You don't get a lot of choice with iOS, however. While you can still buy the iPhone 4 and 4S, as well as the iPhone 5, you can't run iOS on a handset made by any other manufacturer. And unless you jailbreak your handset, you can install only apps from Apple's





App Store. You'll never install any malware, but you are locked into the view of the world from Cupertino. You are also limited to using iTunes to administer music and movies.

Android has come a long way, but not all Android OSes are equal. As well as a wide variety of handsets to choose from, a range of Android OSes is available on new phones.

Because Android is - to an extent - open, hardware makers can choose which version they use. This gives the phone builder little incentive to pass on upgrades from Google. Check which version of Android you are getting - it makes a difference in terms of user experience and which apps you can install and run.

High-end phones such as the Samsung Galaxy Note II and Google Nexus 4 run Android Jelly Bean, versions 4.1 and 4.2 respectively. Other recent handsets such as the Sony Xperia T and the HTC Desire X offer the earlier Ice Cream Sandwich. Both are mature mobile OSes, offering something approaching the slickness and ease of use of iOS. These days all the major apps are accounted for, and Android offers more customisation to both handset owner and maker.

This widens the choice for purchasing music, videos and even apps. It also allows phone makers to experiment, leading to the creation of game-changing devices such as the Galaxy Note II phone/tablet hybrid. The same openness does, however, leave you open to the possibility of installing malware, both from within the Google Play Store and without.

Windows Phone 8 sits somewhere between iOS and Android, being both locked down and available on a variety of handsets. Like Apple's platform it benefits from a curated - although sparsely populated - app store. It's great to look at and easy to use, and the strict minimum specifications mean that all available handsets provide slick performance. Internet Explorer 10 offers an unsurpassed mobile web-browsing experience, and Windows Phone 8 feeds all email and social messaging into a single unified pane.

Those same minimum specs lead to a certain uniformity when it comes to Windows Phones, however. Leaving aside looks, storage and camera, all new Windows Phones are the same. If you like it, you'll love it. For everyone else, there's an Android or iPhone to suit.





## APPLE iPhone 5

**£529** inc VAT (16GB) • [apple.com/uk](http://apple.com/uk) • [tinyurl.com/b5hktan](http://tinyurl.com/b5hktan)

Unlike many Android phones, the tall and thin iPhone raises its screen estate by simply extending the display's height by 14mm, keeping the width identical to the 4S and meaning you can reach the whole panel to easily operate it with just one hand. The 640x1136-pixel display uses in-plane switching (IPS) tech, and is rich in colour saturation. It looks more natural than OLED alternatives, and has a pixel-hiding Retina resolution of 326 pixels per inch (ppi).

Build quality is outstanding: at 115g the iPhone 5 feels wafer-like, but it's almost too light. Its mass is evenly distributed, built around an anodised aluminium backplate that allows more purchase in the hand. Durability may suffer a little, though.

The rear-facing camera is able to shoot full-HD video at 30fps, with software image-stabilisation. It has a lens cover crafted from sapphire crystal for improved optical clarity and scratch-resistance. The front camera enables Apple's FaceTime HD video-chat service.

Updating the standard 30-pin dock connector was always going to upset some people. Thankfully, the Lightning plug looks to be future-proofed, able to be inserted either way, with pin contacts that can adapt to the needs of the device.

The iPhone 5 scored 1,650 points in Geekbench 2, and ran the Egypt HD test within GLBenchmark 2.5 test at 38fps. Browsing the web is super-speedy. When tested for JavaScript rendering speed, the iPhone 5 scored 903ms in the SunSpider test. It's a fast phone.

In use the iPhone 5 feels snappy, opening apps and loading websites quicker than ever. Even web browsing over 3G is faster than it is with the iPhone 4S: we took a series of network speed tests over a short time period from the same location, using the same SIM. From our London office the iPhone 4S averaged 7.92 megabits per second (Mbps) download, and 2.34Mbps upload. The peak speed recorded in any single run was 8.78 Mbps. The iPhone 5 is helped along by not just a faster processor, but a more modern chipset for cellular data. It averaged 13.3Mbps download and 2.52Mbps upload. Peak speed hit a giddy 16.91Mbps. There's no NFC chip, though.

**VERDICT:** More of a subtle upgrade than a radical overhaul, the iPhone remains at the pinnacle of smartphone technology. It benefits from the most full-featured, if locked down, mobile OS. **Andrew Harrison**



## GOOGLE NEXUS 4

**£239** inc VAT (8GB) • [play.google.com](http://play.google.com) • [tinyurl.com/d7htpfj](http://tinyurl.com/d7htpfj)

Built by LG, Google's Nexus 4 is thin and light at 9.1mm and 139g. The glossy finish makes it a slippery handset, but a rubbery circumference aids grip. It feels sturdy and well-built.

The screen sits flush to the bezel, the Micro-SIM tray slots in with no gaps, and the buttons have a smooth action. It's astonishing that a phone with such a desirable design and excellent build costs just £239.

Inside is a quad-core chip clocked at 1.5GHz, with 2GB of RAM. The Nexus set a new record in Geekbench 2, and is the first smartphone to score more than 2,000 points (it recorded 2,009). In comparison, the far more expensive and similarly high-end iPhone 5, Galaxy S III and Galaxy Note II scored 1,650, 1,659 and 1,958 respectively.

In the SunSpider JavaScript benchmark the Nexus 4 couldn't beat the aforementioned rivals, with a score of 1,906ms. However, we didn't find web browsing slow. In a side-by-side test the iPhone 5 and Nexus 4 loaded sites at a similar speed.

The Nexus 4 narrowly beat the iPhone 5 for 3D grunt with a framerate of 39fps in GLBenchmark - the peak of this test.

The 4.7in screen has a resolution of 768x1280, almost matching the iPhone 5 for pixel density at 320ppi. The screen looks stunning, with excellent contrast, rich colours and detail.

Google offers only 8- or 16GB of internal storage, and there's no memory slot for expansion. Our 16GB sample had around 13GB free.

The Nexus 4 offers dual-band Wi-Fi, Bluetooth 4.0, an NFC chip and wireless charging. You can also connect the handset to an external display via a SlimPort HDMI adaptor.

You get an 8Mp rear-facing camera with an LED flash. A 1.3Mp front-facing webcam provides a decent image for video calls.

The Nexus 4 runs the latest version of Jelly Bean, now up to 4.2. There are a few new features, and the interface is just as slick as the previous version; apps tend to open a little faster.

We comfortably got through a full working day using the Nexus 4, with plenty of battery life left over for the next.

**VERDICT:** The Nexus 4 offers a high-end specification at less than half the typical price for such a handset. The build quality and performance are unsurpassed by any other Android phone, and the price is simply staggering. A truly amazing deal. **Chris Martin**

# Perfect combination of hardware...

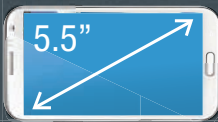
TechNotes bring mobile technology trends to life with a series of infographics inspired by the Samsung GALAXY Note II

## HARDWARE PERFORMANCE

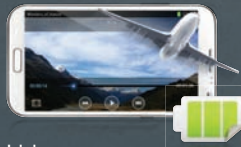
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|             |       |
|-------------|-------|
| Build       | ★★★★☆ |
| Features    | ★★★★☆ |
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## HTC DESIRE X

**£230** inc VAT • [htc.com/uk](http://htc.com/uk) • [tinyurl.com/cn2f7w2](http://tinyurl.com/cn2f7w2)

The HTC Desire X fits neatly into the hand, measuring 62x9.5x118mm and weighing 116g. It can't match the superior build quality of some rivals in this round-up, however. This isn't helped by the rubberised rear cover, which we found rather flimsy.

At £230, the Desire X has a typical specification for a mid-range Android smartphone. There's a 1GHz Qualcomm dual-core processor coupled with 768MB of memory. Performance is reasonable, but not exciting: in Geekbench 2 the Desire X averaged 666 points, while in the SunSpider JavaScript test we measured a middling 2,894ms.

Things are distinctly budget on the storage front, with only 4GB of capacity provided, of which just over 1GB is available to the user. This is remedied by the inclusion of a microSD card slot, with which you can add up to 32GB. HTC also offers 25GB of free (but time-limited) cloud storage with Dropbox via a preinstalled app.

The standout feature of the Desire X is the crisp and vivid 4in LCD screen. This uses the same 480x800 resolution as the company's Incredible S, resulting in a pixel density of 233ppi.

Physical connectivity is restricted to a Micro-USB port and a 3.5mm headphone jack – a common setup for Android phones. There's single-band 802.11b/g/n Wi-Fi, and Bluetooth 4.0 with support for the aptX codec. GPS and DLNA certification complete the Desire X's wireless reach.

HTC has fitted the Desire X with a rear-facing 5Mp camera with an LED flash. There's no front facing camera. Photos taken with the rear camera are reasonable, but unremarkable. Video can be recorded at an unimpressive 800x480 pixels (WVGA).

HTC has loaded the older Android 4.0 Ice Cream Sandwich, along with the HTC Sense 4.0a interface overlay. As we've come to expect from HTC, the user experience is good.

Hiding below the rear cover is a removable 6.1Wh battery. This has reasonable capacity, and in our tests we managed to get through a full working day before the Desire X required a recharge.

**VERDICT:** A solid mid-range Android phone, the HTC Desire X offers respectable performance, reasonable build quality and a nice screen for the money. We also like the microSD slot for storage expansion. But spending an extra £9 on the Nexus 4 is a no-brainer. **CM**



|             |       |
|-------------|-------|
| Build       | ★★★★☆ |
| Features    | ★★★★☆ |
| Performance | ★★★★☆ |
| Value       | ★★★★☆ |
| Overall     | ★★★★☆ |

## HTC WINDOWS PHONE 8X

**£400** inc VAT • [htc.com/uk](http://htc.com/uk) • [tinyurl.com/bc3frzt](http://tinyurl.com/bc3frzt)

Save for the Nokia Lumia 920 (overleaf), HTC's Windows Phone 8X has little competition in the Windows Phone 8 arena. It has a great screen and, at 720x1280 pixels and 4.3in across, a higher 342ppi pixel density than the iPhone 5 and Lumia 920. Colours are duller, though.

The 8X has a flat front, with a smooth curved back. It would feel more comfortable in the hand if it wasn't for its slightly pointed edges. The rubbery finish is pleasant to the touch and aids grip, as does the HTC's 10mm thickness and 128g weight.

The 8X is available in several colours, including 'Flame Red', a sickly 'Limelight Yellow' and 'California Blue'.

Hardware buttons on the handset's side and top sit almost flush with the chassis, with very little travel. This makes them rather difficult to control without looking.

The HTC's Micro-USB port wriggles when you plug in a lead, and the SIM tray release mechanism rattles in its slot.

There's a 1.5GHz Qualcomm Snapdragon S4 dual-core processor and 1GB of memory. Performance is on a par with other Windows Phone 8 handsets. The 8X performed slightly better than the Nokia 920 in the SunSpider JavaScript test, with 910ms versus 922ms. Geekbench and GLBenchmark are not available for Windows Phone.

The 16GB storage allocation is reasonable, plus you get 7GB of cloud space through SkyDrive, but there's no physical expansion slot.

Connectivity is standard fare, with Wi-Fi, Bluetooth 3.1 and NFC. You also get Micro-USB and a 3.5mm headphone port.

The 8X has a dedicated two-stage camera button. The sensor is specified as 8Mp, although 6Mp is the default setting. With an LED flash, it matches the Lumia 820 and other high-end smartphones. On the whole, we found still images to be of good quality. Colours are natural, but the camera overexposes shots. Video footage can be recorded in full-HD. The 8X also has one of the best front cameras we've seen, able to shoot 2.1Mp stills and full-HD video.

We found battery life from the 6.7Wh fixed battery rather short. This HTC handset needed charging at the end of each day.

**VERDICT:** A well-built Windows Phone 8 handset, the HTC Windows Phone 8X offers decent performance, a nice design and a good camera. However, the Windows Store has a dearth of apps. **CM**



# LIFESTYLE ENHANCEMENTS

TechNotes bring mobile technology trends to life with a series of infographics inspired by the Samsung GALAXY Note II

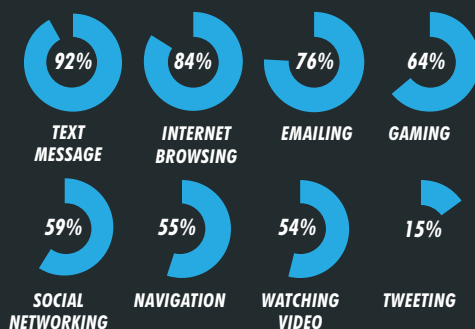
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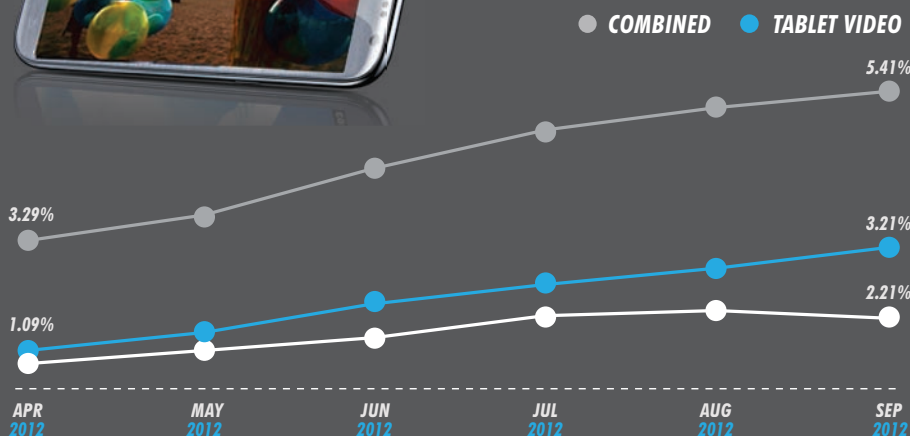


How the average person uses their smartphone — 2012, US, Pew Internet



"MOBILE DEVICES ARE BECOMING INCREASINGLY POPULAR FOR WATCHING ONLINE VIDEOS"

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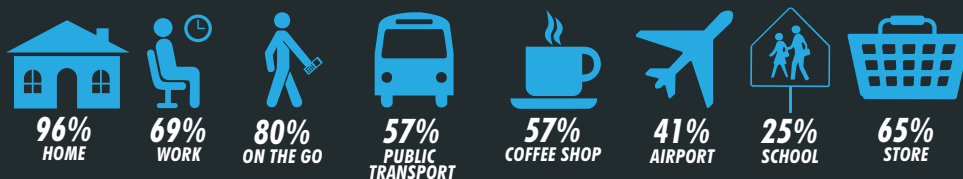
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Samsung  
GALAXY Note II | Be creative

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## NOKIA LUMIA 920

**£444** inc VAT • [nokia.com](http://nokia.com) • [tinyurl.com/ck9ctfs](http://tinyurl.com/ck9ctfs)

We like the Lumia 920's 4.5in PureView HD+ display, which has a 768x1280 resolution and an impressive pixel density of 332ppi (higher than the iPhone's 326ppi, but short of the HTC 8X's 342ppi). It's responsive, with excellent contrast and eye-popping colours.

Around 12mm thick at its fattest point, the Lumia 920 is also heavy, at 185g. Our review model came in white, but you can also choose black, red or yellow. The chassis perfectly frames the screen, while black buttons and a dark-silver camera surround nicely finish off the Lumia's appealing design.

It feels strong, albeit plastic to the touch, with a one-piece polycarbonate body that sits flush with the Gorilla Glass front.

The top-loading micro-SIM card tray feels cheap and plastic, but three side-mounted ceramic buttons have a smooth action.

Inside is a 1.5GHz dual-core processor and 1GB of memory – an adequate specification for the smooth running of Windows Phone 8. We couldn't run our usual Geekbench and GLBenchmark tests on this platform, but the SunSpider JavaScript test backed Microsoft's speed claims for the Internet Explorer 10 browser. We recorded 922ms, which is almost as quick as the iPhone 5's 903ms.

Navigation around the OS is effortless. There's no lag, although menus and lists tend to judder when you scroll slowly.

The 920 has 32GB of built-in storage, but no expansion slot. There's also 7GB of cloud space, accessed via a SkyDrive app.

Physical ports comprise a 3.5mm headphone jack and a Micro-USB port. There's also Wi-Fi and Bluetooth 3.0, an NFC chip, DLNA certification and Qi wireless charging.

The Nokia 920 has a dedicated camera button, and photos from its 8.7Mp PureView rear-facing camera with Carl Zeiss lens are nice. Colour balance, saturation and exposure are good, but some of our test shots weren't as sharp as we'd hoped. Optical image stabilisation means full-HD video is smooth, while the 1.2Mp front cam is adequate.

Nokia has fitted the Lumia 920 with a 7.4Wh battery pack, from which we got a full day's use and still had 25 percent remaining.

**VERDICT:** A big, bold Windows Phone 8 handset, the Nokia Lumia 920 has a great camera, decent build quality, and above-average storage capacity. Apps are sparse, however. **CM**



## SAMSUNG GALAXY NOTE II

**£400** inc VAT • [samsung.com/uk](http://samsung.com/uk) • [tinyurl.com/9zq3kjjw](http://tinyurl.com/9zq3kjjw)

With a 5.5in display it is easy to see the very big Galaxy Note II as a miniature tablet. It's 151mm high, 81mm wide and 10.5mm thick, and it weighs 214g. It really is a two-handed device, despite a software feature titled 'One-handed operation'.

Build quality is satisfactory, with the phone feeling weighty and all-of-a-piece in the hand. Screen quality is very good: while listed as a Super AMOLED type, it doesn't have the over-ripe colour we've seen from these displays on earlier Samsung phones.

The Note II includes a touch stylus. Pulling out the so-called 'S Pen' and bringing it close to the screen lets the phone know you're about to do some sketching, scribbling or doodling, and it will bring up an area at the bottom of the screen for stylus input.

Handwriting recognition is impressive, although we still found it easier to type using the onscreen keyboard. There's plenty of scope to draw and sketch, too. The Multi Window feature lets you view two apps running side by side.

Picture quality from the Samsung's rear-facing 8Mp camera is good, if not brilliant. High-contrast areas showed obvious purple fringing, for instance, although the camera is fast in operation. Recorded HD video is more than usable.

The Note II sports a quad-core ARM processor running at 1.6GHz, and optimised graphics courtesy of an ARM Mali-400 MP. Combined with Android 4.0 Ice Cream Sandwich, this produces decent graphics performance. In GLBenchmark, the Samsung recorded 17fps. This is just half the framerates of the top contenders, but a respectable score.

The Note II also scored 1,958 points in our Geekbench test, bettering the 1,650 points of the iPhone 5, but falling behind the 2,009-point tally of the staggeringly fast Nexus 4.

In the SunSpider JavaScript test the Galaxy Note II scored an average of 1,022ms, which is a very good score.

In our tests battery life was good enough to last two days of sporadic use, helped in part by the large 11.78Wh removable battery.

**VERDICT:** The Galaxy Note II is an intriguing device, and unique on today's market. It won't be for everyone, but it offers very good performance. If you want a phone that offers some of the creative capabilities of a tablet, the Note II is the best device you can buy. **AH**



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## SONY XPERIA T

**£399** inc VAT • [sony.co.uk](http://sony.co.uk) • [tinyurl.com/bduqbxo](http://tinyurl.com/bduqbxo)

Sony's Xperia T is a very square-looking handset, but with smooth, sloped corners and a curved back. It's 9.4mm at its thinnest point, and 12.2mm where the camera lens juts out, and weighs 140g.

Visually, there's not a lot going on with this James Bond handset, save for a set of three buttons on the right side. We were disappointed to find no metal-cutting lasers or mini-rockets.

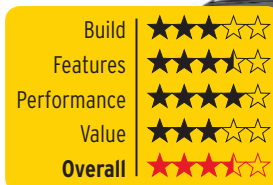
The shatter-proof and scratch-resistant glass gives good protection. The remainder of the Xperia T's casing is made from a smooth-feeling plastic that offers plenty of grip. The only movable part is a side flap that covers the micro-SIM and microSD slots.

The Xperia T's 4.6in screen's 720x1280-pixel resolution results in a crisp and clear pixel density of 323ppi.

The Sony scored an impressive 1,528 points in Geekbench, thanks to a 1.5GHz dual-core processor and 1GB of memory.

Storage capacity stretches to 16GB, and a microSD slot lets you add another 32GB. There's also Wi-Fi, Bluetooth, NFC and DLNA.

A 13Mp rear camera has an LED flash and a dedicated camera button. Aided by the Exmor R CMOS sensor, our test shots were consistently detailed and sharp, with good exposure. You can also record video in full-HD (1920x1080), although the footage is average. The front 1.3Mp front camera provides good video at 720p.



The Xperia T comes with Android 4.0 Ice Cream Sandwich, and Sony promises an upgrade to Jelly Bean in the near future.

A non-removable 6.8Wh battery allowed us to comfortably get through a working day, or two with very light usage.

**VERDICT:** The Sony Xperia T has a decent screen and camera, but it lacks the excitement we expected from the so-called 'Bond Phone' and has little to offer over the competition. **CM**

|                       | <b>APPLE</b><br><b>£529 inc VAT</b><br><b>PC ADVISOR</b><br>RECOMMENDED                                      | <b>GOOGLE</b><br><b>£239 inc VAT</b><br><b>PC ADVISOR</b><br>RECOMMENDED  | <b>HTC</b><br><b>£230 inc VAT</b><br>                         |  |
|-----------------------|--|---|---|--|
| Product name          | <b>iPhone 5</b>  | <b>Nexus 4</b>  | <b>Desire X</b>   |  |
| Processor             | 1.3GHz Apple A6, dual-core   | 1.5GHz Qualcomm Snapdragon S4 Pro, quad-core  | 1GHz Qualcomm Snapdragon, dual-core                           |  |
| Graphics              | PowerVR SGX 543MP3   | Adreno 320  | Adreno 203  |  |
| Display               | 4in (640x1136, 326ppi) IPS   | 4.7in (768x1280, 320ppi) IPS  | 4in (480x800, 233ppi) TFT                                     |  |
| Operating system      | Apple iOS 6.1  | Google Android 4.2 Jelly Bean   | Google Android 4.0.4 Ice Cream Sandwich                       |  |
| Memory                | 1GB  | 2GB   | 768MB   |  |
| Storage               | 16/32/64GB internal, non-expandable  | 8/16GB internal, non-expandable   | 4GB internal, microSD slot                                    |  |
| Connectivity          | Dual-band 802.11a/b/g/n, Bluetooth 4.0, A-GPS, Glonass   | Dual-band 802.11b/g/n, Bluetooth 4.0, NFC, wireless charging, GPS   | 802.11a/b/g/n, Bluetooth 4.0, GPS                             |  |
| Cellular              | nano-SIM, UMTS/HSPA+/DC-HSDPA (850/900/1,900/2,100MHz), GSM/EDGE (850/900/1,800/1,900MHz), LTE (Bands 1/3/5) | micro-SIM, Unlocked GSM/UMTS/HSPA+, GSM/EDGE/GPRS (850/900/1,800/1,900MHz), 3G (850/900/1,700/1,900/2,100MHz), HSPA+ 42 | mini-SIM, GSM (850/900/1,800/1,900MHz), WCDMA (900, 2,100MHz) |  |
| Camera(s)             | Rear: 8Mp, LED flash, 1080p video; Front: 1.2Mp, 720p video  | Rear: 8Mp, LED flash, 1080p video; Front: 1.3Mp, 720p video   | Rear: 5Mp, LED flash, 480x800 video; Front: N/A               |  |
| Ports                 | Lightning, 3.5mm jack  | Micro-USB, SlimPort HDMI, 3.5mm jack  | Micro-USB, 3.5mm jack   |  |
| Battery               | 5.45Wh lithium-polymer, non-removable  | 7.8Wh lithium-polymer, non-removable  | 6.1Wh lithium-ion, removable                                  |  |
| Dimensions (wxdxh)    | 58.6x7.6x123.8mm   | 68.7x9.1x133.9mm  | 62x9.5x118mm  |  |
| Weight                | 112g   | 139g  | 116g  |  |
| Geekbench 2 score     | 1,650  | 2,009   | 666   |  |
| SunSpider score       | 903ms  | 1,906ms   | 2,894ms   |  |
| GLBenchmark 2.5 score | 38fps  | 39fps   | Not tested  |  |

## How we test

Smartphones are tested and rated for build quality; hardware and performance; quality of cameras; the operating system provided; and battery life. As well as the subjective opinions of our experienced team of smartphone reviewers, we utilise independent testing software such as the Geekbench 2 performance benchmark, the SunSpider web-browsing test, and the GLBenchmark Egypt HD gaming framerate graphics test. Not all tests run on Windows Phone, unfortunately. Then, considering all the above, our editors rank each phone for build quality, features, performance and value, before arriving at an overall score that reflects the quality of each smartphone at the price it is offered.

## Conclusion

By a hair's breadth Apple's iPhone 5 remains the best phone on the market, being the complete package of performance, build quality and features. But its advantage over the Google Nexus 4 evaporates when you take into account the relative price of each

handset. The Nexus 4 is, simply, a brilliant deal: well-built, full-featured, and with great specifications.

If you can't source the Nexus 4, Android fans will find plenty to enjoy with the other Droids here, and if they shop around may even find a bargain in the Sony Xperia T or HTC Desire X.

The Samsung Galaxy Note II is an intriguing device, offering some of the benefits of a tablet in a form-factor only marginally different to a traditional smartphone. It won't be for everyone, but if you need a portable computer on which to create as well as consume, the Note II offers great performance and a stylus. Those who would like a Samsung Android phone should also consider the Galaxy S III, a little long in the tooth and not reviewed here, but still a great phone.

Windows Phones remain the jokers in this pack. They offer some of both the benefits and down sides of Android and iOS, without being obviously better than either. But the Nokia Lumia 920 and HTC Windows Phone 8X are well-built, high-performance handsets. If you want Windows in your pocket, you won't go far wrong with either. ☒

| HTC<br>£400 inc VAT<br>★★★★☆   | NOKIA<br>£444 inc VAT<br>★★★★☆  | SAMSUNG<br>£400 inc VAT<br>★★★★☆  | SONY<br>£399 inc VAT<br>★★★★☆  |
|--|---|---|--|
| <b>Windows Phone 8X</b>  | <b>Lumia 920</b>  | <b>Galaxy Note II</b>   | <b>Xperia T</b>  |
| 1.5GHz Qualcomm Snapdragon S4, dual-core   | 1.5GHz Qualcomm Snapdragon S4, dual-core  | 1.6GHz Exynos 4412 Quad, quad-core  | 1.5GHz Qualcomm Krait, dual-core   |
| Adreno 225   | Adreno 225  | ARM Mali-400MP  | Adreno 225   |
| 4.3in (720x1280, 342ppi) TFT   | 4.5in (768x1280, 332ppi) IPS  | 5.5in (720x1280, 267ppi) SuperAMOLED  | 4.6in (720x1280, 323ppi) TFT   |
| Windows Phone 8  | Windows Phone 8   | Google Android 4.1.1 Jelly Bean   | Google Android 4.0.4 ICS   |
| 1GB  | 1GB   | 2GB   | 1GB  |
| 16GB internal, non-expandable  | 32GB internal, non-expandable   | 16GB internal, microSD slot   | 16GB internal, microSDHC slot  |
| 802.11a/b/g/n, Bluetooth 3.1, NFC, GPS, Glonass  | 802.11a/b/g/n, Bluetooth 4.0, NFC, A-GPS, Glonass   | 802.11a/b/g/n, Bluetooth 4.0, A-GPS, Glonass  | Dual-band 802.11a/b/g/n, Bluetooth 3.1, GPS, Glonass                               |
| micro-SIM, GSM/GPRS/EDGE (850/900/1,800/1,900MHz), HSPA/WCDMA (850/900/1,900/2,100MHz) | micro-SIM, GSM (850/900/1,800/1,900MHz), WCDMA (850/900/1,900/2,100MHz), LTE (800/900/1,800/2,100/2,600MHz) | micro-SIM, 3G: HSPA+ 21Mbps (HSDPA 21Mbps/HSUPA 5.76Mbps), 4G LTE: 100/50Mbps (HSDPA 42Mbps/HSUPA 5.76Mbps) | micro-SIM, GSM (850/900/1,800/1,900MHz), HSPA/WCDMA (850/900/1,700/1,900/2,100MHz) |
| Rear: 8Mp, LED flash, 1080p video; Front: 2.1Mp, 1080p video                           | Rear: 8.7Mp, LED flash, 1080p video; Front: 1.2Mp, 720p video   | Rear: 8Mp, LED flash, 1080p video; Front: 1.9Mp, 720p video   | Rear: 13Mp, LED flash, 1080p video; Front: 1.3Mp, 720p video                       |
| Micro-USB, 3.5mm jack  | Micro-USB, 3.5mm jack   | Micro-USB, 3.5mm jack   | Micro-USB, 3.5mm jack  |
| 6.7Wh lithium-polymer, non-removable   | 7.4Wh lithium, non-removable  | 11.78Wh lithium-ion, removable  | 6.8Wh lithium, non-removable   |
| 66.2x10.1x132.4mm  | 70.8x10.7x130.3mm   | 80.6x10.5x151.3mm   | 67x9.4-12.2x129mm  |
| 130g   | 185g  | 214g  | 140g   |
| Not compatible with Windows Phone 8  | Not compatible with Windows Phone 8   | 1,958   | 1,528  |
| 910ms  | 922ms   | 1,022ms   | 1,842ms  |
| Not compatible with Windows Phone 8  | Not compatible with Windows Phone 8   | 17fps   | Not tested   |

# Family PCs

Paul Monckton tests six PCs designed to be all-round performers for home- and family use

**T**he six Windows PCs that follow deliver decent all-round performance and value for money. We look for excellent build quality, a home-friendly design, and useful accessories and peripherals that let you quickly get the PC up and running out of the box. Useful preinstalled software is also appreciated.

If you're not itching to play the latest Windows games, you can save money on a PC that uses integrated rather than dedicated graphics. Such chips are capable of playing full-HD video, plus recent games at moderate detail settings. However, all the systems in our group test feature dedicated graphics, which should enable playable framerates at higher screen resolutions.

## Core components

A powerful processor is a good starting point for smooth, frustration-free performance. But unless you're processing large amounts of video or running industrial-strength applications, such as the full version of Photoshop, you don't need the fastest chip available.

Intel's Ivy Bridge chips, such as the Core i5-3570, are an excellent choice for those who want a fast PC without sacrificing value. For a family PC, any extra cash in your budget will be better spent on an SSD or upgrading the memory rather than stepping up to a faster CPU.

Some vendors supply a core i5-3570K processor. The 'K' suffix means the chip can be overclocked, provided that your motherboard is compatible. The i5-3570K also offers faster integrated graphics than the i5-3570, so it's a good choice if you're not investing in a graphics card. It will add around £10 to the price of your system.

AMD's Bulldozer chips, such as the 4.2GHz FX-4170 selected by CyberPower, can also offer very good value for money. For occasional gaming or to accelerate video encoding, AMD's Fusion chips offer faster integrated graphics. The trade-off is a reduction in application performance.

You can always upgrade the graphics setup later, of course, and an AMD Radeon HD 7770 or nVidia equivalent graphics card would enable satisfying gaming at a reasonable price.

The mainboard used in your system is also important. In some cases, newer processors will work with older motherboards. Some of the systems reviewed here combine Ivy Bridge processors with the budget Intel H61 Express chipset, while others use the newer and more capable B75 Express or Z77 Express chipsets. The choice of chipset will determine the features of your mainboard.

Although additional capabilities can be incorporated by the mainboard manufacturer, an H61-based system is unlikely to support 6Gbps SATA and may come without USB 3.0. Both these features are built into the B75 Express and Z77 Express chipsets. The latter will

also support processor overclocking, Raid and Intel Smart Response Technology, which can accelerate hard drives by using an SSD as cache.

All the PCs featured here are preinstalled with Windows 8. However, if you're buying a system running Windows 7 and hope to upgrade later, it's worth checking your motherboard has Windows 8 certification. Microsoft maintains a list at [tinyurl.com/99wanpp](http://tinyurl.com/99wanpp).

For memory and storage requirements, consider 4GB of RAM and a 500GB hard drive as the bare minimum. All the systems here have at least 8GB of memory.

## Peripherals

If you want a PC for watching films and video, listening to music and chatting with friends, a decent speaker set is essential.

For larger rooms or simply a bigger sound, a 2.1 stereo set that incorporates a separate bass speaker or 'subwoofer' will perform better than a cheap 5.1 setup. (Note that the '5' refers to the number of speakers, while the '.1' refers to the subwoofer.)

Screen quality is crucial. Look out for in-plane switching (IPS) panels, which offer better colour fidelity than budget twisted-nematic (TN) monitors. These high-quality displays are seldom offered in family systems (only Chillblast and PC Specialist provide them here), but are well worth seeking out – especially if you're into photography.

A good screen with decent viewing angles becomes crucial when two or more people are viewing the screen at the same time. Consider a 23- or 24in full-HD monitor rather than a 21.5in model, especially if you'll be using the PC to watch DVDs or video.

A Blu-ray drive is finally a more affordable option, and the HD films it supports will make the most of your screen. Listening to music or watching films is spoiled by a noisy PC, though.





Sound-dampened cases can drastically cut down on the noise produced by fans and drives. Good-quality CPU coolers can also help.

Beginners may find the automated setup process of PCs from larger manufacturers useful. This can help you configure your machine and get online. The down side of this hand-holding gesture can be a lot of unwanted preinstalled software that can slow down your PC, but many UK vendors now bundle the bare minimum.

Built-in wireless networking is useful if the PC won't be positioned next to your router, as are wireless keyboards and mice that

remove unsightly cable clutter from the desk. The quality of these peripherals can often be overlooked but, as the primary interface between you and the PC, it pays to get decent input devices.

As a family PC, the system may be needed as a communications hub. To this end, a webcam is an essential asset.

Don't forget to check the warranty terms, which vary greatly between PC vendors. Some offer a two- or even three-year warranty, but beware of small print that states parts- or labour-only. You may also be expected to pay to return the faulty product.

## ARBICO ELITE 3565XL

**£749** inc VAT • [arbico.co.uk](http://arbico.co.uk) • [tinyurl.com/bjsb7La](http://tinyurl.com/bjsb7La)

One of the more compact systems in this round-up, the Arbico Elite 3565XL nevertheless manages to pack in plenty of features, including a performance-boosting 60GB SSD and a Blu-ray drive.

Based on the 3.4GHz Intel Core i5-3570, this PC delivers ample performance for family use (see chart, page 76). Given that it features a dedicated graphics card and the 400W PSU isn't powerful enough for overclocking, Arbico has wisely opted for the standard rather than overclockable version of this chip, thereby shaving a little off the price.

The graphics card included here is a factory-overclocked nVidia GeForce GTX 650 from KFA2. Although it's faster than the standard GTX 650, it's still the slowest graphics card of the group. If you're looking for a PC to play games, you'd be better served elsewhere.

The system ships with a 23.6in AOC E2450SWDA monitor, which offers a reasonably high specification. It features the now-standard LED backlight and slim frame, but lacks the high-quality IPS panel tech found in the displays offered by Chillblast and PC Specialist.

A Logitech MK260 wireless keyboard and mouse combo is included. It's a very low-cost item, but popular with many vendors at this price point and adequate for most users.

The CiT Templar system case is pleasantly compact, and devoid of any aggressive-looking design details or transparent panels. However, we did find the PC noisy in operation. We also would have preferred to see at least one of the PC's two USB 3.0 ports available at the front of the case, rather than just a pair of USB 2.0 ports.

|             |       |
|-------------|-------|
| Build       | ★★★★☆ |
| Features    | ★★★★☆ |
| Performance | ★★★★★ |
| Value       | ★★★★★ |
| Overall     | ★★★★★ |



**VERDICT:** The Arbico Elite 3565XL is the least-expensive Intel-based system in our round-up, yet it delivers very good overall performance. However, it's a little noisy in operation and lags behind in graphics performance. You also miss out on useful features such as a card reader, front-facing USB 3.0 ports and Wi-Fi connectivity.

## CHILLBLAST FUSION LYNX

**£799** inc VAT • [chillblast.com](http://chillblast.com) • [tinyurl.com/bx2qodv](http://tinyurl.com/bx2qodv)

Chillblast's Fusion Lynx is a mid-priced system with a great balance of features and all-round performance.

One of four systems here to feature the 3.4GHz Core i5-3570, the Fusion Lynx delivers more than enough performance for a family PC. Chillblast has selected the overclockable 'K' version of this chip, although the Asus motherboard can't take advantage of its overclocking features and a dedicated graphics card means you won't require the extra boost it offers to the integrated graphics.

The system comes with a whopping 16GB of memory, while its 1TB hard drive is supported by a 120GB Intel 330 series SSD. The Chillblast thus offers the fastest storage performance here.

An XFX Radeon 7770 graphics card caters to light gaming, but doesn't hit too hard the system price. The Eclipse and PC Specialist systems are better equipped for gaming, but are also more costly.

The Cooler Master Silencio 450 system case includes noise-dampening material to ensure quiet operation. Its minimalist exterior provides a handy front-facing USB 3.0 port and an SD card reader, which can be accessed without opening the hinged front door. This case is one of the smartest of the bunch; it's also meticulously tidy inside, but there's little room for upgrades.

The 23in Iiyama monitor is particularly impressive for its use of IPS tech, and it offers VGA, DVI and HDMI inputs. You also get built-in Wi-Fi, the Logitech MK260 wireless keyboard and mouse, and separate Blu-ray and DVD drives.

|             |       |
|-------------|-------|
| Build       | ★★★★★ |
| Features    | ★★★★★ |
| Performance | ★★★★★ |
| Value       | ★★★★★ |
| Overall     | ★★★★★ |

**PC ADVISOR**  
BEST BUY



**VERDICT:** The Fusion Lynx is a well-balanced system with good overall performance and enough graphics power for a spot of low-level gaming. It comes with an excellent monitor, plenty of memory and a roomy 120GB SSD, while the Cooler Master system case is one of the best of the group.



**CYBERPOWER ULTRA SCYLLA SE (MKII)****£699** inc VAT • [cyberpowersystem.co.uk](http://cyberpowersystem.co.uk) • [tinyurl.com/bytg8qg](http://tinyurl.com/bytg8qg)

The Ultra Scylla SE featured here is a revamped version of that which featured in our previous family PCs group test (read our original review at [tinyurl.com/c7juv7r](http://tinyurl.com/c7juv7r)). The core specification is unchanged, although CyberPower has swapped in a new motherboard and bumped up the memory allocation from 8- to 16GB.

The system uses AMD's quad-core FX-4170 processor, with a blisteringly high 4.2GHz clock speed and a price almost half that of an Intel Core i5-3570K. However, its performance is considerably better than half as good. With a score of 2,842 points in PCMark 7, the Ultra Scylla SE falls some way behind its Intel rivals, but it's still perfectly powerful enough for a decent family PC.

A large part of this reduced performance is due to the PC's lack of solid-state storage. The system does, however, come with a capacious 2TB hard drive – double the capacity of most competing systems.

An AMD Radeon HD 7770 graphics card is also included, and the Ultra Scylla SE held its own in our gaming benchmarks.

Despite a price £100 less than some of its rivals, CyberPower has found room in the budget for a 24in monitor, a set of Logitech speakers (complete with subwoofer), a card reader, a webcam, built-in Wi-Fi and a Blu-ray reader.

The Cooler Master Elite 430 system case is well-made and may appeal to gamers, with aggressive looks and a transparent side. It's been fitted with a Gigabyte GA-78LMT-USB3 motherboard and a pair of USB 3.0 ports, but there's no support for 6Gbps SATA.

**PC ADVISOR**  
RECOMMENDED

**VERDICT:** If you're not hungry for the greatest performance, but prefer a good set of features and peripherals, then the CyberPower Ultra Scylla SE could be just what you're looking for. While it is noticeably slower than the Intel PCs, it will be quick enough for most users, and this AMD-powered PC ticks all the boxes for around £100 less.

**ECLIPSE SOLAR i5357N66Ti****£929** inc VAT • [eclipsecomputers.com](http://eclipsecomputers.com) • [tinyurl.com/ab2esoz](http://tinyurl.com/ab2esoz)

By far the most expensive family PC in our round-up, the Eclipse Solar boasts 16GB of RAM, a 2TB hard drive and a 64GB SSD, plus a sprinkling of features that nudge it into enthusiast territory.

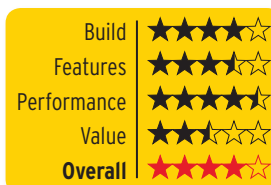
The premium Z77 Express chipset selected by Eclipse makes this the only PC here that can take advantage of the overclocking features built into the Intel Core i5-3570K. The motherboard also supports 6Gbps SATA and offers three USB 3.0 ports, one of which has been routed to the front of the case for easy access.

Another reason for this machine's higher price is its inclusion of an nVidia GeForce GTX 600 Ti graphics card with 2GB of video memory. The Eclipse offers the fastest gaming framerates in our group test, making it a great choice if you like playing games, but it offers very poor value if you don't.

A down side to all this raw performance is increased power consumption and noise. The Eclipse employs some very powerful, very noisy cooling fans, which make it noticeably louder than any of the other PCs reviewed here.

There's a wired rather than wireless keyboard and mouse, which is preferable for gamers, but unusual for a family system. Trouble is, the Eclipse Solar is considered here for its capability as a family system, not a fire-breathing gaming monster.

A 23.6in Acer G236HLBbd monitor is included, which is large and relatively slim. It offers DVI and VGA inputs, but there's no HDMI. This TN panel also lacks the image quality available from IPS models.



**VERDICT:** The Eclipse Solar i5357N66Ti is a very fast PC, but it's also very expensive. If your budget can accommodate it, this system offers a considerable boost in gaming performance over the competition, plus the potential for overclocking. However, for family users, built-in Wi-Fi and a card reader may have been more practical.



## PC SPECIALIST VANQUISH HD-660

**£899 inc VAT** • [pcspecialist.co.uk](http://pcspecialist.co.uk) • [tinyurl.com/a2ve9nz](http://tinyurl.com/a2ve9nz)

The metallic blue detail on the Vanquish HD-660's Cooler Master Elite system case immediately stands out. You'll also notice a Blu-ray drive and a handy multcard reader built into the front fascia.

Inside is a 3.4GHz Core i5-3570 processor, fitted to an Asus P8H77-M motherboard and paired with 8GB of RAM. A 1TB hard drive is supplemented by a capacious 120GB Kingston HyperX 3K SSD, which lends the system a considerable speed boost. The PC Specialist outperformed all others in PCMark 7, with 5,768 points.

The 23in AOC monitor delivers superior picture quality and wide viewing angles, thanks to IPS tech. It also sports VGA, DVI-D and HDMI connections, and is offered alongside a speaker set (with subwoofer) and wireless keyboard and mouse.

The nVidia GeForce GTX 600 graphics card is slower than the 660 Ti selected by Eclipse, but delivers significantly faster gaming framerates than the remaining competition. But it also pushes up the price, so this PC will primarily appeal to those who will spend a significant amount of time playing games.

The system looks rather less expensive inside the case than it appears from the outside, but we don't imagine many family users wanting to upgrade or tweak components as an enthusiast might.



**VERDICT:** The PC Specialist Vanquish HD-660 is a very powerful system, and delivered the highest score in PCMark 7 and the second-fastest gaming framerates in this round-up. It's housed in an attractive and practical system case, and comes with an excellent monitor. It's also very expensive.

|                                 | <b>ARBICO</b><br><b>£749 inc VAT</b><br>★★★★★ | <b>CHILLBLAST</b><br><b>£799 inc VAT</b><br>★★★★★ | <b>CYBERPOWER</b><br><b>£699 inc VAT</b><br>★★★★★ |
|---------------------------------|---|---|---|
|                                 | <b>PC ADVISOR</b><br>BEST BUY                 | <b>PC ADVISOR</b><br>RECOMMENDED                  |   |
| Product name                    | <b>Elite 3565XL</b>                           | <b>Fusion Lynx</b>                                | <b>Ultra Scylla SE (MKII)</b>                     |
| Processor                       | 3.4GHz Intel Core i5-3570                     | 3.4GHz Intel Core i5-3570K                        | 4.2GHz AMD FX-4170                                |
| CPU cooler                      | Retail Intel CPU heatsink and fan             | Standard Intel cooler                             | Standard AMD cooler                               |
| Memory                          | 8GB (2x 4GB) DDR3 1,600MHz                    | 16GB DDR3 1,333MHz                                | 16GB DDR3 1,600MHz                                |
| Storage                         | 60GB SSD + 1TB HDD                            | 120GB SSD + 1TB HDD                               | 2TB HDD   |
| Power supply                    | Xigmatek 400W                                 | Chillblast 700W                                   | Cooler Master 500W                                |
| Motherboard                     | MSI B75MA-P45                                 | Asus P8B75-M LX                                   | Gigabyte GA-78LMT-USB3                            |
| USB ports                       | 2x USB 3.0, 4x USB 2.0                        | 1x USB 3.0, 1x USB 2.0                            | 2x USB 3.0, 6x USB 2.0                            |
| Display                         | 23.6in AOC E2450SWDA (1920x1080), TN          | 23in Iiyama X2377 (1920x1080), IPS                | 24in EdgeIO EF240A (1980x1080), TN                |
| Graphics card                   | KFA2 GTX 650, 1GB VRAM                        | XFX AMD Radeon 7770, 1GB VRAM                     | MSI AMD Radeon HD 7770, 1GB VRAM                  |
| Sound & speakers                | Onboard, Logitech LS210                       | Onboard, Logitech LS220                           | Onboard, Logitech LS220                           |
| Connectivity                    | Gigabit ethernet                              | Gigabit ethernet, 802.11n                         | Gigabit ethernet, 802.11n                         |
| Ports                           | HDMI, 2x DVI, headphone, mic                  | HDMI, 2x DVI, headphone, mic                      | HDMI, DVI, DisplayPort, headphone, mic            |
| Case                            | Cit Templar M-ATX Case                        | Cooler Master Silencio 450                        | Cooler Master Elite 430                           |
| Keyboard & mouse                | Logitech MK260 wireless combo                 | Logitech MK260 wireless combo                     | Logitech MK320 wireless combo                     |
| Optical drive                   | Lite-On BD-/DVD-ROM                           | Lite-On BD-ROM, Samsung 24x DVD ± RW              | Pioneer BD-ROM/DVD ± RW combo                     |
| Operating system                | Windows 8 64bit                               | Windows 8 64bit                                   | Windows 8 64bit                                   |
| Extras                          | CyberLink PowerDVD 10.0                       | Family software, CyberLink PowerDVD 10.0          | None  |
| Warranty                        | 2-year RTB                                    | 2-year collect-and-return                         | 3-year RTB (1-year parts, 3-year labour)          |
| PCMark 7 score                  | 5,519   | 5,311   | 2,842   |
| Sniper Elite V2 <sup>1</sup>    | 26/6  | 41/9  | 43/9  |
| Alien vs Predators <sup>2</sup> | 41/22   | 44/23   | 47/24   |
| Power consumption <sup>3</sup>  | 54/121  | 49/124  | 77/185  |

<sup>1</sup>Tested at Medium and High, 1080p, measured in fps <sup>2</sup>Tested at Maximum, 720p and 1080p, measured in fps <sup>3</sup>Tested idle and under load, measured in Watts

**YOYOTECH PIRANHA COBALT SE****£658 inc VAT** • [yoyotech.co.uk](http://yoyotech.co.uk) • [tinyurl.com/bc84yat](http://tinyurl.com/bc84yat)

YoYoTech's Piranha Cobalt SE is incredibly small, yet it's packed with some impressive features. It's also the only eight-core system here.

Featuring a 3.1GHz AMD FX-8120 processor, the YoYoTech scored rather better in our benchmarks than the quad-core contender from CyberPower, despite the significantly higher clock speed of the latter.

At £658 it appears to be considerably less expensive, too, but note that no monitor is supplied with this system. You do get a wireless keyboard and mouse, a useful multcard reader and a Blu-ray drive.

Although it's certainly the faster of the two AMD-based PCs here, the YoYoTech is no match for its Intel-based rivals in general application performance. Nevertheless, unless you're using it for very demanding applications, this system won't feel slow, thanks to the combination of a 2TB hard drive and a 120GB Samsung 840 SSD.

The YoYoTech is fitted with an Asus-branded HD 7770 graphics card, which delivers performance in line with the competition.

YoYoTech has had to cram an awful lot into a tiny space inside the system case, yet it has managed to do so in a very tidy manner even without built-in cable management. Room has also been found for a large Arctic Freezer 7 processor cooler, which helps keep down fan noise as it cools those eight processor cores.

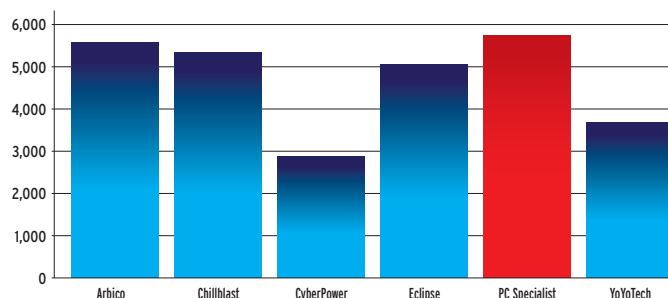


**VERDICT:** The low purchase price of the Piranha Cobalt SE is somewhat deceptive, as the system ships without a monitor or speakers. It's still one of the less expensive PCs of the group, and the only eight-core system on offer. It comes with a large hard drive and speed-boosting SSD, but it can't match its Intel rivals for raw performance.

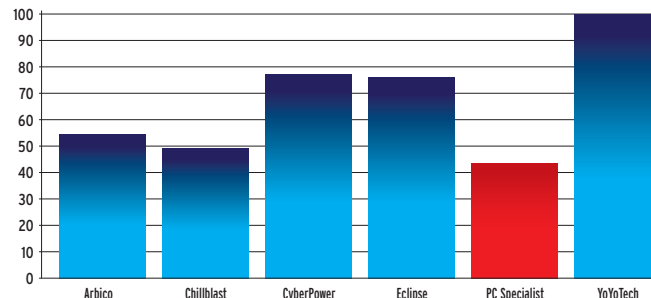
| <b>ECLIPSE</b><br>£929 inc VAT<br>★★★★★ | <b>PC SPECIALIST</b><br>£899 inc VAT<br>★★★★★ | <b>YOYOTECH</b><br>£658 inc VAT<br>★★★★★       |
|---|---|--|
| <b>Solar i5357N66Ti</b>                 | <b>Vanquish HD-660</b>                        | <b>Piranha Cobalt SE</b>                       |
| 3.4GHz Intel Core i5-3570K              | 3.4GHz Intel Core i5-3570                     | 3.1GHz AMD FX-8120                             |
| Standard Intel cooler                   | Standard Intel cooler                         | Arctic Freezer 7 v2                            |
| 16GB DDR3 1333MHz                       | 8GB Samsung DDR3 1,333MHz                     | 8GB DDR3 1,600MHz                              |
| 64GB SSD + 2TB HDD                      | 1TB 120GB SSD + 1TB HDD                       | 120GB SSD + 2TB HDD                            |
| EZCool 650W                             | FSP Dual Rail 450W                            | Corsair CX430 430W                             |
| Asus P8Z77-V LX                         | Asus P8H77-M                                  | Asus M5A78L-M/USB3                             |
| 3x USB 3.0, 6x USB 2.0                  | 2x USB 3.0, 6 x USB 2.0                       | 2x USB 3.0, 6 x USB 2.0                        |
| 23.6in Acer G236HLBbd (1920x1080), TN   | 23in AOC i2352VH (1920x1080), IPS             | Not supplied                                   |
| nVidia GeForce GTX 660 Ti, 2GB VRAM     | Palit nVidia GeForce GTX 660, 2GB VRAM        | Asus Radeon HD 7770, 1GB VRAM                  |
| Onboard, none                           | Onboard, Logitech LS220                       | Onboard, none                                  |
| Gigabit ethernet                        | Gigabit ethernet, 802.11n                     | Gigabit ethernet                               |
| HDMI, 2x DVI, S/PDIF, headphone, mic    | HDMI, DVI, VGA, S/PDIF, headphone, mic        | HDMI, DVI, DisplayPort, S/PDIF, headphone, mic |
| Cooler Master K350                      | Cooler Master Elite 311                       | Piano Case                                     |
| Microsoft Desktop 600 wired combo       | Logitech MK260 wireless combo                 | V7 wireless combo                              |
| Lite-On BD-ROM/DVD ±RW combo            | LG BD-ROM/DVD ±RW combo                       | Lite-On BD-ROM/DVD ±RW combo                   |
| Windows 8 64bit                         | Windows 8 64bit                               | Windows 8 64bit                                |
| None                                    | CyberLink Power2Go                            | CyberLink Power2Go                             |
| 1-year RTB                              | 3-year 'Silver' warranty                      | 3-year RTB (1-year parts, 3-year labour)       |
| 5,058                                   | 5,768   | 3,718  |
| 75/18                                   | 60/15   | 41/9   |
| 84/44                                   | 79/42   | 45/23  |
| 76/228                                  | 43/166  | 100/183  |

&gt;&gt; How we test and our conclusion

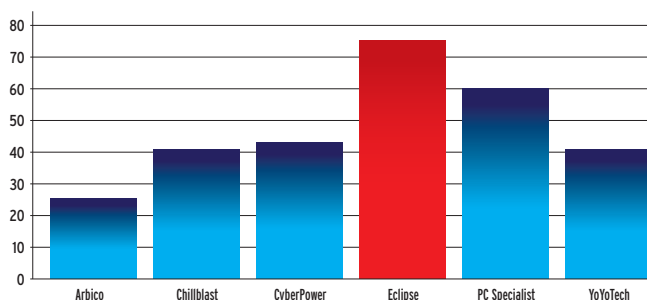
### PCMark 7 Overall



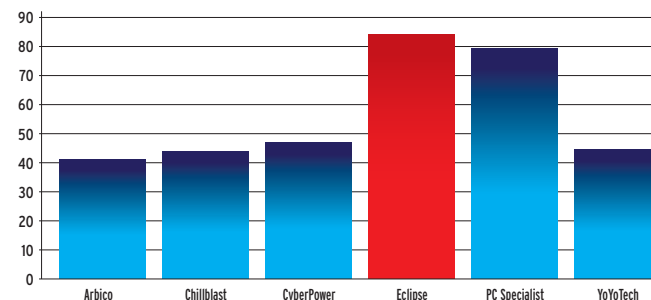
### Idle power consumption (Watts)



### Sniper Elite V2, Medium, 1080p (fps)



### Alien Vs Predator, Maximum, 720p (fps)



## Conclusion

Family PCs come in all shapes and sizes, and at a range of price points. You can narrow down your choice by first deciding whether you'll be spending a significant amount of time playing games: if so, look to the Eclipse or PC Specialist for around double the gaming performance of any other system in our round-up.

The Eclipse is the more enthusiast-friendly of the two, with support for overclocking, but it has a smaller-capacity SSD and an inferior

monitor. Meanwhile, the PC Specialist also offers Wi-Fi and a set of external speakers.

If your budget is smaller, the YoYoTech keeps down costs by omitting a monitor and speakers. If you are looking to upgrade an older system and already have a display, this eight-core PC costs just £658. Alternatively, the £40 dearer CyberPower trades some of this speed and SSD capacity for a screen.

Chillblast's Intel Core i5-3570K-based Fusion Lynx offers a great deal in return for

your £799 outlay. With stellar performance, a large-capacity SSD and a very good-quality IPS display, it represents excellent value for money. The Chillblast is also covered by a two-year collect-and-return warranty. We awarded it our Best Buy in this group.

If you place a strong feature set and a useful box of peripherals before sheer speed, CyberPower's less expensive and newly revamped Ultra Scylla SE may be all you need. It won our Recommended award.

## How we test

### General system performance

Core system performance is measured using PCMark 7, which uses 25 workloads to assess storage, computation, image- and video manipulation, web browsing and gaming. Results from this benchmark are not absolute, with driver issues in Windows 8 meaning video-transcoding tests can present sub-optimal results. Nevertheless, the results give an idea of the relative performance.

### Gaming performance

A typical family PC is likely to be used to play a game or two in its lifetime, but pricey graphics cards tend to be outside the budget of such systems.

You'll be able to enjoy most modern games when run at slightly lower resolutions and quality settings. Indeed, we used Sniper Elite V2 and Alien Vs Predator to test the graphics capabilities of each PC. Sniper Elite is configured with Medium and Ultra quality settings at 1080p resolution, while Aliens Vs Predator is run at Maximum quality and measured 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.

### Subjective assessment

We also 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 used, cabling and airflow. Good-quality peripherals are also important, and where provided these are assessed.

### 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. ☒



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# Web-design packages

Need to build a website? Simon Williams investigates six packages, including both on- and offline options

**I**t's becoming increasingly important to have an online presence for your business, to tell people about your services or display what you have for sale. Alternatively, you might want to create a site so friends can keep track of what you're up to.

Whatever the motive, there's software or a service designed to ease the work involved in setting up a website. At the simplest level, a blog may be ideal. Although originally designed as online text diaries, most blogging sites now support photos and video and can handle simple sales using third-party buttons, such as from PayPal.

A blog has in essence a linear format, in which each entry is separated from those before it. If your main reason for wanting to get on to the web is to express your thoughts or to comment on a subject for which you have specialist knowledge, this will probably be the most convenient format for you.

For a more conventional website design, with a navigation bar and hierarchical structure of pages, you have two main choices: to build your website using an online hosting service or an offline site designer.

An online hosting service does a lot more than simply store your website. It will typically provide all the tools you need to create and edit the content of the site in situ on the page; many can handle e-commerce, too, providing you with the opportunity to sell goods or services, and allow the website to pay for itself.

The editing tools in a typical online web service may be simpler than with a dedicated offline tool, but that can be to their advantage: it eases the learning curve. For many people starting up their first site, being able to put together all that is necessary without worrying about the niceties of screen design or coding is a great relief.

To help with this, most providers offer a range of predesigned templates, with which you simply swap in your own text and pictures to personalise the site for your own use. This way, provided you have some decent content for your site, you can build it and make it available online in a very short time.

Generally speaking, most templates aren't set in stone, so you can use them as a launch pad and incorporate some of your own ideas, whether that's simply adapting the background colours or repositioning the menus and text or image frames.

Offline site designers are favoured by programmers who have the necessary knowledge to write their own code, although modern examples often work more like desktop-publishing programs than coding tools.

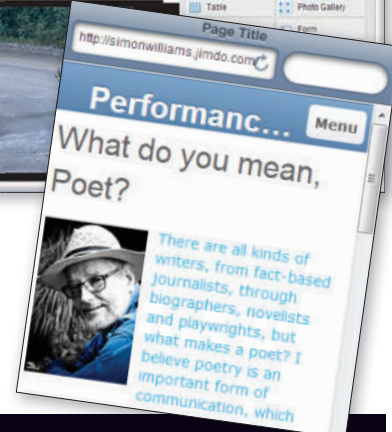
If you are at all familiar with laying out designs for the printed page, moving to a website designer may be your simplest solution for creating a website. Many of the tools will be familiar and, although there will be new ones to learn, many of these are bundled into 'widgets', which appear as simple buttons or logos on a web page and hide the specialist code they provide from both visitor and site owner.

The disadvantage of the offline method is that you also need to choose a web-hosting provider - and pay for this separately. You also have to upload your website to the hosting space, and it won't be possible to edit the site online - you'll have to make changes using the same offline software and upload any altered files.

Your choice of tools depends on the type of web presence you want to create and your level of expertise. First decide what you want to create, and then pick the tool. Here, we'll look at six possible candidates.







## 1&1 MYWEBSITE PERSONAL

**£6 per month** • [website.1and1.co.uk](http://website.1and1.co.uk) • [tinyurl.com/br2hrs3](http://tinyurl.com/br2hrs3)

You've probably seen 1&1 MyWebsite advertised on TV in the past few months. 1&1 claims its sites are quick to set up for individuals and small-business users, and include standard text, which can speed the establishment of a web presence. There are two offerings, for personal and business sites; we look at the Personal version here.

On 1&1's own site, the site designs look homely and are neatly divided into categories. Having signed up, though, we were presented with 300 templates categorised under less helpful headings, such as Trendy, Futuristic and Portfolio, with all the heading text written in German. It can take a while to find the template you like best.

The site structure in the templates is well established, with many obvious headings already in place. So, for example, menu options such as Our Hobbies, Our Sports and Our Pets are available, and can easily be hidden or removed if not required. New pages can be added too, which take on the predefined template style.

Adjusting the site structure and page elements is straightforward. Click on any element and an editing frame pops up; a text frame offers an editor and typographical choices, while picture frames offer to upload new images. Picture size optimisation is automatic, but images can be resized, flipped, rotated, sharpened and brightened.

YouTube videos can be included on pages and documents can be held on a site for download, subject to a 10GB website storage limit. MyWebsite Personal also includes the facility to maintain a guestbook for direct feedback and a contact form, so your readers and/or customers can directly get in touch.

Widgets provide buttons to link social-networking and other services, including Twitter, Facebook, YouTube and Delicious. 1&1 also caters for Flash movies, photo galleries, forms and hit counters, among many other smart page elements. There are no facilities to sell items in MyWebsite Personal, though - you'll need the Business version for this or to manually write the necessary HTML code.

**VERDICT:** 1&1 MyWebsite Personal is a decent tool for quickly putting together a standard website. There are a lot of predefined templates, so finding something from which you can work is easy. Widgets that expand what your site can do are quick and easy to add, although no shopping cart is available in the Personal product.

## JIMDO PRO

**£60 per year** • [jimdo.com](http://jimdo.com) • [tinyurl.com/casycz2](http://tinyurl.com/casycz2)

You don't need to pay anything to have your website hosted, provided that you're happy for it to carry advertisements. Jimdo offers a free version of its website service, but we're looking at the Pro product, which builds on that product with extras such as a proper domain name, email address, newsletter and site statistics.

Jimdo was keen for us to mention that 1&1 uses an outdated version of its software, and that Jimdo Pro is better-looking and slicker in its approach than MyWebsite. It offers fewer predefined templates, but they're generally good-looking and minimalist in appearance. These give sites a modern feel, although some colour scheme choices are a little wayward. The template we chose uses dark grey text on black by default, which is difficult to read.

As with 1&1 MyWebsite, you click on any object on a page to edit its contents. The text editor offers basic formatting and photos are automatically optimised for resolution. You can resize them on the fly, too, which is more convenient than selecting from stock sizes.

As well as text, graphics and dividing lines, you can choose to add a wide range of other objects through a pop-up selector. These include tables, photo galleries and forms. Social-media connections are made with Facebook, Twitter and Google+ feeds, but there's also Google Maps and video, with which you can specify a link, rather than being tied to using YouTube.

E-commerce is supported, but for up to 15 items only. The Business package is designed for more serious traders, and places no limit on the number of items. PayPal is the only electronic payment method, although Jimdo can also handle cheques and invoice payments.

You can add up to 3,000 pages to a Jimdo Pro site, subject to a storage limit of 5GB, and there's no bandwidth limit, so you can attract as much traffic as you want. The package includes a domain name of your choice (now including .co.uk), and a linked email account with a separate storage allowance of 10GB.

**VERDICT:** Jimdo Pro is a practical website package which, even in its free form, offers most of the basics. The Pro product is free from ads and adds a personalised domain and email, plus site stats. It's easy to use and many of the templates are stylish and modern. The 15-item limit on store objects is restrictive, but it's otherwise a good choice.



**PC ADVISOR**  
RECOMMENDED

## MOONFRUIT STANDARD

**£7.20** per month • [moonfruit.com](http://moonfruit.com) • [tinyurl.com/cxm8n2](http://tinyurl.com/cxm8n2)

Moonfruit is another service that has a free entry-level offering and a range of other packages, including a Business version. The Standard product sits above Free and Lite variants, and should suit most personal and entry-level commercial uses.

In many ways, this is how an online web-design application should look. It's polished and slick, but still has nearly all the features you could need. Starting with a wide range of predesigned templates, all of which look clean and modern, it shows the full page onscreen with a toolbar across the top and selection palette down the left side. Individual dialogs appear as tools are selected and everything happens in real time, as if the page were being locally edited.

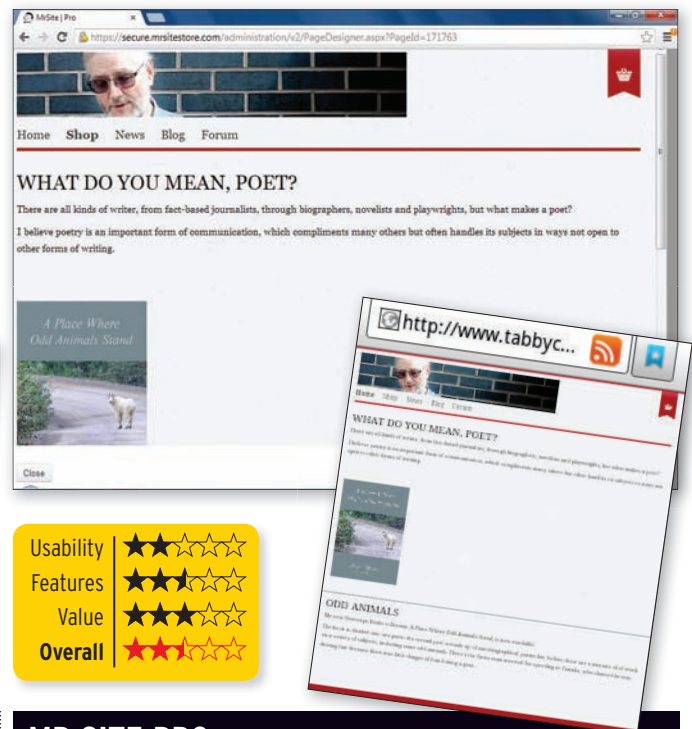
The shop facilities are well integrated into the web design and you can enter each item for sale in a separate database screen, which includes facilities for options, such as colour or postage to different areas. Sale items can be categorised, too, so you can list, for example, books, CDs and DVDs under different headings.

There are some other niceties not generally available in online designers, such as photo effects that open images on to the page with a little more pizzazz than just placing them there. There's also a video player that can link to YouTube and other providers, and audio players for single tracks or a jukebox.

Connections to social media include Twitter and an RSS feed, and Facebook Connect enables visitors to log into your site using their Facebook credentials. Any site you create is also available in a mobile-friendly form, with all the graphics removed and the essential text displayed on your smartphone or tablet. Mobile visitors can still read all the content and even buy goods from the shop.

The only real shortcomings of Moonfruit Standard could be the storage allowance, which at 1GB is a lot lower than some of its rivals, and a bandwidth limit of 20GB, when most such services are unlimited. The nature of your website will determine whether either of these limits are going to present a problem.

**VERDICT:** Moonfruit is a very well-designed web-design tool, and makes it easy to select and customise a template. All the key features are in place to create a modern-looking, full-featured site that's easy to edit. However, the storage and bandwidth limits are disappointing.



## MR SITE PRO

**£10** per month • [mrsite.co.uk](http://mrsite.co.uk) • [tinyurl.com/bjux92c](http://tinyurl.com/bjux92c)

Mr Site was one of the first online website-design tools available and has just undergone an overhaul, so the company is keen to explain that it's currently building up its range of templates, with five- to 10 being added each week. There are six packages in the Mr Site range, with Mr Site Pro sitting above Starter and Classic. Pro includes e-commerce, with a range of payment methods and good SEO tools.

It's difficult to imagine a site designer that is further away in its working method from Moonfruit Standard. Once you've selected a template, which has only very basic page furniture, you work with a blocked outline of fixed content areas on your page, dragging-and-dropping on to it placeholders.

Mr Site calls the placeholders widgets, but these aren't the interactive media tools that normally go by this name - every text box and picture is a widget. You end up with a diagram of what your page will look like, rather than anything remotely WYSIWYG.

It's all very unintuitive, for new and seasoned designers alike. When we tested it, we were prompted to 'Build your page using widgets on the left', when these were in a toolbox on the right.

Text is typed in and photos are loaded with little reference to how they will look on the page. There is a Preview button, but it's very difficult, for example, to size a photograph, as you have to type in its pixel dimensions without knowing the size of the panel in which you're trying to get it to fit.

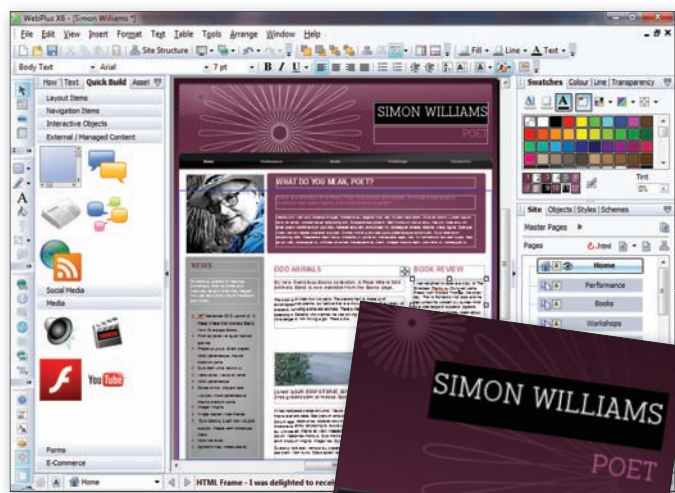
Other things available to add to pages include a news feed, a contact form, a guest book and a poll. You can add a Twitter feed, as well as YouTube and Vimeo videos, and audio from SoundCloud.

The shop, which occupies a fixed-page layout, is the main strength of Mr Site Pro. It has facilities for product categories, and within those categories you can add up to 250 individual products. The storage allowance is the lowest in this group, at 750MB.

Each product has a short and long description, and separate prices can be added for different carriage types.

**VERDICT:** Mr Site, despite its revamp, looks like a design tool from a different generation. The page layout is largely fixed and elements are entered blind. Constant flicking between edit and preview modes is annoying. Using this service is hard work.





## SERIF WEBPLUS X6

**£82 inc VAT • [serif.com](http://serif.com) • [tinyurl.com/8gokgqr](http://tinyurl.com/8gokgqr)**

Serif's WebPlus has been around a good while. It started life as a budget alternative to the likes of Adobe's pro-level Dreamweaver, in the days when the only way to design a website was to hard code it in HTML or build it like a page in a desktop publisher.

Serif has done its best to move with the times, introducing many of the features of its online competitors as widgets that can be added to a page. In the latest version, for example, you can add site search, Google Maps, Google AdSense, YouTube videos and captcha codes, just by dragging-and-dropping smart objects.

When you start the program, the analogy to desktop publishing is strong, with the editing pane bordered on the left by a toolbox and a multi-pane box of objects, and on the right by palettes of colours, a site navigator and object-alignment tools.

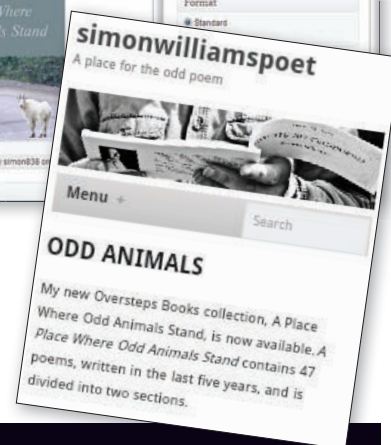
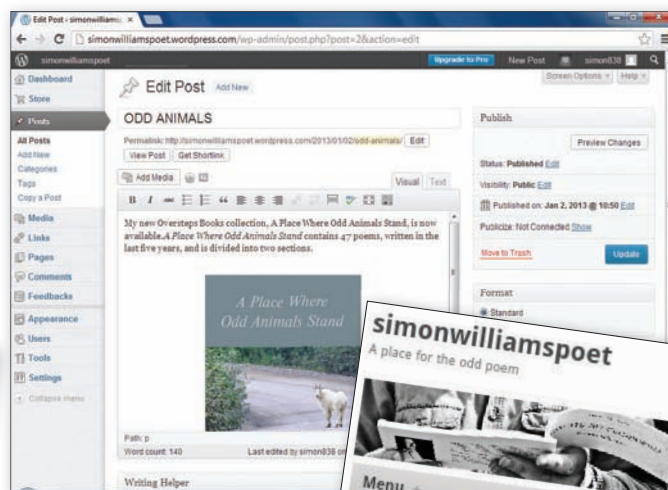
In the same way as most online offerings, Serif provides a bank of predesigned templates, with which you simply swap in your own text and images to personalise each page for your needs.

Many of these templates are provided in dual formats, for desktop and mobile browsers, allowing you to create a consistent design on any platform. Some are provided with WebPlus X6, some are free downloads and some are optional extras, with prices starting at £8.

New features in version X6 include the ability to add live feeds from social-media sites such as Facebook, Twitter and Google+, a site structure view showing thumbnails of pages and their links, and a site wizard that handles the basics of a new site, such as the number and size of pages and the navigation bar.

Serif provides web hosting, but only one month is free at its lowest service level. This means you'll have to opt for something like the Gold package, which offers 2GB of web space and 25GB of traffic for £40 per year. Add that to the cost of WebPlus X6 itself, and you're looking at £122 for the first year. This looks pricey against the competition, although costs do fall later.

**VERDICT:** While WebPlus X6 might be described as old-school in comparison with the newer online offerings, there's a lot more flexibility and many in-depth design tools available in this package. If you want to be able to tailor a complex site to your exact needs, taking some time to get to grips with what it can do pays dividends.



## WORDPRESS

**Free • [wordpress.com](http://wordpress.com) • [tinyurl.com/a9udfn7](http://tinyurl.com/a9udfn7)**

WordPress is probably the best known of all the blogging tools. Setting up a basic blog is free, and this includes taking advantage of the professionally designed templates and hosting. For \$99 a year - around £5 per month - you also get your own domain name, 10GB rather than 3GB of web space, the removal of ads, the ability to design a blog from scratch and the VideoPress video player.

There's a fair selection of well-designed templates, although all are simple. Most things are customisable but, unlike the website services, there's very little in-place editing. Nearly all operations take place on separate screens - when you edit text, for example, it appears in a separate text editor with simple formatting controls. You edit and republish the text to have it appear in your blog post.

This lack of WYSIWYG updating is more disconcerting than it may sound. It's fine if you write all your text in one go and add all the necessary images before publication, but if you prefer to tweak your copy and photos as you go, it's long-winded to have to keep previewing and applying changes. For making minor changes, it's something with which you'll learn to live.

The photo editor enables all the basics, such as resizing, rotation, flipping and simple positioning left, right or centre, but more in-depth photo treatment needs to be completed using separate software.

At the top of a blog, the default pages are Home and About, although you can add others, mainly for static information. Using this facility it's easy to set up a website that isn't a blog, although the one missing feature is e-commerce. You can add PayPal buttons, but there's no payment cart facility. A page can include feedback and comments, though, and polls to gauge visitor opinion.

WordPress provides links to Twitter and Facebook, and automatically lists recent posts, your archives and metadata down the right side of your blog page. It also selects contextual ads for the subject matter if you choose to use the free version.

**VERDICT:** If you're planning to set up a blog, WordPress is probably all you need. While it's not as easy to use as a dedicated web-design service, it's free and can be used to make sites that aren't blogs as well. It could do with a more hands-on approach to editing, but its very popularity suggests most people don't find this a problem.





# DiskStation DS213air NAS server

## The first ever Synology NAS with a built-in router

Synology® DiskStation DS213air is a one stop solution for wireless sharing, web applications and centralised storage. Specifically designed for home users and small offices

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

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## How we test

There is a wide range of features to consider when choosing a web-design tool. As well as the obvious requirements to place text and graphics, it's important to be able to create a website with some individuality. We checked for variety the templates on offer from each service, and tested how easy it is to create a design from scratch.

You want to attract visitors to your site, so it's important to get search engines to find it. SEO is a useful tool for this, as are feeds from the main social-media sites, which let visitors see how active

you or your company are on a day-to-day basis. We checked for free SEO tools and widgets to bring these feeds on to site pages.

If you want a site to bring in a bit of extra cash, or if you're aiming to run a full web shop, you'll want the ability to sell through the pages of your site. We checked how easy it was to do this, and how versatile the services are in handling payments. With companies who offer more than one level of service, we opted to review a mid-range product, costing between £5 and £10 a month.


|                            | <b>1&amp;1</b><br><b>£6 per month/£72 per year</b><br> | <b>JIMDO</b><br><b>£60 per year</b><br> | <b>MOONFRUIT</b><br><b>£7.20 per month/£64 per year</b><br> <b>PC ADVISOR</b><br>RECOMMENDED |  |
|----------------------------|---|--|---|--|
| Product name               | <b>MyWebsite Personal</b>   | <b>Pro</b>   | <b>Standard</b>   |  |
| <b>FEATURES</b>            |   |  |   |  |
| Number of pages            | Unlimited   | 3,000  | Unlimited   |  |
| Number of templates        | 300-plus  | 120-plus   | 160-plus  |  |
| Mobile optimisation        | Yes   | Yes, with preview  | Yes, with preview   |  |
| Image editor, optimisation | Yes, Yes  | Yes, Yes   | Yes, No   |  |
| Photo galleries            | Yes   | Yes  | Yes   |  |
| Widgets                    | Facebook, Twitter, visitor counter, YouTube, Flash movies   | Facebook, Twitter, Google+, Flickr, video  | Social media, video, audio, special effects   |  |
| SEO details                | Website traffic and basic information via submission tool   | Automatic, with meta tags  | All sites optimised for search engines with clean W3C-compliant HTML  |  |
| <b>SHOP</b>                |   |  |   |  |
| Number of items            | N/A   | 15   | 50  |  |
| Category support           | N/A   | One category   | Categories and options supported  |  |
| Checkout options           | N/A   | PayPal, Cheque, Invoice, Local Delivery  | PayPal  |  |
| <b>HOSTING FEATURES</b>    |   |  |   |  |
| Domain included            | Yes   | Yes  | Yes   |  |
| Storage space              | 10GB  | 5GB  | 1GB   |  |
| Bandwidth/month            | Unlimited   | Unlimited  | 20GB  |  |
| Email accounts             | 5   | 1  | 1   |  |
| MySQL databases            | No  | No   | No, but can be embedded with HTML   |  |

## Conclusion

There are several types of web presence. At one end, a simple serial feed of posts in a blog can be very well handled by WordPress, giving you a free way to put yourself out there and express an opinion.

At the other end of the scale, the all-singing, all-dancing web designer is epitomised by WebPlus X6. While Serif has tried to cover all the bases by including a good range of well-designed templates, the real strength of the program still lives in its depth of features. If you want to get well into web design, while still avoiding HTML

coding, there are very few basic- and mid-level websites that can't be realised with this program.

However, for anybody wanting to quickly put together a good-looking website that uses modern design elements, such as frame transparency and photo effects, Moonfruit Standard stands out. With a range of media widgets that let you add to your site audio, video and social media, plus an easy-to-use shop facility, this is the tool we would choose to work with. You can try it for free, too. 

| MR SITE<br>£10 per month/£120 per year<br>★★★★★☆☆   | SERIF<br>£82 + £40 hosting (£22 after first year)<br>★★★★★☆☆   | WORDPRESS<br>Free<br>★★★★★☆☆                                    |
|---|--|---|
| Pro   | WebPlus X6   | WordPress   |
| 100   | Unlimited  | Unlimited   |
| 20 (5-10 new each week)   | 60, plus others downloadable   | 205   |
| No  | Yes, created separately with linked template   | Yes, automatic  |
| Yes, No   | Yes, Yes   | Yes, No   |
| Yes   | Yes  | No  |
| Twitter, Google Analytics   | Social media, forums, Flickr, Reddit, Digg, hit counter, forms RSS feed, Google AdSense, Maps                | Can include HTML for PayPal buttons and more                    |
| URLs, image tags, meta keywords, descriptions and titles, Google site verification and analytics, SiteBoost tools | Google Analytics, Google and Bing Webmaster validation, ALT and TITLE tags for images, page update frequency | Auto-generated XML sitemaps sent to search engines on new posts |
| 250   | Unlimited  | N/A   |
| Categories supported  | Categories and options supported   | N/A   |
| PayPal, Nochex, Worldpay, Cash on delivery  | PayPal, Mal's, RomanCart   | PayPal and Wufoo buttons available                              |
| Yes   | Yes  | No, requires upgrade  |
| 750MB   | 2GB  | 3GB   |
| Unlimited   | 25GB   | N/A   |
| 50  | 10   | No  |
| No  | No   | No  |



# Out-of-body experiences

**Martyn Casserly takes a glimpse into the not-so-distant future, in which the humble keyboard and mouse take a back seat**

**W**ith the release of Windows 8 Microsoft has signalled that the future of computing will involve interacting with our devices in ways the keyboard and mouse cannot deliver. It isn't surprising: we've been using this hardware for the best part of three decades. As we enter this new era, the ideas put forward by innovative designers are surprising, revolutionary and, even - borrowing from the big book of Apple adjectives - magical.

In the early days of computing, the only way to load programs - or do anything else - was to enter commands using a keyboard. The Altair 8800, one of the first home computers, didn't even have a keyboard; instead, you entered commands by toggling various switches, which resulted in two rows of lights blinking in sequential patterns. It's a wonder computers ever caught on.

Researchers at the now-legendary Xerox PARC facility in California knew we could do better than this. They set about designing the WIMP system (a graphical user interface featuring windows, icons, menus and a pointing device). This remained hidden away until Steve Jobs negotiated a trip to the facility, witnessed the technology, and immediately set about replicating and refining it for the mass market.

Following the release of the extravagantly priced Apple Lisa in 1983, the more sensible Macintosh in 1984, and Windows 1.0 in 1985, the landscape was forever changed: the graphical user interface became the norm, which it has remained until now.

Smartphones and tablets have recently opened the doorway to the possibilities of touch- and speech-controlled interfaces. Meanwhile, games systems such as the Nintendo Wii and Microsoft Kinect have released gamers from their sofas and gamepads, demonstrating the possibilities of using gestures and movement to interact with their consoles.

Developers are today showcasing and manufacturing systems that, only a few years ago, would have been the babblings of madmen. The future is here and there's nary a keyboard in sight.





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- Business solutions
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  - games
  - e-books
  - chats

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## GESTURE CONTROL: IT'S ALL IN THE REFLEXES

### Gaming consoles

If there's one new interface with which we're already very familiar, it's motion control. When Nintendo released the Wii in 2006, the idea of standing up to play a computer game was bizarre - multiplayer experiences had previously been limited to Xbox Live and sitting shoulder-to-shoulder with a gamepad-wielding friend. The chances of a yoga game being released were negligible. But Nintendo's smart little white box tapped into something previous games consoles had failed to address: the simple fact that games should be fun, and their interface intuitive.

The elegant control system immediately made sense to most users, since it used actions they already knew how to complete. Wii Sports included a tennis game that you played as if holding a tennis racket, golf required you to swing the controller like a club, and boxing was exhausting and potentially dangerous if an unsuspecting family member walked in front of you during a frantic bout.

The removal of classic barriers, such as multi-buttoned control pads and small joysticks, meant people who had never considered gaming to be a viable or fun pastime flocked in huge numbers to the Wii. Wii parties became a common event, and Nintendo's sales continued to climb - to more than 96 million units. The Wii is the most successful system in Nintendo's history, and proof of what can be achieved with an interface designed to respond to existing human behaviour.

Both Sony and Microsoft quickly responded with their own peripherals that

emulated the Wii motion controller. The PlayStation Move looked like a deactivated lightsaber - or a marital aid, depending on your viewpoint - and received much critical acclaim. Sales were less impressive, though, and Sony recently admitted that the device has failed to live up to its expectations.

Microsoft fared better with its Kinect interface which, after selling over eight million units in the first 60 days of its release, entered the *Guinness Book of Records* as the fastest-selling consumer electronics device

For gaming, this is revolutionary: the player becomes a part of the game. In the many different fitness titles available, your body is shown onscreen as you attempt the various routines. This enables you to correct mistakes and improve your technique, plus avoid the cheating techniques that waving a Wii controller allows.

The camera also acts as a video-calling interface, and the speech controls are



integrated system-wide; you can browse the web via Bing, access

the various apps, and even shut down the console using your voice. It was only a matter of time before something this useful made its way to a desktop environment, especially one in which gestures and touch controls are at the fore.

### Kinect comes to Windows

In June 2011 Microsoft released a Kinect for Windows development kit, which allowed developers to tailor the device to innovative projects within Windows 7. Hackers had already found ways to manipulate the device, of course, but their combined efforts meant the world was able to take a glimpse at the future of digital interaction.

One group of students at MIT created a JavaScript program that allowed the user to navigate websites using gestures, which worked particularly impressively with 3D mapping and drawing programs. Programmer Oliver Kreylos hacked his Kinect so it could create 3D models from the images it captured. A German research lab built a portable guidance system for blind people, and another group of MIT students created a tiny helicopter that used the Kinect sensor to avoid crashing into obstacles.



The **PLAYSTATION MOVE** received critical acclaim, but failed to live up to Sony's expectations

of all time. That's despite a high price that approached the cost of the Xbox 360 itself.

Microsoft's advertising slogan, 'You are the controller,' highlighted one of the main differences between the Kinect and its competitors. With the Wii, most of the tracking is done via accelerometers within the controller itself, which lets the base unit know its orientation, distance from the screen, and the speed at which it's moving. This is fine for most applications, but it still requires batteries to be charged and buttons to be pressed, and it arms players with a solid, offensive weapon that has led to an unsurprising number of Wii-related injuries. The Kinect is different, and has implications for how we will use our PCs in years to come.

The Kinect unit is fitted with an RGB camera, a depth sensor, and a multi-array microphone. This allows the device to see the user, track their movement, range their distance, and even process voice commands, without the need for a separate controller.





The tiny **LEAP** is the size of an Apple iPod nano

More practical uses included a shopping trolley that followed you around a store and allowed you to scan items as you placed them in the basket. The upshot of this was that, once you had finished browsing, you simply entered your payment information, the items were charged, and you could leave the store without visiting the till.

Medical professionals were also quick to see the potential of handsfree control, with a group of surgeons at St Thomas' Hospital in London using the Kinect to manipulate 3D images of a patient's aorta during an operation. John Brennan, president of the British Society for Endovascular Therapy, said: "I would find it difficult to think of operating rooms in 10 or 15 years' time where these were just not the norm'.

Microsoft has been open about its desire to see the technology deployed by developers in interesting and unusual ways, and has continued to release updates to the developer kits. The company also stated on its Kinect for Windows blog that these updates 'will include support for Windows 8 desktop applications', suggesting that those with non-touchscreen PCs may not need to upgrade their entire machine to run the latest offering of Windows. It's still early days for the Kinect, but already it seems to be marking a path toward the future.

If there's one criticism of the device it's that it lacks fine motion controls, with many of the gestures required to be exaggerated and distant from the screen. There are already lens covers such as the Nyko Zoom, which aims to reduce the amount of space needed between you and the sensor, but there are mixed reports on how successful it is in this regard.

## Leap into the future

One company that seems to have a viable solution is Leap Motion. It's set to release its own motion sensor, known as the Leap, which has already been impressing tech journalists and bloggers with its incredible levels of accuracy and diminutive size.

"It's based around a set of technologies developed by my co-founder David Holz while he was getting his math PhD," explains

Leap Motion CEO Michael Buckwald. "In essence, it uses an entirely new approach to motion sensing that has never been used in academia or commercially. Accuracy is generally around one hundredth of a millimetre,

which is many times more accurate than existing approaches, and it's also much more responsive. We have almost no detectable latency, whereas most approaches have very notable latency. One of the most exciting things is that it can be put in a very small form-factor, fairly inexpensively."

This isn't hyperbole: the Leap is about the same size as an iPod nano, and cost just \$70 when it's released in early 2013. Leap Motion asserts that the device will allow you to control the Windows 8 Modern UI using simple movements of fingers, rather than frantic waving of your hands.

"Windows 8 really is hard to use if you don't have a touchscreen," says Buckwald. "This is a great way to control something like that. Users can sit back comfortably in their chair and pinch to zoom and scroll, and do anything they can do with a touchscreen, but in a more responsive way. The goal is to create an interaction bubble around a user seated in front of a computer, and the device can be placed anywhere within that environment.

"In the future we will build long-range versions, but pretty much everything other than TV control is a short-range use case. Since the technology was built to do complicated things, we're more interested in seeing it used for those rather than flipping up and down through a list of channels."

The technological landscape is scattered with the dormant corpses of devices that promised much, but never found support from software developers. This scenario is one that Leap Motion is keen to avoid and, so far, its strategy looks solid.

"Around 42,000 developers have applied to build content on top of the Leap platform," Buckwald reveals, "and we want those developers to have as big an audience as possible. Thousands already have units and are building amazing things. There will be everything from casual games such as Angry Birds and more serious games such as first-person shooters, to music- and video-editing tools, scientific visualisation, and engineering. The goal is to have a diverse market place with a lot of different things that cater to different people.

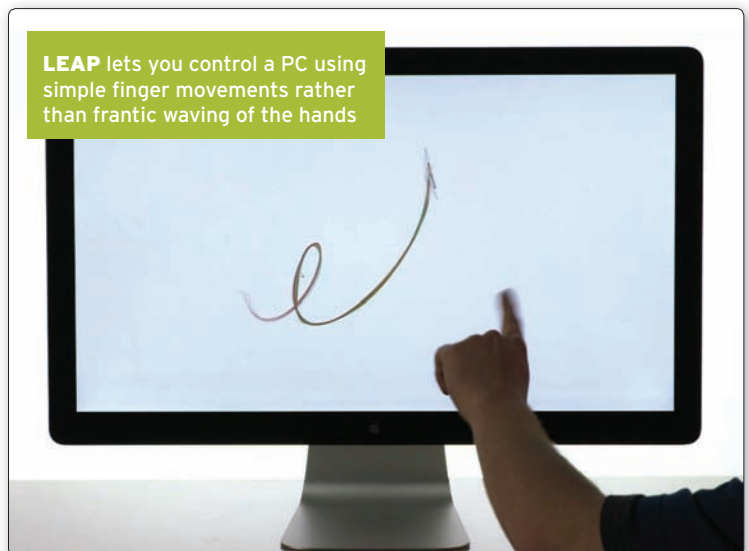
"Over time we're going to start working with OEMs to integrate the technology into more products. We're working to integrate this into laptops, also smartphones and tablets, eventually even cars and planes."

## Gaze Tracking

When it comes to fine motion, it's difficult to beat the minute movements that the human eyes make on a constant basis. Swedish company Tobii has been developing a technology that it calls Gaze Tracking, which uses infrared cameras rather than special glasses to track a user's eyes and execute commands. Tobii sells into the enterprise and research markets only, but it will also target mainstream PCs and tablets in the coming year or so.

A video demonstration of Gaze Tracking on a Windows 8 desktop reveals how tiles and links can be selected simply by staring at them, and web pages scroll as your eyes reach the bottom of the page. Even the screensaver can be set to activate only when you look away from the monitor for a certain amount of time.

**LEAP** lets you control a PC using simple finger movements rather than frantic waving of the hands



## VOICE CONTROL

The past couple of years has seen a huge emphasis put on voice-control interfaces. Thanks to the Kinect, it's possible to control elements of your television or gaming experiences by talking to the device, and Windows 8 integration now looks a distinct possibility in the near future. The technology in which voice is most apparent, though, is in mobile devices.

### Siri, Google Now and S-Voice

When Apple released the iPhone 4S in 2011 it incorporated a digital assistant called Siri, which is controlled by speech. The focus of Apple's advertising campaign for the smartphone centred on this capability, and it brought in celebrities such as Samuel L. Jackson, Martin Scorsese, Zooey Deschanel, and John Malkovich to have onscreen conversations with Siri.



**NUANCE** attaches a profile to users that enables it to better understand the way they speak

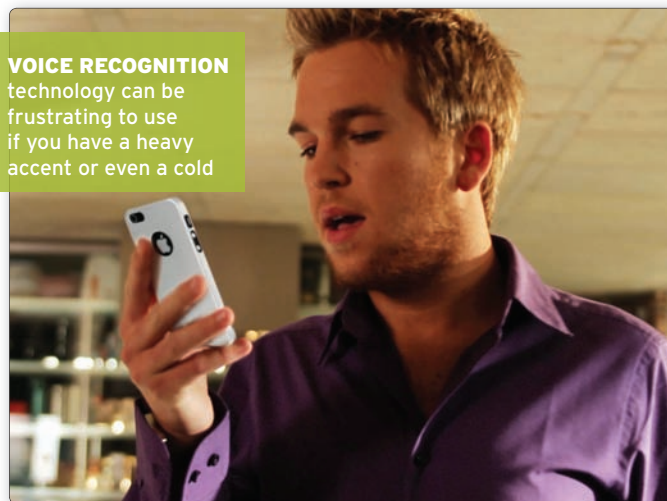
One of the main differences Siri offered over previous products was a personality. The programmers added answers to questions such as 'What are you wearing?', 'When is your birthday?' and even 'Who is God?', which gave the software the appearance of having a sense of humour. This spawned humorous websites that collected the various answers to the odd questions users posed.

Google has its own voice-controlled search apps, and has added to Android Jelly Bean Google Now. This aims to do more than provide information when asked; it builds a profile of the user, allowing it to answer your questions before you ask them.

Samsung has also developed the S-Voice system, which features on its flagship phones.

As these technologies mature, they will become a central part of our interaction with devices - but they still have a way to go in terms of accuracy. Siri can be frustrating to use if you have a heavy accent or a cold. The anguish it can induce is wonderfully highlighted in the YouTube video 'Apple Scotland - iPhone commercial for Siri', which features a Scotsman trying in vain to ask Siri for basic information.

**VOICE RECOGNITION** technology can be frustrating to use if you have a heavy accent or even a cold



### Nuance Dragon Dictate

The main challenge for such systems is that they must contend with many different factors when interpreting a user's input. One company that has been working to overcome these challenges on the desktop is Nuance; its Dragon Dictate software is one of the most advanced in the industry.

"Speech recognition is an extraordinarily hard computational problem," explains Nuance's Neil Grant. "In effect, you've got an astronomical search space. A 17-word phrase within a 50,000-word vocabulary is the equivalent of finding the correct phrase out of  $7.6 \times 10^{79}$  possibilities - roughly the number of atoms in the observable universe. To put that into context, when Google searches for a web page, it looks at significantly fewer possibilities - somewhere around  $1 \times 10^{12}$ ."

"If you're typing something on a keyboard then it's very simple, it's binary - you either hit the keystroke or you don't. With speech there's far more variability in terms of accents, tonality, environmental conditions, background noise and microphone quality.

"One of the ways we tighten that with desktop speech recognition is that a user has a profile that allows the computer to understand the nuances of the way they speak. The software can apply this data to achieve higher accuracy. The more you use it and make corrections, the more it learns and then applies those learnings to your profile."

This dedicated usage also highlights one of the challenges ahead for the mobile software that many of us currently use.

"Siri is in effect speaker-independent speech recognition," says Grant. "It's not training a profile for you, certainly not in

any great depth. You and another member of your family might use it on your phone, so it's dealing with potentially multiple speakers from the same device. It's a much harder process and means it can't set itself up in advance for a particular accent."

Advances in noise-cancelling mics and the continued refinement of voice-control software is seeing rapid improvements in all areas of the technology. Nuance itself offers iPad and iPhone versions of its software, and the continued updates to Siri and Google Voice Search will no doubt improve the software in the years ahead.



**SIRI** differs from similar products in that developers built into it some sense of a personality

## Laptops and voice control

Manufacturers are now beginning to incorporate voice-control technology into laptops in response to the ever encroaching influence of tablets.

"One of the key specifications set by Intel for Ultrabooks is embedded speech recognition," says Grant. "We will see speech becoming more and more ubiquitous on these devices."

One of the eye-catching elements of Siri is system-wide integration of commands. It's able to control calendar entries, send emails, tweets, Facebook updates, and play specific music, all from a single interface. For voice control to make an impact in everyday computing it needs to offer similar depth. Thankfully, Windows offers developers the chance to do exactly that.

"With Windows we can get very, very deep," continues Grant. "A certain amount of integration is built into our Windows software - not only dictation capabilities, but also command and control of applications such as Microsoft Office."

The concept of voice control has been a staple of science-fiction for decades, and the representation of communicable computers such as HAL in *2001: A Space Odyssey*, or even Holly from 'Red Dwarf', has been a constant reminder of the convenience and ease with which the interface could work - so long as the computer will acquiesce to opening the pod bay doors when asked.

"A mouse and a keyboard do not offer a natural way of interfacing with something," states Grant. "They're a solution to a problem, but the keyboard layout slows us down. Stephen Fry once stated that it took less time

to get your private pilot's licence than it did to learn to type 60 words per minute. We've got interfaces that are fine for certain things, but for others there are improvements that can be made. As devices become more mobile, you're not going to carry around a keyboard. Voice control is a natural step."

## WEARABLE COMPUTING

When Google launched the developer prototypes of its Glass Project at the 2012 Google I/O conference, it did so with subtlety. "We have something special for you," announced co-founder Sergey Brin, before switching the feed on the main screen to a remote camera onboard a helicopter that was circling the conference building. This camera was incorporated into the glasses worn by one of the passengers. Three others were also wearing these specs and, as they threw themselves from the helicopter, live data was fed to the screen.

The camera is a good way to illustrate the viewpoint of a user, but the Google Glass project is more than just a novelty. In the demonstration video that followed, Google revealed its vision for the future. When wearing the glasses, information is displayed in a form of Head-Up Display (HUD) on the inside of the lens. A user is able to receive emails, which they can activate and read by looking at the icon - in a similar way to the Tobii Eye product - and reply via voice command, without the need for a mobile phone or computer screen.



Google's **GLASS PROJECT** offers wearable technology, with no mobile phone or computer screen necessary

The video also displayed examples of augmented reality. A user went to a train station and was notified of delays, so the glasses brought up Google Maps to offer an alternative route to the destination, and guided the way using turn-by-turn navigation. Other features shown included taking photos, posting to social networks, and even receiving phone calls.

The project's use in the real world has been met with scepticism, but with the backing of Google there's every possibility that some form of interactive eyewear could become a reality. Developer examples have already been issued, and consumer models could be available by 2014. They won't be cheap, though: the developer kits cost \$1,500, so you'd better start saving if you want to be sporting the latest in wearable tech.

## MIND CONTROL

The concepts of gesture- and voice control are reasonable evolutions of existing technology that we know and understand. After all, most laptops and mobile devices already have cameras and microphones.

Mind control, in which you use the power of your brain to manipulate and control the data and instructions that a computer receives, is one area of research that's more difficult to comprehend. The complexities of such a system are formidable, but the potential benefits are truly immense.

It's all the more remarkable, then, that one of the foremost exponents of practical mind control interfaces saw fit to place its high-tech wizardry into a rather unusual device: a skateboard.

## Board of Awesomeness

Chaotic Moon is a California-based company formed in 2010. It was responsible for the Kinect-powered shopping trolley, which it followed with a Kinect-controlled skateboard that it dubbed the 'Board of Awesomeness'. The next project it built showcased simple, but effective use of mind-control principles: the designers took a headset built by Emotiv, which also specialises in brain/machine interfaces, attached it to a Windows 8 tablet, then bolted both to the skateboard.

"We started with very simple things such as getting it to move," explains Whurley, Chaotic Moon's general manager, "then trying to get it to move and stop. We replaced the Kinect with the USB key that talks

wirelessly to the Emotiv headset. It was simple as far as the physical configuration, but complex, cumbersome and trial-and-error with the software."

The basic principles of the technology are relatively simple. When we think about something in particular, our brain creates patterns of electrical activity. These patterns can be recorded using headsets such as those manufactured by Emotiv, then translated into recognisable commands a computer system can execute. Like speech, though, there are still issues with compatibility.

"Your brain has folds," says Whurley. "Yours are different from mine, and the electrical patterns are different, too. It's not a magic technology where I can put it



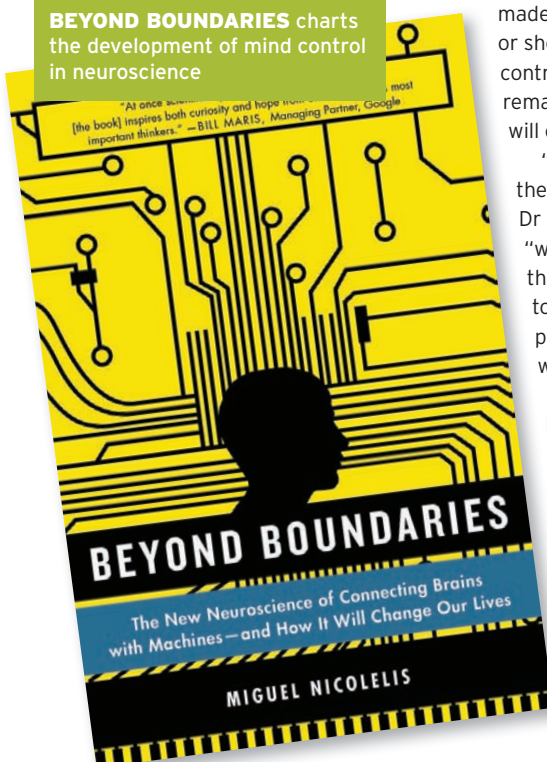
on anybody and get the exact same results every time. We tested different people doing different stuff, hundreds of times, then came up with a way we could get it to work for 95 percent of people using simple commands. Things such as moving forward, forward faster, slowing down and stopping were the four basic tasks we tried to homogenise.

"It is unreal how many people go absolutely bananas. They love it. People are just blown away. It's this moment of magic and sorcery, which is kind of awesome."

Controlling something with the mind is still such a new way for humans to interact with machines that it can be difficult to switch off our thoughts, something that can have unexpected results. An example of this can be seen when CNET reporter Molly Wood, while testing the Board of Imagination, nearly crashed it into a wall, even though she was no longer riding it.

"Yes, yes she did!" Whurley exclaims. "The thing you'll notice on that video is that the skateboard kept going. The reason it did so is because Molly was thinking about moving because she was chasing after it. What she didn't understand is by doing that she was actually driving it further and further, faster away from us. That's why on the video you see me tell her to stop thinking."

**BEYOND BOUNDARIES** charts the development of mind control in neuroscience



Urban sports aside, the potential for technologies that require only an uplink to a headset, but offer the possibilities of complex operation, is not something that Chaotic Moon dismisses.

"There are implications for people in wheelchairs," Whurley considers. "There are implications for people with disabilities of all kinds. In addition to this there's repetitive tasks, controlling automation. So, for example, controlling brain/computer interfaces as part of a robotics control system in manufacturing or hazardous areas, and things like that. There's a lot of different areas you could take this, and that's what we try to do."

### Implications in neuroscience

The ideal mind-control system would be one in which human and machine form some kind of symbiosis. There's a big difference between opening your email by thinking about it, and a computer-controlled exoskeleton that could empower a paraplegic person to walk again.

This very idea is one Dr Miguel Nicolelis is trying to make a reality, and he has a notable deadline. At the opening ceremony of the 2014 World Cup in Brazil, a young adult paraplegic will, if things go to plan, take several steps and kick a football. This will be made possible by a robotic suit, which he or she will wear and control via a thought-controlled interface. It promises to be a remarkable sight, the significance of which will overshadow any football that will follow.

"The idea of having a demonstration at the opening ceremony of the World Cup," Dr Nicolelis stated in a recent interview, "was generated by our desire to speed up the process of bringing this technology to clinical applications. Showcasing the potential of those few steps in a prototype way is the kick-off of this field."

In his book *Beyond Boundaries*, Dr Nicolelis charts the development of this area of neuroscience and explains how the future could look very different if theory becomes reality. The research he and his colleagues at the Walk-Again Project are conducting involves, in very simplistic terms, implanting micro-electrode arrays into the brain to measure precise activity, accompanied by implanted microchips (neurochips). The signals are processed and sent wirelessly



The **BOARD OF IMAGINATION** is controlled by your mind

to a BMI (Brain Machine Interface), which translates the thoughts into commands that power the robotic neuroprosthesis.

In the next decade or so the technology will focus on helping those with paralysis, Parkinson's disease and other neurological disorders. But as the technology becomes accepted and costs decline, Dr Nicolelis sees more viable mainstream applications.

"When we improve our ways to read brain activity with non-invasive technology," he concludes, "so technology does not require, like we do today, these small implants on the brain to read electrical signals from populations of brain cells. When we get to that level we truly will be able to liberate the brain from the physical limits of our bodies. We will be able to communicate in different ways, we will be able to control devices just by thinking. The times in which we will have to exert force or our own movements to control devices probably will be gone."

In a relatively short space of time our relationship with computers has gone from huge water-cooled mainframes that required specialist operators, to far more powerful devices we carry in our pockets. The way we use our devices, and our expectations of them, is now beginning to alter their design, with the evolution of newer and more powerful interfaces. It might seem impossible to consider a computer that has no keyboard or physical means of control but, in a few years from now, it might be impossible to imagine that we ever needed them at all. ☒



# The great hard drive in the sky

Paul Lilly looks at 20 cloud-storage services to find the best tools for sharing and synching files, backing up PCs, sharing photos, listening to music and more. Introduced by Jim Martin

**T**here are more online-storage, -sharing and -backup services than you can shake a stick at these days, and it can be confusing to decide which is right for you. Fortunately, many offer a free or trial option, so you can try them before you buy.

We've split this feature into sections, comparing services that are best for photos, music, file sharing, synchronisation, backup, large files and collaboration, so you're sure to find useful information no matter what your plans.

Truth be told, you may well need to sign up for more than one service: one that's designed to hold your music collection isn't going to double as a synchronisation tool to keep your files updated across multiple computers and handheld devices.

Again, it's well worth using free trials to see what works best for you. Many of the companies mentioned here are US-based, but we've converted the monthly or yearly subscription prices into pounds so you can more easily compare everything to see which offers the best value for the amount of data you need to store.

Some services provide a fixed (and limited) amount of storage - typically a couple of gigabytes - if you're not paying, but some such as Dropbox allow you to earn more free storage through friend-referral schemes and other activities.

For file-sending services, free versions are generally time-limited, so your files are deleted after a short period of time. A particularly nifty solution if you're looking to spend as little as possible is CrashPlan. This allows you to back up your files to a friend or family member's computer (you should probably repay the favour by letting them do the same with your PC), for no cost at all.

Of course, when you do pay for cloud storage, you can expect not just extra storage space, but the guarantee that your files will remain safe from deletion and prying eyes. Plus, you don't have to worry about hard drives failing, or running or storing files on outdated media, since that's all taken care of behind the scenes.

Whatever your needs, read on and discover the right cloud-based storage and syncing service for you.



## Share and sync

The cloud delivers convenience, and nothing is more convenient than synchronising files stored on multiple computers and accessing them from any PC, smartphone or tablet with internet access. Here are our top five syncing services.



**Dropbox:** Simplicity is one of Dropbox's greatest strengths. Install the service on your PC, and it plops a virtual folder on your desktop (and in your Favorites list). The folder acts just as any other folder, except that it automatically uploads and syncs the files that you put into your online account. Changes upload in real time, so you need never worry about working with an outdated file.

With a free account you get only 2GB of storage. If you want more, you have to pony up for a paid account; prices range from \$10 (around £6) per month for 100GB to \$50 (about £31) per month for 500GB. Pester your family and friends to open accounts will earn you a 500MB bonus per referral, up to an additional 16GB.

One great feature: Dropbox keeps a history of file changes, so you can roll back to a previous version at any time. And the tech-savvy can come up with a million and one creative ways to use Dropbox.

For example, you might integrate it with a BitTorrent client to remotely download torrent files. First, set your BitTorrent client on your home PC to monitor a folder on your Dropbox account and to automatically open any torrent file copied to it. Then, while you're at work or travelling, use your remote PC to copy the torrent file to Dropbox, and your home PC will begin downloading that file the next time Dropbox syncs.

On the down side, when you share a folder you can't set a password or give some people permission to edit files while withholding permission from others. You also can't upload files to your Dropbox account via email. If neither of those limitations is a deal-breaker for you, Dropbox is a strong contender.



**SkyDrive:** Are you planning to subscribe to Microsoft's Office 365 or buy Office 2013 when the new suites are available later this year? If so, SkyDrive is the file-sharing service for you. To use it you must have a Windows Live account, and so must any colleagues you authorise to edit files (merely viewing shared documents does not require an account). SkyDrive allots 7GB of storage for free accounts, and you get 20GB more with either version of the Office suite. Even without that commitment, upgrades of 20GB to 100GB cost just \$10 (£6) to \$50 (£31) per year, not per month. That's great value.

Unfortunately, Microsoft has been paring down its service. SkyDrive's free storage quota, for example, was once 25GB (existing customers were grandfathered into the original cap if they were using more than 4GB as of 1 April 2012, or if they took advantage of a Microsoft loyalty offer, which has since expired).

The company also zapped a feature that enabled users to publish their photos to SkyDrive through email. The iOS apps pick up the slack here (although the absence of Android support is annoying), but why take away a useful feature that's already built?



**Box:** Anyone can register an account with Box and begin using it for free, but to take advantage of its robust collaboration and security features you must open a paid Business or Enterprise account, starting at \$15 (around £9) per month, per user, with a minimum of three users. Paying unlocks a truckload of enhancements, including Google Apps integration and other tools that business users will find practical. The admin console, for example, lets an IT administrator add users and manage in bulk their settings.

Personal accounts of up to 5GB are free; if you need more space, Box offers 25GB for \$10 (£6) per month and 50GB for \$20 (£12) per month - that's the lowest storage capacity to the pound among the five services in this category. With a Personal

account, you can share your files with other people, with or without giving them editing privileges, and you can restrict sharing to collaborators only. Box also provides the option of restricting file previews or downloads, but you're not allowed to set passwords or automatic expiration dates unless you have a paid account.



**SugarSync:** As sweet as its name, SugarSync is like Dropbox with extra toppings. Rather than limiting file syncing to one virtual folder, SugarSync lets you sync any folder on your PC, including your Desktop folder.

Obsessive-compulsive types will love the File Manager's ability to organise scattered files and folders from numerous synched devices into a single handy window on your desktop. You can also open a file stored on a remote PC, edit it, and save it back to that computer without consuming permanent storage space on the PC you're using.

Road warriors will appreciate SugarSync's support for all the major mobile platforms, including BlackBerry and Symbian. You'll even find a mobile app built for the Kindle Fire. And you'll rest easy knowing that your top-secret recipes and revealing photos are securely encrypted in transit and storage.

The tools for sharing files with other people are equally snazzy, although not as full-featured as what you get with Box's Business or Enterprise accounts. SugarSync lets you share folders either as albums that anyone can view and download from, or as synched folders that require a SugarSync account. If you choose the latter, you can set permissions and passwords.







**MediaFire:** Unlimited storage and downloads sound enticing, until you realise that MediaFire has little else to offer, at least

to free users. The biggest deal-breaker for MediaFire free users is that files vanish after 30 days. The \$9 (£6)-per-month Pro and \$49 (£30)-per-month Business accounts dispense with the disappearing act and hold on to files forever.

The list of negatives is long. You can't place restrictions on shared files, no mobile apps are available, files aren't encrypted in transit or storage, and MediaFire doesn't keep a history of changes. With a free account files must be less than 200MB, too.



Emailing documents back and forth or using an FTP server to collaborate on projects is slow and cumbersome. Collaborating in the cloud is fast and easy. Once you've tried it, you'll wonder how you ever managed without it.



**Google Drive:** As you might expect, the assumption behind Google Drive is that everyone lives in a Google universe. If you and your colleagues often find

yourselves knee-deep in Google Docs rather than Microsoft Word, Google Drive won't interfere with your mojo.

If the reverse is true, however, Google Drive makes collaboration difficult. Upload a Word .docx document, for instance, and the file will appear as read-only in Google Drive. To make any changes, you must convert the file to Google's document format. Now you have two versions of the same file taking up twice as much space in the cloud, and leaving everyone to wonder which file they should work on.



**Office 365:** Microsoft's Office 365 consists of web versions of Word, Excel, PowerPoint, Outlook, Lync and SharePoint. The package is aimed at businesses whose employees are accustomed to using Microsoft apps, and a subscription costs £3.90 per month, per user.

The next version of Office 365 will target consumers as well as businesses, and it will be designed to run on tablets as well as on desktop and laptop PCs. Although Microsoft has not announced pricing for the new version of Office 365, but the company has stated that a subscription to the service will include licences to install Microsoft's Office 2013 suite on up to five devices. Priced right, it could offer fabulous value.



**Zoho:** You might think of Zoho as the poor man's Office 365. The service is free for personal use, and it has all the essential web-based apps, such as a shared calendar. Its interface is straightforward, and guides introduce you to various functions, such as reverting to a previous file version. If you despise Microsoft's Ribbon, you'll find Zoho a welcome respite. Although you need a premium plan to share files with non-Zoho users, you can collaborate with

fellow Zoho account holders in real-time without spending a penny.

We aren't smitten, though. Files are encrypted only in transit, not when they are on Zoho's servers. And Zoho provides a meagre 1GB of storage; if you want more space, you must subscribe to a paid account at around £2 per user, per month (which also gives you a collection of features and administrative tools), and pay an additional £2 per month for another 5GB of storage.



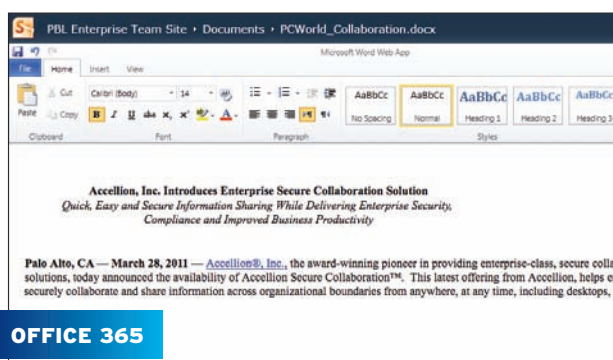
Bounced email messages, bloated inboxes, and security concerns are some of the reasons why you might not want to send blimp-size attachments. These three file-delivery services offer an alternative means of sending large files over the internet.



**RapidShare:** It's tough to overlook the elephant in the room - RapidShare is often lumped in with MegaUpload, a file-hosting service that was recently stopped for a number of alleged criminal misdeeds. RapidShare insists its business is on the level, and we have no knowledge to the contrary.

RapidShare's greatest appeal is that the service places no limit on file sizes (at least until some clown ruins the fun by trying to send a petabyte of data). The caveat for free account holders: RapidShare will delete your files after 30 days.

Free accounts have other restrictions, too. Your files aren't encrypted during transfer, the transfer speeds are slow, and the administrative tools are limited. You won't



**OFFICE 365**

have to worry about any of those issues if you pay for an account; fees range from around £3.50 to £8 per month (converted from Euro), depending on how many months you're willing to pay for up front.

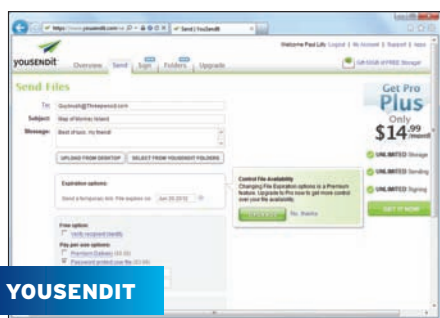


**SendSpace:** Don't need a full-featured file-sending service? Consider SendSpace. Registration is optional, as is installing the desktop software. Doing both unlocks advanced features for monitoring and editing your files. If you don't want to register for an account or install the software, just direct your browser to SendSpace's home page and start dragging-and-dropping files right inside your browser, or click the Browse button to navigate your hard drive and select the files that way.

SendSpace's free service accepts up to 20 files at a time, each of which can be as large as 300MB, and it retains each item for 30 days, provided that someone downloads them at least once during that period of time. Your attachments won't be encrypted, and the download page is littered with advertisements, but if you're just looking to send large files from point A to point B then SendSpace is a serviceable option.



**YouSendIt:** Among the file-sending services we checked out, this is the only one that comes with both a desktop app and an Outlook plug-in. Most of its best features are reserved for paying customers, though.



Penny-pinchers are limited to 50MB file transfers, 2GB of overall storage, and few extras; per-use fees apply to other features that are bundled with the paid accounts, including password protection (£2.50 per use), a 2GB file-size cap (£6 per use), and delivery receipts (£2.50 per use). All prices are converted from dollars.

YouSendIt's Pro plan (£6 per month) raises the maximum file size to 2GB, bumps up the storage cap to 5GB, and permits you to set file-expiration dates. The service's Pro Plus plan (roughly £9 per month) adds download tracking, return receipts and phone support, and it eliminates the storage cap. Under all three plans, your files will be encrypted during transit and while they reside on YouSendIt's servers.



You can lose your valuable data in plenty of ways, including hard-drive failure, theft (laptops are particularly vulnerable), and catastrophe (fire, flood or earthquake). Although the cloud can't rebuild your home or office after a disaster, it can provide a safe haven for your files.



**Mozy:** With this service, you can store up to 2GB of data on a free plan - that's enough space for 300 photos, by Mozy's estimation. Mozy also offers 50GB of storage for £5 per month (for one PC) and 125GB for £8 per month (for three PCs). Only computers running Windows or OS X need apply: Mozy doesn't support Linux machines.

Mozy's desktop application is simple to navigate. The service can back up your data by file type (videos, photos and so on), or you can drill down and select specific files and folders. You get no option, unfortunately, for backing up programs or the operating system. Another major drawback is that you must perform all backups online; you can't copy your files to an external drive and then ship your backup to Mozy. The service's biggest sin, however, is that it permanently removes deleted files after 30 days.



**CrashPlan:** Of the three online backup services we examined, CrashPlan is the only one that provides a genuinely useful free account (most users will find inadequate Mozy's 2GB of free backup space). There's a catch to CrashPlan's free offering, though: you must find family members or friends who are willing to host your backups on their PCs (CrashPlan allows you to back up to multiple destinations, including a local NAS device).

CrashPlan supports more operating systems than most other service providers, including Windows, Mac, Linux and even Solaris. Paid service plans, which let you back up to CrashPlan's servers, cost \$25 (around £15) per year for up to 10GB of backup storage and \$50 (around £31) per year for unlimited backups.

CrashPlan's main appeal lies in the degree of control it allows users to exert over their backups. With this service, you can manage everything from how often CrashPlan checks for new file versions (from once a minute to once a day) to how frequently the service purges deleted files. Power users will enjoy tweaking the software's performance settings, controlling how many CPU cycles CrashPlan consumes while the PC is idle or when you're working on other tasks, and even managing its outbound-bandwidth consumption.



**Carbonite:** Having a mirror image of your entire Windows environment (the operating system, all your programs and your data files) is great if something goes terribly wrong, and Carbonite will build such an image for you if you subscribe to its HomePlus (\$99 per year, roughly £60) or HomePremier (\$149 per year, about £90) plan and provide an external drive. Once you have that image, we recommend storing the drive offsite, with a friend or in a safe deposit box. Carbonite also offers an optional courier service with its HomePremier plan, enabling you to store your backups on an external drive at Carbonite's location (shipping charges apply).

If you'd rather stick to a more basic backup arrangement, Carbonite has a \$59 (£36)-per-year Home plan, too.

The service's tight integration with Windows is our favourite feature. For example, you can right-click any file on your machine and instruct Carbonite to back it up straight away. We also like having the ability to instruct Carbonite to take a nap during specific hours, to prevent it from hogging the internet connection at peak times. And all three Carbonite plans include unlimited storage.

## Store and share photos

Digital photography has made it possible to document nearly every event, without spending a fortune on film. But this surfeit of photos presents a challenge, too: what's the best way to share them all?



**Flickr:** You'll find a strong community on the Yahoo-owned Flickr, which is home to more than 50 million members. The user-friendly interface is easy for anyone to use, and the basic service is free, albeit with limitations.

You can upload 300MB worth of photos a month, with no photo exceeding 30MB; and you can upload two videos a month, each no longer than 90 seconds and no larger than 150MB. The Pro version has no storage limits and costs from just a pound per month if you pay for two years up front.

Flickr will compress photos only if they exceed the file-size limits; otherwise, it leaves them alone. Where Flickr feels light is in its advanced controls. It lacks a watermarking option, for instance, and you can't specify who can download your photos.



**Photobucket:** Like Flickr, Photobucket is available in free (ad-supported) and paid (no-ad) versions. The free version of Photobucket lets you upload many more images than Flickr: 10GB per month.

However, you'll also see many more ads here than on Flickr. In addition to a persistent

banner ad, most pages have at least one pop-up ad. Photobucket's Java-based bulk uploader tool conveniently recreates your system's file structure in your browser and displays only uploadable photos, but its omission of drag-and-drop support is a drag.



**SmugMug:** Providing a mind-boggling array of features, SmugMug is a serious tool for serious photographers. It's also the right choice if you like money, since it offers the potential to earn cash if you have an eye like Ansel Adams and want to sell your photos on prints, mouse pads, coasters, T-shirts, or other items. Set your price per item, or an overall profit percentage, and watch as SmugMug helps to fatten your wallet.

SmugMug also assists you in sprucing up your photos with colour effects, watermarks and basic editing tools. You can display your photo stream in many different ways, and exert fine control over who can download your snapshots and which image sizes are available to viewers. The catch: SmugMug is a subscription-only service, starting at \$40 (around £25) per year.

## Store and stream music

Online music lockers not only back up your music library, but also let you listen to it on most any device, anywhere you have internet access. All three of the services we looked at work on PCs and Macs; mobile device support is more fractured, however.



**Google Music:** This is part of Google Play, and lets you store up to 20,000 songs, with a maximum per-song file size of 250MB. Songs purchased from Google don't count against this quota, but currently Google offers no means of buying more storage.

If you rip your CDs and encode them to FLAC, OGG or AAC, Google Play's Music Manager for Windows, Mac and Linux will transcode your tracks to 320kbps MP3s (you'll get a lower bit rate with a slow



internet connection). What Google Play won't do is play nice with iOS or Windows Phone 7 devices - hardly surprising.



**iCloud**

**Apple iCloud:** Just as Google Play is all about Android, iCloud is limited to iOS. Fair enough, but many users will object to having to purchase an iTunes Match subscription (£22 per year) to sync their entire music libraries to iCloud. Without that, you can stream only the music you've bought through iTunes.

The service will stream all the tracks in your iCloud library as 256kbps AAC, regardless of how you originally encoded them (that's fine if you encoded them at a lower bit rate, but terrible if you encoded them using a lossless codec).

Although Apple gives you 5GB of storage space, everything you store in iCloud counts against that quota. An additional 10-, 20-, or 50GB costs £13, £28 or £70 per year.



**Amazon Cloud Player:** Amazon is the most agnostic music service, supporting the Kindle Fire, Android devices, iPhones and the iPod touch. Although an iPad version isn't yet available, the web interface works fine on mobile Safari (albeit without some Flash functionality). It leaves Windows Phone and BlackBerry users out in the cold, though.

Amazon customers enjoy free storage for 250 songs; you can purchase storage for 250,000 tracks for £22 per year. Songs bought through Amazon don't count against your data cap. Unfortunately, Cloud Player supports only MP3 and AAC files, leaving it up to you to convert unsupported formats. ☒



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## Tech workshops

Is your laptop starting to run more slowly than you'd like? Adding memory could help to speed it up, especially if it has less than 2GB fitted. Find out how to install extra RAM in the first of our two Troubleshooters on page 102.

Most of us keep a lot of email, but what would you do if you lost all those messages? It can be difficult, sometimes impossible, to get back the information they contained, as well as the senders' email addresses. Learn how to back up your email on page 104.

Another problem, if you have multiple computers and mobile devices, is keeping everything in sync. There are plenty of solutions in our cloud-storage feature on page 95; we also explain how to sync your contacts and calendars with Memotoo on page 114.

Keeping kids safe online should be a priority for any parent. One of the simplest ways to do this is to use OpenDNS' free FamilyShield. This filters websites and helps to prevent children from seeing inappropriate content. We show you how on page 118.

We also explain how to use the new Task Manager in Windows 8 (page 112), build your own website (page 116), and resize images for sharing via email or on the web (page 120).

## Index

|                             |     |
|-----------------------------|-----|
| Add RAM to your laptop..... | 102 |
| Back up your email.....     | 104 |
| Helproom.....               | 106 |
| Windows 8 Task Manager..... | 112 |
| Synching with Memotoo.....  | 114 |
| 1&1 MyWebsite.....          | 116 |
| OpenDNS FamilyShield.....   | 118 |
| Resize images.....          | 120 |



102



104



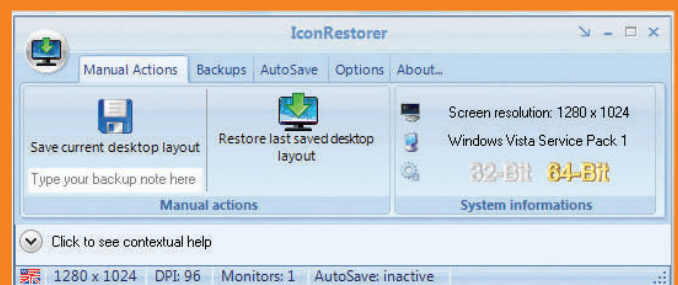
112


## QUICK TIP: SAVE AND RESTORE DESKTOP ICON LAYOUT

You probably have your Windows desktop icons exactly where you want them. Perhaps you group together applications in certain areas of the screen, or prefer a different layout. But Windows offers no way to save these positions, and connecting a second screen or changing the resolution can mess up that layout.

The solution is to use the free IconRestorer utility, available from [tinyurl.com/qmuctL](http://tinyurl.com/qmuctL). This lets you save icon layouts and even the wallpaper on multiple monitors. You can save multiple layouts for different screen resolutions, and also set the program to automatically save the layout on Windows shutdown.

If anything then changes that layout, you can easily restore it by launching the program and clicking the Restore button.



IconRestorer works in all versions of Windows from XP to 8, and also supports 64bit operating systems. 

# Add more RAM to your laptop

One of the best ways to perk up an older laptop's performance is by increasing its memory.

**Jon Jacobi** explains how to upgrade your laptop with additional RAM

**I**f you're hoping to add RAM to your laptop to increase its performance, you'll first have to check that it supports such an upgrade and, if so, how much memory you can add. Typically, your PC's Bios and motherboard dictate your memory options. Consult your user manual or the vendor's website to find out whether your model is upgradable. Also look for information on how to open your laptop and safely swap out the memory modules.

Next, you must learn how your laptop's memory is configured. For example, your laptop may have only two memory slots, each containing a 512MB module. To get to 2GB, you'd have to buy two 1GB modules.

Finally, you need to know the type of memory your laptop uses - PC133, DDR, DDR2 or DDR3 - and its speed. Your laptop's documentation should contain this information, but you can also find it on the startup screen. Press the Tab key while your system is booting to show the boot info. You can also find the memory type in the Bios, accessible by pressing Delete or F2 during the boot process.

## Should you upgrade?

If your laptop is running on no more than 512MB of RAM with Windows XP, or no more than 1GB of RAM with Vista or Windows 7, you should upgrade. You'll see a significant boost in system performance after upgrading the laptop to 2GB with XP or Vista, or to 4GB with Windows 7: menus will display quicker, windows will open faster, and your overall computing will be smoother.

Note that 32bit versions of Windows can't address more than about 3.2GB of memory, so any more than this will be wasted.

## Tools for the job

Assemble your tools. Get a swappable-head screwdriver (or a set) with a variety of slot, Phillips and Torx heads. Spudgers, plastic tools made to pry open pressure-fit parts, help you separate a laptop's top and bottom, and remove and add memory modules. They're also great for separating cables from the PC's motherboard, as they provide



insulation against static electricity. Thin-nose angled tweezers help in removing screws from deep wells, and a magnifying glass is handy for examining small connectors.

## Replace the memory

Never touch memory modules by their gold-plated edge connector. Any stray voltage (such as static electricity) can damage the memory. Always handle the modules by the sides, and wear a grounding (earthing) strap if you have one.

The smaller SODIMM memory modules that laptops use are normally held in place by two spring-loaded retaining clips, one on each side. To remove a SODIMM, you must gently pry back to the side the clips with a finger or a small tool, preferably the aforementioned spudger.

For spring-loaded slots, pry back one spring at a time until that side of the module pops up slightly and the spring is no longer able to seat properly. Then slide the module backward to remove it (2).

Inserting a module is even simpler. With the module tilted up at a slight angle, slide it into the SODIMM slot (3), then press down on the top/back of the module (4); it should click into place. Another frame or cover may mount over SODIMM slots to hold the

memory in place; you should have no trouble removing the screws that cover them.

Laptop designs vary, so the technique outlined here may not work in all cases. Accessing the memory on your laptop is usually a matter of unscrewing a panel on the bottom of the unit (1). But the task can also involve removing the keyboard, or even disassembling the unit.

If you're lucky you'll just have to remove a panel on the bottom, but removing the keyboard isn't terribly challenging in most cases. Commonly, you need to take off the top panel of the upper deck between the keyboard and the display, or remove the entire keyboard deck by undoing the screws on the bottom of the laptop. If you must take away the entire keyboard deck, you'll have to remove the screws from the bottom of the machine or (on some thin-and-light laptops) use the spudger along the seam between the case's top and bottom.

The keyboard should now effortlessly slide up and out; if it doesn't, you'll have to remove a few more screws. The keyboard is connected to the motherboard by a ribbon cable. Usually you can lift the keyboard up and out the way without disconnecting the ribbon cable. If you do need to remove the keyboard entirely, you'll have to unlatch a



clamp on the back of the motherboard's keyboard connector; flip the latch up to release the cable. You may also need to remove an RF shield, typically by undoing more screws, although you may also find items taped to the shield. Peel back the tape and use low-adhesive material to protect the sticky side of the tape if available.

At this point, you should see the exposed memory slots. Replace the SODIMM modules using the procedures described earlier.

Regrettably, some vendors still sell laptops with memory slots on the bottom of the motherboard, but with no access panel. Faced with this design, you must disassemble practically the entire laptop to access them.

However, it's not rocket science, and you can find demonstration videos on the web. These are basic steps of the process:

Flip over the laptop over and unfasten the screws holding the keyboard deck in place. Remove the keyboard deck. This may require sliding a spudger along the seam between the lower portion of the case and

the keyboard deck to release the snaps connecting the two sections. Some modern units are sealed, so don't assume that there's an easy way in. If you discover that your laptop maker used hot glue to hold things together, you might want to farm out this chore - it's easy to mess things up with heat.

Remove the keyboard and other components that prevent you from dislodging the motherboard. This involves taking out the screws used to secure hard drives, modems, Wi-Fi modules and other components, as well as detaching clamped ribbon cables, regular cables or antennae that have pressure-fit connectors. You'll probably also have to remove metal RF shields. Be gentle.

Freeing the motherboard so that you can flip it over and access the memory slots usually involves no more than removing a few screws. The ports integrated on to the motherboard protrude from the case, however, so you may need to jockey the board somewhat as you pull it out.

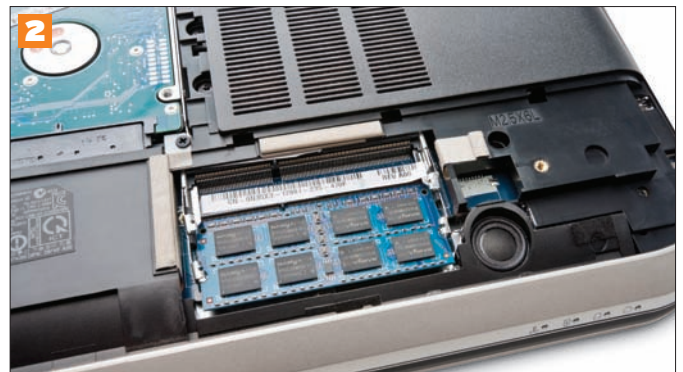
### Disassembly hazards

The number-one rule for successfully disassembling a laptop or other device is this: do not force anything. If you have to exert more than modest pressure to remove or separate parts, a hidden screw or fastener is probably the cause. If you see a plastic part bending, immediately stop and look for the hidden fastener. Push things too far and they will break.

Many types of cables run between various components, so carefully examine any component that you're separating to see if it has attached cables before yanking it out.

To remove ribbon cables, flip up a tab or latch at the back of the slot where the cable terminates. Wire and antenna connectors usually end in pressure-fit connectors that you'll have to pry loose.

Ultimately, if you have the proper documentation, proceed patiently, don't force things, and keep all parts organised, you should be able to successfully upgrade your laptop's memory. ☒



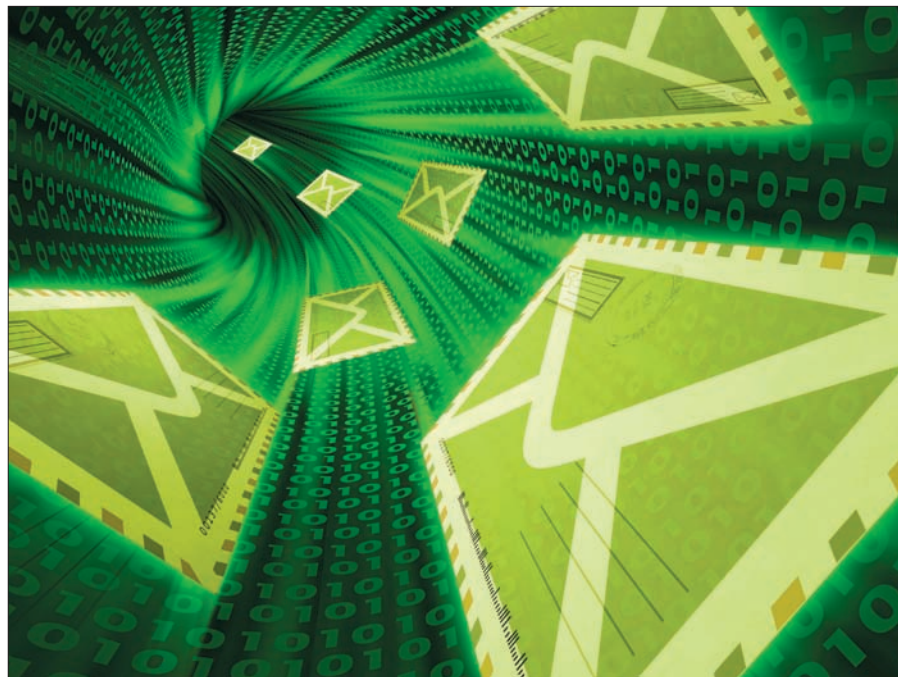
# Back up your email

Email is too valuable to lose, so you should ensure it is backed up.  
**Roland Waddilove** outlines the methods involved

**I**t's difficult to imagine being without email: it's embedded into our work and personal lives. Everything from gas bills to shopping receipts and business matters are sent via email. There are likely to be messages dating back years in your inbox, which contain important information such as login details for websites, contacts, business information and so on. If losing this information is a frightening thought, it's essential that you back up your email. You may never need the backup, but you will be glad you have it should disaster strike.

Email can be placed into one of two categories according to where it is stored: either on- or offline. Examples of online email include Gmail, Yahoo Mail and Outlook (the new name for Hotmail). Conveniently, messages stored online can be accessed via a web browser on any computer, tablet or smartphone. But there are no guarantees from webmail providers that they won't lose your messages, nor that your account won't be hacked or access to it removed.

Offline email, by comparison, is accessible through desktop software such as Outlook Express, Windows Mail, Outlook, Windows Live Mail and Thunderbird. All these programs connect to an email server on the internet and, depending on your preferences, may download your messages to a local hard disk. A disadvantage is that your email is stored only on the computer with the email



software. Suppose you buy a new computer or replace a faulty hard disk, how do you transfer your email to it? Fortunately, email stored on the hard disk is easy to back up and move from one computer to another.

## Traditional email clients

Backing up email is straightforward in Outlook Express, Windows Mail, Outlook, Windows Live Mail and Thunderbird. First, you'll need to find out where on your hard

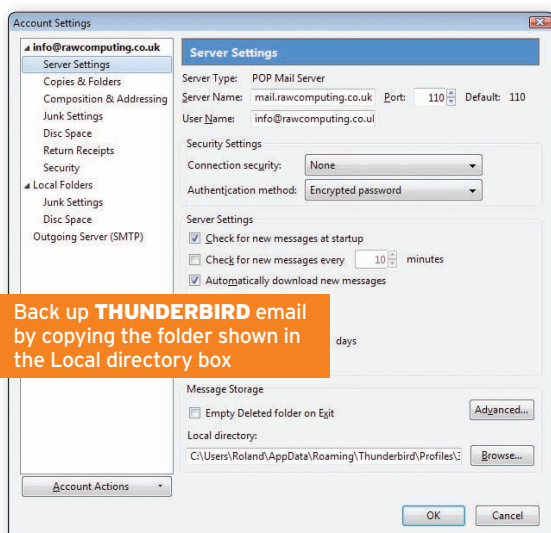
disk the program stores files, and then you can simply copy the existing messages to a USB or flash memory drive, or even to another computer or NAS across a home network. To access these messages on a new computer, you'll simply need to store them in the same location on the hard disk.

Start Outlook Express or Windows Mail and go to Tools, Options. Select the Advanced tab, then click the Maintenance button. Click the Store Folder button to see where the program saves email messages.

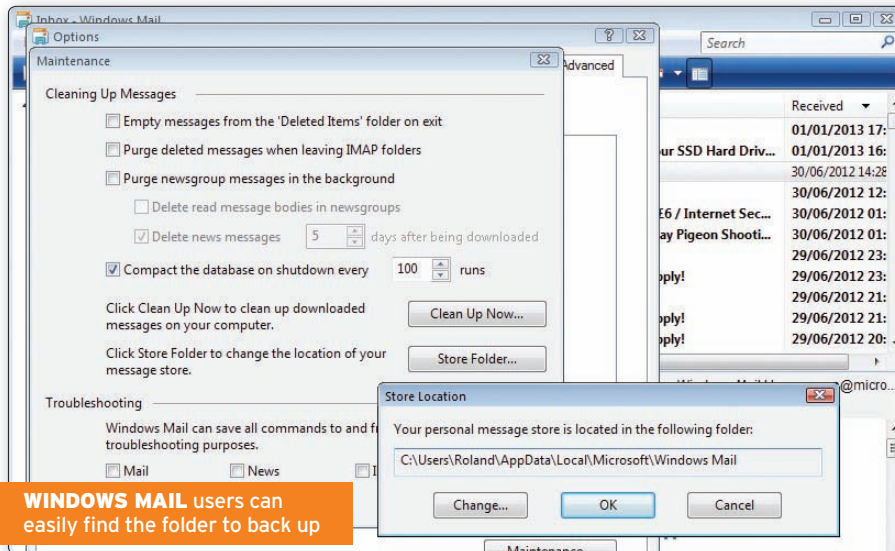
Windows Mail, for example, typically uses C:\Users\<YourName>\AppData\Local\Microsoft\Windows Mail. The process is similar in Windows Live Mail: go to File, Mail, Advanced, Maintenance, Store Folder. In each case you simply copy the folder to make a backup. Should you ever need to restore mail from this backup, you just copy the files to their original location.

Outlook is slightly different, since it stores information in .pst files. All versions of the software use this file extension, but the location in which they save the messages differs. Open Outlook and right-click your email account in the left pane, then select 'Data File Properties'. Click Advanced to see the filename. Only the .pst file is essential, but copying the entire folder allows you to also back up settings and preferences. To restore from your backup you can simply copy it to its original location, or click File, Open, 'Open Outlook Data File'. Outlook can work with any .pst file stored anywhere.

It's a similar process with Mozilla Thunderbird. Right-click your email account in the left pane, then choose Settings. Select Server Settings on the left, then look in the Local directory field for something along







the lines of C:\Users \<YourName>\AppData\Roaming\Thunderbird\Profiles\3hkn128w.default\Mail\your.mail.com.

All these mail locations are stored in hidden folders, so you won't be able to see them in Windows Explorer. To view them, open Control panel and choose Folder Options, then select the View tab and enable 'Show hidden files, folders and drives'.

### Back up your webmail

Gmail, Yahoo Mail and Hotmail/Outlook do not contain any backup facilities. However, all three services are accessible using traditional email clients. Programs such as Outlook, Thunderbird and Windows Live Mail (the latter two are free) can download email from these services and store it on your hard drive.

It's possible to simultaneously store your email on the web and a hard disk, making the local copy your backup and using the online version as normal. There are a few things to watch out for, though, and the process isn't as straightforward as you might expect.

**Gmail:** In Gmail click the gear icon and choose Settings. Select 'Forwarding and POP/IMAP', then enable both POP and IMAP. Set 'When messages are accessed with POP' to 'Keep Gmail's copy in the inbox'. This prevents the email software deleting

messages from the server when it downloads them to the PC. The idea is to copy messages rather than move them to the PC's disk.

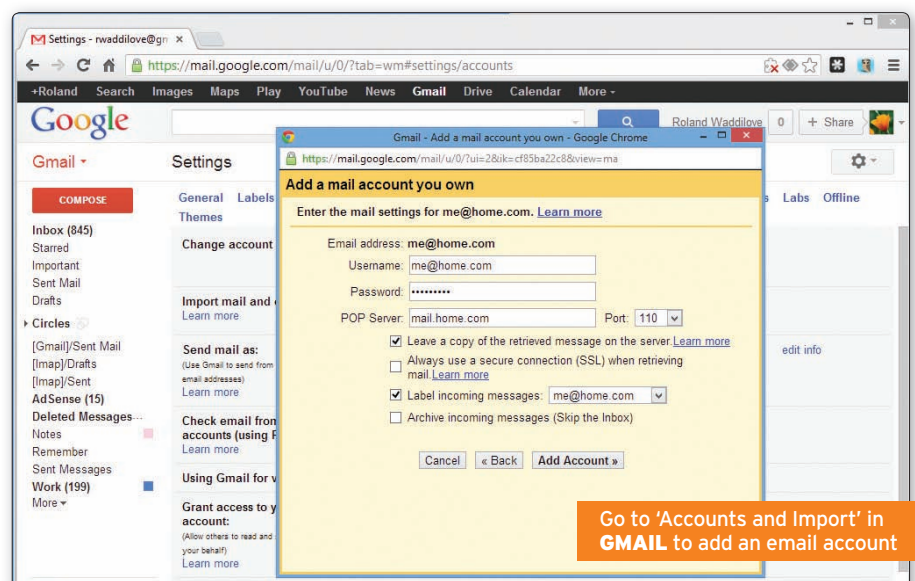
At the bottom of the page are instructions for setting up Thunderbird and Outlook. You won't need these: modern email software knows which settings are required for Google, Yahoo and Hotmail/Outlook. An email address and password is sufficient for setup.

**Hotmail/Outlook and Yahoo:** In Hotmail/Outlook click the gear icon at the top right, then choose 'More Email Settings', 'POP

and deleting downloaded messages'. Select 'Don't let another program delete messages from Outlook'. Yahoo doesn't have this option, but it can be configured within your desktop email client. In Thunderbird, for example, right-click the email account in the left pane and select Settings, Server Settings. Enable 'Leave messages on server'. You can now run your desktop email client whenever you want to make a backup, and it will copy and save to disk all your messages.

There are alternative ways of backing up Gmail, Yahoo Mail and Outlook. Go to the settings in each service, select the mail forwarding option and enter an email address. When an email arrives a copy is automatically forwarded to the specified email account. So, if you have Gmail for example, you could set a Yahoo Mail account as the forwarding address. Yahoo Mail then becomes your Google Mail backup, or vice versa. Old messages won't be copied across, but any new ones will.

Another option is to use Gmail as a backup for your email. In Settings, 'Accounts and Import' there is an option to add a POP3 email account. Add your email account and Gmail will copy every message you receive. Don't forget to tick the option to leave a copy of emails on the server or Gmail will delete them after copying them. ☒







## YOUR QUESTIONS ANSWERED

# Expert computing advice

We tackle readers' hardware and software conundrums

### ANDROID APPS IN WINDOWS

**Q** I use WhatsApp on my Android smartphone to chat with my friends. Is there any way to use WhatsApp on a desktop PC running Windows 7?

WhatsApp is a very popular messaging app for smartphones, with versions available for Android, Blackberry, iOS, Symbian and Windows Phone. Notably absent are versions for desktop operating systems such as Windows and OS X.

However, you can run many Android apps, including WhatsApp, on your desktop by installing the BlueStacks App Player. This creates an environment in which Android apps can operate. It's still in beta, so there are issues that still need to be ironed out, but it works well enough for apps such as WhatsApp, and even some games are playable if your PC or Mac is fast enough.

You can download BlueStacks from [bluestacks.com](http://bluestacks.com), and then download WhatsApp from [whatsapp.com/android](http://whatsapp.com/android).

When you install WhatsApp it will perform the usual verification process. It requires your phone number so it can send a text containing your security number. The app will spend a few minutes attempting to automatically detect this SMS message before failing, at which point you can manually enter the code.

If you attempt to use WhatsApp with the same phone number on both your PC and phone, your phone will become unverified. This is because you can have a WhatsApp



ANDROID APPS  
IN WINDOWS

account only on a single device. If you want to use WhatsApp on your phone and PC, you will need to have separate accounts on each. You can do this by using a different phone number to register WhatsApp on your PC. This can be a landline number if you wish; the SMS message containing the security number will be delivered as a voice message.

WhatsApp should now work on the PC, but none of your contacts will be loaded. The simplest way to rectify this is to download a VCF file containing your contacts from [mail.google.com](http://mail.google.com). BlueStacks will automatically import this file.

### EDITING IN SKYPE

**Q** I was typing in a message to a friend on Skype, and noticed that some of his earlier messages had changed. How is it possible to change messages that have already been sent?

Unlike most other instant-messaging systems, Skype allows you to edit previous messages and even remove them altogether. This will edit the saved message history and also change what appears on the recipient's screen.

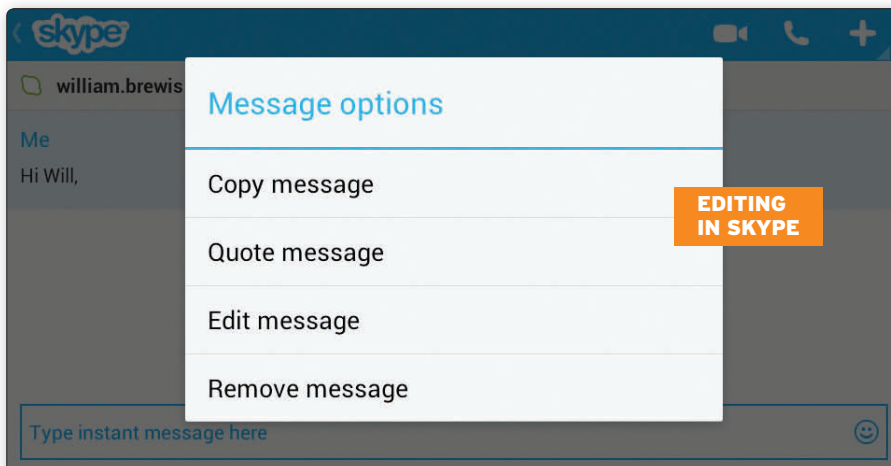
We can't see a great deal of use for the facility, but if you're embarrassed by a spelling mistake or you've said something you later regret, you can go back and change it. Perhaps it could save you some embarrassment if you have one of those 'whoops, wrong window' moments, but only if you catch it before the message is read.

To edit a previously typed message, just right-click (or tap and hold in the app) and select Remove Message to delete it, or Edit Message to change it. The recipient will be alerted to the change, either by a pencil icon next to the altered message or a dustbin icon and the comment 'This message has been removed'.

### WHICH MONITOR?

**Q** I'm looking to upgrade my monitor with a larger model. I'm interested in playing Skyrim. Could you tell me whether this game would support a 24- or 27in screen at a decent resolution. I have a Radeon HD 6970 graphics card, and around £200 to spend.

Your Radeon HD 6970 will be fine for playing Skyrim. You will have to adjust the quality and resolution settings to achieve the best compromise between image quality and smooth gameplay, but you should be able to achieve a very satisfactory result.



EDITING  
IN SKYPE

## Tech Help

It's important to point out that the graphics card doesn't determine the maximum physical size of your monitor. You could easily hook up a 30in monitor, a 60in TV or a projected display as big as a house. What matters is the resolution in pixels. This is largely independent of the physical size of the monitor, although some of the very highest resolutions are available only on larger displays.

For example, if you play at a standard resolution of 1920x1080 pixels, you'll find monitors ranging from 21.5- up to 27in that match this number of pixels. Of course, many larger TVs (and projectors) also use the same 1080p resolution.

If you use a dual-link DVI connection, the maximum resolution supported by the Radon HD 6970 will be 2560x1600 pixels for a single monitor. This resolution is usually found only on 30in displays, although a slightly lower resolution of 2560x1440 is often found on more expensive 27in models.

There are, however, less expensive 27in options, which use the 1920x1080



resolution. One of these would make an excellent choice for Skyrim. Take a look at BenQ's GW2750HM, which we've reviewed at [tinyurl.com/bqkt65s](http://tinyurl.com/bqkt65s).

This 27in display has a high-quality vertical alignment (VA) panel and comes in below your £200 budget. Skyrim will look beautiful on this display, but you may prefer a twisted-nematic (TN) screen with a faster response time if you also play action games. TN offers sharper moving images with less blur, but VA has wider viewing angles.

### IE 8.0 IN WINDOWS 8

**Q** I need to access a website using Internet Explorer 8.0, but since upgrading to Windows 8 I now have Internet Explorer 10.0. How can I use Internet Explorer 8.0 with Windows 8?

Internet Explorer 10.0 has some hidden developer options that let you select various compatibility modes for previous versions of Internet Explorer.

Open Internet Explorer in desktop mode and press F12 to bring up the Developer Tools at the bottom of the page.

In the Developer Tools menu bar you will find entries marked Browser Mode and Document Mode. Click Browser Mode to select a previous version of the browser, then do the same with Document Mode.

Alternatively, you could use virtualisation software, such as VMware, VirtualBox or, if you're running Windows 8 Pro, the built-in Hyper-X, to run a previous version of Windows with Internet Explorer 8.0 installed. Note that this will require a licence for each virtual Windows installation.

## HOW TO BOOT WINDOWS 8 IN SAFE MODE

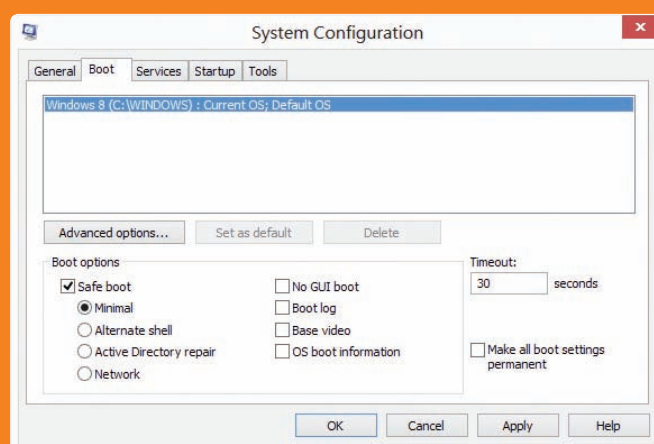
Anyone used to troubleshooting previous versions of Windows will be familiar with the Safe mode boot option. It's often the only way to coax Windows into booting when there are errors preventing a normal startup.

However, with Windows 8, the usual method of pressing F8 during bootup doesn't allow access to the same options. Some pre-release versions of Windows 8 replaced the F8 keystroke with Shift, F8, but now even this option won't work.

Windows 8 monitors the startup procedure and when problems are detected it automatically takes you to the new recovery mode. At this point you will be presented with the message: 'Recovery. It looks like Windows didn't load correctly'.

Select the advanced repair options and choose Troubleshoot, Advanced options, 'Windows Startup Settings', Restart. Your computer will boot into an 'Advanced Boot Options' screen in which Safe mode can be selected.

If you're able to boot Windows normally, but still need to enter Safe mode, you can skip this rather convoluted process by going to the Start screen and typing `msconfig`. Launch System Configuration from the list of search results, then select its Boot



tab. On this screen (pictured above), you can check a box to enable Safe boot, with various different types of Safe mode available below. Click Ok, then click Restart to boot your computer into Safe mode.

## MEDIA PLAYBACK VIA HDMI

**Q** I have a TV that can record programmes on to a USB flash drive. My other TV doesn't have a USB port, but it does have several HDMI ports. Can I purchase an adaptor that plugs into an HDMI port, allowing me to watch programmes recorded by the other TV?

We understand what you're trying to do here and it may be possible, although not in the way you describe. Many TVs that record to USB drives encrypt those recordings to prevent them being transferred to a computer and distributed. You will have to check whether this is the case with your TV.

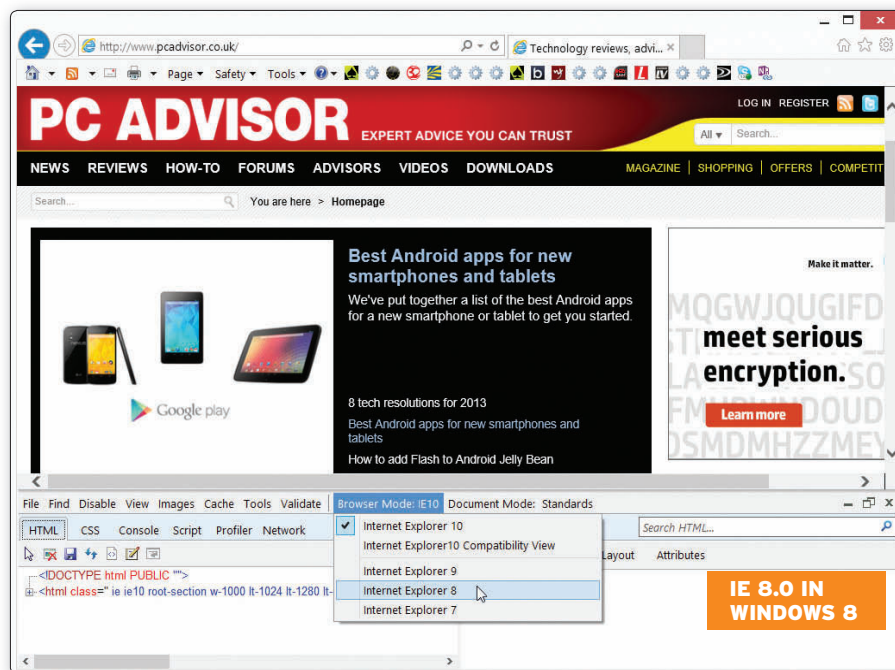
Although HDMI ports are designed to transfer digital audio and video, they're not able to transfer files. You can connect an HDMI port only to another HDMI port or, using an adaptor, another type of digital-video connector (such as DVI).

This means you can't connect a storage device such as a USB flash drive to an HDMI port and expect it to read the data stored on it. To play back the files you will need a device that can read the contents of the USB drive, decode the information and output the audio and video content via an HDMI port, which you can then connect to your second TV using an HDMI cable.

Thankfully, these devices can be cheap, depending on your requirements. For standard-definition programmes you can pick up a device that is bundled with a remote control for around £20. If you want to play HD content, though, you'll need to spend a little more, and advanced features such as internal storage and internet connectivity will cost more still.

Many Blu-ray players support playback from flash memory devices in addition to playing DVDs and Blu-ray discs. The Sony BDP-S790 is one such model; check out our review at [tinyurl.com/b4sojo5](http://tinyurl.com/b4sojo5).

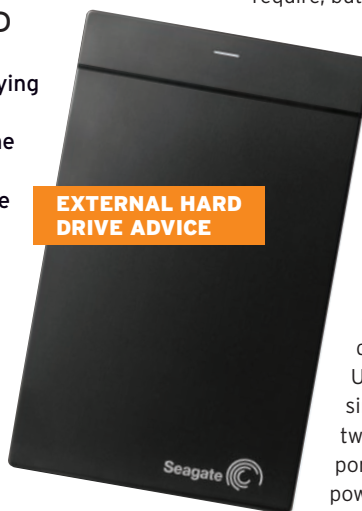
Be sure to check that the specific file format used by your TV is supported by the playback device you choose. We don't know



the model numbers of your equipment, so you'll have to check the specs yourself.

## EXTERNAL HARD DRIVE ADVICE

**Q** I will soon be buying an external hard drive and I need some advice. I rather like the idea of a portable USB-powered unit, but are these as efficient as a mains-powered unit? It will be used only to store my photos and music, so it won't be in continuous use.



External hard drives are a great idea, both for essential backups and to expand the total amount of storage available to you.

The type of drive you need will to some extent depend on how much storage you require, but also whether you need a

high-speed external drive.

USB-powered drives are convenient as they don't require an external power supply - you can use them on the fly when connected to a laptop.

A disadvantage of USB-powered devices is that some PC USB ports don't deliver enough power to operate the drive. Some will come with a USB Y-cable, which allows you to simultaneously plug the drive into two USB ports. It will use only one port to transfer data, but both for power. This is a problem only if you don't have two spare USB ports.

If your PC has a USB 3.0 port (or you will be upgrading it any time soon), you might like to buy a faster USB 3.0 drive. A single USB 3.0 port will likely have enough power to operate the drive, but keep in mind that you may run into power issues if you ever need to connect the drive to a system that has only USB 2.0 ports.

Many USB-powered hard drives can be used with an external power supply, which is usually purchased separately. Sometimes,



MEDIA PLAYBACK VIA HDMI



if your drive is of the type with twin USB connections, you can hook up the one designated for auxiliary power to a USB phone charger.

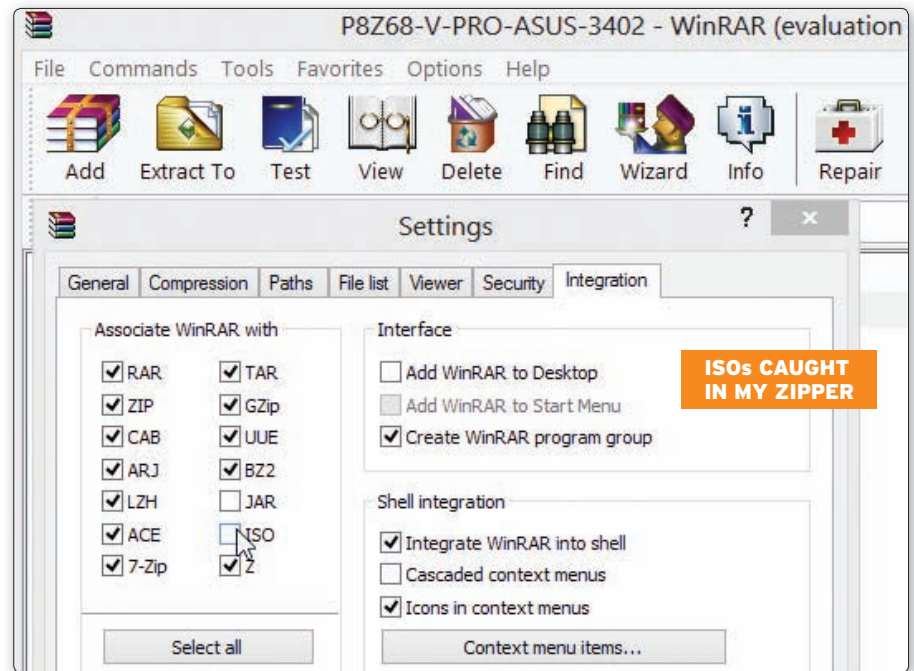
Going for USB 3.0 also makes sense because it can achieve much faster transfer speeds than USB 2.0. Even if you don't have any USB 3.0 ports on your PC now, you're likely to have them on your next system.

For maximum portability you can go for a drive with a 2.5in laptop hard disk inside, but if you need to store more than a terabyte of data you'll have to go for a larger desktop model with one or more 3.5in disks. Apart from being larger and heavier, these drives will almost certainly require an external power supply.

The USB interface is often the limiting factor in terms of performance - unless you go for an SSD, which will be faster, but more expensive and with reduced capacity.

## ISOs CAUGHT IN MY ZIPPER

**Q** When I try to download an ISO file, WinRAR pops up and turns it into a compressed .RAR file. My disc-burning software, Ashampoo 11.0, can't read this file type. I've managed to successfully burn the disc by first uninstalling WinRAR, but I don't want to have to do this every time I need to burn a disc. Is there an easier way to stop this behaviour?



By default WinRAR associates itself with ISO files because it is able to handle them in a similar way to other compressed data, such as ZIP and RAR files. Sometimes you might want to access individual files within an ISO, which WinRAR allows you to do.

To prevent WinRAR automatically taking control of ISO files, open WinRAR and choose Options, Settings and select the

Integration tab. Uncheck ISO in the section marked 'Associate WinRAR with'.

Alternatively, right-click an ISO file in Windows Explorer and choose Open with. Selecting 'Choose Default Program' lets you specify which program should handle the ISO file when double-clicked. Select Ashampoo 11.0, then make sure 'Use this application for all .iso files' is enabled.

## TECH JARGON BUSTER

**ZERO-DAY BUG:** A security vulnerability for which no fix or patch is available. Developers of the affected program have zero days to produce a patch before malicious exploitation of the bug can occur. The term could also be used to refer to a zero-day virus, which is a piece of malware that currently cannot be removed by security software.

**IPS:** An in-plane switching (IPS) display is a type of LCD panel used in the manufacture of monitors, phones and tablets, among other devices. It differs from less-expensive technologies, such as twisted nematic (TN), in that it offers better colour reproduction across wider

viewing angles. However, some TN panels can offer faster response times, which are favoured by gamers who want blur-free high-speed action. Other technologies include PLS, from Samsung, and vertical alignment (VA).

**Hyper-V:** A virtualisation technology created by Microsoft. It allows the creation of virtual PCs, which can concurrently run multiple operating systems on a single PC. It is available as a free download, and a version of the software is also included in Windows 8 Pro. Unlike popular applications such as VMware and VirtualBox, Hyper-V interfaces directly with the hardware rather than

the operating system, giving it several performance advantages. However, it cannot be enabled at the same time as running either of those other virtualisation applications.

**Snapchat (and Facebook Poke):** Snapchat is a multimedia messaging app for iOS and Android devices. It lets you chat via text messages, and send pictures and video clips. The key feature of Snapchat is that content can be set to self-destruct after a pre-determined period of time, at which point they will be deleted from the recipient's device. Facebook Poke is a similar app from the makers of Facebook, currently available only for iOS.

## SLOW STARTUPS

| Task Manager  |                          |         |                 |  |
|---|--------------------------|---------|-----------------|--|
| File Options View   |                          |         |                 |  |
| Processes Performance App history Start-up Users Details Services |                          |         |                 |  |
| Name  | Publisher                | Status  | Start-up impact |  |
| AVG User Interface (2)  | AVG Technologies CZ, ... | Enabled | High            |  |
| Catalyst® Control Center L...                                     | Advanced Micro Devic...  | Enabled | High            |  |
| Acronis True Image Monitor  | Acronis                  | Enabled | High            |  |
| Delayed launcher (2)  | Intel Corporation        | Enabled | High            |  |
| Acronis TIB Monitor   | Acronis                  | Enabled | High            |  |
| Sticky Notes  | Microsoft Corporation    | Enabled | High            |  |
| Windows Desktop Gadgets   | Microsoft Corporation    | Enabled | High            |  |
| SpyderUtility 1.2.3   |                          | Enabled | High            |  |
| Facebook Messenger  | Facebook                 | Enabled | High            |  |
| Dropbox   | Dropbox, Inc.            | Enabled | High            |  |
| BlueStacks Agent (13)   | BlueStack Systems, Inc.  | Enabled | Medium          |  |
| Kies TrayAgent Application  | Samsung Electronics C... | Enabled | Medium          |  |
| Status Monitor for KODAK ...                                      | Eastman Kodak Compa...   | Enabled | Medium          |  |

## SLOW STARTUPS

**Q** My Windows 8 PC seems to be taking longer to start up than when it was new. I haven't changed any Bios settings. Is there anything I can do to find out what's causing the slowdown?

A quick and easy first step would be to open the Task Manager and take a look at the new Start-up tab. To launch Task Manager, hold down the Windows Key and press X, then select Task Manager from the pop-up menu.

Select the Start-up tab and look at the Start-up impact column. Here, each item is graded according to its impact on your

system startup time - either Low, Medium or High. Re-order the entries to display high-impact services by clicking the Start-up impact column heading.

If anything is shown in this list that doesn't need to launch at system startup, it will be slowing down your PC. Right-click the entry and, from the context menu, either disable this behaviour, browse to the folder on your hard drive in which the application is stored, or perform a quick search online to help you decide whether it needs to run at system startup.

Turn over for more advice on using the new Task Manager in Windows 8. ☒

For more PC help go to:  
[pcadvisor.co.uk/helproom](http://pcadvisor.co.uk/helproom)



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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.

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# Using Windows 8's Task Manager



The Task Manager has been overhauled in Windows 8. It's now much easier to understand and has new features. Jim Martin outlines the changes



Many people focus on Windows 8's Start screen and Modern UI, but the 'old' Windows is still very much present beneath the shiny new surface. Here we take an in-depth look at the revamped Task Manager.

Task Manager has been around since Windows 95, and has barely changed in almost two decades. Chances are you've used Task Manager for a spot of troubleshooting or to force applications to close when they've crashed.

In all likelihood, there's an equal chance you've never used Task Manager, or even heard of it. In Windows 8, the humble Task Manager has been given a makeover, which makes it considerably more user-friendly, while a couple of new features make it especially useful on mobile and other devices with a metered internet connection.

As well as providing a list of running programs and processes, it lets you keep an eye on performance. You can monitor how hard the CPU is working, how much memory is being used and how much data is flowing over wired and wireless network connections.

There are several ways to launch Task Manager. The easiest is to press Ctrl, Shift, Esc together; you can also press Ctrl, Alt, Del and choose it from the list. Another way to bring up the Task Manager is to start typing task in the Start screen, and the shortcut will appear in search results.

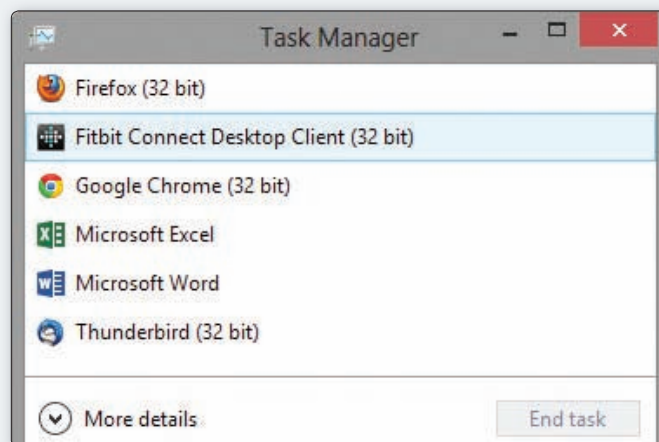
Running applications have been split into apps, background processes and Windows processes. This makes it easier to find what you're looking for than did the alphabetical list of old.

Information associated with each app or process has also been simplified and colour-coded, letting you tell at a glance which programs or apps are hogging resources. Darker shades quickly alert you to problems.

You can still re-order the list by clicking the tabs at the top of the Task Manager. Click on Memory, for example, and the apps using the most RAM top the list.

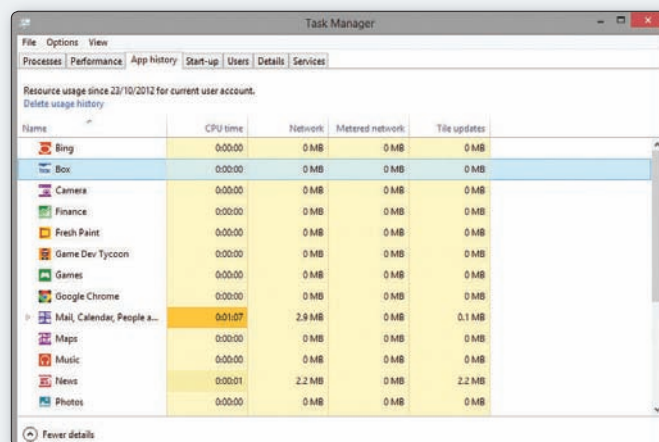
The Performance tab has been tweaked, now offering five graphs, including Wi-Fi. Extra information is given below each graph, such as how fast the CPU is running.

## USING TASK MANAGER IN WINDOWS 8



**START**

From the Windows 8 Start screen start typing **task**, then click the Task Manager when it appears in the results. In desktop mode you can right-click the taskbar and choose Task Manager. Scroll and select an app, then click End task to close it.



**4**

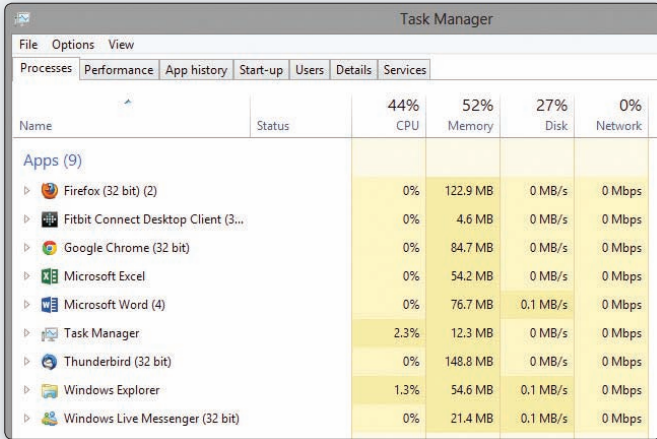
The App history tab is new, revealing Modern UI apps activity only. The information shown is cumulative, and you can see how much data each app has used. This is useful if you're using cellular data with a Windows 8 tablet and have a limited data allowance.

## CUSTOMISE TASK MANAGER

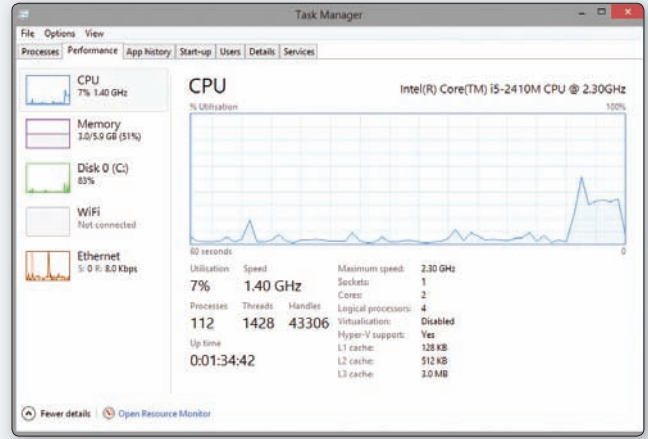
Task Manager's Processes tab shows CPU, Memory, Disk and Network by default. Above these headings are percentages, so you can see at a glance whether any is maxed out. It isn't obvious, but you can also right-click on any of these values to display a list of extra attributes that you might want to monitor.

Tick Command line, for example, and you'll be able to see where the app or process is located on your hard disk.

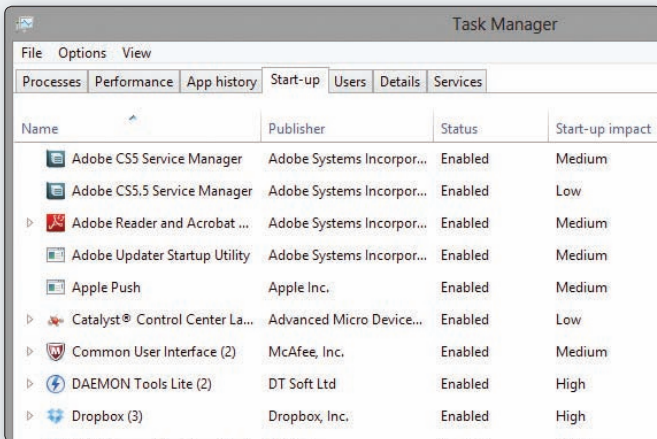
At the bottom of the same menu is Resource values. Hover over this and a sub-menu will appear with Memory, Disk and Network. For each, you can choose whether to show percentages or values.



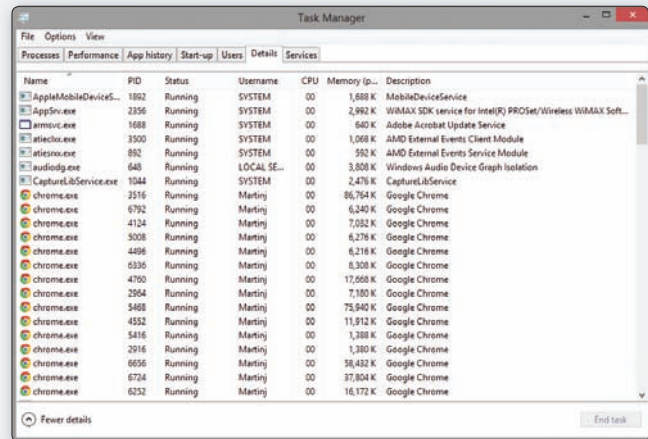
**2** Click More details to expand the view and see everything Task Manager has to offer. Apps are listed in alphabetical order, with their usage to the right. At the top of each column you can see how much of your CPU, memory, disk or network bandwidth is being used.




**3** Click the Performance tab to see usage of these resources over time. Leave open Task Manager to let the data build up, and click the thumbnails on the left to toggle between graphs. Information such as the CPU speed and IP address is shown below.



**5** Also new is the Start-up tab, which reveals how much each program impacts startup time. It's a better system than the old method of running msconfig and disabling often difficult-to-identify apps. Right-click an item and disable it to speed up boot time.

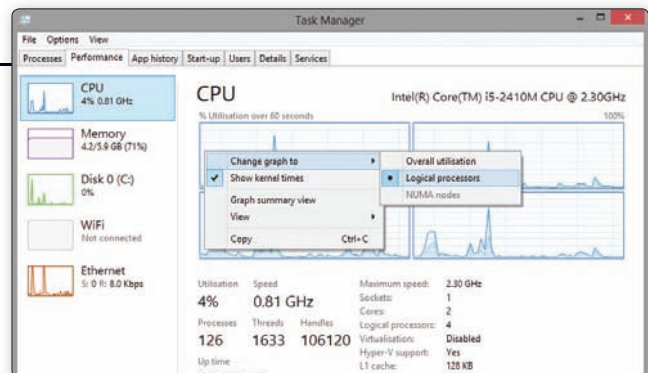


**6** Click the Details tab to view information on processes. Right-click any column heading to either hide or select extra information to display. Left-clicking a column heading orders the processes by that attribute. 

By default these are all set to values, but it can be easier to understand the figures when they're displayed as percentages.

## Performance

The CPU graph on the Performance tab can be customised by right-clicking it and choosing a different view. By default you no longer see how hard each processor core is working, but you can load a graph for each core by choosing 'Change graph to Logical processors' from the right-click menu. Double-click a graph to toggle between normal and compact graph view modes.



# Sync your calendar and contacts across devices



Roland Waddilove explains how to synchronise your contacts and calendar information across computers, tablets and smartphones using Memotoo



With a computer at home and in the office, a tablet in the hand and a smartphone in the pocket, many of us are increasingly using multiple devices to get things done. Keeping your contact and calendar information in sync across these devices can quickly become a chore, and you'll likely end up with contacts on your phone that you can't access on your computer, and calendar events on your tablet that aren't on your phone. It's all very frustrating.

A number of solutions are available, many of which involve signing up to an online service and utilising mobile apps or tweaking settings on your devices. Here we take a look at one such service, Memotoo. It's relatively easy to use, and a free version makes it possible to see whether Memotoo meets your needs without committing to a subscription.

Three versions exist: Memotoo Free, Premium and Business. The primary difference between Free and Premium is the number of items you can sync - the Free account is limited to 100 bookmarks, 50 contacts,

50 calendar events and 50 tasks, whereas Premium is unlimited. The Business version adds multiple account management. If you like the Free version, the Premium package won't break the bank at less than a pound a month.

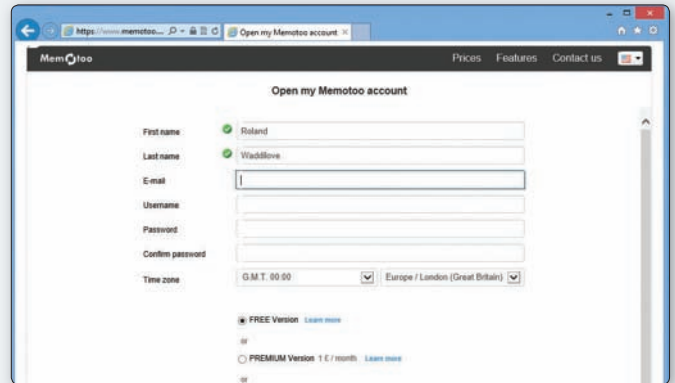
To get started with Memotoo you'll need to sign up online for a free account, which can be upgraded to Premium at any time. You'll be allocated a contact manager, calendar and bookmarks, to which you simply add the services you want to sync, such as Facebook, Twitter, Gmail, AOL, LinkedIn, Windows Phone 8, Outlook, Thunderbird and so on. You provide your login credentials and Memotoo does the rest.

Memotoo provides a mobile app for Android tablets and smartphones, or you can configure sync services with the iPad and iPhone.

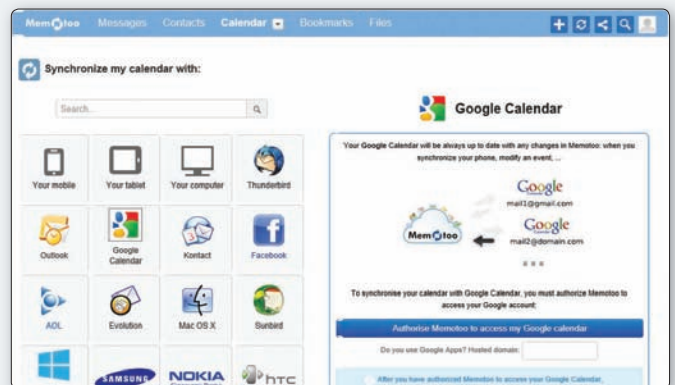
Having done your prep work, Memotoo will continue to keep your computers, tablet and phone in sync, without requiring further input from you. Make a change on one device and it will appear on them all.

Here, we show you how to get started with Memotoo.

## SET UP SYNCHING WITH MEMOTOO



**START** Head to memotoo.com and click the Sign Up button on the home page. Fill in the form with your details and select the version you want to use - the Free one is ideal for a trial run. Click the Sign Up button at the bottom of the page to continue.



**4** Next, click Calendar at the top of the page and choose 'Synchronise my calendar' from the drop-down menu. Memotoo lists the supported services; simply click one to add it, and repeat the process for each service you want to sync.



**7** You'll need to configure your tablet and/or mobile phone. For Android a free app is available. In iOS go to Settings, Mail, Contacts, Calendars. Select Add account, then choose Other, Add CardDAV Account (contacts) or Add CalDAV Account (calendar).

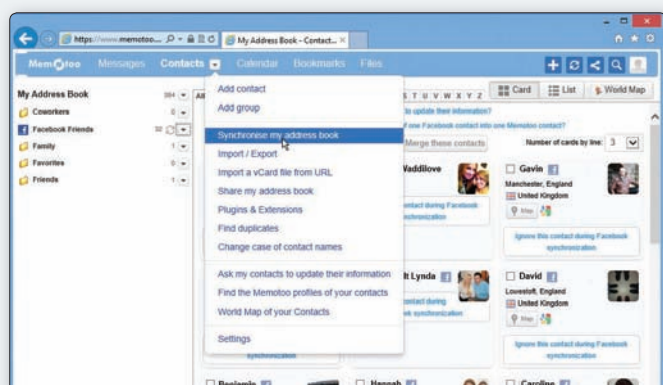




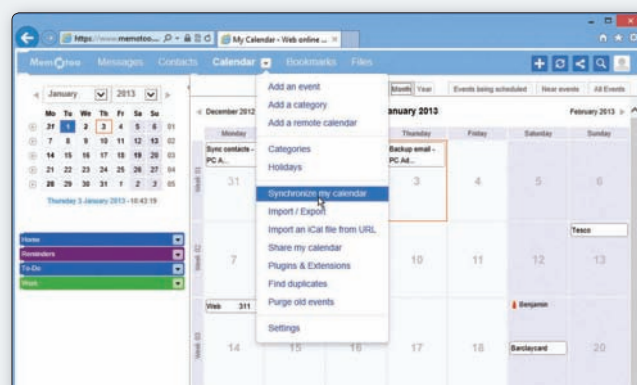
**2** Check your inbox for a confirmation message, then either click or copy and paste into a browser the link provided within. This web page contains important information about syncing various devices, such as Android and Windows phones and tablets.



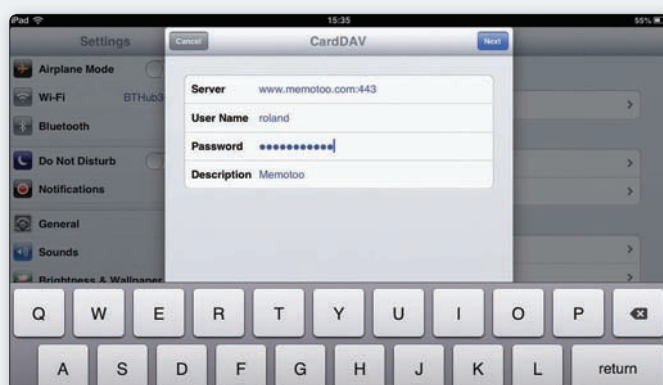
**3** Click Contacts in the menu bar and choose 'Synchronise my address book' from the drop-down menu. Choose the service with which you want to sync your contacts. Repeat this step for each device and service with which you want to sync information.



**5** Explore the rest of the website. Select Contacts to view a complete list of your contacts. You'll find options to add contacts, share your address book and more in the menu. Synchronising your address book adds more sync services.



**6** Having added a sync service, check out your calendar. Use the menu to add more sync services (select the 'Synchronise my calendar' option), or add events and categories, find duplicates, share your calendar and so on.



**8** Whether you selected the contacts or calendar option, you'll need to enter the following information. In the Server field type **www.memotoo.com:443**. The user name and password are whatever you provided at registration. For Description write **Memotoo**.



**9** Wait a minute or two for Memotoo to sync your calendar and contacts across devices, then try them out. In the Calendar you will see events scheduled on other computers or devices; add an event and it will also appear on the website. ☑

# The quick and easy way to build a website



If you want to build a website with the minimum effort and technical knowledge, 1&1 MyWebsite with web apps is ideal. Roland Waddilove is your guide



Should you want to build a website for your small business, club or other venture, you can either install some software on your PC and design the site offline, or take advantage of web apps that run in a browser. Here we explain how to go about the latter, and build a website using 1&1 MyWebsite.

An advantage of working online is that you can access your site from any computer with an internet connection. The obvious disadvantage is that you can't edit the site or add content offline.

An online menu-driven website designer is a good way to quickly get a site up and running, with online storage and a unique website address as part of the deal.

To get started with 1&1 MyWebsite, you'll first need to sign up online for a free trial. You'll be presented with a small website, in which pages are populated with dummy text and images that you can replace with your own.

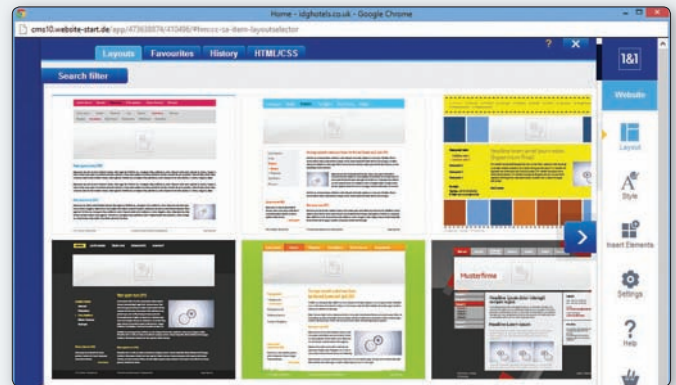
Elements on the web page such as headings, body text

and images can be selected and moved around or edited. You can paste and edit text, add links to other web pages and more. You can even modify the site structure to create new sections, and add or remove pages. A menu is automatically created to aid navigation around the site.

1&1's online designer has some great templates and a good library of images that you can simply drop into pages. The most exciting feature, though, is its web apps. This is a recent addition, which enables you to embed YouTube movies, a Flickr photostream, Google Maps, Facebook and Twitter integration and much more. We'll take a look at some of these in our tutorial.

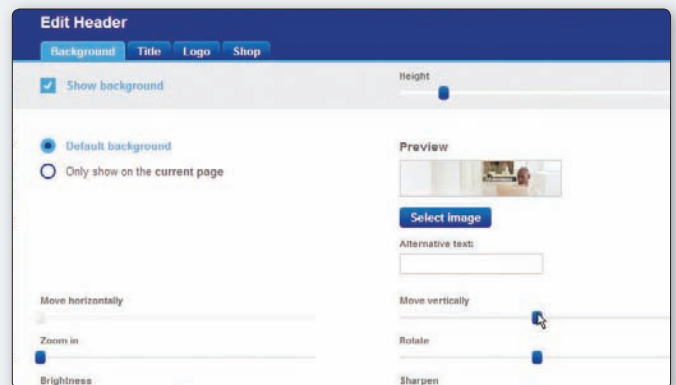
We hold a Business Plus account, but you may find the Basic (£9.99/month) account is all you need. 1&1 Web Apps are free with MyWebsite Plus and Premium, and you can add 1&1 SiteAnalytics Plus for £4.99. An SEO service may also prove useful for catching Google's eye.

## GET STARTED WITH 1&1 MYWEBSITE



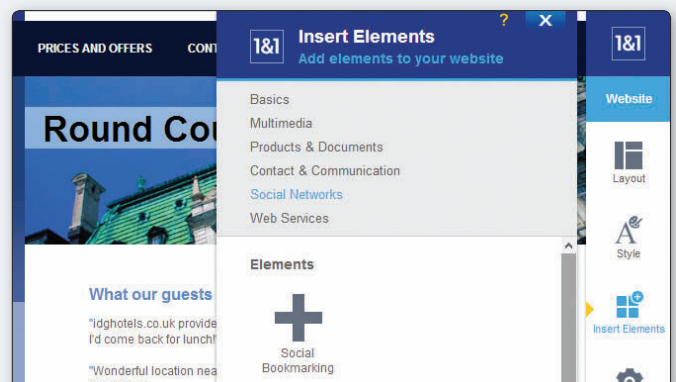
**START**

Log into MyWebsite (1and1.co.uk). Click Edit Website in the Control Panel, then choose Open. Select Layout in the righthand panel to display a gallery of website templates; choose one that's suited to your content.



**4**

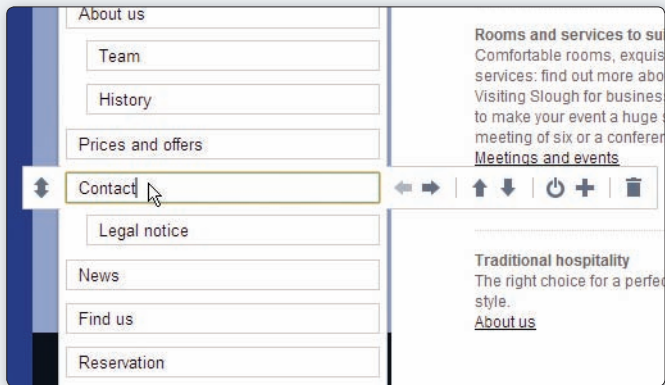
Move the mouse over the image and title at the top of the page and click Edit Header. A panel is displayed with options to change the title and the background image. There are some useful editing controls for tweaking the image, too.



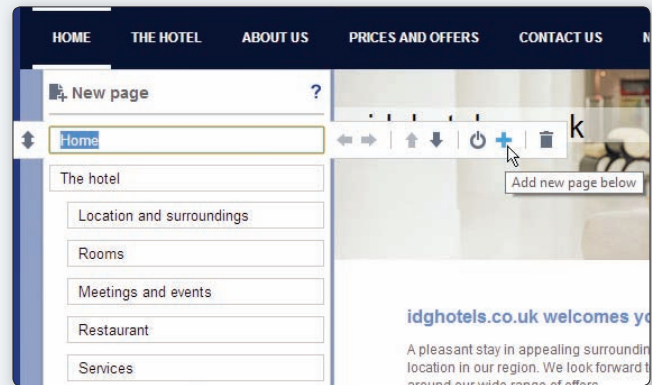
**7**

You can go to any page by using the menu exactly as a visitor to your site would. Select Insert Elements in the right pane to display available web apps. There are many more than are shown here; click the browse button to view them all and select one.

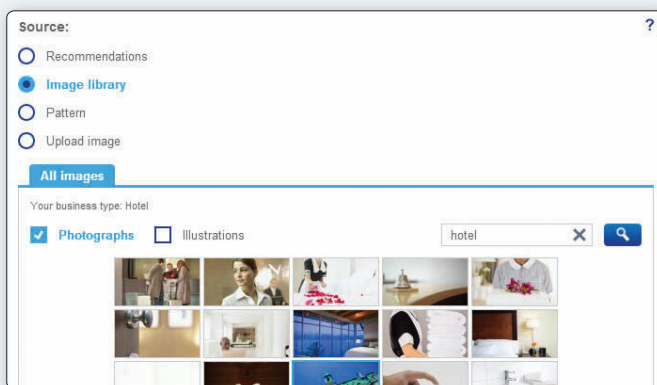
## Tech Help



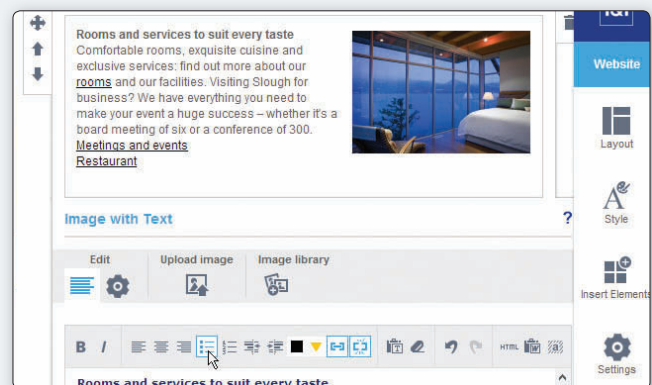
**2** A navigation bar on the left lists individual pages in the website template. Hover the mouse over this pane and click 'Edit page structure'. Click any heading to alter the text to something more suitable, or hit the trash can on the right to delete the selected page.



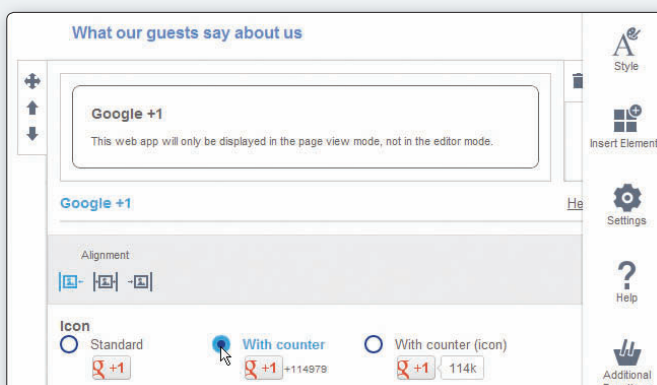
**3** It's unlikely that the template will contain the exact number of pages you need, and in the correct order. Click the plus icon to add pages, then use the up/down arrow to rearrange them. The power button hides the selected page.



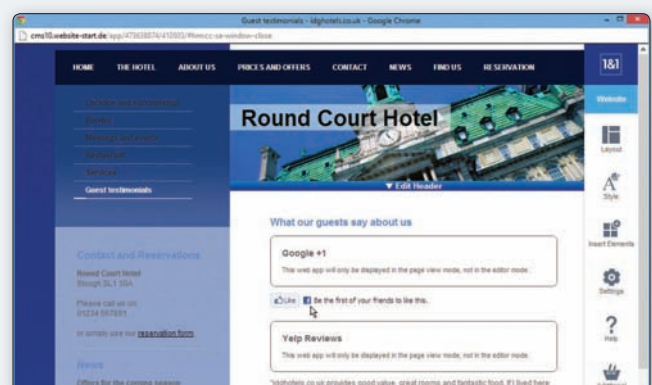
**5** You will probably want to replace the template image with your own. Click Select image and a new panel will open that provides options to upload your own image, search for suitable clipart or use a pattern. It's your choice.




**6** Move the mouse over the page and click an item, such as a heading or paragraph of text. An editor appears, in which you can replace the template text with your own, change the image, add hyperlinks and so on.



**8** Click and drag a web app to one of your website's pages, then drop it where you want it to appear. In the above example we've added a Google +1 button. Depending on your selection, there may be layout and design options, forms to fill in and so on.



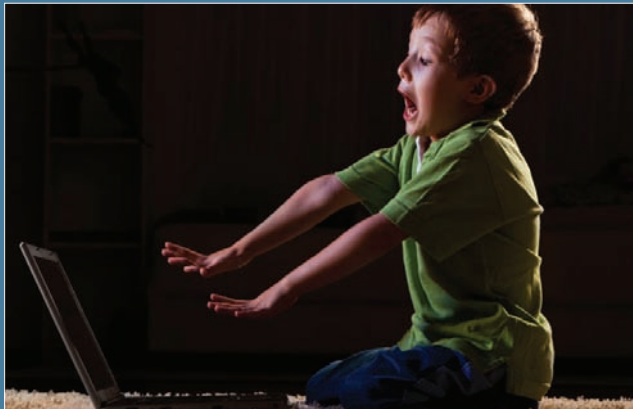
**9** You can add as many web apps to the page as you like. We've also added a Facebook Like button and Yelp reviews. Some won't display in edit mode, so you'll need to view the actual website to see how they look. 



# Free web filtering with FamilyShield



Keep your kids safe online with a free filtering tool from OpenDNS. Mike Bedford explains how to get started with FamilyShield



The prevalence of adult material on the web will be of concern to many people with young families. Thankfully, there are several ways you can ensure that such content remains inaccessible.

Your ISP might offer parental-control software if you're lucky - it's certainly worth taking advantage of if available. Alternatively, plug-ins are available for most browsers, but configuring filters in each browser on every PC in the home can be time-consuming. Standalone parental-control software can simplify things, but you'll still need to install it on individual PCs, tablets and smartphones.

In the following workshop, we introduce a solution that works irrespective of browser, computer, OS and ISP. It does this by establishing rules via the wireless router that each device uses to connect to the internet (so do note that smartphone users will be able to get around its controls with a cellular connection).

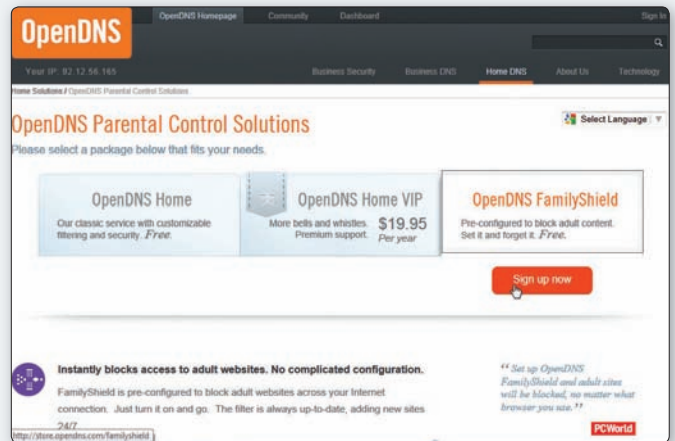
The software in question is FamilyShield. It's free to use, and provided by OpenDNS. Parental control via this system involves using a

different domain name system (DNS) server from that which you would normally access to get your computer online.

A DNS server is hosted by your ISP and responsible for handling the request when you enter a URL into your browser's address bar. Computers don't recognise memorable addresses such as PCAdvisor.co.uk and Microsoft.com; rather, they see these URLs as numerical strings that are known as the IP address, such as 64.4.11.42. The DNS server looks up the IP address for the URL you enter, then directs the browser to the correct location on the web. It's a bit like an online equivalent of a telephone directory.

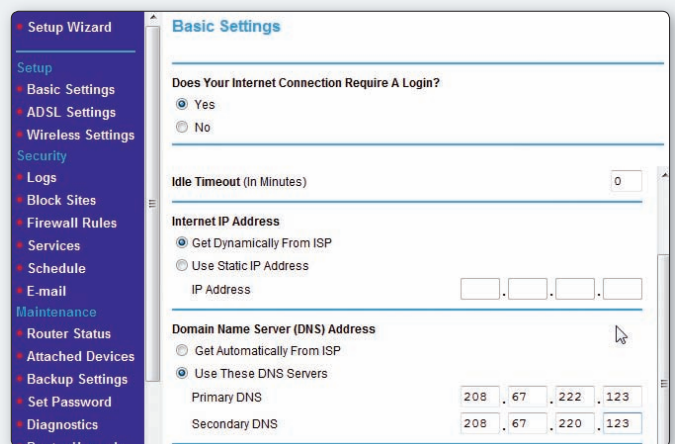
Although you normally use your ISP's default DNS server, it's possible to use an alternative one by entering the address of your preferred server in your wireless router's configuration menu. FamilyShield is simply a content-filtering option for the OpenDNS server. You won't have to install any software on your PC(s), nor register with OpenDNS. Here's how to get started.

## CONFIGURE FAMILYSHIELD



START

Head to [opendns.com](http://opendns.com) and select Home DNS; under Parental Controls click Get Started. On the next page choose OpenDNS FamilyShield, then click 'Sign up now'. You can enter an email address or click 'continue' below to bypass registration.



**4** Select Basic Settings, then enable 'Use these DNS servers' under 'Domain Name Server (DNS) Address'. Jot down the original addresses, then enter **208.67.222.123** and **208.67.220.123** as the Primary and Secondary DNS addresses. Click Apply and log out.

## MORE CONTROL WITH OPENDNS

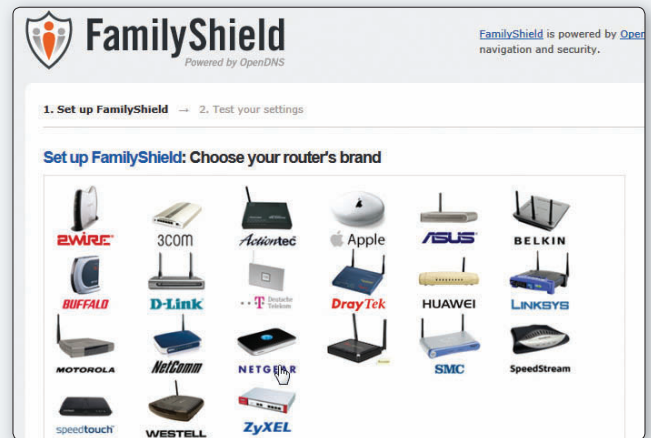
If you want more control over what is considered to be acceptable content than the level of filtering provided by FamilyShield, perhaps the free version of the standard OpenDNS will do the trick. Configuring this is much the same as Family Shield, but you must enter **208.67.222.222** and **208.67.220.220** as the primary and secondary DNS servers in your wireless router.

Once you've set up OpenDNS, you can choose a filtering setting: High, Moderate Low, None or Custom. Select Custom and you'll be able to fine-tune the filtering to block or allow 26 categories of website. Note that you'll have to tell OpenDNS your IP address so it

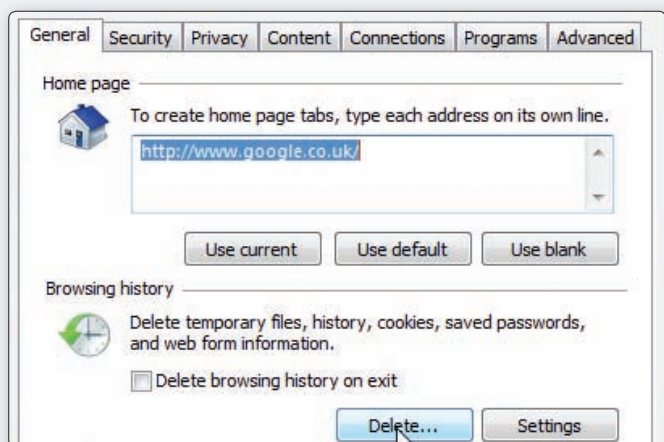
## Tech Help



**2** FamilyShield will ask whether you want to set up the service on your computer or router. The router is the recommended choice, since you'll need to configure the service only once to protect all devices accessing the web through it. Click the router to continue.



**3** Select the icon for your router manufacturer to get detailed configuration instructions. In a new tab, enter into the URL bar the IP address provided to access your router's admin settings, then log in with the username 'admin' and password 'password'.



**5** New DNS requests will go to FamilyShield, but your browser may also call on cached pages. Clear your browser history, then wipe the DNS cache. Type `cmd` in the Start menu Search bar to open a command prompt, then type `ipconfig /flushdns` and press Enter.



**6** Back in the browser tab you were using in Step 3, click 'Next: Test your new settings'. All being well, a page will display the message 'Your family is now protected!' If you don't see this message, retrace your steps and correct any mistakes. ☒

is able to recognise you and apply these settings to your network on subsequent occasions. That's fine if you have a static IP address, but it won't work if you have a dynamic IP address.

In the latter case, which applies to most people, you're allocated an IP address from a pool each time your wireless router is turned on. The solution is to employ the OpenDNS Updater, which reports to OpenDNS your current IP address. Unfortunately, this removes much of the simplicity of FamilyShield - because the Updater must always be running for filtering to take effect, it must either be installed on all your PCs or just one provided it's turned on 24/7.



# Resize your digital photos in seconds



Jim Martin explains how to resize images for sharing



Even today's budget digital cameras have sensors with double-digit megapixel counts. This doesn't mean the resulting photos will be of spectacular quality, but it does mean they can be rather large and consume a considerable chunk of your storage space.

Attempting to share these photos via email is awkward, even if the attachment file-size limit allows you to do so. You'll clog up your recipient's inbox and, over a slow web connection, they may have to wait minutes for your images to download. An alternative is to print your pictures, or upload them to an image-hosting or social-media site.

Whatever you decide to do with your images, it's important to resize them accordingly. The first thing you should note is that an image's two basic attributes, file size and resolution, are not directly linked. The amount of compression involved plays a huge part in the ultimate size of the image file, but it's also possible to shrink a photo without reducing its quality.

Images are made up of thousands of dots (pixels) of

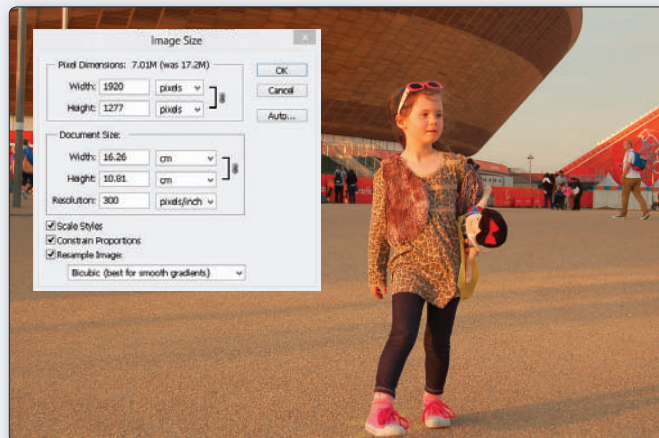
colour, which become visible when you zoom in using a photo editor. The resolution is simply the number of horizontal pixels multiplied by the number of vertical pixels.

A 16Mp camera will produce photos with a typical resolution of 4600x3400. That's too much detail for a standard laptop, which may have a screen that has only 1366x768 pixels. Even a full-HD TV or PC monitor supports only 1920x1080.

These devices are forced to downscale your image to fit the screen, with the extra detail wasted. Shrinking your images to match this resolution will result in a smaller file that's much easier to share via email or online. Increasing the compression will make the files smaller still – just don't go overboard or you'll risk blurring the shots.

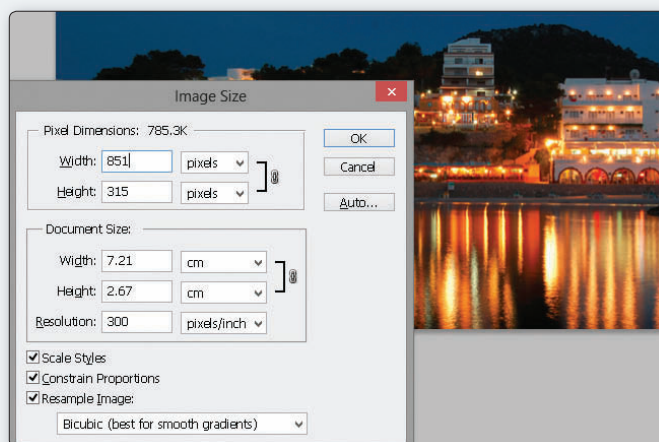
Many sites automatically downscale your pictures when you hit the Upload button, giving you no control over their resolution or how much compression is used. Take back control by resizing the images yourself. Here, we'll show you how to do so in Adobe Photoshop.

## RESIZE YOUR DIGITAL PHOTOS FOR SHARING



**START**

Choose Image Size in the Image menu. Ensure Constrain Proportions is enabled, then enter a *smaller* value in the Width field. The Height is proportionately altered. The Document size also changes, which is the size at which the image will print.



**4** If you're resizing images for the web, use the dimensions at which the image will actually appear to keep the file size as small as possible. A Facebook banner image, for example, should be 851x315 pixels, and the equivalent for Google+ is 940x180 pixels.

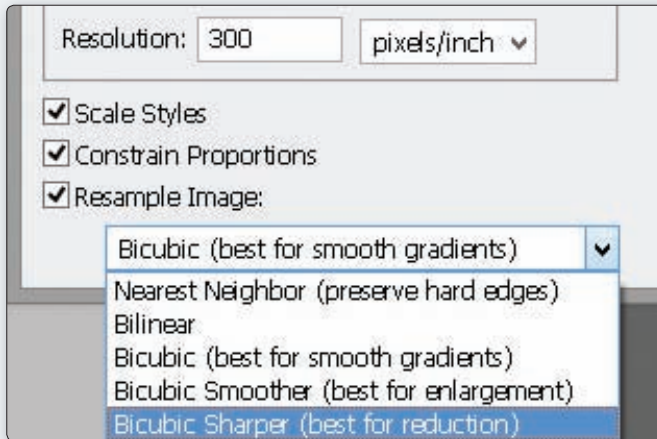
## BATCH RESIZING

It's easy to batch-resize multiple images in Photoshop, either by using the dedicated Image Processor or by creating an action for each image size you require and using the File, Automate, Batch command. You'll find the Image Processor under File, Scripts in Photoshop, or File, 'Process Multiple Files' in Photoshop Elements. It lets you resize files stored in a particular folder and specify the file type and level of compression used.

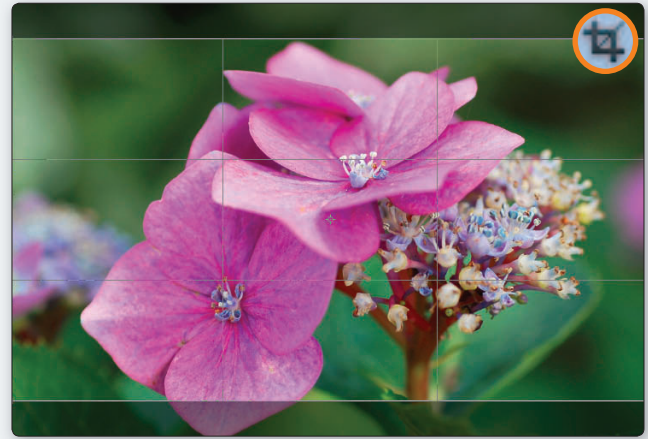
We also like ImageResizer, which lets you scale down a selection of photos within Windows Explorer – and it's free to use. Download ImageResizer from [imageresizer.codeplex.com](http://imageresizer.codeplex.com).



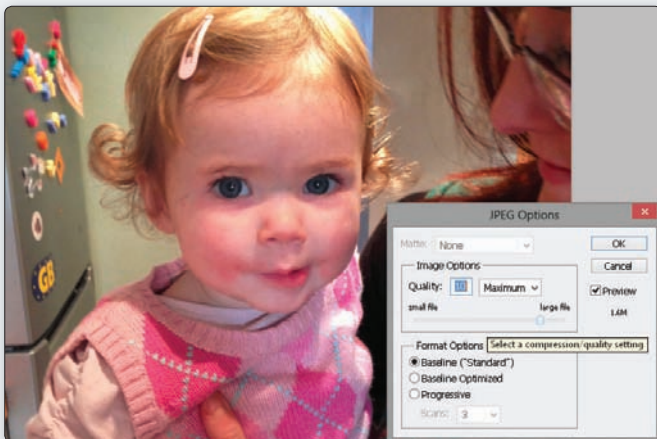
# Tech Help



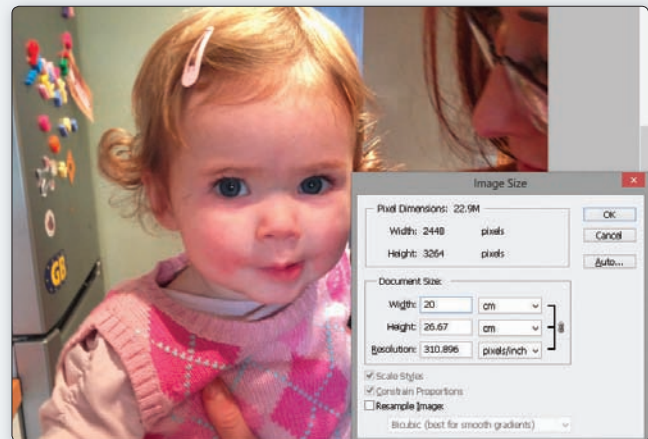
**2** You can alter the algorithm used by Photoshop when resizing images using the drop-down menu at the bottom of the Image Size window. Bicubic Sharper is recommended when shrinking images. Click Ok to apply your changes.



**3** To use your image as a wallpaper, you'll need to crop it to match the screen's aspect ratio. Select the Crop tool and enter your screen resolution in the Width and Height fields. Click and drag to select the area of the photo, then double-click to crop.



**5** To save the file click File, Save as, then select from the variety of formats and compression levels, being careful not to overwrite the original. PNG is a lossless format, but if you choose Jpeg use the slider to trade off file size against image quality.

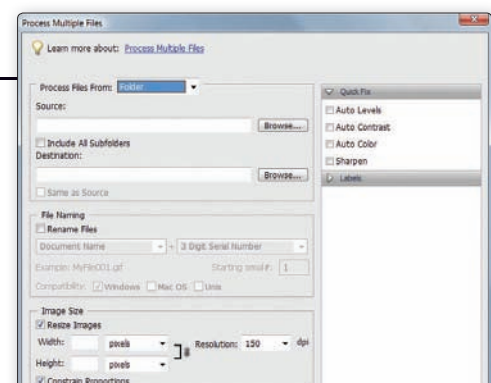


**6** If you plan to print the image, resize it using the Document Size settings. You shouldn't need more than 300 pixels per inch, and may find 200ppi is adequate. Disable Resample Image to avoid scaling up the image. ☒

Click an image to select it, then hold down Ctrl to also select subsequent images (if all are listed together in Windows Explorer you can simply click on the first and last while holding down Shift).

Right-click any one of the selected images and choose ImageResizer from the contextual menu. Set your options for the image resolution and where the software should save the new images, and you're done.

If there are certain photos that need rotating, you can choose Rotate Clockwise or Rotate Counterclockwise from the same right-click menu. Again, this works if you have several photos selected, but be sure to check they all need rotating in the same direction before you do so.





## Ashampoo WinOptimizer 2013

### FULL PROGRAM

ONLINE  
REGISTRATION  
REQUIRED

#### Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 213\Ashampoo WinOptimizer 2013 and open the file

#### Online registration

**required:** follow the links during installation before 6 March 2013

#### System requirements

Windows XP/Vista/7; 1GB RAM (2GB for Blu-ray); 90MB drive space (additional space for backups); Windows Media Player 9.0 or later; DirectX 9.0

Ashampoo WinOptimizer 2013, like its predecessors, will stand for modern technology, efficiency, security and intuitive handling.

#### Highlights

**Maintenance:** WinOptimizer 2013 analyses the health status of your hard drive(s) to identify potential problems before your valuable data is lost due to a disk failure

**Optimisation:** Updated algorithms in Ashampoo WinOptimizer 2013 ensure improved performance of automatic maintenance, providing more thorough results and accelerated execution of the most popular modules and functions

**Interface:** WinOptimizer 2013's improved interface provides direct access to all the software's important functions and features, as well as smooth operation and intuitive handling

**Security:** Ashampoo WinOptimizer 2013 offers improved performance and handling when permanently deleting data, providing detailed information and a direct link to the Windows Recycle Bin

**General:** WinOptimizer offers more than 100 improvements across all its modules



**PCA  
OFFER**  
UPGRADE TO  
WINOPTIMIZER 9.0  
FOR ONLY £5.99!  
[TINYURL.COM/7S5YB4Q](http://TINYURL.COM/7S5YB4Q)

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Visit our website for more software special offers: [pcadvisor.co.uk/special-offers](http://pcadvisor.co.uk/special-offers)

## 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 213\ Panda Antivirus Pro 2013 and open the install file

**Online registration required:** follow the links during installation before 6 March 2013

#### System requirements

300MHz processor; Windows XP/Vista/7/8; 128MB RAM without TruPrevent; 512MB with TruPrevent; 265MB drive space; Internet Explorer

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.

- 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 ☑

## 1-abc.net Hard Drive Washer 6.0

### FULL PROGRAM

ONLINE  
REGISTRATION  
REQUIRED

#### Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 213\ 1-abc.net Hard Drive Washer 6.0 and open the file

**Online registration required:** head to [tinyurl.com/ny5fdg](http://tinyurl.com/ny5fdg) before 6 March 2013

#### System requirements

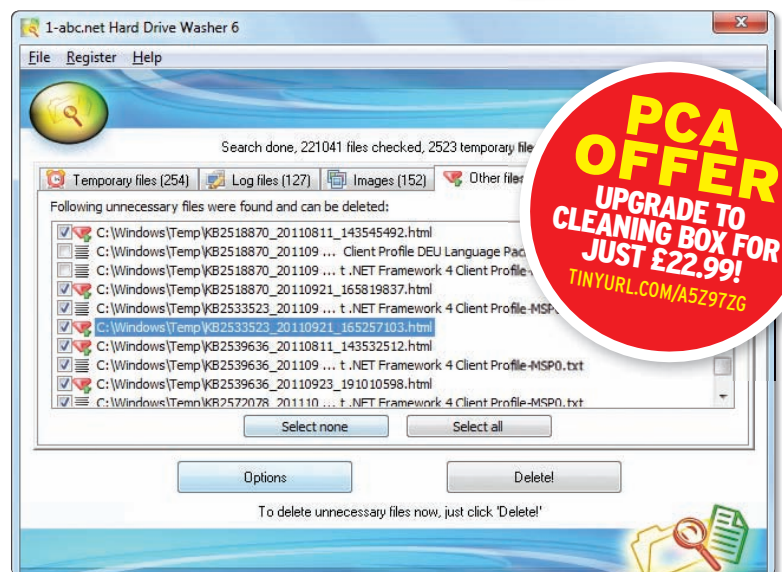
Windows XP/Vista/7

Windows and third-party software produce temporary data. These disk-space-consuming files allow programs to remember user data and behaviour, but they can also clog up your PC and slow it down.

Very few programs consider the problems caused by an accumulation of temporary files in various places on your hard drive; they use different file extensions and won't always delete them when they're no longer needed. 1-abc.net Hard Drive Washer does what all these programs forget: it searches for these unnecessary files and offers to delete them.

Besides conventional temporary files (saved with a .tmp extension), you'll also find backup and log files that are no longer required. All can be found and easily deleted with Hard Drive Washer.

In addition, 1-abc.net Hard Drive Washer can delete the entire



contents of temporary folders, and lets you specify which files it should seek out. You can make exception rules, set up an automatic schedule, and even scan floppy disks, camera

cards and USB sticks in addition to your hard drive.

All unwanted data can be deleted to the Recycle Bin, thus enabling easy restoration if necessary. ☑



# Steganos Privacy Suite 2012

## FULL PROGRAM

ONLINE  
REGISTRATION  
REQUIRED

### Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 213\Stegano Privacy Suite 2012 and open the file

**Online registration required:** follow the links during installation before 6 March 2013

**System requirements**  
Windows XP/Vista/7/8;  
1GB RAM; 200MB storage

Steganos Privacy Suite has been the reference tool for the protection of user privacy for more than 10 years. Eight powerful tools protect your data on your hard drive, CDs, DVDs, Blu-ray discs and USB sticks, and in your emails.

It takes only seconds for a USB stick to fall out your pocket, or for a user to unearth data on your PC, so it's crucial to protect your privacy. With Steganos' enhanced 256bit AES encryption you can easily safeguard your important data, while the Trace Destructor destroys any traces you leave behind when surfing the web. ☒



# Xara Photo & Graphic Designer 6.0

## FULL PROGRAM

ONLINE  
REGISTRATION  
REQUIRED

### Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 213\Xara Photo & Graphic Designer 6

**Online registration required:** follow the links during installation before 6 March 2013

**System requirements**  
Windows XP/Vista/7; 256MB RAM; 200MB storage

Photo & Graphic Designer is a single integrated solution for all your illustration, photo and page-design needs. It's the perfect tool for:

- Creating personal and business graphics, from simple logos and signs, cards, invitations and stationery, to more ambitious posters, flyers and brochures
- Drawings, from simple cartoons to the ambitious works of illustration
- Creating web graphics such as buttons and icons, with compact graphics and high onscreen quality



- Photo editing, from simple cropping, brightness and contrast adjustments to state-of-the-art tools such as content-aware scaling

Whatever graphics you need and whatever your skill level, Xara's friendly user interface and unrivalled speed make getting creative a pleasure. ☒

## DISC INSTRUCTIONS

Place disc in drive. Open the file 'Click here to begin.pdf' for extra information.

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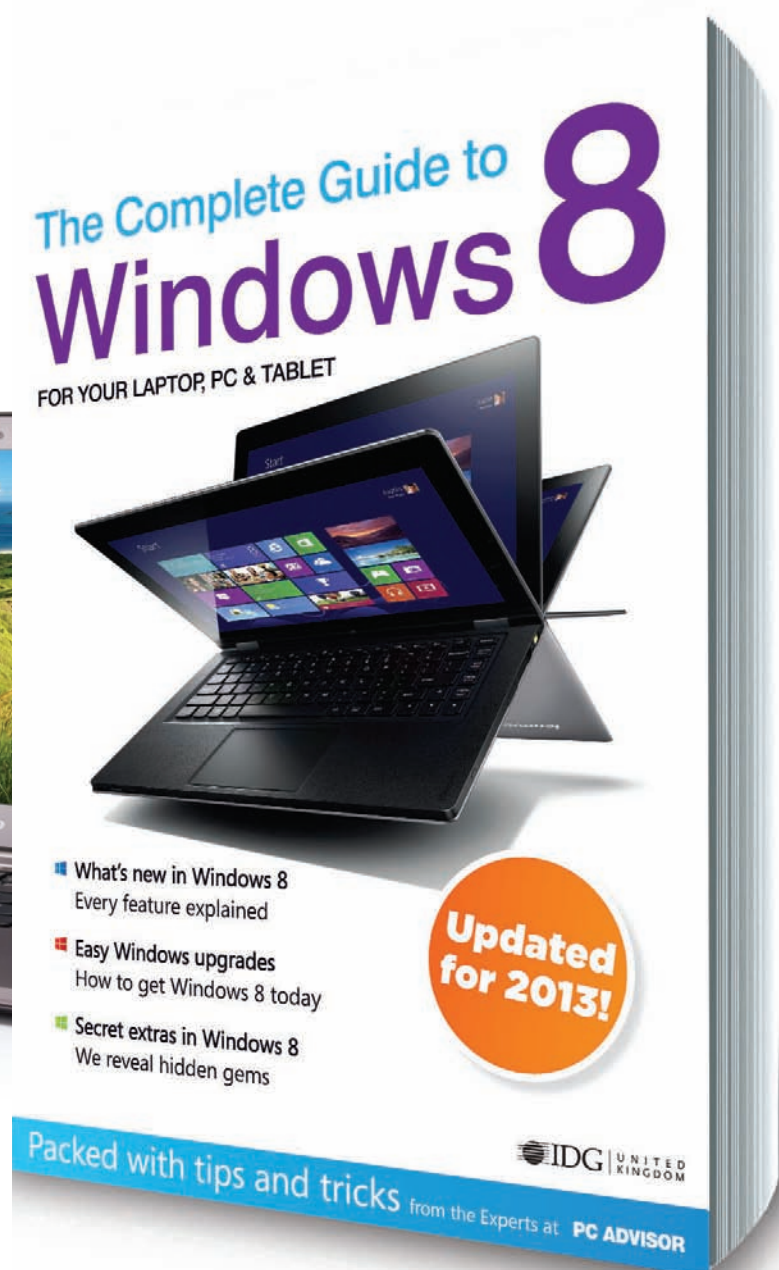
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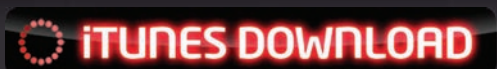
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## Index

|                              |     |
|------------------------------|-----|
| Ultraportable laptops.....   | 130 |
| Sub-£500 laptops.....        | 131 |
| £501-£1,000 laptops .....    | 132 |
| £1,001+ laptops .....        | 133 |
| Media PCs.....               | 134 |
| Gaming PCs.....              | 135 |
| All-in-one PCs.....          | 136 |
| Business PCs .....           | 138 |
| Tablets.....                 | 139 |
| Antivirus software .....     | 139 |
| Sub-£150 printers.....       | 140 |
| £151+ printers .....         | 140 |
| Blu-ray drives .....         | 141 |
| Wireless routers .....       | 141 |
| USB drives .....             | 142 |
| NAS drives .....             | 142 |
| Projectors.....              | 143 |
| Compact system cameras.....  | 143 |
| Sub-£150 graphics cards..... | 144 |
| Flat-panel displays .....    | 145 |



## Ultraportable laptops



|                      | Apple MacBook Air 13in  | Apple MacBook Pro 13in Retina   | Samsung 900X4C  | Apple MacBook Air 11in  | Acer Aspire S7-391  |
|----------------------|---|---|---|---|---|
| Price                | £1249 inc VAT   | £1,699 inc VAT  | £950 inc VAT  | £849 inc VAT  | £1,399 inc VAT  |
| Website              | Apple.com/uk  | Apple.com/uk  | Samsung.com/uk  | Apple.com/uk  | Acer.co.uk  |
| Build rating         | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   |
| Features rating      | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   |
| Performance rating   | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   |
| Value rating         | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   |
| Overall rating       | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   |
| Processor            | 1.8GHz Intel Core i5-3427U  | 2.5GHz Intel Core i5-3210M  | 1.7GHz Intel Core i5-3317U  | 1.7GHz Intel Core i5-3317U  | 1.7GHz Intel Core i5-3317U  |
| RAM                  | 4GB DDR3L   | 8GB DDR3L   | 8GB DDR3  | 4GB DDR3L   | 4GB DDR3  |
| Storage              | 256GB SSD   | 256GB SSD   | 128GB SSD   | 64GB SSD  | 128GB SSD   |
| Screen size          | 13.3in  | 13.3in  | 15in  | 11.6in  | 13.3in  |
| Screen resolution    | 1440x900  | 2560x1600   | 1600x900  | 1366x768  | 1920x1080   |
| Graphics             | Intel HD Graphics 4000  | Intel HD Graphics 4000  | Intel HD Graphics 4000  | Intel HD Graphics 4000  | Intel HD Graphics 4000  |
| Video memory         | N/A   | N/A   | N/A   | N/A   | N/A   |
| 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 with adaptor  | Gigabit   | Via adaptor only  | x   |
| Bluetooth            | ✓   | ✓   | ✓   | ✓   | ✓   |
| USB                  | 2x USB 3.0  | 2x USB 3.0  | 2x USB 3.0, 1x USB 2.0  | 2x USB 3.0  | 2x USB 3.0  |
| FireWire             | x   | x   | x   | x   | x   |
| Thunderbolt          | ✓   | ✓ (2)   | x   | ✓   | x   |
| DisplayPort          | ✓   | ✓   | x   | ✓   | x   |
| HDMI                 | x   | ✓   | ✓ (Micro HDMI)  | x   | ✓ (Micro HDMI)  |
| DVI                  | x   | x   | x   | x   | x   |
| VGA                  | x   | x   | x   | x   | x   |
| eSATA                | x   | x   | x   | x   | x   |
| Media card slot      | ✓   | ✓   | ✓   | x   | ✓   |
| Audio                | Headphone jack, mic   | Headphone jack, mic   | Headphone jack, mic   | Headphone jack, mic   | Headphone jack, mic   |
| Optical drive        | N/A   | N/A   | N/A   | N/A   | N/A   |
| Extras               | HD webcam, multitouch trackpad, backlit keyboard  | HD webcam, multitouch trackpad, backlit keyboard  | Webcam  | HD webcam, multitouch trackpad, backlit keyboard  | HD webcam   |
| Operating system     | Mac OS X 10.8 Mountain Lion   | Mac OS X 10.8 Mountain Lion   | Windows 7 Home Prem 64bit   | Mac OS X 10.8 Mountain Lion   | Windows 8 Pro 64bit   |
| Bundled software     | iLife 11  | iLife 11  | Samsung Recovery Solution   | iLife 11  | None  |
| Fear (Max detail)    | 29fps   | 29fps   | 28  | 28fps   | 23fps   |
| Battery              | 50Wh lithium-ion  | 74Wh lithium-ion  | 62Wh lithium-ion  | 35Wh lithium-ion  | Not specified   |
| Battery life         | 8 hrs 20 mins   | 8 hrs 44 mins   | 8 hrs 3 mins  | 6 hrs 10 mins   | Not tested  |
| WB 6/PC Mark 7 score | 132/4,497   | Not tested/4,596  | 125/not tested  | 129/not tested  | Not tested/4,581  |
| Dimensions           | 325x227x4-17.5mm  | 313x219x19mm  | 375x237x15mm  | 300x192x3-17mm  | 323x223x12.5mm  |
| Weight               | 1.34kg  | 1.64kg  | 1.67kg  | 1.07kg  | 1.28kg  |
| 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>• Screen's pixel count has quadrupled</li> <li>• Strong performance</li> <li>• Fantastic battery life</li> <li>• Limited future expansion</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>• Strong IPS touchscreen</li> <li>• Incredibly thin</li> <li>• Decent performance</li> <li>• Frustrating trackpad</li> <li>• Poor gaming speeds</li> </ul> |
| FULL REVIEW          | TINYURL.COM/8C7LYCO   | TINYURL.COM/BQBSHC  | TINYURL.COM/6VZ5TOG   | TINYURL.COM/CCPOANM   | TINYURL.COM/DYAJ46E   |

## >> 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 Slimbooks), 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

| Sub-£500 laptops   | 1   | 2   | 3  | 4  | 5   |
|--------------------|---|---|--|--|---|
|                    | Acer Aspire V3-571  | Toshiba Satellite Pro L850  | Samsung RV511  | Lenovo IdeaPad S205-1038   | Acer V5-571   |
| Price              | £475 inc VAT  | £450 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 i5-3210M  | 2.3GHz Intel Core i3-2350M  | 2.53GHz Intel Core i3-380M   | 1.6GHz AMD E450  | 1.4GHz Intel Core i3-2367M  |
| RAM                | 8GB DDR3  | 6GB DDR3  | 6GB DDR3   | 4GB DDR3   | 8GB DDR3  |
| Storage            | 750GB 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>• Windows 7 Professional</li> <li>• Anti-glare matt screen</li> <li>• Capacious hard drive</li> <li>• Keys lack depth</li> <li>• i3 processor isn't the fastest</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/CABX8Z">TINYURL.COM/CABX8Z</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



|                    | Dell Inspiron 15R 7520 SE   | Toshiba Satellite P855-32J   | Asus VivoBook S400E   | Lenovo IdeaPad Z580  | HP Envy 6 S1eekbook  |
|--------------------|---|--|---|--|--|
| Price              | £699 inc VAT  | £999 inc VAT   | £700 inc VAT  | £730 inc VAT   | £599 inc VAT   |
| Website            | Dell.com/uk   | Toshiba.co.uk  | Uk.asus.com   | Lenovo.com/uk  | Hp.com/uk  |
| Build rating       | ★★★★★   | ★★★★★  | ★★★★★   | ★★★★★  | ★★★★★  |
| Features rating    | ★★★★★   | ★★★★★  | ★★★★★   | ★★★★★  | ★★★★★  |
| Performance rating | ★★★★★   | ★★★★★  | ★★★★★   | ★★★★★  | ★★★★★  |
| Value rating       | ★★★★★   | ★★★★★  | ★★★★★   | ★★★★★  | ★★★★★  |
| Overall rating     | ★★★★★   | ★★★★★  | ★★★★★   | ★★★★★  | ★★★★★  |
| Processor          | 3.2GHz Intel Core i7-3632QM   | 2.5GHz Intel Core i5-3210M   | 1.9GHz Intel Core i7-3517U  | 2.9GHz Intel Core i7-3520M   | 2.1GHz AMD A6-4455M  |
| RAM                | 6GB DDR3  | 8GB DDR3   | 4GB DDR3  | 8GB DDR3   | 6GB DDR3   |
| Storage            | 750GB hard drive  | 750GB hard drive   | 500GB hard drive  | 1TB hard drive   | 500GB hard drive   |
| Screen size        | 15.6in  | 15.6in   | 14.1in  | 15.6in   | 15.6in   |
| Screen resolution  | 1366x768 pixels   | 1920x1080 pixels   | 1366x768 pixels   | 1366x768 pixels  | 1366x768 pixels  |
| Graphics           | AMD Radeon HD 7730M   | nVidia GeForce GT 640M   | Intel HD Graphics 4000  | nVidia GeForce GTX 630M  | AMD Radeon HD 7500G  |
| Video memory       | 2GB   | 2GB  | N/A   | 2GB  | N/A  |
| Wireless           | 802.11b/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                | 4x USB 3.0  | 4x USB 3.0   | 1x USB 3.0, 2x 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, mic   | Speakers, mic  | Beats Audio  |
| Optical drive      | 8x DVD ±R drive   | 6x BD-ROM drive  | None  | BD-ROM, 8x DVD ±R drive  | None   |
| Extras             | Webcam  | Webcam, glasses-free 3D  | Webcam, touchscreen   | None   | None   |
| Operating system   | Windows 8 Pro 64bit   | Windows 8 Pro 64bit  | Windows 8 Pro 64bit   | Windows 7 Home Prem 64bit  | Windows 7 Home Prem 64bit  |
| Bundled software   | None  | Toshiba utilities  | none  | CyberLink PowerDVD 10.0  | None   |
| Fear (Max detail)  | Not tested  | 71fps  | 22fps   | 79fps  | 51fps  |
| Battery            | 48Wh lithium-ion  | 48Wh lithium-ion   | 44Wh lithium-ion  | 48Wh lithium-ion   | 59Wh lithium-ion   |
| Battery life       | 3 hrs 43 mins   | 3 hrs 4 mins   | 3 hrs 27 mins   | 5 hrs 49 mins  | 6 hrs 40 mins  |
| WorldBench 6 score | Not tested  | Not tested (2,716 PCMark 7)  | Not tested (2,928 PCMark 7)   | 153  | 82   |
| Dimensions         | 378x252x34.1mm  | 385x253x33mm   | 339x239x21mm  | 376x245x35mm   | 374x253x21mm   |
| Weight             | 2.8kg   | 2.94kg   | 1.9kg   | 2.44kg   | 2.1kg  |
| Warranty           | 1-year onsite   | 1 year European carry-in   | 2 year International  | 1-year return-to-base  | 1-year collect-and-return  |
| Verdict            | <ul style="list-style-type: none"> <li>Great matt display</li> <li>Decent speed</li> <li>Short battery life</li> <li>Rather large laptop</li> </ul> | <ul style="list-style-type: none"> <li>Glasses-free 3D</li> <li>BD-ROM drive</li> <li>Not cheap</li> <li>Short battery life</li> </ul> | <ul style="list-style-type: none"> <li>Touchscreen</li> <li>Almost an ultraportable</li> <li>Poor battery life</li> <li>Trackpad and keyboard not the best</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 ultraportable</li> <li>Good quality keyboard</li> <li>Slow performance</li> <li>Fairly good value price</li> </ul> |
| FULL REVIEW        | <a href="http://TINYURL.COM/A9LRYC3">TINYURL.COM/A9LRYC3</a>  | <a href="http://TINYURL.COM/B4KSAFJ">TINYURL.COM/B4KSAFJ</a>   | <a href="http://TINYURL.COM/CZHXTYM">TINYURL.COM/CZHXTYM</a>  | <a href="http://TINYURL.COM/92GOLXY">TINYURL.COM/92GOLXY</a>   | <a href="http://TINYURL.COM/BMM7XYU">TINYURL.COM/BMM7XYU</a>   |

### >> 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    |  | 1   | 2   | 3  | 4  | 5   |
|--------------------|--|--|--|--|--|---|
|                    |  | 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   | Customisable backlit keyboard  | 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.






Ultraportables 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)

| Media PCs               |  1<br>PC ADVISOR<br>BEST BUY  |  2<br>PC ADVISOR<br>RECOMMENDED  |  3   |  4  |  5   |
|-------------------------|--|---|--|--|---|
|                         | Chillblast Vacuum Mini 2   | Apple Mac mini  | Quiet PC FC8 Fanless Mini PC   | CyberPower Ultra HTPC  | Arbico eXcel A2540  |
| Price                   | £999 inc VAT   | £795 inc VAT  | £1,198 inc VAT   | £749 inc VAT   | £699 inc VAT  |
| Website                 | Chillblast.com   | Apple.com/uk  | Quietpc.com  | Cyberpowersystem.com   | Arbico.co.uk  |
| Build rating            | ★★★★★  | ★★★★★   | ★★★★★  | ★★★★★  | ★★★★★   |
| Features rating         | ★★★★☆  | ★★★★☆   | ★★★★☆  | ★★★★☆  | ★★★★☆   |
| Performance rating      | ★★★★☆  | ★★★★☆   | ★★★★☆  | ★★★★☆  | ★★★★☆   |
| Value rating            | ★★★★☆  | ★★★★☆   | ★★★★☆  | ★★★★☆  | ★★★★☆   |
| Overall rating          | ★★★★★  | ★★★★★   | ★★★★★  | ★★★★★  | ★★★★★   |
| Processor               | 2.5GHz Intel Core i7-3770T   | 2.3GHz Intel Core i7-3615QM   | 2.5GHz Intel Core i7-3770T   | 3.8GHz AMD FM2 A10-5800k   | 3.6GHz AMD A6-5400K   |
| RAM                     | 16GB DDR3  | 4GB DDR3  | 16GB DDR3  | 8GB DDR3   | 8GB DDR3  |
| Storage capacity        | 240GB SSD  | 1TB HDD   | 120GB SSD + 1TB HDD  | 120GB SSD + 1TB HDD  | 2TB HDD + 120GB SSD   |
| Motherboard             | Asus P8H77-I   | Apple Mac Mini board  | Gigabyte GA-Z77M-WIFI  | Gigabyte F2A85XM-D3H   | Asus F2A85-M LE   |
| CPU cooler              | Streacom heatpipe system   | Apple cooling fan   | Streacom heatpipe system   | Standard AMD cooler  | Scythe Shuriken   |
| Power supply            | Streacom 150W  | 85W Apple   | NanoPSU 150W   | 500W Cooler Master   | Xigmatek 400W   |
| Graphics                | Intel HD Graphics 4000   | Intel HD Graphics 4000  | Intel HD Graphics 4000   | AMD Radeon HD 7660D  | AMD Radeon HD 7540D   |
| TV tuner                | BGT 3620 (dual tuner)  | N/A   | TBS 6280 (dual tuner)  | Compro S800F (dual tuner)  | Compro VideoMate T220   |
| Wireless                | 802.11b/g/n  | 802.11b/g/n   | 802.11b/g/n  | 802.11b/g/n  | N/A   |
| Ethernet                | Gigabit  | Gigabit   | Gigabit  | Gigabit  | Gigabit   |
| Bluetooth               | ✓  | ✓   | ✓  | ✗  | ✗   |
| USB                     | 4x USB 3.0, 6x USB 2.0   | 4x USB 3.0  | 4x USB 3.0, 4x USB 2.0   | 4x USB 3.0, 4x USB 2.0   | 2x USB 3.0, 4x USB 2.0  |
| Ports                   | HDMI, DVI, VGA, S/PDIF, line-in/out  | HDMI, Thunderbolt, FireWire 800, Toslink, line-in/out   | 2x HDMI, DVI, S/PDIF, mic, line-in/out   | HDMI, DVI, VGA, S/PDIF, mic, line-in/out   | HDMI, DVI, VGA, eSATA, S/PDIF, mic, line-in/out   |
| Case                    | Streacom FC8 EVO   | Apple aluminium unibody   | Streacom FC8 EVO   | Silverstone SST-GD06B  | Silverstone Grandia GD04  |
| Keyboard and mouse      | Xebec HTPC wireless touchpad and keyboard  | Apple Magic Trackpad, Apple Bluetooth Keyboard  | Gigabyte GK-KM7580 wireless keyboard and mouse   | N/A  | Logitech K400 wireless keyboard   |
| Remote control          | ✓ (integrated to keyboard)   | ✗ (optional, £25)   | ✓  | ✓  | ✓   |
| LCD screen              | ✗  | ✗   | ✗  | ✗  | ✗   |
| Optical drive           | Sony BD-ROM drive  | Optional (£65)  | 8x Sony DVD±RW drive   | 12x Pioneer Blu-ray writer   | 6x LG Blu-ray writer  |
| Sound                   | Onboard  | Onboard   | Onboard  | Onboard  | Onboard   |
| Operating system        | Windows 7 Home Prem 64bit  | Apple OS X 10.8 Mountain Lion   | Windows 7 Home Prem 64bit  | Windows 7 Home Prem 64bit  | Windows 7 Home Prem 64bit   |
| PC Mark Overall         | 5,749  | 3,038   | 5,928  | 4,113  | 3,332   |
| PC Mark Entertainment   | 4,254  | 3,088   | 4,410  | 3,512  | 2,395   |
| Stalker Med/Ultra (fps) | 34/9   | 34/9  | 35/9   | 66/21  | 39/12   |
| AvP Med/Ultra (fps)     | 8/5  | 8/5   | 9/5  | 24/13  | 13/7  |
| Consumption (idle)      | 25W  | 11W   | 27W  | 41W  | 44W   |
| Consumption (load)      | 52W  | 50W   | 61W  | 140W   | 109W  |
| Warranty                | 2-year collect-and-return  | 2-year parts and labour   | 2-year collect-and-return  | 3-year labour, 1-year parts  | 2-year labour, 1-year parts   |
| Verdict                 | <ul style="list-style-type: none"> <li>• Mostly silent operation</li> <li>• Very good performance</li> <li>• Small case</li> <li>• Not the cheapest</li> </ul> | <ul style="list-style-type: none"> <li>• Silent and power-efficient</li> <li>• Looks and works great</li> <li>• Needs some software setup</li> <li>• Not the fastest overall</li> </ul> | <ul style="list-style-type: none"> <li>• Strong storage</li> <li>• Fastest general performance</li> <li>• Average gaming speeds</li> <li>• No Blu-ray</li> </ul> | <ul style="list-style-type: none"> <li>• Strong storage</li> <li>• Good gaming performance</li> <li>• Blu-ray writer</li> <li>• Rather too loud</li> </ul> | <ul style="list-style-type: none"> <li>• Vast storage</li> <li>• Blu-ray writer</li> <li>• Poor benchmark figures</li> <li>• High noise levels</li> </ul> |
| FULL REVIEW             | <a href="http://tinyurl.com/csfadgv">TINYURL.COM/CSFADGV</a>   | <a href="http://tinyurl.com/d2dazbq">TINYURL.COM/D2DAZBQ</a>  | <a href="http://tinyurl.com/d2cfdas">TINYURL.COM/D2CFDAS</a>   | <a href="http://tinyurl.com/blotlc7">TINYURL.COM/BLOTLC7</a>   | <a href="http://tinyurl.com/cjbmrld">TINYURL.COM/CJBMRDL</a>  |

## » Buying advice



## Media 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.

You can use any PC to create a media centre, but a quiet system is preferable. It's important to strike a balance between power consumption and performance -

not only will the PC probably be left switched on for long periods, but a high-performance processor will generate large amounts of heat, and cooling that chip can involve noisy whirring fans.






Fanless systems can be built using large passive heat sinks or heat pipes, although you can find ultra-quiet tweakable fans if fitting one is unavoidable.

SSDs have no moving parts, making them silent in use. They're expensive, mind, so consider setting up a NAS elsewhere in your home for extra storage.

A TV tuner is desirable; you'll need a dual-tuner to watch and record shows simultaneously.

Also look for a Blu-ray drive and a wireless keyboard and mouse.

**READ MORE:** [TINYURL.COM/CGFO2K](http://tinyurl.com/cgfo2k)

| Gaming PCs         | <br><b>1</b> PC ADVISOR<br>BEST BUY   | <br><b>2</b> PC ADVISOR<br>RECOMMENDED   | <br><b>3</b> PC ADVISOR<br>RECOMMENDED   | <br><b>4</b>   | <br><b>5</b>   |
|--------------------|--|---|--|---|---|
|                    | 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)<br>Intel Core i7-3770K   | 3.4GHz (4.6GHz)<br>Intel Core i5-3570K  | 3.1GHz Intel Core i5-3450  | 3.4GHz (4.5GHz)<br>Intel Core i5-3570K  | 3.4GHz (4.6GHz)<br>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<br>(1920x1080)  | 27in Asus PB278Q<br>(2560x1440)   | Not supplied   | 23.6in Asus VS247H<br>(1920x1080)   | 27in Iiyama E2773HDS<br>(1920x1080)   |
| Graphics           | Palit Jetstream nVidia<br>GeForce GTX 680  | EVGA nVidia GeForce<br>GTX 680  | Gigabyte nVidia GeForce<br>GTX 660 Windforce 2X  | Gigabyte nVidia GeForce<br>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<br>M60 mouse  | Not supplied   | Cyborg V7 keyboard,<br>Cyborg rat3 mouse  | Razer Arctosa keyboard,<br>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<br>package, card reader   | Corsair Vengeance<br>1300 headset   | None   | BullGuard security,<br>surge protector  | Microsoft Office 2010<br>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,<br>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 i5-3570K is a popular choice of CPU, but will require a decent cooler and beefy PSU. The HyperThreaded i7-3770K 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.

nVidia's GTX 680 delivers unparalleled performance – but at a price. Cheaper solutions include the GeForce GTX 660 and 670.

Look for wired peripherals and a headset. Good warranty terms are crucial for overclocked PCs.

**READ MORE:** [TINYURL.COM/CZXH443](http://tinyurl.com/czxh443)



| 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

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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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- GeForce GTX 680 2GB Graphics Card
- 120GB Samsung 840 Series SSD & 2TB HDD
- Blu Ray ROM / DVD-RW Drive
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| Business PCs       | 1  <b>PC ADVISOR</b><br>BEST BUY  | 2  <b>PC ADVISOR</b><br>RECOMMENDED  | 3  <b>PC ADVISOR</b><br>RECOMMENDED   | 4  <b>PC ADVISOR</b><br>RECOMMENDED   | 5  <b>PC ADVISOR</b><br>RECOMMENDED   |
|--------------------|--|---|---|--|--|
|                    | Chillblast Fusion Obsidian   | Apple Mac mini  | PC Specialist MPC-2120  | Eclipse eBiz i321r755  | Arbico FX4130 Office PC  |
| Price              | £549 inc VAT   | £429 inc VAT  | £539 inc VAT  | £599 inc VAT   | £500 inc VAT   |
| Website            | Chillblast.com   | Apple.com/uk  | Pcspecialist.co.uk  | Eclipsecomputers.com   | Arbico.co.uk   |
| Build rating       | ★★★★★☆☆  | ★★★★★★★   | ★★★★★☆☆   | ★★★★★☆☆  | ★★★★★☆☆  |
| Features rating    | ★★★★★☆☆  | ★★★★★☆☆   | ★★★★★☆☆   | ★★★★★☆☆  | ★★★★★☆☆  |
| Performance rating | ★★★★★☆☆  | ★★★★★☆☆   | ★★★★★☆☆   | ★★★★★☆☆  | ★★★★★☆☆  |
| Value rating       | ★★★★★☆☆  | ★★★★★☆☆   | ★★★★★☆☆   | ★★★★★☆☆  | ★★★★★☆☆  |
| Overall rating     | ★★★★★☆☆  | ★★★★★☆☆   | ★★★★★☆☆   | ★★★★★☆☆  | ★★★★★☆☆  |
| Processor          | 3.4GHz Intel Core i5-3570K   | 2.3GHz Intel Core i5-2415M  | 3.3GHz Intel Core i3-2120   | 3.1GHz Intel Core i3-2100  | 3.6GHz AMD FX-4100   |
| RAM                | 8GB DDR3   | 2GB DDR3  | 4GB DDR3  | 8GB DDR3   | 8GB DDR3   |
| Storage capacity   | 1TB SATA 6Gbps   | 500GB SATA  | 1TB SATA 6Gbps + 120GB SSD  | 1TB SATA 3Gbps   | 500GB SATA 6Gbps   |
| Motherboard        | Asus P8H61-M LE/USB3   | Apple Mac mini board  | Intel DH67CF  | Asus P8H61-M LE/USB3   | Asus M5A78L M/USB3   |
| CPU cooler         | Standard Intel cooler  | Custom active cooler  | Standard Intel cooler   | Standard Intel cooler  | Xigmatek Apache  |
| Power supply       | 500W EZCool  | 85W Delta Electronics   | 160W Power Man  | 450W unbranded   | 650W Ace   |
| Screen             | 21.5in Asus VE228T   | N/A   | N/A   | 2x 21.6in AOC F22+   | N/A  |
| Screen resolution  | 1920x1080 pixels   | N/A   | N/A   | 1920x1080  | N/A  |
| Graphics           | Intel HD Graphics 4000   | Intel HD Graphics 3000  | Intel HD Graphics 2000  | AMD Radeon HD 7750   | Asus nVidia GT 430   |
| Video memory       | N/A  | N/A   | N/A   | 1GB  | 1GB  |
| USB                | 2x USB 3.0, 8x USB 2.0   | 4x USB 2.0  | 2x USB 3.0, 7x USB 2.0  | 3x USB 3.0, 6x USB 2.0   | 2x USB 3.0, 4x USB 2.0   |
| Sound              | Onboard  | Onboard   | Onboard   | Onboard  | Onboard  |
| Speakers           | Built into monitor   | Not supplied  | Not supplied  | Not supplied   | Not supplied   |
| Case               | Cit Shade  | Apple Mac mini unibody  | In-Win BM643  | Generic 437-16 series  | Ace Ecco 250   |
| Keyboard           | Logitech MK260 (wired)   | Bluetooth Keyboard, Magic Trackpad (optional)   | Logitech K200 (wired)   | Logitech MK120 (wired)   | Logitech MK120 (wired)   |
| Optical drive      | 24x Sony DVD±RW  | N/A   | 8x Samsung DVD±RW   | 22x Samsung DVD±RW   | 24x Sony DVD±RW  |
| Operating system   | Windows 7 Professional 64bit   | Mac OS X 10.7 Lion  | Windows 7 Professional 64bit  | Windows 7 Home Prem 64bit  | Windows 7 Professional 64bit   |
| Bundled software   | Microsoft Office 2010 Starter  | iLife   | Microsoft Office 2010 Starter   | Microsoft Office 2010 Starter  | None   |
| WorldBench 6 score | 176  | 117   | 154   | 139  | 128 (est)  |
| Power consumption  | 39W/97W/9,603J   | 9W  | 22W/55W/11,440J   | 43W/93W/48,081J  | 63W/163W/73,676J   |
| Warranty           | 2-year collect-and-return  | 1-year collect-and-return   | 3-year RTB (labour only)  | 1-year RTB   | 2-year RTB (labour only)   |
| Verdict            | <ul style="list-style-type: none"> <li>Packs the latest Ivy Bridge processor</li> <li>Strong components and performance</li> <li>Superior 22in flat-panel</li> <li>HD 4000 a cut above the usual onboard graphics</li> </ul> | <ul style="list-style-type: none"> <li>Beautifully compact</li> <li>Good performance</li> <li>No DVD drive</li> <li>Very low power consumption</li> <li>Quiet and elegant</li> <li>Versatile OS X operating system</li> </ul> | <ul style="list-style-type: none"> <li>Small-form-factor PC takes up little desk space</li> <li>Very low power consumption</li> <li>Performance is adequate, but not stunning</li> <li>Graphics card only an onboard HD 2000</li> </ul> | <ul style="list-style-type: none"> <li>Dual-screen system</li> <li>Neither of the screens are of great quality</li> <li>CPU isn't very powerful</li> <li>Windows 7 Home Premium not aimed at office users</li> </ul> | <ul style="list-style-type: none"> <li>Sound-damping materials keep noise to a minimum</li> <li>Low price for a system with Windows 7 Professional</li> <li>Performance some way behind the fastest here</li> <li>No monitor included</li> </ul> |
| FULL REVIEW        | TINYURL.COM/CNOALAZ  | TINYURL.COM/88GUG5H   | TINYURL.COM/CT9ZR4J   | TINYURL.COM/CVFKRRZ  | TINYURL.COM/CRTC8M8  |

## >> Buying advice



### Business 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.

Provided you have sufficient RAM (at least 2GB, but preferably 4GB), any modern CPU will provide enough power for low-level admin tasks. Intel's Core i3 provides

ample performance for general use and come with integrated graphics, saving you the cost of buying an additional card.

In a typical networked business environment there will be storage available on the LAN, so you're unlikely to need a large hard drive. A 500GB drive should be ample.






Wireless keyboards and mice can cause issues in the workplace

due to interference between adjacent workstations. A decent wired kit is ideal, while quiet-typing keyboards can be less distracting.

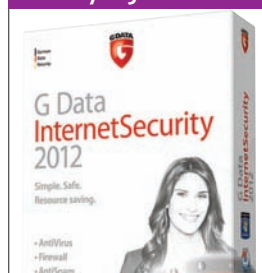
For small businesses with just one or two PCs, Windows 7 Home Premium is cheaper but can't connect to servers. The Pro edition is a better option for businesses, especially if you need compatibility with older software.



| Tablets                 |      |  |   |   |   |
|-------------------------|--|--|---|---|---|
|                         | 1  | 2  | 3   | 4   | 5   |
|                         | 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             | TINYURL.COM/CRSTDsk  | TINYURL.COM/CGBA439  | TINYURL.COM/CLJWUVS   | TINYURL.COM/ARL2KDG   | TINYURL.COM/CH6CLNZ   |

| Antivirus software         |      |   |  |   |  |
|----------------------------|---|---|--|---|--|
|                            | PC ADVISOR BEST BUY   | PC ADVISOR RECOMMENDED  | PC ADVISOR RECOMMENDED   | PC ADVISOR RECOMMENDED  | PC ADVISOR RECOMMENDED   |
|                            | 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                | TINYURL.COM/4P5YCXp   | TINYURL.COM/66SK77U   | TINYURL.COM/6BFXWCS  | TINYURL.COM/6HQA2WB   | TINYURL.COM/4HUORV3  |

## >> 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)

| Sub-£150 printers      |      |  |  |  |   |
|------------------------|--|--|--|--|---|
|                        | 1 <b>PC ADVISOR</b> GOLD   | 2 <b>PC ADVISOR</b> BEST BUY   | 3  | 4 <b>PC ADVISOR</b> RECOMMENDED  | 5 <b>PC ADVISOR</b> RECOMMENDED   |
|                        | Samsung ML-2955DW  | Oki C110   | Pantum P2050   | Canon MX895  | HP Photosmart 7520  |
| Price                  | £105 inc VAT   | £126 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 <b>PC ADVISOR</b> BEST BUY  | 2 <b>PC ADVISOR</b> RECOMMENDED   | 3 <b>PC ADVISOR</b> BEST BUY  | 4  | 5 <b>PC ADVISOR</b> RECOMMENDED   |
|                        | Kyocera Mita FS-1320D   | Lomond EvoJet 2 Office  | Kyocera FS-C5250DN  | Brother MFC-J4510DW  | Kyocera Ecosys FS-4300DN  |
| Price                  | £175 inc VAT  | £50-£150 per month  | £448 inc VAT  | £185 inc VAT   | £900 inc VAT  |
| Website                | Kyoceramita.co.uk   | Lomond.com  | Kyoceramita.co.uk   | Brother.co.uk  | Kyoceramita.co.uk   |
| Overall rating         | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★  | ★★★★★   |
| Technology             | Mono laser  | Colour laser  | Colour laser  | Colour inkjet  | Mono laser  |
| Max print resolution   | 1200x1200dpi  | 1600x1600dpi  | 600x600dpi  | 6000x1200dpi   | 1200dpi   |
| Actual print speed     | B=26.1ppm   | B=41.4ppm/C=23.1ppm   | B=24.8ppm/C=18.3ppm   | B=18.8ppm/C=12.8ppm  | B=41.2ppm   |
| Scan/fax facilities    | None  | None  | None  | 2400x2400 scans, fax   | None  |
| Supported interfaces   | USB 2.0   | USB 2.0, ethernet   | USB 2.0, ethernet   | USB 2.0, ethernet, Wi-Fi   | USB 2.0, ethernet   |
| Cost per page          | B=1.4p  | Variable  | B=1.2p/C=5.2p   | B=2.8p/C=5.7p  | B=0.4p  |
| Media card/auto duplex | ✓✓  | ✗✗  | ✗✓  | ✓✓   | ✗✓  |
| Input capacity         | 250 sheets  | 250 + 20 sheets   | 500 + 50 sheets   | 150 + 20 sheet ADF   | 500 + 100 sheets  |
| Dimensions             | 375x393x250mm   | 542x455x265mm   | 390x523x397mm   | 480x290x185mm  | 380x416x320mm   |
| Weight                 | 12kg  | 12.8kg  | 30kg  | 9.3kg  | 14.6kg  |
| Warranty               | 2 years   | 1 year  | 2 years   | 2 years  | 2 years   |
| 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>Monthly payment plans rather than outright purchase</li> <li>Stunning speed</li> <li>No auto-duplex</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> |
| FULL REVIEW            | TINYURL.COM/6GG9UKV   | TINYURL.COM/CLQAQ5V   | TINYURL.COM/7QM XVZA  | TINYURL.COM/BUE2DMY  | TINYURL.COM/9Y9HHT3   |

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 instore 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)

| Blu-ray drives   |      |  |   |  |  |
|------------------|--|--|---|--|--|
|                  | 1  | 2  | 3   | 4  | 5  |
|                  | LG BH10LS38  | Lite-On iHBS212  | LG BP40NS20   | Lite-On iHES112-115  | Buffalo BR3D-12U3  |
| Price            | £65 inc VAT  | £87 inc VAT  | £90 inc VAT   | £50 inc VAT  | £199 inc VAT   |
| Website          | Uk.lge.com   | Liteonit.eu  | Uk.lge.com  | Liteonit.eu  | Buffalotech.com  |
| Overall rating   | ★★★★★  | ★★★★★  | ★★★★★   | ★★★★★  | ★★★★★  |
| Blu-ray speeds   | 10x -R, 8x -R DL, 2x -RE, 10x -ROM   | 12x -R, 8x -R DL, 2x -RE, 8x -ROM  | 6x -R, 6x -R DL, 2x -RE, 6x -ROM  | 12x -ROM   | 12x -R, 12x -R DL, 2x -RE, 8x -ROM   |
| DVD speeds       | 16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 12x -RAM, 16x -ROM   | 16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 12x -RAM, 16x -ROM   | 8x ±R, 6x ±R DL, 6x -RW, 8x +RW, 5x -RAM, 8x -ROM   | 8x ±R, 8x ±R DL, 6x -RW, 8x +RW, 8x -ROM   | 16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 5x -RAM, 8x -ROM   |
| Max storage      | 50GB   | 50GB   | 100GB   | 8.5GB  | 50GB   |
| Interface type   | SATA (internal)  | SATA (internal)  | USB 2.0 (external)  | SATA (internal)  | USB 3.0 (external)   |
| Label technology | LightScribe  | LightScribe  | None  | None   | None   |
| Software         | (OEM - add £5 for software)  | CyberLink Blu-ray Suite  | PowerDVD, PowerProducer   | None   | PowerDVD, PowerProducer  |
| Dimensions       | 146x170x41mm   | 146x170x41mm   | 160x153x22mm  | 158x145x22mm   | 160x220x50mm   |
| Weight           | 749g   | 650g   | 380g  | 700g   | 1.1kg  |
| Warranty         | 1 year   | 2 years  | 1 year  | 2 years  | 2 years  |
| Verdict          | <ul style="list-style-type: none"> <li>• 10-speed internal writer</li> <li>• Attractive front panel</li> <li>• Reliable performance</li> <li>• Very good value</li> </ul>  | <ul style="list-style-type: none"> <li>• 12-speed internal writer</li> <li>• Issues during testing</li> <li>• Noisy during operation</li> <li>• Average with 4x media</li> </ul> | <ul style="list-style-type: none"> <li>• Attractive external model</li> <li>• Maxes out at 6x BD-R (most media is only 6x)</li> <li>• Supports triple-layer BD-R</li> </ul> | <ul style="list-style-type: none"> <li>• Playback only</li> <li>• No software included with many bundles</li> <li>• Low price</li> </ul> | <ul style="list-style-type: none"> <li>• 12-speed external writer</li> <li>• Power supply required</li> <li>• Bulky design</li> <li>• Expensive</li> </ul> |
| FULL REVIEW      | TINYURL.COM/8YTUJEF  | TINYURL.COM/65PXHUJ  | TINYURL.COM/BS8UAFF   | TINYURL.COM/8SYECMW  | TINYURL.COM/453BX7L  |

| Wireless routers           |      |   |   |  |   |
|----------------------------|---|---|---|--|---|
|                            | 1   | 2   | 3   | 4  | 5   |
|                            | Apple AirPort Express   | D-Link Cloud Router N600  | Cisco Linksys EA6500  | Asus RT-AC66U  | AVM FritzBox Fon 7390   |
| Price                      | £79 inc VAT   | £60 inc VAT   | £200 inc VAT  | £170 inc VAT   | £200 inc VAT  |
| Website                    | Apple.com/uk  | Dlink.com   | Linksysbycisco.com  | Uk.asus.com  | Fritzbox.eu   |
| Overall rating             | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★  | ★★★★★   |
| Standards supported        | 802.11a/b/g/n   | 802.11a/b/g/n   | 802.11b/g/n/ac  | 802.11b/g/n/ac   | 802.11a/b/g/n   |
| Frequency modes            | 2.4GHz/5GHz (concurrent)  | 2.4GHz/5GHz (concurrent)  | 2.4GHz/5GHz   | 2.4GHz/5GHz  | 2.4GHz/5GHz (concurrent)  |
| 128/256bit WEP/WPA2        | ✓ x ✓   | ✓ x ✓   | ✓ x ✓   | ✓ x ✓  | ✓ x ✓   |
| ADSL Modem/Guest NW        | x ✓   | x ✓   | x ✓   | x ✓  | x ✓   |
| Parental cont./mobile app  | ✓ ✓   | ✓ ✓   | ✓ ✓   | ✓ ✓  | ✓ ✓   |
| Firewall                   | NAT/SPI   | NAT/SPI   | NAT/SPI   | NAT/SPI  | NAT/SPI   |
| Ports                      | 10/100 WAN, 10/100 LAN, USB   | Gig WAN, 4x gig LAN, USB  | Gig WAN, 4x gig LAN, 2x USB   | Gig WAN, 4x gig LAN, 2x USB  | 10/100 WAN, 4x gig LAN, 2x USB  |
| Average power use          | Not tested  | Not tested  | 10.2W   | 9W   | Not tested  |
| Throughput (near, far, ac) | 94Mbps, n/a, n/a  | 142Mbps, 115Mbps, n/a   | 266Mbps, 195Mbps, 471Mbps   | 270Mbps, 199Mbps, 457Mbps  | 92Mbps, 38Mbps, n/a   |
| Dimensions, weight         | 98x98x23mm, 240g  | 111x93x145mm, 330g  | 256x184x40mm, 500g  | 207x149x36mm, 450kg  | 226x160x48mm, not specified   |
| Warranty                   | 1 year  | 1 year  | 2 years   | 2 years  | 5 years   |
| Verdict                    | <ul style="list-style-type: none"> <li>• Sleek, flat and square look</li> <li>• Concurrent 2.4/5GHz</li> <li>• Extremely easy setup</li> <li>• Digital audio output</li> </ul>  | <ul style="list-style-type: none"> <li>• Cloud features</li> <li>• Parental controls</li> <li>• Excellent value</li> <li>• Interesting looks</li> </ul> | <ul style="list-style-type: none"> <li>• Stunning performance</li> <li>• Excellent interface</li> <li>• Strong QoS</li> <li>• 802.11ac isn't cheap</li> </ul> | <ul style="list-style-type: none"> <li>• Decent value</li> <li>• Versatile antennae</li> <li>• Great for file-hosting and media streaming</li> </ul> | <ul style="list-style-type: none"> <li>• Supports landline and internet telephony</li> <li>• Dual-band Wi-Fi</li> <li>• USB port</li> </ul> |
| FULL REVIEW                | TINYURL.COM/6LH6OOS   | TINYURL.COM/9LGFF8Y   | TINYURL.COM/AWYOPYX   | TINYURL.COM/BU79W64  | TINYURL.COM/3QUJZBX   |

## >> Buying advice



### Blu-ray drives

A single Blu-ray Disc holds the equivalent of 35 CDs or five DVDs. It might look like a DVD, but its shorter wavelength and narrow blue laser beam allow it to hold greater capacity. It's the storage method of choice for HD and 3D video content.

External drives are easier to install, portable, and can be shared

between PCs, but they will cost you considerably more than internal models, and may not be as quick.

If you opt for an internal drive, ensure you have enough space inside your PC. Most internal drives use the SATA interface, so check you've got a compatible port.

Look for a drive that also supports several DVD formats, but don't obsess about write speeds.






You should be able to get 16-speed DVD writing, but it's not worth paying more to save seconds.

You may find that the Blu-ray media currently on the market isn't fast enough to enjoy your chosen drive's maximum write speeds. Six-/eight-speed BD-R capabilities are standard, but even six-speed BD-R media is still rare.

**READ MORE:** [TINYURL.COM/70EPYL6](http://tinyurl.com/70EPYL6)



| External hard drives |      |  |  |  |  |
|----------------------|--|--|--|--|--|
|                      | 1  | 2  | 3  | 4  | 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   | £75 inc VAT  | £295 inc VAT   | £750 inc VAT   | £395 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          | TINYURL.COM/BN2Z92F  | TINYURL.COM/BMG7SW9  | TINYURL.COM/BMGKSVY  | TINYURL.COM/CXEF6MH  | TINYURL.COM/C6TADAH  |

| NAS drives     |      |   |  |  |  |
|----------------|---|---|--|--|--|
|                | 1   | 2   | 3  | 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    | TINYURL.COM/6UUL4DE   | TINYURL.COM/7B9EPW8   | TINYURL.COM/72N4GBN  | TINYURL.COM/84JD226  | TINYURL.COM/7AT8HA5  |

## >> 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                         |    |    |   |    |   |
|------------------------------------|---|---|---|---|--|
|                                    | 1 <b>PC ADVISOR GOLD</b>  | 2   | 3   | 4   | 5  |
|                                    | <b>InFocus ScreenPlay SP8600</b>  | <b>Epson EB-1945W</b>   | <b>Vivitek Qumi Q2</b>  | <b>Dell M110</b>  | <b>ViewSonic Pro8300</b>   |
| Price                              | <b>£670 inc VAT</b>   | <b>£1,370 inc VAT</b>   | <b>£395 inc VAT</b>   | <b>£318 inc VAT</b>   | <b>£850 inc VAT</b>  |
| Website                            | Infocus.com   | Epson.co.uk   | Vivitek.co.uk   | Dell.co.uk  | Viewsoniceurope.com/uk   |
| Overall rating                     | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★  |
| Projection technology              | DLP   | 3LCD  | DLP   | DLP   | DLP  |
| Resolution (pixels)                | 1920x1080   | 1280x800  | 1280x800  | 1280x800  | 1920x1080  |
| Brightness <sup>1</sup> , Contrast | 1,800, 5,000:1  | 4200, 3,000:1   | 300, 2,500:1  | 300, 10,000:1   | 3,000, 4,000:1   |
| Image size                         | 300in   | 280in   | 30-90in   | 80in  | 300in  |
| Supported aspect ratios            | 16:10, 16:9, 4:3  | 16:10, 16:9, 4:3  | 16:10, 16:9, 4:3  | 16:10, 16:9, 4:3  | 16:9, 4:3  |
| Noise levels (dB)                  | 30 (26 eco)   | 37 (29 eco)   | 32 (28 eco)   | 36 (32 eco)   | 33 (29 eco)  |
| Connections                        | VGA, HDMI, CM, CP, SV, USB  | VGA, HDMI, DP, CM, USB, ET  | VGA, HDMI, USB  | VGA, HDMI, CM, CP, USB  | VGA, HDMI, SV, USB   |
| Lamp/lamp life                     | 230W/4,000 hrs  | Not supplied/2,500 hrs  | LED/30,000 hrs  | LED/10,000 hrs  | 230W/4,000 hrs   |
| Dimensions                         | 326x254x104mm   | 377x271x108mm   | 162x102x32mm  | 105x104x37mm  | 332x110x264mm  |
| Weight                             | 3.4kg   | 3.9kg   | 635g  | 360g  | 3.9kg  |
| Warranty                           | 5 years   | 5 years   | 3 years   | 2 years   | 3 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>• Incredibly easy to find optimum image quality</li> <li>• Strong spec and quality</li> <li>• Not particularly portable</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> |
| FULL REVIEW                        | <a href="http://TINYURL.COM/3HQANPV">TINYURL.COM/3HQANPV</a>  | <a href="http://TINYURL.COM/CP95P7G">TINYURL.COM/CP95P7G</a>  | <a href="http://TINYURL.COM/3TXMWPK">TINYURL.COM/3TXMWPK</a>  | <a href="http://TINYURL.COM/77S8D6D">TINYURL.COM/77S8D6D</a>  | <a href="http://TINYURL.COM/9PU6XJS">TINYURL.COM/9PU6XJS</a>   |

<sup>1</sup>Ansi lumens GLOSSARY: • CM: component • CP: composite • ET: ethernet • SV: S-Video

| Compact system cameras |    |    |    |   |   |
|------------------------|--|--|---|---|---|
|                        | 1 <b>PC ADVISOR RECOMMENDED</b>  | 2 <b>PC ADVISOR BEST BUY</b>   | 3   | 4 <b>PC ADVISOR GOLD</b>  | 5   |
|                        | <b>Panasonic DMC-G3 (14-42mm)</b>  | <b>Nikon D5100 (18-55mm)</b>   | <b>Canon EOS 600D (18-55mm)</b>   | <b>Sony Alpha NEX-5 (18-55mm)</b>   | <b>Pentax K-01 (18-55mm)</b>  |
| Price                  | <b>£350 inc VAT</b>  | <b>£530 inc VAT</b>  | <b>£490 inc VAT</b>   | <b>£490 inc VAT</b>   | <b>£425 inc VAT</b>   |
| Website                | Panasonic.co.uk  | Nikon.co.uk  | Canon.co.uk   | Sony.co.uk  | Pentax.co.uk  |
| Overall rating         | ★★★★★  | ★★★★★  | ★★★★★   | ★★★★★   | ★★★★★   |
| Megapixel rating       | 16Mp   | 16.2Mp   | 18Mp  | 14.6Mp  | 16.28Mp   |
| Maximum resolution     | 4592x3448 pixels   | 4923x3264 pixels   | 5184x3456 pixels  | 4592x3056 pixels  | 4928x3264 pixels  |
| Optical zoom           | 3x   | 3x   | 3x  | 3.1x  | 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   | SD/SDHC/SDXC  | MS/SD/SDHC  | SD/SDHC/SDXC  |
| Battery/life           | 1x lithium-ion/270 shots   | 1x lithium-ion/660 shots   | 1x lithium-ion/440 shots  | 1x lithium-ion/not specified  | 1x lithium-ion/540 shots  |
| ISO range              | 100 to 6,400   | 100 to 6,400   | 100 to 6,400  | 200 to 12,800   | 100 to 12,800   |
| Dimensions             | 115x84x47mm  | 124x97x79mm  | 133x100x80mm  | 111x59x38mm   | 121x59x79mm   |
| Weight                 | 336g   | 510g   | 570g  | 229g  | 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>• Now at an excellent price</li> <li>• Top-notch photo results</li> <li>• Fully auto/manual modes</li> <li>• Strong video capture</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>• K-mount lens</li> <li>• Impressive image quality</li> <li>• No optical viewfinder</li> <li>• Slower than digital SLRs</li> </ul> |
| FULL REVIEW            | <a href="http://TINYURL.COM/7JCXJCR">TINYURL.COM/7JCXJCR</a>   | <a href="http://TINYURL.COM/6UTE9KK">TINYURL.COM/6UTE9KK</a>   | <a href="http://TINYURL.COM/72STE88">TINYURL.COM/72STE88</a>  | <a href="http://TINYURL.COM/37XOZX5">TINYURL.COM/37XOZX5</a>  | <a href="http://TINYURL.COM/BOAJT08">TINYURL.COM/BOAJT08</a>  |

## » 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  |
|                         | Sapphire HD 7770 OC  | Sapphire Radeon HD 7750  | Asus Radeon HD 6670   | PNY XLR8 GTX 650 Ti  | Gigabyte GeForce GT 640 OC   |
| Price                   | £105 inc VAT   | £80 inc VAT  | £60 inc VAT   | £130 inc VAT   | £96 inc VAT  |
| 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             | TINYURL.COM/BWJ7BL9  | TINYURL.COM/7ZB5OE3  | TINYURL.COM/3LM8HGE   | TINYURL.COM/8Z5BDCZ  | TINYURL.COM/9OSWMK2  |

| £151+ graphics cards |      |  |  |  |  |
|----------------------|---|--|--|--|--|
|                      | 1   | 2  | 3  | 4  | 5  |
|                      | MSI GeForce GTX 670   | Zotac GeForce GTX 680  | Asus GTX 660 Ti  | Asus HD 7870 DirectCU II   | XFX 7970 3GB GDDR5   |
| Price                | £300 inc VAT  | £396 inc VAT   | £250 inc VAT   | £200 inc VAT   | £320 inc VAT   |
| 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          | TINYURL.COM/CRDW78J   | TINYURL.COM/C6C37QO  | TINYURL.COM/D5BV2NG  | TINYURL.COM/BUFAFF   | TINYURL.COM/6UZRVXC  |

## >> 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.

READ MORE: [TINYURL.COM/7BPUHQE](http://tinyurl.com/7BPUHQE)



| Sub-£200 flat-panels  |      |   |   |  |   |
|-----------------------|---|---|---|--|---|
|                       | 1   | 2   | 3   | 4  | 5   |
|                       | AOC i2352Vh   | BenQ GW2750HM   | ViewSonic VP2365-LED  | AOC i2353Fh  | ViewSonic VX2460H-LED   |
| Price                 | £132 inc VAT  | £195 inc VAT  | £190 inc VAT  | £145 inc VAT   | £141 inc VAT  |
| Website               | Aoc-europe.com  | Benq.co.uk  | Viewsoniceurope.com/uk  | Aoc-europe.com   | Viewsoniceurope.com   |
| Overall rating        | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★  | ★★★★★   |
| Screen size           | 23in  | 27in  | 23in  | 23in   | 23.6in  |
| Panel type            | In-plane switching  | Vertical alignment  | In-plane switching  | In-plane switching 3D  | Twisted nematic   |
| Native resolution     | 1920x1080 pixels  | 1920x1080 pixels  | 1920x1080 pixels  | 1920x1080 pixels   | 1920x1080 pixels  |
| Pixel pitch           | 0.27mm  | 0.31mm  | 0.27mm  | 0.27mm   | 0.27mm  |
| Brightness            | 258cd/m²  | 313cd/m²  | 238cd/m²  | 225cd/m²   | 250cd/m²  |
| Static contrast ratio | 731:1   | 1,530:1   | 681:1   | 666:1  | 710:1   |
| Response time         | 5ms   | 6ms   | 6ms   | 5ms  | 5ms   |
| Ports                 | 4x USB, DVI, HDMI, VGA  | HDMI, DVI, VGA  | DVI   | 2x HDMI, VGA   | 2x HDMI   |
| Dimensions            | 247x185x399mm   | 654x489x191mm   | 548x433x250mm   | 550x388x188mm  | 581x447x194mm   |
| Weight                | 3.2kg   | 5.6kg   | 5.4kg   | 5.6kg  | 3.5kg   |
| Warranty              | 3 years   | 3 years   | 3 years   | 3 years  | 3 years   |
| Verdict               | <ul style="list-style-type: none"> <li>• Good value IPS panel</li> <li>• Accurate colours</li> <li>• Plain styling</li> <li>• Few extras</li> </ul>   | <ul style="list-style-type: none"> <li>• Massive 27in screen</li> <li>• VA panel is excellent</li> <li>• Superb contrast ratios</li> <li>• Colour accuracy not perfect</li> </ul> | <ul style="list-style-type: none"> <li>• Better value than ever</li> <li>• Great quality</li> <li>• Good viewing angles</li> <li>• DVI port only</li> </ul> | <ul style="list-style-type: none"> <li>• Wide viewing angles</li> <li>• Excellent colours</li> <li>• Attractive, slimline design</li> <li>• No DVI connection</li> </ul> | <ul style="list-style-type: none"> <li>• Slim and stylish looks</li> <li>• Good range of inputs</li> <li>• One of the better examples of TN technology</li> </ul> |
| FULL REVIEW           | <a href="http://TINYURL.COM/7HXTVPV">TINYURL.COM/7HXTVPV</a>  | <a href="http://TINYURL.COM/BQKT65S">TINYURL.COM/BQKT65S</a>  | <a href="http://TINYURL.COM/5WMJLR9">TINYURL.COM/5WMJLR9</a>  | <a href="http://TINYURL.COM/7TWLB2A">TINYURL.COM/7TWLB2A</a>   | <a href="http://TINYURL.COM/CSQ2H7P">TINYURL.COM/CSQ2H7P</a>  |

| £200+ flat-panels     |      |   |   |   |  |
|-----------------------|--|---|---|---|--|
|                       | 1  | 2   | 3   | 4   | 5  |
|                       | Dell S2440L  | Asus PA248Q   | AOC myPlay i2757Fm  | ViewSonic VP2765-LED  | Philips 248X3LFH5B   |
| Price                 | £205 inc VAT   | £340 inc VAT  | £230 inc VAT  | £360 inc VAT  | £210 inc VAT   |
| Website               | Dell.co.uk   | Asus.com/uk   | Aoc.co.uk   | Viewsoniceurope.com/uk  | Philips.co.uk  |
| Overall rating        | ★★★★★  | ★★★★★   | ★★★★★   | ★★★★★   | ★★★★★  |
| Screen size           | 24in   | 24in  | 27in  | 27in  | 23.6in   |
| Panel type            | Vertical Alignment   | In-plane switching  | In-plane switching  | Advanced MVA  | Twisted nematic  |
| Native resolution     | 1920x1080 pixels   | 1920x1200 pixels  | 1920x1080 pixels  | 1920x1080 pixels  | 1920x1080 pixels   |
| Pixel pitch           | 0.28mm   | 0.27mm  | 0.31mm  | 0.31mm  | 0.27mm   |
| Brightness            | 239cd/m²   | 201cd/m²  | 237cd/m²  | 1,200cd/m²  | 326cd/m²   |
| Static contrast ratio | 1,200:1  | 630:1   | 660:1   | 378:1   | 800:1  |
| Response time         | 6ms  | 6ms   | 5ms   | 25ms  | 2ms  |
| Ports                 | HDMI, VGA  | 4x USB, HDMI, DVI, DP, VGA  | 2x HDMI, VGA  | DVI, DisplayPort  | 2x HDMI  |
| Dimensions            | 568x191x418mm  | 557x416x235mm   | 622x449x130mm   | 642x365x474-608mm   | 578x443x194mm  |
| Weight                | 3.6kg  | 6.4kg   | 5.7kg   | 8.5kg   | 5.1kg  |
| Warranty              | 3 years  | 3 years   | 3 years   | 3 years   | 3 years  |
| Verdict               | <ul style="list-style-type: none"> <li>• Premium build quality</li> <li>• Very good VA panel</li> <li>• Excellent contrast ratio</li> <li>• Calibrate for best results</li> </ul>  | <ul style="list-style-type: none"> <li>• For graphics professionals</li> <li>• Good control over image</li> <li>• Very accurate colour</li> <li>• 16:10 contrast ratio</li> </ul> | <ul style="list-style-type: none"> <li>• Nice 27in IPS panel</li> <li>• Versatile viewing angles</li> <li>• MHL Android hook-up</li> <li>• Base can be removed</li> </ul> | <ul style="list-style-type: none"> <li>• Large 27in display</li> <li>• Low resolution for size</li> <li>• Poor viewing angles</li> <li>• Slow response for games</li> </ul> | <ul style="list-style-type: none"> <li>• Graceful design</li> <li>• Illuminated Lightframe bezel reduces eye fatigue</li> <li>• Twisted nematic panel</li> </ul> |
| FULL REVIEW           | <a href="http://TINYURL.COM/CXWJLJM">TINYURL.COM/CXWJLJM</a>   | <a href="http://TINYURL.COM/CPYX7MQ">TINYURL.COM/CPYX7MQ</a>  | <a href="http://TINYURL.COM/C53K8KP">TINYURL.COM/C53K8KP</a>  | <a href="http://TINYURL.COM/86T3PFM">TINYURL.COM/86T3PFM</a>  | <a href="http://TINYURL.COM/6MJA2NS">TINYURL.COM/6MJA2NS</a>   |

## >> Buying advice



### Flat-panel displays

You'll spend most of your working day staring at the screen, so it makes sense to choose one that's comfortable to view.

The panel size will largely depend on your budget and amount of desk space, but those measuring 22in and above tend to offer a full-HD resolution. All but the cheapest models also have at

least one digital interface (DVI, HDMI or DisplayPort). VGA (or D-Sub) is an analogue interface, and won't provide as clean a signal.

The panel technology is important. Twisted nematic (TN) is the budget option, offering fast response times but limited viewing angles. Multiple vertical alignment (MVA) and patterned vertical alignment (PVA) screens offer

better viewing angles and higher contrast ratios than TN, but slower response times. Advanced MVA screens are more responsive.

In-plane switching (IPS) panels offer excellent viewing angles, contrast and colour accuracy, but they can be rather pricey.

Get a matt rather than gloss coating for fewer reflections.

**READ MORE:** [TINYURL.COM/6RMBVR6](http://TINYURL.COM/6RMBVR6)

JIM  
MARTIN

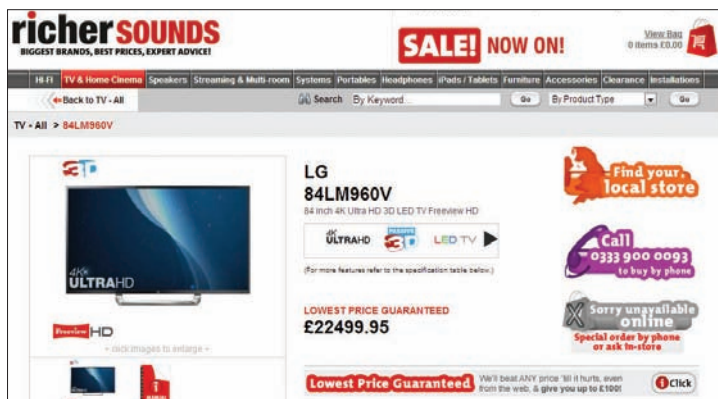


## The problem with 4K TVs

If you think your shiny new HDTV is the bee's knees, think again. A new generation of TV is on the way, which promises to make your so-called 'full-HD' set look like a blurry mess.

At January's Consumer Electronics Show (CES) in Las Vegas, pretty much every TV manufacturer was proudly demonstrating Ultra-HD screens, which are also known as 4K TVs. These have four times as many pixels as full-HD sets, with a huge resolution of 3840x2160.

It's easy to get over-excited about Ultra-HD, especially having seen the stunning demos and marvelled at the better-than-real-life image quality.



However, while manufacturers are rubbing their hands with glee at the prospect of being able to sell punters a new TV, Ultra-HD has a problem. In fact, it has several.

First is a lack of content. 3D was said to be the next big thing last year but, even now, there are relatively few 3D broadcasts. 4K will have the same problem. Netflix is already trialling a 4K streaming service, Sony promises a 4K content-delivery system by this summer, and at least one UK broadcaster is also running trials, but it could be years before programmes you want to watch are shown in Ultra-HD.

Next is price. LG is already selling a 4K TV in the UK: its 84LM960V costs £22,499. Only rich sportsmen need apply. Smaller, more affordable models are on the way, but these will still cost well over £10,000.

Arguably the biggest problem is size. Few people in the UK have the space - or are willing to put up with - a 55in TV in their lounge, which is probably the realistic minimum size for 4K. We're certain manufacturers will produce smaller versions, but at normal viewing distances the extra detail may not be particularly noticeable.

Most people didn't upgrade to HD for its better picture alone. Thrown into the bargain was a slimmer, more stylish TV set, and extras such as built-in BBC iPlayer support and HDMI. Anyone who already owns a TV with these perks will be much less likely to upgrade to 4K. ☒

## Next issue

ISSUE 214 ON SALE 7 MARCH 2013

**TEST  
CENTRE**

### Budget laptops round-up

We test the best-value sub-£600 laptops. These models barely deserve their 'budget' titles, as they're capable of handling just about any task.

**TEST  
CENTRE**

### HD TVs group test

From 32- to 42in, we look at full-HD TVs to suit all budgets. With 3D and Smart features, they're highly entertaining.

**TEST  
CENTRE**

### Office PCs reviewed

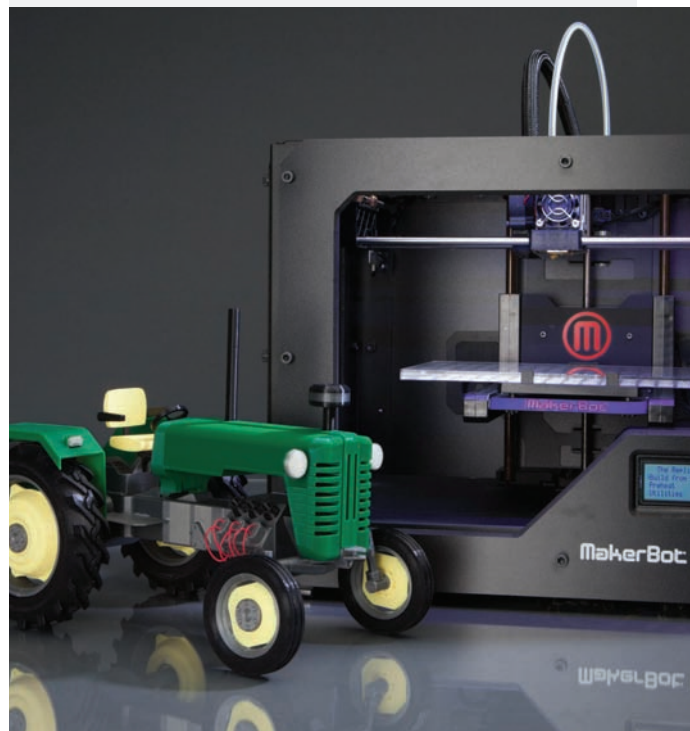
The Windows PC is dwindling in popularity, but it's still widely used in the workplace. We test six desktops that should appeal to office users.

### Make the most of Wi-Fi

If you're using your wireless router only for internet access, you're missing out. We show you lots of other great uses for Wi-Fi.

### Future tech

TVs that respond to gestures, 3D printing and big sensors in small cameras: just a few of the emerging technologies that you'll see on sale this year.



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