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The hunt for true portability

Being able to compute on the move is about a decent device and a decent connection

conomics aside, when you consider the pace of technological change over the past decade it's a wonder that any of us have to work more than three days a week. Of course, the opposite is true: work today is a thing you do, not a place you visit, and white-collar professionals are on-call seven days a week.

The efficiency engendered by technologies such as email mean the competition is fiercer. If your competitor is answering emails on Sunday evening you ought to be. And because you both do it, neither of you is gaining an advantage. Stalemate.

Another reason technology hasn't made us more time, however, is because it doesn't always work. Take mobile broadband. In order to have access to such staples as trees and golf courses I travel into- and out of London for three hours each day. In theory I work for most of that time, but in practice I can tell you exactly at what point my signal works, and the many areas in which I struggle to load up a web page.

The theory of mobile broadband is great – a constant connection in the palm of your hand wherever you are. But your connection becomes a lot less useful if you are unable to rely on it. And that speaks to a conundrum – if you can't rely on mobile broadband you won't use it, so you may not have noticed that it has improved. Certainly that was my experience this month when we set out to test mobile broadband.

As you can read on page 80, that experience saw us travel 800 miles around the country, carrying out 37 tests – simultaneously – on all the major mobile networks. It was a big undertaking that allows us to tell you with confidence which mobile networks are best.

When it works, mobile broadband works exceptionally well. I was surprised by the quality and speed of coverage provided by the better networks. But there's great variation between them.

Connectivity is but a small part of the ability to work remotely. You need a device on which to work, and we have been searching for mobile computers that offer the portability and staying power of a smartphone, combined with the productivity of a full-spec Windows PC. Could a Windows 8 tablet be the answer? We remain to be convinced.

We've taken a look at the factors involved in choosing a Windows tablet, and reviewed the cream of the current crop. There are great compromises to be had - full-spec, tiny PCs with decent performance - but compromises they are. And not cheap ones, either. We've yet to see a Windows tablet that can offer similar responsiveness and battery life to that of the iPad, but there isn't an iOS or Android tablet that can match Windows 8 for portable productivity. See our selection of Windows tablets on page 64.

One thing that may help is the introduction of Intel's 4th-gen Core processors, known as 'Haswell' (see page 12). Intel says Haswell will improve performance, but the most important change may be much better battery life. See how well early builds are performing in our first Haswell PC and laptops reviews starting on page 32. But if Intel can make processors that run Windows 8 quickly for nine hours or more of battery life, truly portable, powerful Windows PCs could be on the way.

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Reader comments











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letters@pcadvisor.co.uk

Windows, OS X compatibility I enjoyed your Windows 8 vs OS X comparison in the July issue, but you missed a vital point: crossplatform compatibility for both apps and peripherals.

I have two Windows 8 laptops, an iPad 3 and an iPhone 5. Apple AirPrint is a nightmare. I have a Canon multifunction printer that is useless with my iPad or iPhone. Why can't Apple simply use standard Wi-Fi?

And I've tried various apps to import a Microsoft Word document into iOS but none, including Pages, manages a clear and workable import every time.

If I buy a MacBook Air it will be because of the strength of the iPad and iPhone; if I don't it will be because of the compatibility issues. This is the same argument that stops me buying into Windows RT. I love Surface, but who wants yet another device with compatibility issues?

pcadvisor.co.uk

Windows PCs from £24

The Microsoft-backed Get Online @ Home scheme is offering Britons who receive housing benefit, income support, job seeker's allowance, pension credit and others benefits the chance to pick up a refurbished Windows desktop from just £24 (or a laptop for £74) when they also subscribe to £2.99-permonth broadband (see tinyurl.com/ke9wth7). The news didn't go down as well as we might have expected, however.

blessyz: 'Comes with a minimum 2GHz processor, 60GB hard drive, a CD drive, Microsoft Office Basic'... ah, that explains the price. I wouldn't pay more than £50 for a laptop with those specs.

Raymond: Those laptops and PCs are ancient, low-spec, and wouldn't run anything. The price is a joke - I wouldn't pay a penny for them. You're better off going to eBay and picking up a better spec at the same price.

furbian: Useless offer. Most broadband users will be locked in until the end of the year or longer, and there's no indication of what sort of connection you will get.



Windows 8 still struggling to find fans

I like to feel in charge of my PC. I started some 30 years ago with Windows 3.1, progressed through 95 and 98 to XP and Windows 7, skipping Windows ME and Vista. I tried Windows 8 on a new laptop but, despite months of perseverance, I couldn't get my head around it and finally decided to 'downgrade' to Windows 7. There is little wrong with Windows 7 that has been corrected in Windows 8 - so if it ain't broke, don't try to fix it. For me, Windows 8 is just another Vista, and the sooner that it is replaced the better," wrote AlanM on our Windows 8 review (see tinyurl.com/65jxpzL).

Flagged: Star letter

Data security tips

Thanks for your excellent 12 must-do PC tasks feature in the August issue. You mentioned encrypting data, which is a very useful suggestion and essential when handling client and confidential information. However, as well as setting up TrueCrypt (or similar encryption products), it is essential to consider the files that Word and Outlook download and automatically save to a default location. These also need to be saved into the encrypted folder.

You also pointed out the importance of backing up data. However, Carbonite and many cloud backups such as Dropbox are

not entirely foolproof. There is no password facility to lock down the backup, which means that if you don't have a password on your PC a hacker can easily gain access to and even delete files from your backup. Spideroak is a useful alternative here, since the application is password-protected. Andrew Northcott

Marie Brewis, managing editor, replies: Many thanks for your useful tips on data security, Andrew. For taking the time to share them with PC Advisor readers you've won a six-month subscription to Netflix.

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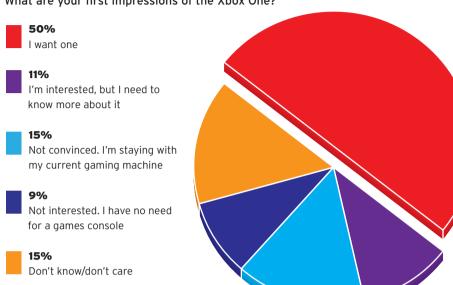


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pcadvisor.co.uk/polls

What are your first impressions of the Xbox One?



Based on 7,608 votes, tinyurl.com/mwc3ggr

facebook.com/pcadvisor

Who wants One?

Having polled the visitors to our website on their first impressions of Microsoft's new Xbox One games console, we put the same question to our Facebookers. Here are some of their thoughts:

Doug Green: Not two impressed so far. It would be better if Microsoft just gave me a three upgrade on my 360 - then I'd be all four it.

Tom Jones: I want ONE! I want ONE! I WANT ONF!

Elias Arismendez: Sounds like a lot more than just a regular gaming console.

Antony D'Andrea: HTC One, Xbox One... is this the age of adding 'One' to product names?

David 'nevyn' Williams: Apathetic.

Surface Pro

Microsoft has finally announced the UK pricing for its Surface Pro Windows 8 tablet. It'll cost £719 with 64GB of storage and £799 with 128GB. "I was looking at these last year when I was researching tablets but, blimey-

oh-Riley, that's very expensive," wrote Jen Hemmings. Richard Vine agreed: "Microsoft has priced it so high for what it is," he said.

BBM on iOS, Android

BlackBerry Messenger (BBM) is to be made available to Android and iOS smartphones and tablets via a free mobile app, but can it win back its fans? "Too late," wrote Marty Kirwan. "All my friends have already migrated to iPhones and Droids. This app should have been released years ago when BlackBerry was still relevant."

5G broadband on the horizon

Samsung has announced developments in 5G that it claims mean the technology could launch by 2020, we excitedly told Facebookers. "You make it sound as though it'll be here tomorrow," wrote Erick Abiyah, who clearly has more patience than we do. "We are still using 3G and 3G+ in Kenya, and we won't start using 5G until maybe 2025. Let's wait."

"This is getting silly," added James Foster. "They still haven't fully integrated 3G, 4G has barely started, and they're already talking about 5G!"

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Energy-saving tips

We asked forum members for their energy-saving tips. Don't try some of these at home (tinyurl.com/Lvy9zhv).

AI94 Use more deodorant and use the electric shower less! Buy a clothes line and ditch the tumble drier.

wee eddie Reinstate the net curtains - gives you triple glazing on the guiet.

Bing.alau If it's really cold, rather than turning up the heating, don't be afraid to wear ladies tights beneath your normal clothing.

Fruit Bat /\0/\ Rub a bit of amber on a nylon jumper and create your own electricity for free (also helps to keep you warm in the process).

Graham* Drill a small hole in the fridge door to check the light goes out when you close it.

Mr Mistoffelees Don't use your car for travelling on a windy day. All you need is rollerskates, or a skateboard and a sail.

abby Put a drop of Super Glue on the central heating thermostat.

Bald Eagle When daylight fades we put homemade non-flammable expanded polystyrene slabs into the window reveals to keep the heat in the house. Papered to match the room (wife's demand) they are unobtrusive.

Aitchbee I have been experimenting with my spare roof tiles as a replacement for aluminium foil underneath my gas-oven grill pan. They absorb the heat and, after a quick clean, can be used to heat a cold area, whatever that might be...

...Mr Mistoffelees On a cold morning you could strap hot tiles to your feet and save money on slippers. oximes

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Haswell offers 'better performance' and 'reduced power consumption' than predecessor Ivy Bridge

Intel has launched the fourth generation of its Core processor series. The quad-core chips, codenamed Haswell, offer better performance and the biggest increase in battery life in Intel's history, says the firm.

Intel refutes the idea that we are living in a post-PC world. It believes the PC is becoming a more diverse, portable and consumer-friendly beast, and its processors are now better equipped than ever to meet that challenge. The distinct worlds of smartphones and desktop PCs are converging, and it is at this sweet spot that Haswell chips are aimed. Indeed, it is promoting the fourth-gen chips as part of a move toward two-in-one computing.

Intel has also revised the minimum spec for Ultrabooks. Such laptops must now be no thicker than 25mm, and include both a touchscreen and voice control. In battery mode they also have to last seven days on standby, and nine hours when idling.

Intel believes its fourth-gen Core processors are perfectly designed for all-in-one PCs, too. To this end, it has focused on lower power consumption and stronger integrated graphics. The new low-voltage processors have a thermal design power (TDP) as low as 7W, which is much lower than the 17W of some third-generation Ultrabook processors.

If PC makers use this feature wisely it could mean a big breakthrough in battery life, but in the past many have taken the opportunity to build in cheaper batteries.

The chips

Intel has introduced four mobile and three desktop Haswell chips. The H-, M-, U- and Y-series processors are aimed at laptops and tablets, the K-series are enthusiast processors intended to be overclocked for extreme performance, and the S- and T-series are low-power chips for desktops.

We saw the die map
of a fourth-generation
Core processor, built on a
22-nanometre process, with Tri-Gate
3D transistors. An L3 cache is shared
across all four cores and the GPU, with
1.4 billion transistors on a 177mm² die.
As part of Intel's drive toward portability
it has moved from a traditional two-chip
platform to a single-chip BGA solution with
the CPU and platform controller hub (PCH)
integrated into a single package.

Integrated graphics are an important factor when it comes to battery life - if

they aren't up to the job then PC makers will fit power-hungry graphics cards. Intel says it has improved its already impressive onboard graphics with the addition of features such as faster Intel Quick Sync Video, Jpeg and Mpeg decoding, OpenCL 1.2 support and three-screen collage display.

There is enhanced 4Kx2K support, plus double the bandwidth with DisplayPort 1.2. Intel has added Iris Pro graphics with integrated on-package EDRAM memory and

API support for DirectX
11.1, OpenCL 1.2 and
OpenGL 4.0. It should,
Intel says, add up to twice
the graphics performance
for fourth-gen Ultrabooks
when compared to those with
third-gen processors.

As well as the existing Intel HD Graphics 4000, look for Intel Iris Pro Graphics 5200, Intel Iris Graphics 5100 and Intel HD Graphics 5000, plus Inte

5100 and Intel HD Graphics 5000, plus Intel HD Graphics 4600, 4400 and 4200.

Intel has also improved Wireless Display. Wireless Display 4.1 includes such features as low power panel self-refresh, reduced latency and a touch-first interface. There's support for more USB devices and full-resolution S3D, too.





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BRITONS OFFERED PCs AND LAPTOPS FROM £24

Microsoft-backed Get Online @ Home scheme aims to get more of Britain's population surfing

A Microsoft-backed scheme is offering British consumers PCs and laptops from just £24 inc VAT.

Get Online @ Home launched in June to help millions of households across the UK get connected. The scheme is offering eligible consumers a refurbished computer for as little as £24 when they also subscribe to broadband (£2.99 per month).

Baroness Martha Lane-Fox, founder of Go ON UK, the charity behind the scheme, said: "With the cost of internet access cited as a key reason for not being online, this is an incredible saving and will transform the lives of everyone that hasn't been able to get online before."

Those who claim housing benefit, income support, job seeker's allowance,

pension credit and other benefits are eligible for a refurbished desktop PC for £99 or laptop for £149. A £75 discount is applied when they also sign up to broadband, at £2.99 per month, bringing down to just £24 the cost for a Windows 7 PC with a monitor, keyboard and mouse.

Those who do not meet the eligibility criteria can pay £149 and £179 for the desktop PC or laptop respectively.

The PCs and laptops, supplied by Computer Recyclers, Stone, Partners IT and others, come with a minimum 2GHz processor, a 60GB hard drive, a CD drive, Microsoft Office Basic and a one-year warranty.

"Many devices will be better than this," admitted Get Online @ Home.

Households that are not online may be losing out financially. More and more services and jobs require you to fill in online application forms, for example.

Samsung chooses Intel over ARM for its 3rd-gen Galaxy Tabs

Galaxy Tab 3 8in and 10.1in are powered by 1.5- and 1.6GHz Intel Atom dual-core processors

Following the unveiling of its Galaxy Tab 3 7in, Samsung has announced two more Galaxy Tab 3 tablets, but this time running Intel Atom chips.

Samsung has taken off the wraps from its Galaxy Tab 3 8in and 10.1in, which are the first Android tablets made by the company to feature Intel rather than ARM processors.

Samsung said in a statement: "In order to meet the demand from our vendor/carrier partners and provide a consistent high-quality experience for customers, Samsung has sourced components, including chipsets, from trusted partners."

It represents a big win for Intel in the mobile market: the firm has previously struggled to compete with the dominance of ARM. Samsung is the biggest vendor of Android tablets in the world and has a market share of 18 percent, according to IDC.

The firm said that each model will arrive globally in June, and will be available in the UK later this year. Models with 4G, 3G and Wi-Fi-only connectivity will be available.

The 8in model has a 1.5GHz dual-core processor, a 1280x800 (189ppi) display, 1.5GB of RAM, a 5Mp rear camera and 16- or 32GB of internal storage. A microSDXC slot supports expansion.

Samsung said its Galaxy Tab 3 8in is "the optimal device for viewing videos, playing enhanced games, and reading e-books anytime, anywhere." The Galaxy Tab 3 10.1in features a marginally faster 1.6GHz dual-core processor, a 1280x800 (149ppi) screen and 16- or 32GB of storage. However, it only has 1GB of RAM and a 3Mp rear facing camera.

According to Samsung, the Galaxy Tab 3 10in has been designed to be the best





Microsoft U-turn on **Xbox restrictions**

After a frenzy of public and media criticism, Microsoft has caved into pressure and changed key aspects of its Xbox One. The console no longer requires an internet connection to authenticate every 24 hours and physical games can be shared without restriction. It hasn't changed the price, though - not yet anyway. MORE: tinyurl.com/qapwws7

Apple unveils iOS 7 at WWDC

Apple has announced iOS 7, which it claims is "the most significant iOS update since the original iPhone". The redesign includes subtle motion, a fresh colour palette and new typography to create a leaner. simpler look. New features include the Control Centre and a Spotify rival called iTunes Radio. MORE: tinyurl.com/jwfl252



BBM to launch on iOS and Android

BlackBerry has announced it will unleash BlackBerry Messenger (BBM) to both Apple's iOS and Google's Android. The struggling smartphone maker will launch its instant-messaging app on its rival mobile operating systems this summer.

MORE: tinyurl.com/Lscpheb

VODAFONE DELAYS 4G NETWORK ROLLOUT

Operator will spend £900m boosting network's reach and performance

Vodafone has admitted that it won't launch its 4G mobile-data service until the end of summer.

The mobile operator is investing £900m, 50 percent more than last year, to help cope with the launch of 4G and other services. That's on top of the £800m already spent on 4G spectrum in Ofcom's auction earlier this year.

Vodafone has been selling 4G-ready handsets since the beginning of spring, so many spectators expected its 4G service to launch much earlier.

EE, which owns T-Mobile and Orange in the UK. launched its 4G service last year and claims its 4G network can already be reached by more than 50 percent of UK homes and businesses.

Vodafone's delaying of its own 4G service will invite questions as to how many customers will be able to access 4G from the off, despite them paying a significant premium for their use of a 4G smartphone.

Vodafone savs its 4G service will be available both indoors and outdoors to 98 percent of the UK population by 2015.

Guy Laurence, Vodafone UK chief executive, told the Financial Times: "This investment is further evidence of our commitment to deliver our best ever network. We're bringing together the best of mobile and fixed communications to help our business customers make their communications work for them."

It's still not clear when mobile operators O2 and Three will launch their own 4G services, having



EE launches UK's first shared mobile tariffs

Offers combined data bundles for 4G phones and tablets, plus a PAYG option

EE has launched a range of tariffs that allow its customers to share 4G plans across phones and tablets, or even with other people.

This is the first time a UK operator has allowed multiple devices on a single contract. Pricing and availability has not yet been announced, but EE said that the new plans will offer great value.

The company has also announced a pay-as-yougo broadband offering with a range of data bundles.



"We recognise that with 4G customers connect to the things they care about more frequently, across more devices. Our Shared 4GEE plans and Pay as You Go 4GEE Mobile Broadband will offer our customers more ways to do this," said CEO Olaf Swantee.

The announcement coincided with the news that 500,000 customers are now signed up to EE's 4G service, just seven months after launch. The operator said it has been the fastest uptake of 4G in Europe and it aims to reach 1 million 4G customers by the end of the year.

"This represents a remarkable turnaround for the UK, which is on track to become the largest European market by 4G subscribers this year," said Kester Mann, a senior analyst at CCS Insight.

EE is currently preparing to roll out its double-speed 4G service (averaging 24-30Mbps) in Birmingham, Bristol, Cardiff, Edinburgh, Glasgow, Leeds, Liverpool, London, Manchester and Sheffield.

By the end of June, EE expected its 4G network to reach more than 55 percent of the UK population, and cover 98 percent by the end of 2014. As well as expanding to more key towns and cities, the next phase of EE's 4G rollout will target major commuter routes, shopping centres and airport hubs. oximes

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The increasingly connected world promises to usher in an automated future that will see the internet of people surpassed by the internet of things. Martyn Casserly explains onnectivity is a word that's synonymous with the internet. Whether it be access to the vast store of human knowledge that nestles in the millions of servers around the world, videos of teenagers hurling themselves off buildings with the intent of tucking and rolling on to a nearby roof, or proud parents sharing the precious first images of their newborn on Facebook, the internet brings to us these things with incredible efficiency and ease.

It is estimated that around 2.5 billion people use the web, with that figure set to rise over the next few years as developing nations become increasingly connected. But on the horizon is something that looks set to eclipse this colossus of communication: as more and more devices are embedded with sensors and the ability to communicate we are experiencing the birth of a new type of network, one that promises to usher in an automated future that will see the internet of people surpassed by the internet of things.

Automated environment

The idea of this new system is a reasonably simple one, but the applications can become incredibly complex depending on how many devices are involved. In its basic form the internet of things incorporates devices that can remotely communicate with other devices. For example, if you've ever gone

out, then remembered that you didn't set the PVR to record 'Game of Thrones' and used the Sky+ app on your smartphone to instruct your Sky+ box to do so, you have already interacted with the internet of things.

Another example is provided by a Nest thermostat, to which you can send a command from your phone to ensure the house is warm upon your return.

These useful functions give us a greater control over our environment, but they still require human interaction. Ultimately, the internet of things will see devices analyse the available information and make decisions for themselves.

"Today computers – and, therefore, the Internet – are almost wholly dependent on human beings for information," writes Kevin Ashton, the British technology pioneer who coined the term 'Internet of Things'.

"Nearly all of the roughly 50 petabytes of data available on the Internet were first captured and created by human beings – by typing, pressing a record button, taking a digital picture or scanning a barcode. Conventional diagrams of the Internet include servers and routers and so on, but they leave out the most numerous and important routers of all: people. The problem is, people have limited time, attention and accuracy – all of which means they are not very good at capturing data about things in the real world.





"If we had computers that knew everything there was to know about things - using data they gathered without any help from us - we would be able to track and count everything, and greatly reduce waste, loss and cost. We would know when things needed replacing, repairing or recalling, and whether they were fresh or past their best.

"We need to empower computers with their own means of gathering information, so they can see, hear and smell the world for themselves, in all its random glory," he writes.

Applications

Now before you yell "Skynet!" and start hoarding arms in the deserts of Mexico, it should be made clear that these decisions are more mundane than the total automation of a large superpower's military force.

A common example is that of a washing machine and dishwasher. The owner loads both, but then goes out. He relies on the smart machines to talk to a national grid device, which will tell them when the demand across the grid is at a low rate and therefore the most environmentally friendly time to commence their duties.

A recent trial in the Isle of Wight that combined various energy-saving devices and used the data generated to identify hotspots ended up saving one household £170 on their annual electricity bill. The trial has been so

successful that the island is now being used as a testbed for a smart electricity grid.

Public-transport services are also prime locations for smart connected devices. In London the iBus system works with more than 8,000 buses fitted with GPS capabilities and various other sensors that relay data about the vehicle's location and current progress. This data informs the electronic signposts at bus stops, which display details of when the bus will arrive. The information is also sent to the Control Centre, where it can trigger priority requests for traffic signals if the bus is running behind schedule.

As cars now become more connected, through built-in mapping services and the like, in a few years we could see in major cities dynamic, responsive, even predictive traffic control as it actively monitors the locations and speed of every vehicle on the road. Add the driverless cars with which Google is experimenting and traffic jams could become a thing of myth and legend.

This location-based technology is also proposed for the healthcare sector. By tagging various medical equipment such as defibrillators with RFID tags, the nurses can identify exactly where within a hospital the necessary equipment is and retrieve it more quickly. This small aid could enable nurses to spend more time with their patients, and more timely administering of treatment.

Patients themselves could benefit from smart technologies following their discharge from the hospital. For example, a pill box could trigger an email or automated phone call to a relative should the patient forget to take their medicine.

These smaller real-world applications will converge to form something extraordinary: a constantly updated database of information that can be interpreted in real time and produce valuable and relevant information.

Imagine you are the relative of the aforementioned patient who forgot to take their medicine. You receive the alert, are able to learn their location and remotely check their vital signs, then be informed by your car's navigation system which hospital has the most free beds, the clearest traffic route to get there, and even where you can park.

Many of these ideas are still in their infancy, but rapid advances in technology make them a real possibility. There are hurdles to overcome in terms of privacy protection and the protocol these devices will use, but the potential gains have promoted incredible levels of investment.

By 2020 it is estimated that there will be more than 50 billion connected devices on the planet - that's around six per person. If we can harness this power and build a communication framework to support it, what seems like the realms of science-fiction now could become a reality in just a few years. ⊠

New devices emerge as 'fatbooks' fade away

PC makers are experimenting with new laptop and hybrid form-factors to compete with tablets, says Agam Shah

he trusty old laptop is being kicked to the curb, with PC makers trying to spice up their offerings by pushing a variety of hybrids, tablets and smaller-screen devices at the recent Computex tradeshow in Taipei.

Asus, Acer and Dell have introduced tablets and markedly different laptop designs in an effort to revive their flagging fortunes. Many of the products use Intel's Atom chip or next-generation Core processor, called Haswell, which launched at the event.

Some of the thin-and-light laptops have detachable screens, or displays that can slide or rotate. There's also an uptick in the number of products being offered with Google's Android mobile operating system, since Windows 8 struggles to find its feet on touchscreen devices.

desktop when connected to a wireless display. The Trio has a 1920x1080 screen and up to 64GB of storage. Asus has yet to confirm pricing and availability.



Acer Iconia W3

Also on display was Acer's 8in Iconia W3, the first small-screen Windows 8 tablet. Until now, Windows tablets have come with 10in or larger screens, and Acer is reacting to a trend toward smaller devices driven by Amazon's Kindle Fire and Google's Nexus 7. The Iconia W3 weighs 540g, making it heavier than the iPad mini and Nexus 7, and is expected to cost between \$400 and \$500 in the US. It has a 1200x800-pixel screen and comes with up to 64GB of storage.

Dell XPS 11

Dell showed off the XPS 11, a hybrid device similar to Lenovo's IdeaPad Yoga. The 11.6in Gorilla Glass screen can be folded back through 360 degrees to turn the XPS 11 into a tablet. The keyboard fits snugly into the chassis, making it less apparent when the device is used in tablet mode. The screen can display images at a 2560x1440 pixels. Pricing has yet to be confirmed, but the product is due to ship worldwide by December.

Design and screen size matter, but functionality, portability and long battery life are more important, according to Kirk Schell, vice president of computing products at Dell.

It may take some time to find out which designs consumers like best, Schell said. The market is changing fast and there are unexplored opportunities to tap into.

The PC industry won't stand still either, and Intel is looking to add more features and functionality, such as face log-ins, voice controls and 3D cameras.

"Personal computing is alive and well. it's just morphing, said Kirk Skaugen, senior vice

president and general manager of Intel's PC Client Group. The market that once comprised generic desktops and laptops is now made up of all-in-one PCs and hybrid laptops that can double as tablets.

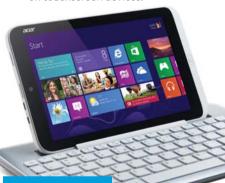
BOOK TRIO

ASUS TRANSFORMER

"You get all the greatness of the PC, but you are getting all the things people have been used to in the tablet," Skaugen said.

That's not to say people don't want pure tablets - and not ones running Intel chips, either. Perhaps the product that caused the greatest stir at Asus's press conference was its Memo Pad FHD7. It wasn't the tablet's Android OS or ARM-based processor that wooed the crowd, but the price tag, which starts at just \$129. That's difficult for a Windows PC in any form-factor to match.

Still, Intel believes tablets in their current form remain secondary devices, for content consumption rather than creation. And through its new Haswell chips, Intel says its partners will offer full-powered laptops - and tablets - that can be used for editing video and other demanding tasks. oximes



ACER ICONIA W3

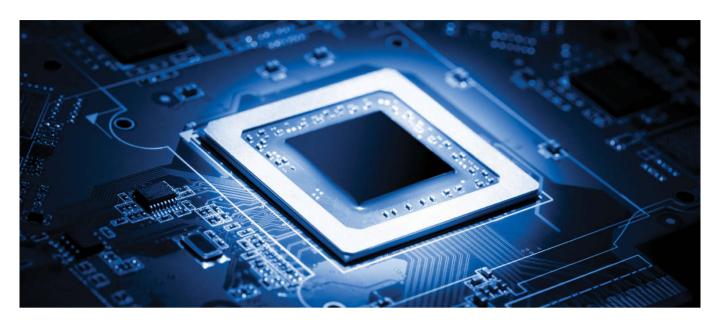
PC shipments have been in a terrible slump, thanks partly to the surging popularity of tablets, and PC makers are trying to adapt to the new reality. Many are replacing old-school laptops - which Intel executives refer to as "fatbooks" - with new styles that can be adapted for different uses.

Some are inspired by tablets and emphasise touch and long battery life, although vendors insist they also come with PC-like performance. And while Taiwan's computer manufacturers are all talking about reinventing the PC, many of them can't resist the urge to throw in a keyboard.

Asus Transformer Book Trio

Asus has introduced some of the most attention-grabbing designs. Perhaps most intriguing was its Transformer Book Trio, a dual-OS device that Chairman Jonney Shih described as a laptop, tablet and a desktop all rolled into one.





AMD no longer a Windows-only chip maker

AMD has broken free from Windows exclusivity and adopted Google Android and Chrome OS. Agam Shah explains

fter years of Windows operating system exclusivity, AMD will design processors that run Google's Android and Chrome OS in PCs and tablets.

AMD is expanding OS options as it designs chips based on x86 and ARM architecture, which run multiple OSes, said Lisa Su, senior vice president and general manager of global business units at AMD.

AMD is also expanding its custom-chip business, and Android and Chrome OS offer flexibility for third-party chip design and integration, Su said.

"We are very committed to Windows 8, we think it's a great operating system - but we also see a market developing for Android and Chrome," Su said.

AMD previously said it had no interest in Android and that its chips would be exclusively tuned for Microsoft's Windows 8. But now the company will adapt its chips for companies that want to build laptops or tablets with Android or Chrome.

"I think Android and Chrome tend to be in the entry-form-factors - the tablets, the low-end clamshells," Su said.

Su did not comment on when AMD-based Android tablets would reach the market. But the company is working with developers on Android applications for AMD chips.

Independent efforts are already under way to bring Android support to AMDbased tablets and PCs. AMD also offers the BlueStacks emulator to run Android apps on Windows PCs. ARM, Intel and MIPS chips are already compatible with Android, although most native Android code is written for ARM.

Adoption of Windows 8 on tablets has been weak, and Android support could open up a larger market for AMD. Its Z-01 and Z-60 tablet chips were used in just a handful of Windows tablets, none of which sold well.

Temash

AMD hopes to get a fresh start in tablets with the latest chips in the product line codenamed Temash, the A4 and A6. The chips offers power consumption as low as 3.9W and battery life up to 8 hours.

Devices with Temash are expected in the second half of the year, and a prototype tablet from Quanta was shown by AMD at the recent Computex tradeshow.

The Temash chips are 64bit and have been designed with Windows 8. In contrast to Intel's forthcoming Bay Trail tablet chips, which have a stronger focus on battery life, the chips are designed to provide PC-like performance on tablets. Temash includes support for DirectX 11, which improves gaming on Windows.

Bay Trail chips will go into Windows 8.1 and Android tablets starting at \$199.





LTE & smartphones drive mobile traffic

The total number of global smartphone subscriptions will reach 4.5 billion by the end of 2018, reports Mikael Ricknäs

he spread of smartphones powered by fast 3G and LTE networks is pushing up the volume of mobile data traffic as more and more video is consumed. The challenge for operators will be to turn that into more revenue, as users prefer Wi-Fi networks, an analyst said.

While recent financial reports from operators have shown tepid growth in some parts of the world, especially in the south of Europe, the coming years will still see smartphone subscriptions and traffic significantly increase on a global basis, according to Ericsson's Mobility Report.

Two billion handsets

It took five years to reach one billion smartphones shipped, but it will take just two years to reach the two billion mark, which illustrates how fast the industry is moving.

Much of that growth is expected to come from developing countries, according to Pyramid Research. Global smartphone sales are expected to more than double between 2012 and 2017, with sell-through in emerging markets expected to generate 58 percent of smartphone sales during the period, it said.

The total number of global smartphone subscriptions hit 1.2 billion in 2012, and will reach 4.5 billion by the end of 2018, according to Ericsson. More subscriptions will help drive traffic growth, and challenge operators to build networks that can cope with increasing loads. Overall data traffic is expected to grow twelve-fold by the end of 2018, Ericsson said.

Much of that growth comes from video, which hogs the largest amount of traffic in networks and it is expected to grow by about 60 percent annually until the end of 2018.

Cellular vs Wi-Fi

The growing popularity of video is also due to the faster network speeds offered by technologies such as LTE. Nonetheless, cellular networks aren't delivering the bulk of smartphone data traffic, according to Mark Newman, chief research officer at Informa.

"We have access to some very good statistics that suggest the majority of data traffic on smartphones is via Wi-Fi. That is because most usage takes place at home where Wi-Fi coverage tends to be better than 3G," Newman said.

Fast LTE will be key for operators if they want that data traffic and the revenue that comes with it. And as revenue from calls and messaging decreases they will become more dependent on data.

Vodafone's latest fiscal year highlighted that problem. In its case, revenue from voice and messaging decreased by £3.8bn, while data revenue grew by just £469m.

LTE is now growing, particularly in North America, and will represent the majority of subscriptions in the region by 2016. That compares to Western Europe, where the 4G technology will represent around 35 percent of subscriptions by 2018.

LTE services will be available to about 60 percent of the world's population in 2018, according to Ericsson. The number of commercial LTE networks has grown to about 175 and will surpass 200 before the end of the year.

But while LTE is getting a lot of attention, Ericsson also said WCDMA and HSPA had three times more net additions - 60 million versus 20 million - in the first quarter. There are already more than 500 HSPA networks, according to industry organisation GSA.



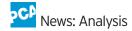


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Google woos software developers at I/O

In the August issue we reported announcements from Google's I/O conference, but the big move was a newfound focus on developers, argues Mikael Ricknäs

oogle did its best to court software developers at this year's I/O conference with a much-needed integrated developer environment API for better games and the ability to more easily translate apps. Their allegiance will become increasingly important as smartphone and tablet hardware sees fewer dramatic improvements.

"You guys, Android developers, are the heart of this ecosystem and I think you know that. We have been on this journey together for over five years now," said Hugo Barra, vice president of Android product management, during the opening keynote.

"Google Play has just crossed 48 billion app installs but, even better than that, over the past four months of this year we have already paid out more money to Android developers on Google Play than in all of last year," he said.

Importance of software

Google's focus on developers doesn't come as a surprise, given how the smartphone and tablet market is changing.

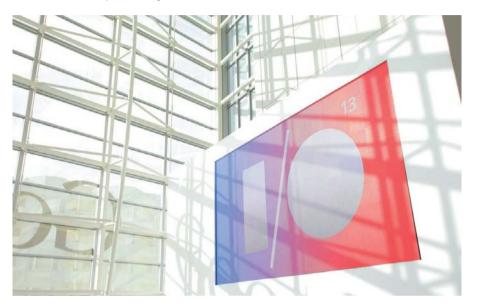
"Without great apps and content, a mobile device is just a very expensive telephone. Making developers productive and engaged is the number-one goal for any platform company and that seems to be the clear goal at I/O 2013," said Michael Mullany, CEO at Sencha.

As the hardware and design becomes less of a differentiator for smartphones and tablets, the service and the apps that developers create become more important.

"We all know that Android and iOS have significantly more apps than, for example, Windows. Is that a key factor in people's buying decisions? I think it's a factor and a growing one," said Mark Newman, chief research officer at Informa.

Google isn't the only company chasing developers. The recent release of an open beta for Unity's BlackBerry 10 add-on lets developers use Unity's cross-platform game-development tools to create games for the new operating system.

With IDC's first-quarter numbers showing Android's smartphone market share at 75 percent and BlackBerry OS at 2.9 percent, the two platforms are in very different positions, and that is mirrored in their developer strategies. While BlackBerry is hoping cross-platform tools will lower



the bar for developers, Google launched an integrated developer environment (IDE) specifically for Android.

Android Studio

Android Studio, which is based on the IntelliJ IDEA Community Edition, drew loud applause from the audience at I/O. It is a step in the right direction for Google, thanks to features such as the ability to see how an app looks on different screen sizes. Better UI editing is also something Android needs, according to mobile developer Konrad Hübner.

"This is exactly where Apple is so much better and I hope Google can catch up. So far, I have done UI editing in XML and then hoped for the preview to work, but that is quite a pain," Hübner said.

Mullany agreed: "Fragmentation is a significant problem for Android developers and the existing tools for creating Android apps have a pretty mixed reputation. The new Android IDE helps developers visualise their app experience on multiple device types and should help them be significantly more productive," he said.

Another feature announced at I/O that caught Hübner's interest was a translation service that lets developers order translations from the developer console.

"A translation service for developers to get their apps out in different languages is a cool service offering. Often translations in apps are really poor," Hübner said.

At first Google will offer the translation service as a pilot program to which

developers can sign up from the console. Google has also added application optimisation tips, the ability to see the effectiveness of ads, revenue graphs, beta testing and staged rollouts to the console.

Google also launched a number of APIs, including ones for more battery-efficient location-based services, geofencing and activity recognition, which are all part of Google's Play services. There is also a new family of APIs specifically for games, which let developers build games with leaderboards and multiplayer support. Cloud saves provide developers with a storage API to handle game saves and settings, allowing users to move between devices and continue from where they left off.

But even if Google and its partners dominate at selling devices, Android still lives in Apple's shadow when it comes to app development. According to a recent survey from IDC and Appcelerator, developers who said they were very interested in developing for iPhones accounted for 89 percent of respondents, with 86 percent interested in iPads. Just 77 percent felt the same way about Android smartphones, and 64 percent were very interested in Android tablets.

"Most often we develop both iOS and Android apps, but iOS is still number-one in our world. That's what you start with, and if there is money left you do Android," said Patrik Book, CEO at AppByrÂn.

Google still has some work to do, but Barra's message to developers was clear: "We really want you to thrive," he said. ⊠

Intel's new boss looks to the future

A new CEO means Intel could move in the direction of becoming a full-fledged foundry, says Agam Shah, but the chip maker won't build products for competitors

ntel hasn't signalled a change in strategy with the appointment of Brian Krzanich to CEO, but it is likely that the company will take steps to outrun its foundry competition by opening its industry-leading manufacturing facilities to more third parties.

Krzanich replaces Paul Otellini, who retired in May after 40 years with the company, including eight years as CEO. With knowledge of Intel's complex manufacturing and chip operations, Krzanich became the top candidate to take over.

The appointment of Krzanich points to a possible directional change for Intel to take on a larger foundry model and make more chips for third-party companies. Krzanich previously managed Intel's manufacturing operations, and analysts agreed that his appointment sends a message that the company wants to use its strong manufacturing assets to generate revenue and keep factories occupied.

Intel has historically used its manufacturing assets to make chips for itself, but recently warmed to the idea of becoming a contract manufacturer. Intel has signed contracts to make chips for third parties such as Altera, Tabula and Achronix. Intel's manufacturing assets are considered a generation ahead of rivals such as TSMC and GlobalFoundries.

"Intel will lead with massive manufacturing and fab technologies to attempt to outrun the competition. It will likely ramp up its foundry business and turn it from a hobby into a billion-dollar business," said Patrick Moorhead, president and principal analyst at Moor Insights and Strategy.

There's no change in the company's strategy as of now, although things may change with manufacturing in the future, said Intel spokesperson Chuck Mulloy.

Intel puts a lot of research into the underlying science and physics in the field, and will continue to take advantage of its manufacturing resources, he added.

Intel is the world's largest chip manufacturer and has invested billions of

dollars in building new factories. It will be the first to move to the 14nm process later this year. The nanometre process refers to the underlying physics used in factories to create substrates on which chip features are etched. Intel was the first to stack transistors on top of each other (also called FinFET or 3D transistors) in 2011, while rivals such as TSMC and GlobalFoundries are expected to catch up only next year.

catch up only next year.

main goal

catch up only next year.

BRIAN KRZANICH, INTEL CEO

Maximising profit

But with PC shipments falling and Intel's smartphone and tablet chips not yet shipping in large amounts, Intel will need to fill the factory capacity to reduce the financial burden from low utilisation. More chips will come out of Intel's factories with the forthcoming move to 450mm wafers.

Intel won't change direction on its public-facing operations such as mobile and PC chips, but it is doubling down on manufacturing, said Gartner analyst Sergis Mushell. Krzanich is the right choice for CEO as he understands the business of manufacturing and ways in which profit can be generated from it. He can take advantage of the manufacturing assets, Mushell said.

Choosing Krzanich as CEO is a clear indication that Intel believes it is time to take advantage of the manufacturing assets, which are the firm's strength, said Dean McCarron, principal analyst at Mercury Research. "The main goal is profit," McCarron said.

McCarron estimated that Intel would likely dedicate 80 percent of its capacity to its own chips and leave 20 percent for third-party chips. Right now that third-party chipmaking operation is small, but McCarron expects Intel to take on more manufacturing contracts as it moves to a foundry model.

Intel is first and foremost a manufacturing company and that is the company's most distinctive strength relative to competitors such as Qualcomm and AMD, which use third parties to get their chips made, said David Kanter, a chip expert and industry observer.

Intel has poured millions of dollars into smartphone- and tablet chip development as it tries to take away market share from ARM, whose processors are used in most mobile devices. But Intel has a philosophy of not making chips that would enable competitors.

"Intel is successfully pursuing strategic customers for foundry work, and will continue to do so. I don't believe Intel will work with competitors," Kanter said. But there could be some

exceptions, such as Apple, which is unlikely to ever use x86 and may not be viewed as a competitor, said McCarron.

Intel recently has had trouble keeping its factories busy due to a drop in PC chip shipments. Krzanich is responsible for the current capacity situation, said Jim McGregor, principal analyst at Tirias Research. Intel will probably need dedicated capacity and design services to be truly successful and that could take a considerable amount of time to establish.

"It is working on that, but it will take time to put the resources in place," he said. \boxtimes



Dell XPS 27 <<

All-in-one PC

Dell says the XPS 27 offers one of the world's most vibrant touchscreen experiences. The display has a high 2560x1440-pixel resolution and is super-bright at 350nits. The all-in-one PC is equipped with USB 3.0 and Thunderbolt connectivity, plus a dual-hinge stand.
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>>> Sony Vaio Duo 13 Hybrid laptop/tablet The Duo 13 is a refinement of last year's Duo 11. It boasts a 13in screen and claims of a whopping 15-hour battery life. A keyboard is hidden under the screen, while the included stylus offers another way to interact with Windows 8. Around £1,000 inc VAT sony.co.uk

CHRIS MARTIN



Introducing Haswell

We've rounded up the first batch of new products to run Intel's fourth-generation processor, 'Haswell', which offers faster performance and improved battery life





Toshiba Satellite P >>>

Laptop

Toshiba offers several laptops running Intel Haswell processors; among them is this Satellite P-series model. It focuses on multimedia with a 15- or 17in full-HD screen and optional touch input. You'll get an nVidia GeForce GT 740M graphics card and support for Ultra-HD output, too.

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Apple MacBook Air

Thanks to its fourth-gen Intel chip, Apple's latest MacBook Air models offer up to 12 hours of battery life. They also come with 802.11ac Wi-Fi and flash storage, which Apple claims makes them 45 percent quicker than the previous generation. Read our review of the 13in MacBook Air on page 33.

From £849 inc VAT apple.com/uk

Acer Aspire V7 <<

Ultrabook

A thin-and-light option is the Aspire V7 from Acer. It's less than 20mm thick and weighs just 1.38kg. Acer's Converter Port and cable supports VGA, USB and RJ45 connections.

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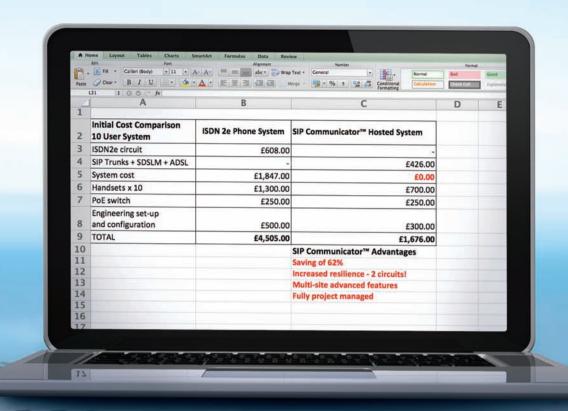
Games console

Microsoft's latest console is the Xbox One. The £429 price includes a controller and the new Kinect sensor. It has a similar specification to the PlayStation 4, with an eight-core AMD processor, 8GB of RAM, a Blu-ray drive and a 500GB hard drive. £429 inc VAT xbox.co.uk



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ANDREW HARRISON



All day, and all of the night

hings got interesting the day Intel launched the Core Duo processor. Until then, it looked like a company obsessed with winning megahertz wars against AMD, IBM and Motorola rivals. But at least one company knew there's more to making a great PC than having the fastest revving motor on the street.

With the Core Duo line of 2006, followed swiftly by Core 2 Duo, Intel laptops of sensible dimensions could see usable battery life of around 4 hours. The 2010 Core i-series updates upped the processing speed, but TDP figures of 25- and 35W were still ridiculously high for laptop life. As I've rambled on before, 12 hours should be the entry-point for all-day computing.

By all accounts it was Apple that kept pushing Intel to make sensibly frugal processors, to power its MacBook Air and future lightweight designs. Getting down TDP to 17W was a useful step in the past few generations of low-voltage Core chips. This season's Core i5 du jour from the Haswell summer collection is listed at 15W.

More than that, it looks like Intel has tackled the problem of idle power suckage, letting an x86 chip take deep, deep slumbers between 15W chores. So, like the ARM chips that currently rule the world's phones and tablets, Intel processors now stand a chance of being welcomed in mobile computing circles.

Which should please Intel's old friend Microsoft, too, since its newfound mobile strategy has fallen on its face. Fewer people than it had hoped want powersipping Windows RT on ARM - it's pricey and capable of little useful functionality. And full-fat Windows 8 tablets couple bad value with appalling battery life, often 5 hours or less. That runtime was too short for comfort when Core first launched; today it's just embarrassing.

But as our test of the 2013 MacBook Air suggests (page 33), Haswell finally puts Intel in the mobile game - and maybe even Microsoft with it. You can get as much work done with slower-clocked chips, and improved power dormancy means batteries lose almost nothing when you're doing nothing.

Microsoft's got its work cut out: IDC ranks its Surface Pro and RT sales in distant fifth position. That sounds almost promising but, combining all the devices Microsoft and every other Windows tablet maker have sold, sales figures total a tiny 3.7 percent.

Intel's low-power arrival could even deflate the Microsoft tablet plan. Laptops in their new all-day guise may again edge out the rounding-error of Windows 8 tablet sales, as people realise just how much more you can do with a versatile always-charged laptop in comparison to a tablet suited to consumption. \square



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£1,199 inc VAT

Contact

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Specification

3.4GHz Intel Core i5-4670K (overclocked to 4.2GHz); Asus Z87-A motherboard; Windows 8 64bit: 16GB DDR3 RAM: 2TB 7,200rpm HDD; Cooler Master HAF 912 case: 650W Corsair TX650 PSU: 2GB nVidia GeForce GTX 770: Creative SoundBaster Z: 2x USB 3.0: 6x USB 2.0: DVI; HDMI; DisplayPort; eSATA; gigabit ethernet; 4x Lite-On BD-ROM: Microsoft Office Starter 2010; 3-year labour-only Silver RTB warranty



DESKTOP PC

PC Specialist Vanguish 912 'Haswell' PC

Intel has unveiled its fourth-gen Core processor, codenamed Haswell and successor to 2012's Ivy Bridge. It promises faster graphics and lower power consumption, allowing for laptops that can keep going for 15- to 20 hours.

PC Specialist's Vanquish 912 is one of the first desktop PCs we've seen to contain a Haswell chip (also see pages 58-59). It uses a new type of motherboard and chipset, making upgrades from Ivy Bridge difficult. So, is it worth the hassle?

We compared the quad-core Core i5-4670K selected by PC Specialist with an Ivv Bridge i5-3570K. In both our test machines the chips were paired with 16GB of the same memory. Both chips were also overclocked: the i5-4670K from its default 3.4GHz to 4.2GHz, and the i5-3570K from 3.4GHz to 4.6GHz.

Integrated graphics

The i5-4670K comes with an HD 4600 graphics controller, which is a step up on the HD 4000 offered by the i5-3570K.

In games tests the scores were virtually level in both Alien vs Predator and Sniper Elite V2, with the i5-4670K less than a frame ahead at every step. The difference widened in some games, notably Hard Reset and Stalker: Call of Pripyat. In the latter, for example, the i5-4670K notched up figures of 296- and 143fps, at Medium and Ultra settings respectively. These were significantly up on the 276and 130fps of the i5-3570K.

Less heat, less power

Haswell isn't only faster than its predecessor, it also draws less mains power and creates less heat.

Testing both chips with Intel Burn Test 2.54 and Real Temp, the i5-4670K never went beyond 83°C. The i5-3570K, on the other hand, topped out at 88°C. Under Maximum load the i5-4670K pushed up to 90°C, while the i5-3570K reached a rather hot 94°C. In Sniper Elite V2 the i5-4670K peaked at 50°C, while the i5-3570K pushed up to 57°C.

We recorded 56W when the i5-4670K was idling, and 65W for the i5-3570K. The new chip never exceeded 256W in our games tests, while the i5-3570K hit 285W.

It'll be interesting to see how Haswell's heat and power advantages play out in the laptop and tablet markets. For desktop users, though, the speed advantage isn't massive, and those seeking a significant boost may be disappointed.

Vanquish 912

Not that this should put off prospective buyers of this PC Specialist system. After all, if you're buying a brand-new system, it makes sense to snap up the newer technology.

And there is a great deal else provided with the Vanguish 912. The 16GB of Kingston HyperX Beast memory nicely complements the i5-4670K chip. Add to this the capacious 2TB Seagate Barracuda drive, and the timely speed boost offered by the 120GB Kingston SSD, and you have a strong all-round system. Little wonder, then, that the PC romped to a very pleasing 6.685-point score in PCMark 7.

Sound and vision are well served. The nVidia GeForce GTX 770 graphics card has 2GB of memory and offers plenty of performance at a relatively good price. The audio is also a notch up on the usual fare, with the SoundBlaster Z soundcard making a welcome appearance.

Not everything about this system is ideal, however. The Cooler Master HAF 912 case is ruggedly stylish. even down to its satanic red glowing front. It takes up a fair amount of space, yet it's still a tight fit inside.

The graphics card can only just be squeezed into the space available between the drive bays. You can get to the memory, although it's not the easiest job. All four of the slots are taken up. In fairness, a decent amount of room is consumed by the commendable and essential cooling system, and the Corsair Hydro H60 does a fine job of keeping the case well aired, although its pipes do get in the way of other components.

The 650W Corsair PSU offers plenty of juice for expansion, and ports and connectors are plentiful. Eight USB ports are included, two of which are found at the front of the case, alongside eSATA. Of the six rear-mounted USB ports, four are specified for USB 3.0.



The graphics card caters for HDMI and DisplayPort, plus DVI.

A Lite-On iHOS104 Blu-ray reader is also thrown in, offering smooth playback of Blu-ray media, but it can't write to any optical media.

Verdict

From Intel's point of view, Haswell is a very important step forward. It marks vet another attempt to break into some of the markets of the future, namely mobile computing such as smartphones and tablets. How well its mobile Haswell chips can approach the ARM competition remains to be seen. For desktop PC users, however, the merits are less clear. If you weren't already keen to buy a new processor and motherboard, there's no compelling reason to snap up Haswell. For many users a new graphics card (for gamers) or SSD (everyone) will make a much greater difference.

That said, if you're in the market for a new desktop PC, the Vanguish 912 from PC Specialist is worth investigating. You could get a healthy discount by settling for last year's Ivy Bridge processor, and probably wouldn't notice the difference. The Chillblast Fusion Carbine gaming PC (see page 133), for instance, offers improved game speeds and slightly reduced system performance, but packs in a highgrade IPS monitor and other decent peripherals - at exactly the same price. Overall, the PC Specialist is a good system, and you can't get much hotter - or should we say cooler? - off the press than this ensemble. Mobin Morris



£949 inc VAT

Contact

- apple.com/uk Read more
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Specification

1.3GHz Intel Core i5-4250U. dual-core (2.6GHz Turbo); OS X 10.8.4 Mountain Lion; 128GB SSD: 13.3in (1440x900) gloss LCD with LED backlight: Intel HD Graphics 5000: 802.11a/b/g/n/ac: Bluetooth 4.0: 1x Thunderbolt: 2x USB 3.0; SDXC card slot: FaceTime HD camera: dual mics: stereo speakers; multitouch trackpad; 54Wh lithiumpolymer non-removable battery; MagSafe 2 power connector; Apple iLife; 325x227x4.0-17.5mm; 1.35kg

PC ADVISOR



ULTRAPORTABLE LAPTOP

Apple MacBook Air 13.3in (Mid-2013)

Apple has hit two notable firsts in its 2013 incarnation of the iconoclastic MacBook Air. Not only is it the first mainstream laptop you can buy with an Intel Haswell processor, it's also the first production laptop to support the new 'three-times-faster' 802.11ac Wi-Fi draft standard.

The use of a low-power Core i3 processor also means the Air should last longer than ever before - Apple's figures, based on wireless web browsing, spell out a total runtime that has been stretched from an already handy 7- to 12 hours.

Build and features

The new Air sports Apple's supreme all-metal build that we've yet to see surpassed by other manufacturers, and is styled with a wedged taper from the rear to front edge.

One small visible change is an extra pinhole on the left flank. This marks a second microphone that adds noise cancellation and improves voice clarity

On the inside, where once was a 1.8GHz Core i5 chip is now a 1.3GHz CPU and 4GB of lowpower RAM. It's worth noting that this dual-core chip still includes Hyper Threading, and it will also dynamically overclock to 2.6GHz.

But the reduced clock speed doesn't mean the Air lacks pace. Indeed, aside from the Intel Atom, bargain-bin Pentiums and some AMD chips, every CPU we test is capable of decent speed running OS X or Windows. Today's battles are instead fought over battery life.

Performance

We installed Windows 7 and ran PCMark 7. The new MacBook was awarded 4,602 points, which reveals a 2.3 percent improvement over the 2012 Air (4,497 points).

According to Geekbench 2, though, raw processor and memory performance is actually down on last year's model, with the new MacBook recording 6.770 points against its predecessor's 7,903. Since PCMark 7 also measures the speed of storage, the improved score could be attributed to the upgrade in flash storage. The now-standard 128GB SSD takes a new form that connects via PCI Express rather than SATA.

Battery life

Apple seems to have taken several strategies to help it eke out more runtime. The largest factor is almost certainly the shift from third-gen lvy Bridge to fourth-gen Haswell CPU. But unplugged operation is also helped by a slightly larger-capacity battery (54Wh vs 49Wh) and the use of low-power memory.

Again running Windows 7, we tested battery life using MobileMark 2007. We recorded a runtime that comfortably exceeded Apple's claimed 12 hours, hitting a new high of 13 hrs 57 mins. So, there's little need to lug about a mains charger: this laptop will keep going all through your working day - and long into the evening.

Wireless

The first routers to support the forthcoming 802.11ac wireless standard appeared late last year, yet compatible laptops haven't been so quick to follow. Apple is the first to include an 802.11ac chipset. courtesy of the only hardware manufacturer currently shipping 802.11ac components: Broadcom.

The Broadcom BCM4360 is a three-stream-capable wireless processor, although Apple appears to fit the Air with only two antennae (hidden in the screen hinge).

This means the fastest wireless sync speed you'll see is 867 megabits per second (Mbps), and real-world throughput will be much lower even in ideal conditions.

We hooked up the MacBook Air to an existing 802.11ac wireless network, based on the Netgear R6300 802.11ac router. Set 3m apart from the router, it indicated a sync speed of 867Mbps on 802.11ac's higher-speed 5GHz band. In realworld file transfers we measured throughput at a steady 176Mbps.

Turning to the new Apple Time Capsule with 802.11ac, the same results were seen with short-range transfers. While wireless throughput is less than one-quarter of the indicated wireless speed, we noted that longer-range connections maintained better performance.

At 10m from the Time Capsule, with one intervening plaster stud wall, transfer speed was measured at a relatively good 148Mbps.

To summarise the wireless performance, these are better results than we've ever seen for 802.11n on the 5GHz radio band, but real-world performance continues to be disappointing.

Put into real terms, 802.11ac with this 2x2 Mimo configuration in any case - is still some way behind the speed you'd find from the old USB 2.0 standard, for example.

But you can expect to benefit from better Wi-Fi connections with the 2013 Air on 802.11ac compared to 802.11n, and especially at more distant range where pre-802.11ac networks tail off so rapidly in quality.

Verdict

The Apple MacBook Air (Mid-2013) really does provide all-day battery life. For that alone, it fully deserves to be top of the list for anyone looking for a workaday laptop, one that can reduce one of modern life's stresses: that of wondering whether vour computer will still be functional just when you need it. It's just as fast as the previous model - more so in real-world use - and Apple seals the deal with future-proofed faster Wi-Fi, more solid-state storage and a lower price than last year's model. It's an outstanding ultraportable among a mass of me-too Ultrabook mediocrity. Mandrew Harrison



LAPTOP

Lenovo IdeaPad Z500 Touch

Lenovo's Z-series is designed for 'mainstream entertainment'. Translated from Marketingese into English, that means these laptops are a bit heavy, but provide good performance at a decent price.

The Z500 Touch is certainly no Ultrabook. Our review unit measured 30mm-thick when folded flat and weighed in at a hefty 2.7kg. That's heavy even for a laptop with a 15.6in display and a built-in DVD drive.

Its potential to become a travelling companion is also compromised by relatively short battery life. We recorded just 4 hours when streaming video over Wi-Fi. Given its size and weight, though, the Z500 Touch will probably spend most of its life sitting on a desk at home or in the office.



The design is neat, with a matt black exterior and gunmetal keyboard and screen surround. The moulded keys of Lenovo's 'accutype' keyboard have a smooth action. while the trackpad is large and comfortable in use. It boasts full-size cursor keys, which is something of a rarity these days.

Prices start at £560 for a model with a 2.5GHz Intel Core i3 processor. We tested the £790 top-end model, which has a 2.4GHz quad-core i7 chip, 8GB of memory. a 1TB hard drive and an nVidia GeForce GT 740M with 2GB of video RAM. The Lenovo also has an integrated Intel HD Graphics 4000 chip and a touchscreen.

Some cost-cutting is evident, notably the 15.6in screen's low 1366x768-pixel resolution. You might reasonably expect a machine designed for entertainment to provide full-HD (1920x1080) video. If you don't need a touchscreen you can save around £50 on one of the lower-spec models in the range.

The display is otherwise adequate for most computing tasks. It's bright and clear, and image quality is acceptable when browsing the web or watching video. Our main complaint is the panel's glossy finish, which is annoyingly reflective, and particularly so when viewed from an angle.

Lenovo's other compromise is the use of a slow 5,400rpm hard drive, which resulted in a below-par score of just 3,011 points in PCMark 7.

The Z500 Touch was able to load the Windows 8 Start Screen in about 12 seconds from hibernation. but then treated us to another 30 secs of cursor-spinning while it worked up to cruising speed. Once there, the Z500 Touch felt snappy and responsive, and it should be capable of handling heavy-duty work such as photo- or video-editing.

This model could also enjoy some gaming action too, mustering a just-playable 26fps when running Batman: Arkham City at 1366x768 resolution with DirectX 11 and High graphics settings.

We stepped down the resolution to 1280x720 and the Lenovo was able to nudge past 30fps, which is adequate for casual gaming.

Verdict

The Lenovo IdeaPad Z500 Touch has some rough edges - we'd happily trade the touchscreen (which isn't crucial to Windows 8 operation) for a full-HD display or faster internal storage. Even so, the Z500 Touch is a well-built desktop-replacement machine that could earn its keep for entertainment at home or more demanding work in the office. ☑ Cliff Joseph

£790 inc VAT

Contact

- lenovo.com/uk
- Read more
- tinyurl.com/nxrqo2q

Specification

2.4GHz Intel Core i7-3630QM (3.4GHz Turbo Boost); Windows 8 64bit; 8GB DDR3 SDRAM: 1TB 5,400rpm SATA HDD; 15.6in (1366x768) touch-sensitive TN LCD: Intel HD Graphics 4000/nVidia GeForce GT 740M, 2GB VRAM: trav-load DVD \pm RW: 802.11b/a/n: Bluetooth 4.0: HDMI: VGA: 1x USB 3.0; 2x USB 2.0; SDHC; 720p webcam with built-in mic; headphone socket; 10/100 ethernet; 48Wh lithium-ion battery (non-removable); 370x255x30mm; 2.7kg



£350 inc VAT

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- uk.asus.com
- tinyurl.com/kL6Lvvu

Specification

15GHz Intel Pentium B987: Windows 8 64hit: 4GR DDR3 RAM: 500GB HDD: 11.6in (1366x768) TN LCD: Intel HD Graphics; 802.11b/g/n; 303x201x22mm; 1.5kg



Asus VivoBook S200E-C157H

Who says the netbook is dead? With its 11.6in screen, Intel Pentium processor and £350 price tag, Asus' VivoBook S200E almost harks back to the brief heyday of the netbook.

Back in 2008 the masses were drawn to cheap netbooks. They cost around £300 with their 10in screens and Intel Atom processors, and were easily portable and suited to simple tasks such as browsing the web or firing off the odd email. But netbooks were little more than a fad in cut-price computing.

This VivoBook is more than an exercise in nostalgia, though. The touch-sensitive screen means the S200E can happily interact with Windows 8's Modern UI.

Build quality is good, despite the low price. The VivoBook is sufficiently sturdy and doesn't look or feel as flimsy as most sub-£400 laptops we've recently seen.

In size, weight and overall flair the Asus can't match more expensive ultraportable laptops it lands as 1.5kg and measures 22mm thick, compared to the 1.1kg and 17mm of the 11in MacBook Air but you can still pick it up with one hand and easily slip it into a bag.

The 11.6in display is decent, a 16:9 panel that uses the same 1366x768 resolution as the aforementioned Air. It's very bright and clear.

One niggle is the cramped keyboard. The keys are wide enough at 15.6mm, but rather shallow - just 13mm deep. That could be a problem for less nimble-fingered users.

In contrast, the 105x60mm trackpad is large and comfortable to use - and, of course, you've got the touchscreen to play with, too.

Connections include HDMI and VGA for video, ethernet, an SD card slot and three USB ports (only one of which supports USB 3.0).

Inevitably, the low price means costs have been cut on the internal components, and the VivoBook can offer only modest performance.

It's a while since we've seen any Windows PCs with Pentium-branded processors, but the dual-core Pentium 987 the VivoBook S200E



£599 inc VAT

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Specification

2.5GHz Intel Core i5-3210M. dual-core (3.1GHz Turbo Boost); Windows 8 64bit; 8GB DDR3 SDRAM; 1TB HDD (5400rpm) + 8GB SSD ExpressCache; 15.6in (1600x900) matt TN LCD; Intel HD Graphics 4000: dual-band 802.11a/b/g/n with 2x2 Mimo: Bluetooth 4.0: slot-load DVD ± RW: micro-VGA (adaptor required); HDMI; gigabit ethernet; 2x USB 3.0; 1x USB 2.0; SDXC; 1.3Mp webcam with built-in mic; headphone socket; 80Wh lithium-in battery: 362x239x24mm; 2.4kg



I APTOP

Samsung Series 7 Chronos

The original Series 7 Chronos was very much a high-end laptop, costing around £900 with a quad-core Intel Core i7 processor, a discrete AMD Radeon GPU and impressive 8-hour battery life. This variation on the theme is a more modest affair. stepping down to an Intel Core i5 processor. Samsung lists it at £799, but you might find it for £599 online.

The basic design remains unchanged, with a 15.6in display housed in a sturdy case with a smart brushed-metal finish. It's reasonably heavy, weighing in at 2.4kg, and it measures 24mm thick, which isn't too bad for a full-size laptop with a built-in DVD drive.

The Samsung also retains the decent battery life that is the watchword of the Chronos range. When streaming video over Wi-Fi we recorded a full 7 hours, and less power-hungry tasks such as web browsing and office work may stretch this further.

The keyboard and spacious (105x75mm) trackpad are well designed. The keys sit proud of the main keyboard panel and have a smooth action, making the Chronos comfortable to use for long periods.

Close attention to detail is evident in the colour-coded keys of the slot-loading DVD drive, and in the built-in mic's placement close to the user on the keyboard's front edge.

It's odd that Samsung has opted for a micro-VGA port that requires the purchase of a separate adaptor, but HDMI has also been included, along with gigabit ethernet.

The screen is something of a mixed bag. It's not touchsensitive, so if you're sold on Windows 8's Modern UI you might want to look elsewhere. However, it has a matt finish that reduces the glare and reflections that afflict the majority of modern laptops.

The screen's viewing angle leaves something to be desired, and brightness rapidly fades as you move to the side. A screen this size could also benefit from full-HD (1920x1080) resolution, although its 1600x900 pixels is acceptable at this price.

Performance from the 2.5GHz Core i5 chip is somewhat down on that of the previous Core i7. The Samsung is more than adequate for handling basic tasks, such as running office software, and with 8GB of memory and a 1TB hard drive it should cope with photoand video-editing, too.

We were concerned about the huge-capacity but potentially slow 5,400rpm hard drive. However, it's paired with an 8GB SSD that helps

speed up boot times. We were able to reach the Windows 8 Start screen and launch Internet Explorer in 25 seconds from hibernation. And in the lab the Chronos edged just past the 3,000-point mark in PCMark 7.

Casual gaming is possible, but the integrated HD 4000 chips isn't up to the likes of Batman: Arkham City at 1600x900 resolution. We were able to get a just-playable 27fps at 1280x720 and the lowest possible detail settings.

Verdict

It's difficult to fault a laptop that provides useful battery life for less than £600. The Samsung Series 7 Chronos provides good performance and features, and will prove itself to be a decent option if you need an affordable workhorse that can last part of a working day away from the mains. **Cliff Joseph**



packs was released in late 2012, so it's certainly no antique. There's no Turbo Boost or Hyperthreading in operation here, and with the 1.5GHz Pentium it could manage only 1,740 points in PCMark 7.

It's nothing to shout about, but this performance is adequate for basic tasks such as running Microsoft Office, web browsing and a spot of streaming video.

The VivoBook admirably handled Windows 8's touchscreen controls, with the Start screen quick and smooth to respond as we flicked from app to app. The laptop's 4GB of memory and 500GB hard disk are also fine for basic computing tasks.

Needless to say, gaming performance isn't up to much, and the Intel HD Graphics built into this Pentium chip could muster only single-figure framerates in Windows games such as Batman: Arkham City.

We were more disappointed by the S200E's battery life. When streaming video over Wi-Fi we

measured only 3.5 hours. For a laptop intended to be portable this is very short, and it also falls short of our expectations, given the slow processor and small screen.

The S200E is fine for tapping out a few emails during your commute, but it won't keep you entertained throughout a long plane or train journey unless you're lucky enough to find a power socket.

Verdict

A lightweight, compact laptop such as this ought to have decent battery life. The VivoBook offers reasonable value, however, and is worth a look as a very basic Windows 8 laptop. ☑ Cliff Joseph

£500 inc VAT

Contact

- wired2fire.co.uk Read more
- tinyurl.com/Ltykuut

Specification

3.8GHz AMD A10-5800K APU: Asus F2A85-M LE: Windows 8 64bit; 8GB DDR3 RAM; 1TB HDD; Zalman T1 case; Xigmatek 400W: 21.5in AOC E2250SWDA: AMD Radeon HD 6670: 2x USB 30: 6x USB 2.0: VGA: DVI: HDMI: eSATA: 24x Samsung SH-224BB DVD writer: 2-year parts and labour warranty



DESKTOP PC

Wired2Fire Velocity VX

With its £500 Velocity Wired2Fire has carefully chosen components to create a balanced system that can chug through most everyday tasks without causing pulses to race.

The AMD A10-5800K processor is clocked high at 3.8GHz, but this Fusion chip doesn't offer a great deal of power. It's bolstered by 8GB of capable Patriot Viper memory, yet the system's lack of firepower isn't helped by the large-capacity (1TB) yet slow Seagate hard drive. The Velocity VX recorded just 2,779 points in PCMark 7.

The graphics card is a low-end option regularly paired with the A10-5800K. The AMD Radeon HD 6670 with 2GB of video memory was always intended as a costeffective solution, and it's now past its best. It is possible to coax playable framerates from this card, however, provided you're willing to compromise on the resolution.

We saw the best performance in Stalker: Call of Pripyat, in which we measured 46fps at 720p, but just 14fps at full-HD resolution.

In Hard Reset the Wired2Fire managed 31fps at 720p, Medium quality, but with the detail set to Ultra it offered a meagre 22fps.

Alien vs Predator also lumbered to just 22fps, even at 720p.

The Zalman T1 case is modestly sized, and can prove tricky to access.

We struggled to get to the memory chips - only two slots are provided - and even accessing the graphics card isn't particularly easy. The drive bays are restricted and the case itself feels extremely cramped, despite the small CPU cooler.

Neither is the Xigmatek PSU prepared for major upgrades, specified at just 400W. In short, this isn't a PC you'll relish upgrading.

The machine is not great on power draw, slurping about 61W when idling. Running Stalker: Call of Pripyat it hit 138W - a relatively low figure for a cheap PC with an AMD processor.

The Velocity VX isn't especially quiet, adding around 14dB to the room noise. This level of disturbance isn't entirely distracting, however.

Predictably, given the price tag, the Samsung optical drive won't know what to do with Blu-ray, although it does offer smooth 24-speed writing to DVD \pm R discs.

Eight USB ports are available, two of which support USB 3.0, but the front-facing ports are USB 2.0. Other ports and connectors at the rear include HDMI and eSATA.

The Cit wired keyboard and mouse are adequate, but they're no match for the experience offered by higher-quality peripherals.

The system price includes a flat-panel display (not pictured).



The 21.5in AOC E2250SWDA is a budget model, but it offers a balanced palette and slimline styling.

Wired2Fire has added IvoSoft's Classic Shell software, giving Windows 8 users a more accessible way to operate Microsoft's OS.

The warranty is decent for the price, covering both parts and labour for two years.

Verdict

The Wired2Fire Velocity VX is relatively sluggish, while its cramped case and wimpy PSU discourage upgrades - yet this is no surprise, given the £500 price. The Wired2Fire still offers a remarkably pleasant experience for a budget desktop. I Robin Morris

GRAPHICS CARD

AMD Radeon HD 7990

Contact

£900 inc VAT

- amd.com
- tinyurl.com/nxussro

Specification

2x 3GB GDDR5 RAM; 950MHz core, 1.5GHz memory clock; 2x 384bit memory interface; 2x 2 048 stream processors: 2x 128 texture units; DirectX 11; DVI; 4x Mini-DisplayPort



For some years now AMD has stopped short of bringing out a true high-end graphics chip, choosing instead to take its best chip and place two of them on the same card. Given that the 7990 follows in this line, bolting two 7970 Tahiti chips on to the one card, it's perhaps surprising that we haven't seen this launch long before now. After all, we reviewed the 7970 well over a year ago. The main surprise, though, is that this is no half-baked attempt at doubling up on resources.

Previous dual-GPU cards have tended to throttle back on the specifications, offering slightly slower clock speeds and reduced processing features here and there. But rather than reduce the spec, the 7990 actively increases it.

The core clock of 950MHz is 25MHz higher than that of a 7970, for example. In addition, the 7990 has a boost clock, so it can push up the total speed to 1GHz. The 1.5GHz (6GHz DDR effective) memory clock is faster than the 1.375MHz (5.5GHz DDR) of the 7970, too.

These figures are competitive against nVidia's GeForce GTX Titan, with the latter offering a memory clock of 1,502MHz (6,008MHz DDR effective), and a vastly inferior core clock of 876MHz.

The dual-GPU GTX 690 matches the Titan's memory clock, but trails the 7990's core-clock by 35MHz.

In the 7990 you also get two lots of 2,048 stream processors, and double the 128 texture units and 32 raster operations of the 7970. These eclipse the Titan's 2,688 stream processors, 224 texture units and 48 raster operations.

The 690 matches the 7990 on texture units and raster operations, but it falls behind on stream processors, with two lots of 1,536.

The 690, 7970 and Titan each has a 384bit memory interface, but the 7990 has two. This gives it twice the memory bandwidth (2x 288GBps) of the Titan and the 7970.

The 7990 has a TDP of 'just' 375W, despite the 7970's 250W rating. But in no way does it compare



£270 inc VAT

Contact

- canon.co.uk Read more
- tinyurl.com/Lkk3qrb

Specification

12.1Mp: 8x zoom: 28-224mm equivalent lens; f/3.0-f/3.9 aperture range; 9 autofocus points; 10mm closest focusing distance; ISO 100-6,400; 1-1/2.000-sec shutter speed: 2.8in touchscreen: 802.11n: 78.6x60.2x29.3mm: 95a



DIGITAL CAMERA

Canon PowerShot N

Wi-Fi, 12.1Mp and an 8x zoom are a lot to squeeze into a camera around 80x60mm in size. This Canon is smaller than you might imagine, too, with a footprint to match a very thick credit card and a fold-out touchscreen behind.

The screen itself flips up by only 90 degrees, and it doesn't twist, but this shortcoming is largely overcome by the fact it's designed to work both right way up or upside-down.

The shutter button has gone in favour of a ring surrounding the lens, and there's a second ring behind the shutter control for the 28-224mm zoom. Each works in either orientation, so you can use them upside down for overhead shots, or the right way around for candid street photography.

Image quality is good, but the lens exhibited some barrel distortion when shooting a test target at wide angle. There's also a fall off in the level of focus when comparing the centre of the frame with the corners, even at narrower aperture settings.

However, detail is clearly rendered, and although there is some very light noise at ISO 400, you'll need to push the PowerShot N a long way before it starts to have a detrimental effect on your images. At ISO 6400 you'll be able to read fine writing in your images, but you'll start losing detail in the darker areas, and sharp contrasts won't be as crisp as they are at lower settings.

You can manually adjust the sensitivity and exposure compensation by switching from Auto to Program mode. However, most other common shooting settings, including aperture and shutter speed are out of reach. You'll have to rely on the scene modes if you want to get creative - these supplement the standard shooting modes, and include monochrome, toy camera. fisheve and miniaturisation.

The latter simulates a tilt-shift lens in place of the captive glass, and using it when shooting video lets you select the speed at which the movie should play to more accurately simulate a miniature world.

You can shoot movies in any of the regular stills modes and, as with stills, the results are good. We saw punchy colours, plenty of fine detail, and no compression artefacts or issues with fast motion.

Images are recorded at best at 1920x1080 and 24fps, but you can choose lower resolutions either to save memory or for easier sharing.

The captured soundtrack is full of detail, although the built-in mic picked up wind noise in our tests and we could also hear the lens mechanics when zooming.



The PowerShot N's closest rival is the Nikon Coolpix SO1, which is around half the weight and 10mm shallower and narrower. However, Nikon has achieved this by integrating the memory and battery, while the Canon lets you swap out both the AA-sized battery and microSD memory card.

The Nikon also loses the fold-out screen and built-in Wi-Fi, which Canon offers for managing your images from an iPhone or Android. It also lists 20 percent fewer pixels, its chip instead squeezing in 10.1Mp.

Verdict

Set against competition such as the Nikon Coolpix SO1, the Canon PowerShot N is an attractive option - but you need to consider the price. At £270, it's more than twice the price of the Nikon. That naturally impacts our final verdict, but the fact remains that of the two it's the more rounded option and, if you can afford it, the better buy. Nik Rawlinson



with the Titan's 'mere' 250W TDP, nor the 690's 300W figure.

Sound levels are good, too. The 7990 isn't as quiet as the Titan, but AMD's three-fan design is only marginally louder, adding a couple of decibels to the room levels in our testina.

The 7990 takes the single-card performance crown from the dual-GPU nVidia GTX 690. But only just. In practice, we're talking about two or three frames here and there. That makes it a few frames faster again than the GeForce Titan.

In Crysis 2, the 7990 hit 78.3and 55fps at 1920x1200 and 2560x1600, against the 690's figures of 75.8- and 53.1fps.

The Titan comes close to the 7990 at 1920x1200, but falls far behind at our top 2560x1600 resolution setting, with 45.3fps.

In Stalker: Call of Pripyat the 7990 managed 139.9- and 103.8fps, again narrowly beating the 690's 137.3- and 101.6fps.

The nVidia Titan was even further behind in our Stalker test, with scores of 121.7- and 91fps at the same settings.

Verdict

Impressive though the 7990's specifications may appear, it only just defeats nVidia's GTX 690 in real-world testing. The latter consumes less power, and will cost around £100 less. Faced with the nVidia Titan the AMD Radeon HD 7990 has an easier battle in general gaming, but the Titan has the edge in Compute speed. The AMD Radeon HD 7990 is in need of a price cut for it to truly take on its nVidia rivals. Robin Morris

42in TV

Finlux 42S9100-T

You won't find budget-brand Finlux in the shops, but this 42in TV with a Freeview HD tuner, DIY PVR function and 3D upscaling and viewing is available online. The narrow bezel is reasonably sleek, but there's too much chrome edging for it to be taken too seriously.

The Finlux has four HDMI ports, two Scart, two USB 2.0, stereo analogue and Toslink optical audio outputs. Analogue video is also covered by a trio of phono sockets for Component, and D-Sub for VGA.

The panel uses PVA technology, which offers wide viewing angles. but its semi-gloss sheen is reflective.

Static image quality is reasonable, with fine detail and naturally rendered skin tones. The brightness is too high by default but, unlike the poor contrast, can be easily toned down. If you like watching dark, moody films then you won't make out much detail in the shadows - just big blocks of black.

Images are very sharp, but this causes ringing to image edges. When the TV is used as a PC monitor it also means text is too distorted for clear viewing.

Moving images are perhaps the biggest disappointment, and here the 100Hz processing is not enough to remove jarring motion distortions. You don't need to be a sports fan to notice the judders that appear as images pan left-to-right onscreen.

We tried the 3D upscale function,

which can give an uncanny sense of depth to even broadcast standard-definition TV. Eight pairs of passive specs are included in the box, so an extended family can simultaneously watch in 3D.

Sound quality is lacking any depth of bass and has a quacky mid-range and sibilant top, but it is passable for hearing dialogue in a large lounge.

Control is through a comprehensive remote handset, neatly laid out with all the core functions to hand. A simplified mini remote is also supplied.

The onscreen menus are bright and clear, and we had no difficultly navigating the setup and EPG menus. The Freeview tuner was underpowered, though, taking up to a long 3. Seconds. For. Every. Channel. Change.

Used as a Smart TV we again felt the sluggishness. BBC iPlayer took around 20 secs to launch and, once there. BBC HD wasn't an available option. No other UK TV catch-up services are offered, but you do get links to social media. For news you can turn to CNN Turk and ITN.

DLNA compatibility means you can stream certain video and music from another device on your local network. Audio support is weak; we couldn't play any FLAC or ALAC material, nor any video of various codec flavours that we tried from a Synology NAS. The PVR function can be useful, though - we plugged in a 32GB USB drive and were able to instantly pause and record live TV.

Verdict

The Finlux ticks off many of the consumer-pleasing features such as 3D, HD and internet services. Image quality is good for still images, but tiring with moving images. 🛛 Andrew Harrison

£599 inc VAT

Contact

- finluxdirect.com Read more
- tinyurl.com/m5t4aqx

Specification

42in LCD TV: 1920x1080 pixels: Freeview HD tuner: passive 3D, with 2D-3D conversion available; 8x glasses; Wi-Fi; 10/100 ethernet; 8ms specified response time: 1.600:1 specified contrast ratio: 100Hz refresh rate: Cl slot: 2x Scart: 1x component video (YPbPr): 4x HDMI: 2x USB 2.0; 64W power consumption; 1,007x40x623mm; 22kg



£1,000 inc VAT

- philips.co.uk
- tinyurl.com/kbpxgox

Specification

42in I CD TV: 1920x1080: Freeview HD or Satellite DVB-S2 tuner: 400cd/m² brightness: 4x HDMI: 1x Scart: 1x component; Wi-Fi; ethernet; 953x562x32.5mm; 12.5kg



42in TV

Philips 42PFL6188S

Philips doesn't hide its lights under a bushel. Instead it bolts them to the back of its TVs, as is the case with the 42PFL6188S reviewed here, and calls them Ambilight.

Still very much a signature technology of Philips, Ambilight sets this often byzantine brand apart from the rest. Once you've lived with those pools of multicoloured light it can be difficult to imagine migrating to less flashy alternatives.

Philips 6000 series is available in four screen sizes. Our featured 42in model is joined by the 32in 32PFL6188S, 47in 47PFL6188S and 55in 55PFL6188S. All come with Ambilight in a basic two-sided XL configuration. You can select

complementary hues based on video content, or isolated illumination in red, green or blue. Both look great.

Indeed, cosmetically, this screen is a winner. With edge-to-edge glass and the narrowest of wraparound bezels, the TV appears triumphantly futuristic. Even the wire-frame stand looks ace - although it proved a fiddly nuisance to assemble. And there's the rub with Philips TVs: they're always more complicated than you might imagine.

Fine-tuning the picture is certainly a challenge. The set's Pixel Precise HD bouquet comprises all manner of processing, from Perfect Natural Motion and Clear LCD to Backlight Enhancement.

Menu settings are largely a matter of taste, but we found the image sharpness should never be set higher than 1 on the sliding scale - selecting a higher setting is an invitation to ugly edge-enhancement.

While this set's HD imagery is natively sharp, all the Natural Motion settings invoke some level of motion artefacting. Minimum is the only sensible option, but it also comes with that high-frame sheen to movement which, while great on sport, looks rather distracting for movies. We'd advocate turning it off when watching a film, although there is a hit to motion resolution.

Black level performance is good, with clear shadow detail retained:

£64 inc VAT

Contact

- securifi.com/almond Read more
- tinyurl.com/kkt9vwj

Specification

Touchscreen wireless router: 2.8in (320x240) touchscreen; single-band 802.11b/g/n; 2.4GHz wireless; 2x 10/100 ethernet; 2x2 Mimo configuration; wireless range extender: clock and weather display function



WIRFLESS ROUTER

Securifi Almond

Very few Wi-Fi routers could be described as user-friendly, with almost all relying on labyrinthine web interfaces. The process is a chore for technical users, but a true challenge for novices.

Ease of setup is what makes Securifi's Almond unique. It's a compact wireless router with a small touchscreen display. Common settings are easily accessible through just a few screen taps.

Although you'll still need to venture into the browser interface for some functions, simple tasks such as checking the status of your internet connection or displaying the wireless security password are a doddle, and can be done without needing a separate computer.

Securifi looks to be pitching its product at Windows 8 users. Its interface bears more than a passing resemblance to the Modern UL with six brightly coloured static tiles on each of its five pages. A stylus is attached to the underside of the Almond to aid text input.

As routers go, the Almond is fairly basic. There are two ethernet ports at the back, along with an uplink port for connecting a modem. And wired ethernet is of the slow 100Mbps variety, too.

Its wireless capability is 802.11n and single-band, so limited to the 2.4GHz band with a 2x2 Mimo



antennae configuration. It can also be used as a range extender for an existing wireless network.

In our testing the Almond muddled along at best. A datatransfer rate of 45.9Mbps at 1m from the laptop, or 7.8Mbps at 10m, is nothing to get excited about. It's safe to say the Almond isn't recommended to anyone for whom speed is a consideration.

Yet this router is ideal for a non-technical user. The technology behind networking is complex, vet Securifi has done a great job of making it more accessible.

The web-based admin interface, when it needs to be used, has the simplest, most user-friendly design we've seen. Gone are the list of menus on the left, favoured by almost every other manufacturer,

here replaced with a single screen split into two sections. Once again it borrows heavily from Windows 8's tile-based Modern UI. Big flat tiles with large fonts lead you to each section, and everything is accessible from a single page.

At the top you can see some commonly required network information in one place. It shows the router's IP address and the SSID, and lists the DHCP clients.

Underneath this is the 'advanced' section, with links to the firewall settings, DMZ, port forwarding, a system log and port filtering. Some advanced features present on other routers, such as support for VPNs, are absent from the Almond.

We wouldn't use the Almond, but it would be our recommendation for a friend or family member who needs frequent technical support. It won't eliminate the need for them to ask for help, but the accessibility of the display and clear labelling of its various menus will ease troubleshooting from afar.

Verdict

The Almond lacks commonplace features such as gigabit ethernet, but it makes up for this with an accessible interface. We're looking forward to the faster, more advanced model with the same simple design.

□ Orestis Bastounis



the Philips' backlight uniformity is also impressive.

Connectivity includes four HDMIs, component, Scart via an adpator, optical audio out, ethernet and a trio of USB inputs. The set also has integrated Wi-Fi and a choice of Freeview HD or DVB-S2 tuner.

While the set is physically flamboyant, the user interface is surprisingly pedestrian, with a basic EPG and text-heavy menus.

Philips' Smart portal is also somewhat lacklustre. Streaming services are primarily limited to BBC iPlayer, Acetrax, YouTube, Blinkbox, Viewster and iConcerts.

Bizarrely, perhaps in an effort to attract a different audience to its rivals, the set also has an astonishingly high quota of adult material on tap. While you can age-restrict access to these services, it's a pretty limp safeguard. We can't imagine parents would want younger viewers to browse the content on display here.

The 42PFL6188S offers passive rather than active 3D or, as it's known in Philips parlance, 'Easy 3D'. It comes with four pairs of glasses. The system works well enough, offering tangible stereoscopy without any significant loss of brightness. The set also boasts an effective stereo sound system. which is not short of volume.

Verdict

Fashionistas will love this TV. It's a designer thinscreen that's both keenly priced and ostensibly well specified. But the lightweight portal content may be a turn-off for some, and image quality is something of an acquired taste. Steve May

£79 inc VAT

Contact

■ netgear.com

Read more

■ tinyurl.com/n4xdh25

Specification

Dual-band 802.11n wireless extender: 802.11b/g/n; 2.4GHz and 5GHz; 2x2 Mimo antenna; 1x 10/100 ethernet port; 3.5mm stereo audio iack: 1x USB 2.0 port; DNLA compatible DMR: WPS Security (WPA2 available); 120x79x42mm



WIRELESS RANGE EXTENDER

Netgear WN3500RP

Wi-Fi range extenders typically come in only one wireless flavour: singleband 2.4GHz. However, given that many people now have dual-band 5GHz-capable routers, Netgear offers the option to use this band with its WN3500RP extender.

It's one of the best-looking range extenders on the market, made from high-quality plastic and feeling reassuringly sturdy in the hand. You can either plug the unit directly into the wall or use its extension cord to achieve the strongest signal.

The unit offers 10/100 ethernet, plus a USB 2.0 port for hooking up printers and other peripherals. Unusually, there's also a 3.5mm stereo jack, which allows you to connect a speaker and stream music directly from the extender.

You simply connect to the Netgear's open Wi-Fi network and browse to its web interface. A wizard helps you to configure both 2.4- and 5GHz networks. These work simultaneously, so no manual switching is required.

The _EXT extension given to the network SSID enables you to connect to either the extender or the router, which can be beneficial if you are working closer to one than the other.

To test performance we placed the Netgear on the stairwell of our building, approximately 5m from the router. Achieving a line of sight was neither possible nor practical. We then ran a speed test on our laptop from the first, second and third floors of the building.

For comparison purposes, when connected directly to the router the laptop measured 56Mbps on the first floor over the 2.4GHz band, or 60Mbps over 5GHz, and 20Mbps on the second floor over 2.4GHz. Beyond this point the router's wireless signal was unreachable.

Adding the WN3500RP to the equation the laptop was able to record speeds of 17- and 31Mbps on the first floor, 30- and 13Mbps on the second floor, and 5- and 12Mbps on the third floor over the 2.4- and 5GHz bands respectively.



Although the range was extended, the throughput weakened. This can be partly explained by obstructions such as concrete walls, but other extenders have fared better in this regard.

Verdict

The Netgear is well-designed and offers a reliable network connection. It fell short of our speed expectations, however, particularly in comparison to the WD extender reviewed below. Maylor

£64 inc VAT

Contact

■ wdc.com

Read more

tinyurl.com/psgwwcf

Specification

Dual-band 802.11n wireless extender (nonconcurrent); 802.11b/g/n; 2.4GHz and 5GHz; 3x3 Mimo antennae; 1x gigabit ethernet; WPS security (WPA2 also available); 153x132x51mm



WIRELESS RANGE EXTENDER

WD My Net Wi-Fi Range Extender

In common with the Netgear extender reviewed above. Western Digital's My Net Wi-Fi Range Extender operates on both the 2.4- and 5GHz hands. The difference here is that it uses 3x3 rather than 2x2 Mimo antennae, which can produce better real-world performance.

The unit itself is slightly larger than most such devices, and its build quality feels slightly less solid than some of its rivals. The WD offers a single gigabit ethernet port but, unlike the Netgear, no USB ports.

Setup is the WD's weakest point. You must manually choose between 2.4- and 5GHz operation via a switch on the rear of the device: concurrent use of both bands is not possible.

We found the process would hang when we selected our wireless network, and the setup countdown clock terminated mid-installation with every router we tried. More worryingly, it couldn't detect the 5GHz network on our Apple Time Capsule. Eventually we got a WD N900 router working correctly.

To test the speed of this range extender we placed it on the stairwell of our building about 5m from the router. As with the Netgear, we then ran speed tests from the lapton on the first, second and third floors of the building.

For comparison purposes, when connected directly to the router the laptop measured 56Mbps on the first floor over the 2.4GHz band, or 60Mbps over 5GHz, and 20Mbps on the second floor over 2.4GHz. Beyond this point the wireless signal was unreachable.

With the WD employed we measured 63- and 62Mbps on the first floor, 38- and 46Mbps on the second floor, and 16- and 18Mbps on the third floor, over the 2.4and 5GHz bands respectively.

Thanks to that 3x3 Mimo configuration, the WD extender's performance is significantly more impressive than that of the Netgear - and, indeed, any other range extender we've tried.



It's worth noting that we achieved faster performance at greater distance over the 5GHz band. This may be explained by interference from neighbouring 2.4GHz networks within the building.

Verdict

The WD My Net gives by far the best performance of any range extender we've tested. If you already have a WD router, adding this extender to the mix should increase your wireless range and data rate. However, if you wish to use it with another router first check whether it's compatible. 🗵 John Taylor



£250 inc VAT

Contact

- g-technology.com Read more
- tinyurl.com/nv7f32f

Specification

4TB external hard drive (also available in 2TB and 3TB); USB 3.0; 2x FireWire 800; Hitachi Deskstar 4TB 7,200rpm; integrated heat sink; 12V DC power adaptor; Kensington lock slot; 235x130x46mm; 1.35kg; 3-year warranty



HARD DRIVE

G-Technology G-Drive 4TB

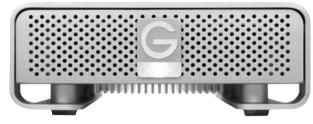
G-Technology offers a range of smart external storage, styled to blend with Apple Mac hardware. Many of the G-Technology desktop models now feature two- or four-disk Raid for peak performance and capacity, but a single-disk unit such as the G-Drive can still offer vast storage, and at a keener price point.

The G-Drive is available in three capacities - 2TB, 3TB, and the 4TB we tested. A change of interface option sees USB 3.0 replacing 2.0. This means that the Hitachi Deskstar hard disk inside can now easily operate at its maximum speed.

There's still a FireWire option, with two FireWire 800 ports enabling straightforward connection to most Macs, although the eSATA port has gone.

Construction of this sleek aluminium slab is as solid as ever and, thanks to a finned heatsink on the underside, the G-Drive can run without additional fan cooling.

It's far from silent, though, and the rumblings of the 7,200rpm disk



inside are clearly audible. Placed on your desk, you'll likely feel its thrum and hear rustling platters, although it is slightly quieter than the previous-generation G-Drive.

We tested FireWire performance under OS X, and saw consistent sequential read and write speeds of 71MB per second (MBps). Smaller random reads from 4kB to 1,024kB averaged 19MBps, and random writes of the same file size span averaged 30MBps.

Turning to USB 3.0, the G-Drive was able to stretch its legs. Small-file random reads and writes were very similar at 23- and 30MBps respectively, but sequential reads hit 160MBps and writes 168MBps.

That's with an empty drive, of course. Expect real-world speed to average 120MBps, which still means you won't be hanging around long waiting for large files to be written to or read from the G-Drive.

Verdict

The addition of USB 3.0 to the G-Technology G-Drive is very welcome. Previously the only way to match the performance of the disk was through eSATA, which is almost entirely limited to Windows systems. Now both Windows PCs and Apple Macs can take advantage of the high-performance Hitachi disk inside this robust and stylish chassis. Andrew Harrison

£79 inc VAT

Contact

- sony.co.uk
 Read more
- tinyurl.com/n4p8fe7

Specification

1.3in (128x128) OLED screen; Android (compatibility 2.1 and up); Bluetooth 3.0; USB charger; 36x36x12.8mm; 40g including wriststrap



SMART WATCH

Sony SmartWatch

Sony's SmartWatch is a 1.3in-screen Android device that you wear on your arm. It's among the first of many wearable tech devices that are set to explode on to the mobile market this year.

The watch looks undeniably cool with its rounded corners, silver metal edge and glossy black fascia. It's also remarkably similar-looking to the iPod nano, but with only half the screen resolution (128x128 pixels).

Despite its light weight (40g), the 12.8mm-thick Sony is rather bulky, and you may struggle to fit it under tight clothing. In such scenarios a clip on the rear allows you to attach it to a belt or strap.

The rubber wristband is available in several colours. We found the rubber could at times feel rather clammy, but an adaptor is supplied so you can affix the SmartWatch to an alternative strap.

Paired with almost any Android phone over Bluetooth, the Sony acts as a second screen for your handset. Navigation via touch gestures isn't overly intuitive, but we found them quick to learn - help is provided within the companion app, too.

In common with a standard wristwatch the SmartWatch can tell the time; there are 10 styles of analogue and digital clock faces from which to choose. But unlike most watches, the screen will enter standby to save battery life - to display the time you press the button on the side. Battery life is a key issue: it can take some time to get used to the idea of taking off and recharging your watch every few days.

The SmartWatch also offers various smartphone-like functions, such as alerting you to texts, calls and notifications, letting you check your inbox and controlling music playback, and it incorporates widgets for such things as weather and fitness trackers. You choose which features you want to use in the same way that you decide which apps to download to your phone.

Custom apps and widgets for the SmartWatch are downloaded and



installed via the smartphone app. This app is also used to rearrange the SmartWatch's home screen.

If you often miss text messages and calls because your phone is in a pocket or bag then the SmartWatch can be a real boon - it's impossible to ignore it vibrating on your wrist.

The screen is too small to type in replies to messages and emails, but the SmartWatch will let you send a predefined message.

Verdict

You don't need a Sony SmartWatch, but you probably want one. It's a cool, attractive gadget, but it also offers some useful functionality.

Chris Martin

Best apps for travel

Chris Martin rounds up some handy Android, iOS and Windows apps for use when travelling abroad

e take our smartphones and tablets wherever we go. With mobile internet, public Wi-Fi hotspots and GPS, travel apps can be extremely handy.

Travelling can be a stressful experience, but there are plenty of apps that can help make your trip as smooth as possible whether you want a cheap weekend getaway or you're planning a gap year abroad. Travelling also tends to be expensive, so all the apps we've selected are free.



Google Maps

Available on: Android, iOS

Probably the most useful travel app you can download is Google Maps. Not only does it offer a clear, concise and easy-to-use mapping system, it's packed with features. You can search the entire planet for places and local attractions, getting turn-by-turn directions to your destination, live traffic and local information. Google Maps has different layers, including traffic, satellite and terrain. Buildings mapped in detailed 3D and Google's Street View will help you find your way on foot in the cities, too. And if you go inside a selected airport, hotel or shopping centre, it will offer an indoor map. Just beware of expensive data charges when abroad.



National Rail Enquiries

Free; £4.99 ad-free Available on: Android, iOS

If you have a need to travel by train in the UK, National Rail Enquiries is a useful travelling companion. Having configured your home station, you can simply hit a 'Get me home' button to find relevant services based on your location. The app is easy to use and, although it's ad-supported, these don't get in the way in our experience. Should the advertising cause you headaches



an ad-free version of the app costs £4.99. Aside from train times, National Rail Enquiries offers handy information such as ticket pricing, platform numbers and train progress. To stay ahead of the game you can get notifications for real-time disruptions. plus alerts that prevent you falling asleep and missing your stop.



Trip Advisor

Free

Available on: Android, iOS

and Windows Phone

When travelling in an unknown place you want to be able to find the best places to visit, the best prices and the best service. Trip Advisor brings you more than 100 million reviews from fellow travellers, so you so know how to make best use of your time. The app displays detailed information on airfares, hotels, restaurants and attractions. So, whether you're flying abroad or looking

for something to do closer to home, you can probably find it on Trip Advisor. If you're not sure where to go simply enter your location or an address to find out what's nearby.

Wi-Fi Finder



Available on: Android and iOS We all like to stay connected

when travelling, whether we need to make an important Skype call or just check our Facebook account. If you don't want to pay high roaming charges or expensive rates at your hotel or an internet café then Wi-Fi Finder will unearth free and paid-for nearby hotspots (an iOS version is dedicated to free hotspots). The app features 550,000 locations in 144 countries, and can be filtered by location or type. After a guick scan, the app will show you all hotspots in the area and guide you to the closest one.

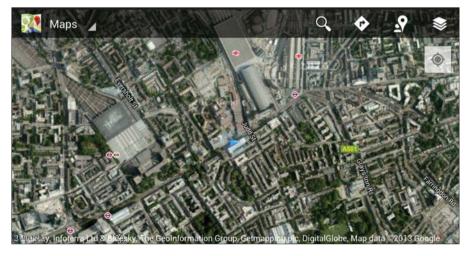


Google Translate

Price: Free

Available on: Android and iOS

Another entry from Google is Translate, and there are no prizes for guessing what it does. If you're going abroad you can usually rely on the fact that many nations learn and speak English almost as well as we do. But, for those sticky situations when the language barrier rears its ugly head, Translate will be your best mate, with support for more than 70 languages. Not only can it translate text, but also speech and images taken from your device's camera. You can even save your most frequently used translations and sync them across devices. lackim



Backup & Sync Everything



Your files, wherever you are

- A massive 5,000GB Cloud Drive
- Unlimited Backup for 5 computers
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- Stream to your mobile device
- Military Grade Encryption
- UK based Customer Support

REQUIRED

www.livedrive.com/pcadvisor

WEB BROWSER

Puffin Browser

Free

Contact

- puffinbrowser.com
- Read more
- tinyurl.com/n5k2j7k

System requirements

Android 2.2 or later; 12MB storage; iOS 5.0 or later; 11.2MB storage Puffin builds in support for Adobe Flash, and is compatible with mobile devices running Android 2.2 or iOS 5.0 and later. The browser itself is free to use forever, but if you want to continue accessing Adobe Flash following the two-week trial you must pay £1.93 for the full version.

The main caveat is that Puffin's servers are in the US, which means some content may be restricted by UK sites. We were unable to catch up with iPlayer programmes, for example, and there's no workaround. Other content, such as videos on our Facebook page, worked without issue - vou wouldn't even know the OS didn't natively support Flash.

It's worth using the trial to see whether the content you want to view and the sites and services you want to access are available.

Aside from built-in Flash, it's quite simply the fastest web browser we've ever tried. Running SunSpider on a Nexus 10 Android Jelly Bean tablet, we recorded a staggeringly fast 204.6ms. At 721.9ms. Firefox is



its nearest rival. And on our Sony Xperia P phone, performance just got better: we recorded a tiny 179ms.

A virtual trackpad brings dragand-drop functionality to Android. or you can simply navigate the web using a familiar mouse cursor. If you're playing a game, you can map any keyboard function to the buttons on the gamepad.

Despite its ability to use a virtual trackpad or gamepad, Puffin Browser is decidedly finger-friendly. Simple gestures allow you to easily navigate pages and manage tabs.

Tap on a link in a web page and a small blue circle appears onscreen,

letting you know the browser has registered your command.

A few add-ons are available, notably Readability, which strips out images and adverts from a page.

There's no private browsing mode, but the developer claims its servers do not track or store your personal information.

Verdict

Puffin is the fastest web browser we've ever seen on any mobile device. It also builds in Flash support, although its US servers will prevent UK users from accessing certain content. Marie Brewis



PRODUCTIVITY APP

Skitch Touch

Free

Contact

evernote.com

Read more

■ tinyurl.com/Lxc8vz6

System requirements

Windows 8; 1.7MB storage

Evernote-owned Skitch offers a way to annotate your images and screenshots; the Touch edition is built for Windows 8's Modern UL It has the same simple and pretty annotation tools as the other versions, but offers fewer features.

Like many other Modern apps, Skitch Touch seems to be designed for screen in the 11- to 13in range. On a 24in monitor it displays vast expanses of white, unused space. Upon launch, Skitch Touch shows a beautiful Create New area on the left side of the screen, letting you pull in material from a camera, a map, a photo, a screenshot, an image saved to the clipboard or a blank canvas. Notably missing is the option to capture a new screenshot.

Once you have an image open for editing, annotating it is just as easy as it is in other versions of Skitch. Part of what makes Skitch fun to use is that it doesn't overwhelm the user with numerous tools: there are just seven to master. You can draw arrows on your image, enter text,



demarcate areas with rectangles, and squiggle with a marker. Other tools let you style your annotations (pick a colour and stroke width). pixelate areas and crop the image. It might not sound like a lot, but that's all you need to get your point across when annotating an image.

When you're ready to share your work with others, click the Export button to save the image as a Jpeg or PNG file. This isn't as convenient as being able to drag the image off the window to save it (a feature offered by the full version of Skitch), but it works. To save your work as

a Skitch document for later editing, click the checkmark in the top-right corner of the screen.

This is another area in which Skitch Touch could do better: Unless you log into your Evernote account using Skitch, you can access only your most recently edited file.

Verdict

Skitch Touch is a fundamentally simple tool, and is well-suited for annotating images, especially on smaller screens. It offers a better Modern experience than most apps we've seen. 🗵 Erez Zukerman



GAME

Candy Crush Saga

Free

Contact

- king.com
- Read more
- tinvurl.com/LkL7wah

System requirements

Varies for Android: iOS 4.3 or later: 49.3MB storage

Candy Crush Saga prompts you to match like sweets in a line of three or more to gain points and bonuses. In common with that other great gem-puzzler, Bejeweled Blitz, the more sweets you match with each move the more candy bombs you create, points you collect and faster you progress. Each level is slightly different,

Hailed as 'the sweetest game',

whether you have to remove all the sweets encased in jelly within a certain number of moves, achieve a given point-score within a specified amount of time, or drop the various ingredients for a tasty recipe to the bottom of the grid. It requires a degree of logic that keeps you entertained through hundreds of levels, which encompass various 'episodes' such as 'Wafer Wharf' and 'Peppermint Palace'.

Candy Crush Saga offers you five chances to screw up and, once you've run out of lives, you must either put down the game and wait for your health to be replenished,



stock up by begging your Facebook friends, or fork out real cash. Or you can roll forward your handset's time a few hours... but you know you've gone too far when messages and calls are logged on your phone three or four days into the future.

Once you reach level 35 King begins charging 69p per episode. Alternatively, you can complete a series of quests or connect your phone to Facebook. Various other boosters available within the game cost as much as £27: it's no wonder Candy Crush Saga is the top grossing app in Google Play, despite it being a 'free' game to download and play.

What's really neat about Candy Crush Saga is the ability to pick it up and continue your game wherever you are and on whatever device you have to hand. It's also simple enough that anyone can pick it up and get started without instruction, yet sufficiently difficult that you won't breeze through the game in an hour.

Verdict

Candy Crush Saga is an addictive puzzle game that anyone can pick up and play. But the frustration caused when you run out of lives could easily lead you elsewhere for your gaming fix. Marie Brewis



Injustice: Gods Among Us

Free

Contact

injustice.com

Read more

tinyurl.com/msqdxf2

System requirements

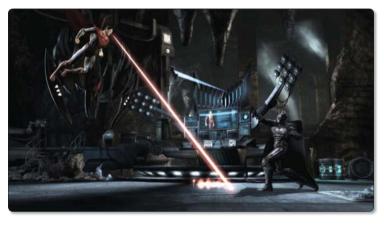
iOS 5.0 or later; 555MB storage

Comic book characters have so far struggled to score a smash-hit game on a mobile platform, with few titles proving worthy of the Marvel and DC Comics' names. But Injustice: Gods Among Us for iPhone and iPad hopes to change all that with a huge cast of iconic characters, a savvy trading card game mechanic, and an enticing price of free.

The game is billed as a collectable card game first and a fighting game second; Injustice definitely feels more like Pokémon than Mortal Kombat. The fighting gameplay is a no-frills combination of one-touch mashing and gesturebased special moves - the real way to succeed in the game is to collect cards that unlock additional characters or moves.

The plot isn't explained well in text or in the core campaign, but really it's a fighting game, so the plot doesn't matter: you see someone; you try to beat them up.

Despite a pretty hefty roster of DC luminaries, which look great



thanks to the Unreal Engine, the characters perform in much the same way: everyone has a fast attack, a slow attack and three power moves that do significant damage. Certain moves are easier to execute than others and have nice nods to the console game.

Cards can be collected in a number of ways. You earn certain cards by beating bosses and progressing through the game, but such cards are sporadic and rarely given. You can also purchase them in the store. Buying special moves or upgrades are fairly cheap, but new character cards are exceptionally

expensive. Unlocking Superman or Batman, for example, costs 90,000 coins or hours of gameplay.

It's unfortunate that the best aspects of the console game - the bizarre plot, the deep roster and the strong core fighting mechanics - are largely neutered in the iOS version.

Verdict

Warner Bros provides just enough unlockable moves, characters and upgrades to keep players coming back for more. This isn't the flagwaving, triumphant debut of DC Comics on iOS, but it's way more fun than it ought to be. 🗵 Chris Holt



DIGITAL MEDIA CREATOR

Roxio Creator NXT Pro

£80 inc VAT

Contact

- roxio.co.uk
- Read more
- tinvurl.com/Lkwe67s

System requirements Windows XP/Vista/7: 2GB RAM: 3GB drive

space

Usability: Features: Value:

Roxio was one of the keys names in the early days of CD-R, making Toast for the Mac and Easy CD Creator for Windows. It's changed hands several times and is now part of Corel.

In its heyday in the 90s, one of Corel's main sales tactics was to put stacks of software in a box: thousands of images and fonts came with CorelDraw, itself an ever-expanding suite of apps. The company seems to be doing the same thing with recently acquired Roxio, as its Creator NXT Pro suite has burgeoned on to two full DVDs - or one very big download. This results in a long installation process.

At the core is the Creator app itself, still geared to burning all kinds of optical disc, and also to uploading material to sites such as YouTube, Facebook and Google.

Many of the functions in its wheel of icons lead to creation apps, for burning audio CDs, creating DVDs (including Blu-ray) and editing video. But, in several cases. there are bigger, better standalone applications included as alternatives.

For example, Roxio Photosuite loads up from the Photo button in the Creator app. It's a perfectly serviceable image editor for occasional use, geared to making quick changes to photos such as removing blemishes and red-eye. But the also included Paintshop



ROXIO CREATOR is useful for anyone creating data, photos, audio or video

Pro X4 is a Corel editing app with considerable credentials and a full feature set. It supports HDR, batch manipulation and adjustment layers, plus there's a RAW lab.

There's plenty here for the sound enthusiast, too, but more for those wanting to convert tracks from analogue media, such as vinyl or cassette, or adding music to video.

Izotope automatically removes noise and hum from an audio track. It can enhance voice and music too, but you get very little control. Roxio's own Sound Editor offers only basic editing and is out-played by freeware offerings.

The biggest sound application is Sonicfire Pro 5, which is designed to tailor music tracks to specific lengths of video. The clips cover a range of music styles and the app offers control down to a single beat.

The main video application is Roxio Videowave, which is a mid-range video editor that sits somewhere between a basic app such as Windows Movie Maker and a semi-pro utility such as Premiere Elements. It offers separate timeline tracks for video, audio, overlay, effects and text (although only one of each), and a good range of effects and transitions. If you have handheld video to reproduce, the application can also stabilise it

Verdict

You can't complain about the amount of software included in Roxio's Creator NXT Pro bucket. Anybody creating data, photo, audio or video is well provisioned. What you can niggle about, though, is the lack of integration with the standalone apps. M Simon Williams

GRAPHICS PACKAGE

Serif DrawPlus X6

£82 inc VAT

Contact

■ serif.com

Read more

■ tinyurl.com/Lp9zj4w

System requirements

Windows XP/Vista/7/8; 512MB RAM; 778MB drive space; 1024x768 display



So many devices can now produce bitmapped images (photos) that it's easy to forget there's another major form of image, based on vector shapes. This is the kind of drawing produced by Adobe Illustrator but. since there's no Illustrator Elements, there's a gap in the market for a powerful vector editing tool that doesn't cost hundreds of pounds. Step forward Serif DrawPlus X6.

As the version number might suggest, this is a mature product and the basics of vector editing can be taken for granted.

You can easily create a variety of shapes and edit their outlines by dragging nodes and control handles. The shapes can be coloured using

a remarkably easy-to-use colour wheel and can be cut, combined and stacked in a variety of ways.

DrawPlus X6 goes much further, though, with features such as Quick Shapes. These include simple shapes, such as rectangles and circles, and complex ones such as clock faces and gauges, and each offers slider-controlled adjustments - for example, the number of points on a star or the edge shape of a shield. These can be converted to curves, too, so individual nodes can be adjusted as though they'd been drawn from scratch.

There's pressure-sensitive graphics tablet support, so you can draw freehand using natural brush

types, and DrawPlus X6 includes a pressure calibrator, so you can tune the software to your lightor heavy-handedness.

Brush strokes work well, but we noticed a tendency for the software to tidy the edges on completion, which may not be what you want.

New features for this edition include Arc, Spiral and Triangle tools, which enable guick production and adjustment of these commonly used shapes. You can use them to cut out of other objects, too, and this idea has been carried further with the introduction of stencils.

Stencils are objects that also act as masks, so you can paint through and then remove them. There's a



ASTRONOMY SOFTWARE

Starry Night Pro Plus 6

\$187 (£120)

Contact

- astronomy.starrynight.com Read more
- tinyurl.com/q9fqvLw

System requirements

800MHz processor; Windows XP/Vista/7/8; OS X 10.4 or higher (PPC/Intel compatible): 256MB RAM (512MB recommended): 5GB drive space (11GB needed for full install); 64MB (128MB recommended) OpenGL 1.4 capable graphics card (OpenGL 2.0 is required for advanced features); 1024x768 display



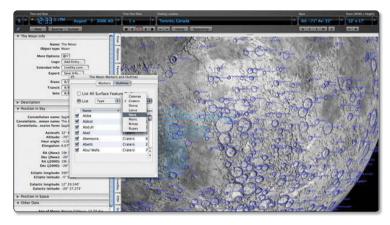
Smartphones and tablets have opened the heavens to stargazers, bringing detailed sky maps to our fingertips. But, for the best insight into astronomy, you can't beat the breadth and depth of images and data available on a suitably equipped PC. Inspired by our tutorial on free astronomy software (see page 116), we decided it was time to catch up with Starry Night, one of the longest-running such programs, available for Mac and Windows.

Four versions are now listed: the Enthusiast edition: Starry Night Pro: Pro Plus: and an entry-level Complete Space & Astronomy Pack. You can buy direct from the US website, where prices range from \$37 (£23) to \$187 (£120).

Pro Plus features the widest range of time travel throughout the universe, from 99,999 BC to 99,999 AD, along with LiveSky images from observatories and satellites. Databases are greatly expanded to all manner of objects such as NGC, quasars and galactic clusters.

Most conspicuously different from the standard Pro version is Pro Plus' addition of a complete sky map captured by CCD cameras, grafted into the database of 65 million stars and 1 million deep-sky objects.

As you zoom into starfields you will see the star maps switch between different resolutions of



STARRY NIGHT is one of the longest-running astronomy apps for PC & Mac

imagery. At around 42 arc-minutes of zoom the imaging switches from captured to synthetic star maps.

The main interface comprises a large single-pane window that fills the screen, with 12 tabbed drawers that slide out from the left, along with the usual drop-down menus at the top. A long bar across the window top includes the current time and date, followed by the time rate from 1x to 30,000x. Then there's the viewing location, by default vour chosen home on Earth. although you can teleport yourself through space to observe from any planet or moon, for example.

We last tried Starry Night Pro around 10 years ago. Since then computing technology has moved on, but Starry Night has changed little.

The OpenGL graphics, very good for 2005, now look a little mechanical. And there's been no update to the program since 2011.

For astronomers who are more practical than armchair-based, the Pro and Pro Plus editions include telescope control, allowing the dialling-up of required objects from the program and letting a motorised 'scope take you there. Fields of view for the main viewing window can also be adjusted to suit whatever telescope or binoculars you use.

Verdict

Starry Night Pro is a very powerful and well-featured application. It hasn't been developed for several years and now must stand against cheaper apps such as Star Walk for more casual stargazers at least. But against free, basic offerings such as Google Sky it becomes a lot more attractive. Andrew Harrison



DRAWPLUS X6 is a very good vector graphics package, and a worthwhile upgrade from X5

limited range to choose from, but you can add your own by dragging objects into the stencil selector.

If you want to incorporate photos into your artwork, simple bitmap functions such as white balance and lighting are available in the PhotoLab applet; the program also

links with Serif's companion photo editor, PhotoPlus.

You can move a bitmap component in DrawPlus directly through to the companion program for more sophisticated adjustment, before returning it to its place in the vector editor. You can already do this with PhotoPlus and PagePlus.

Layer handling has been improved, so you can work with objects in their relative position in the stack, rather than explicitly selecting a layer before editing.

You can also pick out the colours from an object or bitmap and create a palette from them, allowing you to use the same colours in other elements, such as text.

The drawing engine has been rewritten for 64bit processors, and in 2D work it was smooth and snappy on our modest-spec Windows 7 PC with 3GB of RAM. Using Instant 3D to create solids slowed everything down, however.

Verdict

It's difficult not to like DrawPlus X6. This program can do many of the things normally found only in much more expensive vector editors, and even a few they can't. While none of the new features is earth-shattering on its own, they add up to a worthwhile upgrade from DrawPlus X5. 3D processing was sluggish, though. Simon Williams

OPERATING SYSTEM

Ubuntu 13.04 Raring Ringtail

Free

Contact

ubuntu.com

Read more

■ tinyurl.com/pzmq5fh

System requirements

700MHz Intel Celeron processor or better: 512MB RAM: 5GB drive space (or USB stick. memory card or external drive): 1024x768 screen resolution: CD/DVD drive or USB port for installation



The **SEARCH LENS** feature returns results with whiplash-speed

It's been two years since Canonical made Unity the default desktop environment in Ubuntu. Since the release of 11.04 Natty Narwhal (reviewed at tinyurl.com/6ag2gfc) the distribution has seen some interesting times, as a backlash against the new desktop led to much dissent in the Linux community.

Some accused the company of wanting to be too much like Apple, with its heavy-handed control over design and functionality. Others were mystified at the loss of customisation that previous versions of Ubuntu had made so easy and couldn't understand why Unity, which had been designed for netbooks, was being forced on to their large-screen desktops.

Many users jumped ship, with Ubuntu-based distributions such as Linux Mint (which retained a more familiar Gnome environment) growing in popularity as a result.

Ulterior motive

One of the main reasons for instigating such a controversial redesign seems to be that of convergence. In the past couple of years Canonical has showcased its vision for smart TVs, tablets and, most recently, the forthcoming Ubuntu mobile phone operating system. These all share a remarkable resemblance to the Unity desktop.

It's obvious now that the company had a plan from the start. and one that we may well see come to fruition in the months ahead.

All this is well and good but, as Microsoft may be learning, people don't want mobile phone-fixated operating systems running on their





UBUNTU's interface, clean and OS-like, makes more sense than before

laptops or home desktop machines. Having huge icons that are designed for touchscreens, but which you're expected to control with a mouse and keyboard, makes for a symphony of frustration. It's good to know, then, that Ubuntu hasn't entirely followed Windows 8 down the rabbit hole. Instead, it can be seen to have come of age.

New features

Ubuntu 13.04 bears the codename Raring Ringtail, and is named after the ring-tailed cat. This is oddly fitting for the new iteration of Ubuntu as it's fast - raccoon-fast.

Whereas previous generations of Unity might be seen as resourceheavy, the new addition to the stable is refined and feels more optimised than ever, possibly thanks to the work Canonical has been doing with mobile platforms.

The search lens feature returns results with whiplash-speed, and incorporates new options such as Social and Photos. Once you've provided authorisation in the settings, the search results can also display content from a number of online sites and services, including Facebook, Twitter, Google and Flickr. It's a nice feature for socialites.

The aesthetics have also been tweaked, with several new icons receiving a nip and tuck. Search looks good, although the rest of the OS is now beginning to show its age. The menus in many of the packaged applications look cartoonish in comparison to the newer, more elegant designs. We hope this will be addressed in subsequent versions.

The software centre, where you'll find new apps to download and

install, mostly free of charge, looks probably the worst of all, especially when compared to the likes of Apple, Google and Microsoft's app stores. But there are rumours that Canonical will be paying this some attention within the next few releases of Uhuntu

In some ways the software centre is less important than it was in the past, as the search lens has improved its capabilities to find apps by type. Enter 'photo editor', for example, and you'll be presented with the available options in the app store and can install them simply by clicking the download option. Easy.

Stability issues

We did encounter a few glitches along the way, with Flash crashing several times when we tried to watch a long HD video on YouTube The soundcard on our test machine also caused the machine to occasionally revert to a more mute state. Both were easily fixed through a reboot or simply relaunching the program in question. Otherwise Raring Ringtail is a very stable and impressive release.

Verdict

Unity might have made Ubuntu some enemies in the past, but with 13.04 we feel it is now a definite plus for the platform. With the design aesthetic allied to a speedy and robust engine, we're finally seeing what the team at Canonical has been trying to achieve over the past few years. There will be those who still prefer the level of user control offered by other distros but, for the rest of us, Ubuntu is as good as it gets. Martyn Casserly



PRODUCTIVITY SOFTWARE

Audio Notetaker

£95 inc VAT

Contact

sonocent.com

Read more

■ tinyurl.com/Lgp4v5q

System requirements

Windows XP/Vista/7/8 (output recording not available for XP)/OS X 10.5.8 or later



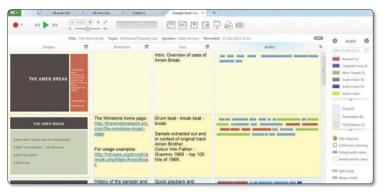
Audio Notetaker from Sonocent is billed as an alternative way of taking notes in meetings, interviews and lectures. It does this by breaking down speech, recorded on your computer, into visual bite-sized bars, for annotating and editing.

Unlike Dragon speech-recognition software, it doesn't attempt to turn audio into text, although you can add written notes or reminders should you wish.

It's a novel experience, but one that takes a little time to get used to. especially colour-coding bars live as you attempt to highlight important parts of any audio.

Once highlighted, these key elements can be played back to form a more concise and useful set of audio notes, with the option to add images, PowerPoint slides, PDF documents, links and more.

Things are complicated a little further when your voice is part of the conversation. Listening to your own voice isn't necessarily pleasant, while editing your contributions on



AUDIO NOTETAKER splits recordings into individual phrases, shown as bars

the fly requires good multitasking skills. It's also crucial that you don't simply switch off during meetings, in the hope that you can make up ground at a later date.

Quibbles aside, it's still great to have your notes and supporting files all in one organised, intuitive place. Indeed, the more you embrace Audio Notetaker the more it makes sense.

It's also good to have a complete record of audio notes for backup, should the precision of your edited notes be questioned.

Sonocent gives users the option to buy a perpetual (£95) or sixmonth (£29) licence, the latter ideal for students who need to study for only a short period. Both options cover two computers at any one time, so you can happily install the software on both Windows and Mac. A mobile app is still on the to-do list.

Verdict

While clearly rooted in educational software, Audio Notetaker is widening its appeal with every update. Plenty of potential users are likely to find annotating and visually organising audio a boost to productivity. Mick Spence

Metro: Last Light

£30 inc VAT

Contact

- enterthemetro.com/uk
- Read more
- tinyurl.com/Lm6xked

System requirements

2.2GHz processor; Windows XP/Vista/7/8; 2GB RAM; 7.5GB drive space; nVidia GTS 250 or better with DirectX 9 and Shader Model 3

Following in the footsteps of 2010's Metro 2033, Last Light improves the gameplay of its predecessor without destroying what made the series great: the setting. We return to post-apocalyptic Russian wasteland, with an excellent soundtrack and bleak, desolate imagery.

Boot up Last Light and you'll be dropped into the boots of Artyom as he attempts to leave the Metro to capture 'a dark one', monstrous remnants of the world before it was devastated by all-out nuclear war.

Along the way you'll be captured by other survivors and work together with another captive, Pavel, to orchestrate an escape.

Artyom's quest ultimately culminates in one of the coolest firefight finales we've ever seen, but frenetic, fast-paced combat is tiresome without reason to fight. Last Light tells a meaningful story via emotionally charged flashbacks.

Exploring, scrounging and fighting for your life with a hodgepodge of innovative post-apocalyptic weapons



It's the sound and graphics that make METRO such as great game to play

remains the theme. Even your weapons tell a story, such as the handmade submachine gun whose magazine slides left-to-right. It's a little thing, but idiosyncratic touches such as this do an excellent job of showcasing the unique, alien nature of Metro's alternate Russia.

Weapons can be customised to fit your tactical preferences, letting you tailor the game to your liking.

Metro's score is one of the best in the business. Pair this with the spot-on sound effects - terrifying gunfire, wet, gurgling screams, the frantic cries of communication

between both enemies and the occasional comrade - and you find a sense of aural immersion to rival that of any blockbuster film.

Unfortunately, Last Light suffers myriad bugs and issues. It also has a lack of direction and is incredibly difficult: there'll be no dashing through with guns blazing here.

Verdict

Metro: Last Light is a flawed game with genuine pathos, a unique firstperson shooter that accomplishes more with its narrative than do some blockbusters.

Alex Rubens



GAME

Far Cry 3: Blood Dragon

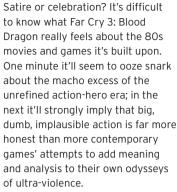
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System requirements

2.6GHz Intel Core 2 Duo E6700 or 3GHz AMD Athlon 64 X2 6000+ or better; Windows XP/ Vista/7; 2GB RAM; 15GB drive space; graphics card with DirectX 9.0c and Shader Model 3.0



One thing it's easier to decide upon is that Blood Dragon isn't particularly interested in being taken seriously. It's set in 2007 - but that year as it might have seemed to low-brow sci-fi creators back in the 80s. So cyborgs, deathrays, mutants and nuclear wars all abound without shame. As does an almost gruesome amount of neon, overlaying a world set in perma-darkness and forever seen through VHS-style scanlines.



Michael Biehn, supporting star of *The Terminator* and *Aliens*, is perfectly cast as the foul-mouthed, blood-crazed, impatient cyborg 'hero' of the piece. His growling voice and persona almost define the prototypical 80s grunting angel of death/personality vacuum.

He, his enormous arsenal and his robot hand have been sent in to stop an android army up to no good on a secret island. There is a plot and there are supporting characters, but all of it exists purely as a framework for running around shooting things

with ludicrously overpowered guns in a small but open-world setting full of robots, angry wildlife and the titular, dinosaurian Blood Dragons.

It is designed to be enjoyed as utterly unrepentant violence. It's caustic and excessive and it absolutely means to be. The only attempts to temper this are in the humour, which is a barrage of 80s references and fourth-wall-breaking sneering at the tropes and restrictions of games (for instance, Biehn swears in frustrated outrage as the tutorial agonisingly tells him how to jump, aim, run and so forth).

This stuff makes it clear the game is a farce, but it's a thin line between knowing and obnoxious, and Blood Dragon repeatedly crosses it. There are giggles to be had, but much of the time you're better off tuning out the snark and enjoying firing a weapon that could level a city at something that looks like the offspring of *Jurassic Park* and *TRON*.

Satire

Despite revelling in superficiality, there's a sense that Blood Dragon is, underneath the noise, trying to pass some comment on how absurd and gratuitous videogames have become. The writer of parent game Far Cry 3 has explained in interviews that the game's tale of a white, spoilt student gradually becoming a superman who's idolised by island natives was a pastiche of game tropes. But the fact that it came off so earnest and that the action was so well-implemented meant that commentary wasn't obvious.

Blood Dragon, though, perhaps makes the point better - so much of it simply changes the names and graphics of the enemies, items and features in Far Cry 3, and that's enough to make it openly satirical. If that's really all it takes to turn a game about repeatedly shooting people from serious to silly, to what degree should we think the likes of Spec Ops and BioShock Infinite have something to say about virtual violence? From that spawns a certain sense that anyone playing and getting anything out of Blood Dragon becomes the butt of its authors' joke about how stupid and bloodthirsty gamers are.

Still, any such arguments will fly over most players' heads, because they'll be too busy shooting enormous neon dinosaurs with dog-sized miniguns. Really, Blood Dragon is just the same gag over and over again. It's a passingly funny gag, and for the £11 price it doesn't seem like bad value.

The map is significantly smaller than that in Far Cry 3, there aren't many missions or enemy types and, while the art style successfully evokes 80s sci-fi, it's also pretty ugly. And it's difficult not to come away from Blood Dragon with a faint sense that the game's been mocking you for enjoying it.

Verdict

1980s-spoofing testostersone-fest Blood Dragon is an easy sell if you're the kind of person who laughs along with 'I Love 1985'. It's perhaps a little tougher if you prefer satire with teeth.

Alec Meer



ENEMIES look like the offspring of *Jurassic Park* and *TRON*





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Specification

10-bay desktop NAS drive; 3.3GHz Intel Core i3-2120 dual-core processor; 2GB DDR3 RAM: 512MB DOM flash memory; Qnap TurboNAS 3.8.2: 10x lockable drive bays for 3.5in or 2.5in SATA 6Gbps hard drive or SSD: 2x gigabit ethernet: 2x USB 3.0; 4x USB 2.0; 2x eSATA: LCD backlit display; 29dB idle/30dB operation noise level; 1x expansion slot; 1x 30mm, 2x 120mm cooling fans; VGA for system maintenance: Kensington lock slot; 218x3,278x321mm; 9.8kg



NAS DRIVE

Qnap TS-1079 Pro

Network-attached storage is the lynchpin of business, a single place to keep and maintain many users' data and miscellaneous resources. We see up to six- or eight-bay NAS drives as standalone desktop units, while eight-bay and larger boxes tend to be rack-mount units for server-room installation.

The Qnap TS-1079 Pro is unusual, a large freestanding unit featuring 10 3.5in bays. Pre-drilled holes also allow 2.5in disks or SSDs to be fitted. This means you could put 40TB of unformatted storage eggs into one fortress-like basket.

This NAS is closely modelled on the company's eight-bay TS-879 Pro, but with eight disks mounted on their side and two positioned horizontally below. This allows for the same size chassis.

The processor is very powerful in NAS terms - an Intel Core i3 dual-core chip running at 3.3GHz. This Sandy Bridge chip is paired with a generous 2GB of memory. That's a combination that ought to take even high-bandwidth, multi-user threads in its stride

As standard the Qnap connects to networks with one of two gigabit ethernet ports, and there's an option to aggregate the two ports. The NAS overcomes the bottleneck of even load-balanced dual-gigabit setups by offering an expansion slot that

can accept additional ethernet NICs.

You can add an extra dual-port 1GbE or a dual-port 10GbE network expansion card here. The latter is specified for up to

1.6GBps reads and 1.4GBps writes - tremendously high figures, given that most gigabit NAS drives run at around 100MBps.

We didn't have an expansion card or supporting hardware to test the 10GbE option, but in normal use the TS-1070 proved itself a very powerful unit. Ten suitable disks weren't available, but we saw all the performance we'd hoped for from four 3TB WD Red disks, configured in a Raid 5 array.

Synthetic benchmarks provided suspiciously slow results, though. Over AFP QuickBench returned decent sequential read speeds of around 111MBps, but low writes of around 60- or 70MBps. And in Windows using SMB networking. we measured 111MBps sequential writes, but just 70MBps reads.

Some real-world transfer tests settled the argument. Copying large ISO files to and from a connected MacBook, in AFP the Qnap averaged 115MBps writes and 123MBps reads, constrained by the 125MBps theoretical maximum.



AFP and NFS network protocols. Storage area networks (SAN) and iSCSI offer rapid data transfers that suit virtualisation over network cabling, for instance. There's also 256bit encryption, plus remote replication of encrypted channels.

External disk support is firstclass, with two USB 3.0 and eSATA ports provided. The QNAP supports HFS+, FAT and NTFS formatting, too.

Power consumption is higher than that of a typical SMB NAS, but 39W when idling isn't too excessive. We recorded 59W with four WD Red disks under load.

Verdict

The Qnap TS-1079 is a powerful. well-specified NAS, suitable for businesses and well-heeled power users who don't wish to install network racks, but need a fast and capable one-box data repository. The very high build quality and finish match the supreme performance.

Andrew Harrison

ACCOUNTANCY SOFTWARE

£69 ex VAT (/month) £83 inc VAT (/month)

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Specification

Web-connected PC/Mac/ iPhone/iPad



Boox

Boox is an online accountancy service aimed at contractors, freelancers, locums and certain micro-businesses. At a monthly fee of £69.50 (ex VAT), this cloud-based software comes with a dedicated

client accountant to answer users'

gueries and provide assistance.

Boox can also assist selfemployed users by incorporating their businesses and completing self-assessment tax returns, although you must pay extra for these additional services.

Boox prides itself on the speed and time-saving benefits of its services - the company incorporation service, for example, boasts a 24-hour turnaround.

The Home dashboard displays your latest accounts-related messages and the company's financial position at a glance, with a graphical representation of monthly sales, expenses, and sales-minus-expenses (for many, this will be profit).

It will also give figures showing the tax liabilities for VAT, PAYE/NIC, corporation tax and VAT savings for those businesses signed up to the flat-rate scheme.

For those in a hurry, there is a 'Quick invoice/expense' function on the home page. This lets you quickly log in, raise an invoice to a client or record an expense in their accounts, then log out.

It's easy to later amend or view the details via the tabbed interface. In addition to the Home dashboard, there are also tabs for Invoices, Expenses, Pay Yourself (although there are currently no functions to pay any staff), Banking, Taxes, My Boox (where you can contact your personal accountant or amend your company's details), Reports and Help. It should therefore be easy to work out what one needs, even for the least-experienced self-employed user.

Those not familiar with accounts will find a number of features very useful. For example, there's the calendar with system-generated records of the date that quarterly



£1,666 ex VAT £2,000 inc VAT

Contact

kodak co uk

Read mo

■ tinyurl.com/Lwjzedb

Specification

Combined sheetfed and flatbed (with Book Edge) scanner; 600dpi optical (can run up to 1200dpi effective); 48bit colour; colour duplex; 250-sheet feeder capacity; USB 3.0; daily duty cycle 10,000 sheets (100 pages a day on the flatbed); TWAIN/ISIS/WIA compliant; 432x371x238mm; 15.8kg; 3-year warranty



SCANNER

Kodak i2900

This heavy-duty scanner caters for large offices with mountains of paperwork to scan and convert to electronic format. The duty cycle is a massive 10,000 pages per day.

The printer-style design accommodates multiple scanning methods. You can place your source material in the sizeable input tray below, which accepts 250 sheets.

The mechanism is extremely robust, and the tray automatically rises and descends for paper to be fed in at exactly the right place. We didn't have a single problem with even mildly skewed pages, let alone paper jams.

A rear exit paper path is also included for longer source material.

The Kodak has a flatbed for the safe scanning of thicker material, but even in the standard scanning mode its Intelligent Document Protection meant we were unable to force the i2900 to chew up any of our test documents.

The flatbed's Book Edge feature means the glass runs right to the edge, allowing you to place one half of a book on top and the other hanging down at a 90-degree angle. This keeps the book perfectly flat, while the Kodak's weighty lid holds it firmly in place.

The flatbed component isn't as fast as the sheetfed scanner, and required 8 seconds to scan A4

documents at 200dpi, 10 secs at 300dpi, and 21 secs at 600dpi. The results are very fine, with strong detail and accurate colours.

The sheetfed component is very easy to use, thanks to a straightforward user interface and a control panel that has some of the largest buttons we've ever seen. Several presets are available, whether you're working with PDFs, Jpegs or Tiffs, for example, or you can tweak the settings to suit. Scanning is possible at 100- to 1200dpi, and a range of useful options includes colour balance, foreground boldness, blank image detection and automatic post-scan rotation for output.

Kodak claims to scan 120 pages per minute (ppm), or 60ppm with single-sided sheets. It gets nowhere near to this figure, but remains a fast scanner. Regardless of the type of file we were trying to create, it took 16 secs to feed in a 30-page (15 double-sided sheets) bundle.

With mono double-sided Tiff files the i2900 was able to produce 300dpi output in 32 secs (56.3ppm). Dropping the resolution to 100dpi has little effect on the speed, but the fall in quality is significant. At 300dpi pictures and text are clearly rendered.

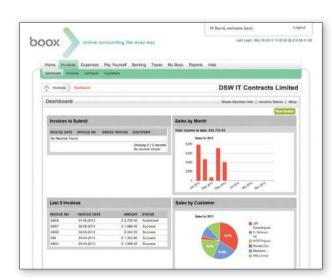
The colour scanning is of a good quality, with a relatively accurate palette. There isn't much of a hit on speed, with the Kodak completing our 30-page bundle in just 35 secs (51.5ppm). Creating colour PDFs adds to the time: the i2900 needed 1 min 39 secs (18.2ppm).

You can use the Kodak for OCR work, and one of the presets lets you create .rtf text files. It took 1 min 4 secs to create an .rtf file from our 30-page bundle. The accuracy was adequate, but we had to correct a number of errors and the software didn't always make a good job of handling columns and headers.

Other bundled software includes ISIS and TWAIN drivers, and Kodak's Capture Desktop, a useful program that makes it easy to perform batch scanning and sorting of documents.

Verdict

Kodak's i2900 usefully offers two methods of scanning, and its Book Edge feature is very good. Ideal for large businesses. 🗵 Robin Morris



VAT returns are due, and the breakdown of sales and expenses expressed in a number of ways.

This can be both graphical and numerical for users who process information in different ways, and offer different ways to pay yourself, deal with banking and taxes. There's even a Help function to show you how to use the software, although most of it is easy to work out.

The only thing you should be aware of that might be confusing at first is that the drop-down menus below the main accounting tabs are for the accounting tab one has hovered over, rather than the tab selected. But it's a very tiny point and shouldn't detract from the ease of use and easy-to-understand functionalities this accountancy service offers.

Verdict

A solid accountancy service accessible from any internet-connected computer, Boox is intuitive, easy to use and certainly suitable for contractors. In fact, any self-employed individual with a personal service company will find Boox useful.

Available from £69.50 (ex VAT) per month, the service includes a personal accountant who can help you to handle your financial affairs. With a 14-day free trial available, you should find Boox reasonably straightforward to set up, complete your accounts, and obtain professional assistance when needed.

Santhie Goundar



£489 ex VAT **£587** inc VAT

Contact

dell.co.uk

Read mo

■ tinyurl.com/Lz23cfp

Specification

Mono laser printer; 256MB standard memory; 1200x1200 max printing resolution; 800MHz processor; 47ppm specified speed; auto-duplex printing; 550-sheet standard input capacity; 650-sheet maximum input capacity; 10/100 ethernet; USB 2.0; 399x382x306mm; 15.7kq



PRINTER

Dell B3460dn

Dell's B3460dn mono laser printer won't win any beauty pageants, but it is well worth considering if you run a busy office and need a dependable workhorse that prizes speed and volume above a glossy appearance.

Designed to be a sturdy and reliable printer, and styled in discreet, non-reflective black, the B3460dn measures a squat 399x382x306mm and weighs in at a hefty 15.7kg.

A healthy 550-sheet input tray lives in the base of the printer. This can be expanded using three additional 550-sheet trays (£115 each) to provide a 2,200-sheet maximum input capacity.

There's also a drop-down 100-sheet multipurpose tray at the front, and the machine comes with auto-duplex (double-sided printing, which saves on paper costs at the expense of speed) as standard.

The Dell's wired connectivity options include ethernet and USB 2.0. No wireless networking is built in, but an external wireless

adaptor is available as an optional extra.

The control panel is extremely easy to operate, with large, clearly labelled buttons, a full number pad and a well-lit 2.4in colour LCD.

To the right of the keypad is a USB port that lets you plug in a USB flash drive to speed up printing by bypassing the PC.

Dell's print-speed claims are only slightly inflated, and the B3460dn offered decent performance in our benchmarks. Text and graphic documents were produced at a rate of 44ppm, just 3ppm off Dell's 47ppm estimate.

The text quality is satisfying, if not exceptional, and the Dell's output should prove more than acceptable for churning out documents and reports.

Quality takes a noticeable dip with photos, and in our tests these appeared much darker and grainier than the originals.



A major selling point for this printer is its potentially low running costs. A basic 2,500-page black cartridge works out at an unimpressive 3.12p per page, but buy the 8,500-page high-capacity cartridge and you can almost halve this outlay to just 1.62p per page. An even larger-capacity 20,000-page version will set you back a competitive 1.14p per page.

Verdict

The combination of large-volume printing at fast speeds and very low running costs makes the Dell B3460dn an obvious contender for small-to-medium businesses.

£143 ex VAT **£172** inc VAT

Contact

= canon.co.u

Read more

tinyurl.com/LvfrLev

Specification

Sheetfed scanner; 600dpi; 24bit colour; colour duplex; 10-sheet feeder capacity; USB 2.0 interface (can run from USB power); 100 scans/ day duty cycle; TWAIN/ISIS compliant; 312x56x40mm (when fully closed); 312x77x40mm (when open); 600q



SCANNER

Canon imageFormula P-208

Canon's P-208 is a truly portable scanner that's light enough to be thrown into a bag and still feels reasonably robust when folded.

It draws all its power from a USB connection, and a cut-down version of the necessary software and drivers are contained on the device itself. A full version of the software is supplied on disc for home use.

To keep down size and bulk the P-208 lacks a proper paper feed. Instead, two slender guides swing out to provide basic support at either side. The paper is then slowly pulled through the scanner and drops out on the other side.

In general the P-208 managed to find its target, even when we felt the paper hadn't been properly fed in. However, skewed scans weren't infrequent and, although it supports up to 10 sheets, we'd be reluctant to feed in more than two at a time.

Duplex is supported, allowing you to scan both sides of a sheet without manually turning it. The resolution stretches to 600dpi, and the P-208 can work with trickier source material, such as photos or business cards, too.

You can add Wi-Fi via
the WU-10 attachment,
which also enables
you to use the
CaptureOnTouch
app to scan directly to
iPhone and Android, but it costs
nearly as much as the scanner itself.

CaptureOnTouch is both friendly to beginners and reasonably powerful. The Full Auto Mode lets the scanner pick many of the settings for you. And once you've scanned the files, it takes only a couple of seconds more to convert the scans to searchable PDFs.

The range of output formats isn't enormous. Raw text, in particular, is neglected, making the P-208 a poor choice for OCR work.

The Canon is fast in comparison to its rivals, and at 150dpi it took just 25 seconds to scan five sheets in duplex mode (24ppm). Scanning only one side we recorded 14ppm.

The Canon falls short on top quality, though. At 300dpi the same bundle of documents took 41 secs (14.6ppm) and, at 600dpi, 216 secs (2.8ppm). Even at 600dpi the quality of reproduction isn't outstanding, with slightly fuzzy lettering.

Verdict

The Canon is light and extremely convenient to carry around, and its automatic duplexing isn't a given in such models. Provided you don't expect astonishing quality, the results are very decent. Only the flimsy feed mechanism lets it down.







Developed by gamers for gamers

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FAMILY PLG

Paul Monckton tests six PCs with good all-round performance that will find favour with every member of the family

very Windows desktop PC in our round-up delivers decent all-round performance and value for money. We look for excellent build quality, a homefriendly 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.

Core components

A powerful CPU is the starting point for smooth, frustration-free performance but, unless you're processing large amounts of video or running intensive applications, you don't need the fastest chip available.

Intel's Ivy Bridge (iX-3XXX) chips remain an excellent choice for those who want a fast PC without sacrificing value, but now there's Haswell. Intel's fourth-generation Core chip (iX-4XXX) will quickly replace Ivy Bridge as the processor of choice. There's not a huge difference in performance, but Haswell requires a new CPU socket and motherboard, making later processor upgrades more difficult. So, if you want a Haswell chip, buy a Haswell-powered PC.

You would be better advised to spend any extra cash in your budget on an SSD or memory upgrade rather than the fastest CPU. A 120GB SSD will boost performance and boot times, while smaller-capacity, cheaper SSDs can be configured to act as a cache to accelerate hard drives via SRT.

Some vendors will supply a processor with a 'K' suffix, such as the Core i5-3570K. This means the chip can be overclocked, provided that your motherboard is compatible, and it also includes faster integrated graphics than the standard version of the processor.

The new Core i5-4570 isn't overclockable, but provides still-faster graphics. You'll be able to watch full-HD video and play more

challenging games, without needing to pay out for a dedicated graphics card.

AMD chips, such as the FX-4170, can also offer very good value for money. For occasional gaming or to accelerate video encoding, AMD's Fusion chips offer faster integrated graphics than Intel. The trade-off is a reduction in application performance and an increase in power consumption.

You can always upgrade the graphics setup later, of course, and an AMD Radeon HD 7770 or nVidia GeForce GTX 650 Ti graphics card would enable satisfying gaming at a reasonable price.

The motherboard is also important. 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 capabilities can be added by the 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 SRT.

Haswell chips require new chipsets, such as the B85 or Z87. These feature additional 6Gbps SATA ports and other features.

Consider 4GB of memory and a 500GB hard drive as the minimum.

All the PCs featured here are preinstalled with Windows 8, but most vendors will install Windows 7 upon request.

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 twistednematic (TN) monitors. High-quality IPS displays are now much more affordable and the improvement in quality is such that all users, with the possible exception of gamers, should aim for one whenever possible.

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 films.

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. Better systems approach the challenge with lower-power processors and passive rather than active cooling strategies.

Beginners may find the automated setup process of PCs from big-name 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, which may even slow down your PC.

Don't forget to check the warranty terms, which vary greatly between PC vendors.





BRAEBO APHRODITE

£800 inc VAT • braebo.com • tinyurl.com/Ln4zo6w

Braebo's Aphrodite offers excellent build quality and a well-rounded set of peripherals, but in our tests delivered lacklustre performance.

Housed in Cooler Master's CM Force 500 system case, the Aphrodite looks impressive. Its twin optical drives provide DVD ± RW support and Blu-ray playback and sit atop a multiformat card reader. At the top of the case are three handy front-facing USB ports, one of which supports the speedy USB 3.0 standard.

Built-in cable management ensures everything is kept tidy and accessible for upgrades, with the Asus motherboard providing plenty of slots. One of these has been used to install an 802.11n Wi-Fi card. Also included is a VTX 3D-branded Radeon HD 7750 graphics card.

Intel's 3.4GHz Core i5-3570 processor, once ubiquitous in our PC group tests but now superseded by the latest Haswell chips, powers the system. Using last season's technology, this system will have shorter longevity in terms of upgrades.

A 1TB low-power hard drive is supplemented by a 32GB SSD. The latter is configured as a cache volume using Intel's Smart Response technology, which accelerates the hard drive.

Overall performance in our benchmarks was disappointing, however. The Aphrodite scored only 3,842 points, whereas others here managed over 6,000 with the same processor. Graphics speed is noticeably slower than some of the cheaper competition, too.

A decent set of stereo speakers is included, along with a subwoofer and a high-quality IPS monitor. However, the display



measures only 21.5in and, although it still provides a full-HD 1920x1080-pixel resolution, text and icons will appear smaller.

VERDICT: Braebo's Aphrodite is reasonably priced and well-constructed. It's one of only two systems here to include a set of speakers and a subwoofer, too. Unfortunately, its performance was rather unimpressive in both PCMark 7 and in our gaming benchmarks. It also uses the older Ivy Bridge processor technology rather than a future-proofed Haswell chip.

CHILLBLAST FUSION COMMANDO

£799 inc VAT • chillblast.com • tinyurl.com/kf6g3t7

The Fusion Commando from Chillblast is one of the first PCs we've reviewed to feature a fourth-generation Core processor, codenamed Haswell. Its Core i5-4570 chip runs at a base clock speed of 3.2GHz and can turbo up to 3.6GHz when pushed. This places it slightly below the popular Core i5-3570 in headline clock speed, but gains in efficiency compensate - and deliver a little bit extra besides.

Also installed is an Arctic Cooling Freezer 7 Pro processor cooler to keep down temperatures and noise.

Haswell requires a new type of motherboard chipset, which has been provided by the Asus B85M-G motherboard and B85 Express chipset. This board supports USB 3.0 with UASP support for even greater performance, plus optimisation for Windows 8 boot times.

A Zotac nVidia GeForce GTX 650 Ti graphics card enables the PC to run most games at decent framerates without sacrificing quality. Computer Planet's F2000 Family PC delivered superior gaming performance, but at a much higher price.

Unlike several of its competitors, the Fusion Commando provides 802.11n wireless via a plug-in USB adaptor. This is less tidy than an internal solution, but easier to unplug and use on a different PC if you wish. No memory card reader has been installed.

A Blu-ray/DVD ± RW combo drive provides for HD movie playback on the 23.6in liyama X2377 IPS monitor. This is a basic-looking display, but it offers great image quality and a large screen area. You also get a pair of stereo speakers with a separate subwoofer.



Overall performance is very good. PCMark 7 recorded 6,177 points and, thanks to the inclusion of a 120GB Samsung 840 series SSD and 1TB Seagate hard drive, the system felt snappy and responsive.

It's housed in the Cooler Master CM Force 500 system case, featuring front-facing USB ports and internal cable management.

VERDICT: The Fusion Commando is a great purchase, thanks to its upto-date processor and motherboard. Performance is very good, build quality is high, and a pair of speakers complement the large display.



COMPUTER PLANET F2000 FAMILY PC

£930 inc VAT • computerplanet.co.uk • tinyurl.com/nevwq4u

At £930 the Computer Planet F2000 Family PC is the most expensive of the six systems in this round-up. Featuring a 3.4GHz Intel Core i5-3570 processor and a quiet Arctic Cooling CPU cooler, it delivers plenty of performance for serious applications and casual family fun.

Its 2TB Seagate hard drive offers twice the capacity of most offerings, while a 120GB Corsair SSD ensures excellent system responsiveness and ample storage for frequently used applications.

In our lab tests the PC scored very well, with its 6,134 PCMark 7 points proof that third-generation Ivy Bridge processors can still go head-to-head with Haswell without embarrassment.

The true strength of this PC is in its graphics performance. By fitting an nVidia GeForce GTX 660 with 2GB of video memory, Computer Planet has provided the most powerful gaming system of the bunch - although not by a huge margin.

Despite its strong performance, we found the F2000 to be lacking in other areas. Notably, the Cooler Master Elite 335U system case is inferior to the CM Force 500 used elsewhere. The lack of cable management results in a messy interior.

Externally the system looks reasonably smart and tidy, with a handy multiformat card reader, but there's no Blu-ray drive.

In common with Chillblast Computer Planet supplies a 23.6in liyama X2377 IPS monitor, but no external speakers are provided.

Full versions of Webroot 2013, CyberLink PowerDVD and Nero are included, and Computer Planet provides unlimited phone, email and



live chat support. The first year of the two-year warranty is provided on a collect-and-return basis, which reverts to RTB thereafter.

VERDICT: The Computer Planet F2000 Family PC held its own in our benchmarks and delivered a performance advantage in gaming. It's backed by good support and warranty terms, but it's very expensive – especially considering the lack of a Blu-ray drive and external speakers. Despite the name, the F2000 Family PC is clearly more tuned to gamers than families.

CYBERPOWER ULTRA SCYLLA SE MKIII

£699 inc VAT • cyberpowersystem.co.uk • tinyurl.com/qht5x2h

This latest version of CyberPower's Ultra Scylla SE retains the low £699 price tag of the original, but updates the spec with a new processor and upgraded peripherals.

Out goes the 4.2GHz AMD FX-4170 Bulldozer processor and in comes the latest FX-4350 Piledriver, running at the same base clock speed. Our PCMark 7 results show a small increase in performance, with the new system boasting a rather pedestrian 2,957 points to its predecessor's 2,842. Part of the reason for this lack of pace is the absence of an SSD. A 2TB hard drive is supplied in its place.

The perhaps excessive 16GB of DDR3 RAM in the original has been pared back to 8GB here, which won't cause any performance issues for general family use.

A 24in BenQ GL2450E monitor replaces the low-rent Edge10 model. This large display is a great size for watching movies from the supplied Blu-ray drive, but its TN panel lacks colour fidelity and the decent viewing angles you get from an IPS model.

An MSI-made AMD Radeon HD 7770 graphics card is included, which in our tests attained reasonable gaming framerates, despite the relatively low overall system performance.

Although it's no match for systems featuring an nVidia GeForce 650 Ti, the Ultra Scylla SE MKIII still runs games at more than double the speed of Braebo's more expensive Aphrodite system. CyberPower has therefore managed to deliver by far the best value for money if gaming is your primary requirement.



The Cooler Master Elite 430 system case shows more gamer touches in the show-off transparent side panel. CyberPower has assembled the system with great care, with all cables neatly tied.

The Logitech MK330 keyboard and mouse combo is of higher quality than the MK260 version supplied with the competition, too.

VERDICT: This low-cost AMD system sacrifices application performance and offers no SSD. However, it offers good gaming performance for the money, outperforming Braebo's more expensive system.

DINO PC RAGING LIZARD

£899 inc VAT • dinopc.com • tinyurl.com/ragLiz

The second of two family PCs based on Intel's fourth-generation Haswell processor, Dino PC's Raging Lizard takes the 3.2GHz Core i5-4570. And it does so to great effect, delivering the fastest overall PCMark 7 score of any of the family PCs here with 6,282 points.

Gaming performance was also very good, with a Gigabyte-made nVidia GeForce GTX 650 Ti delivering very playable framerates at high-quality settings. Some of these gaming results can be bettered by the Computer Planet's slightly faster GTX 660, but Dino PC's system costs less and comes with a Blu-ray drive and 16GB of RAM.

Dino PC has opted for a Gigabyte GA-Z87M-HD3 motherboard that employs the enthusiast-grade Z87 Express chipset. A 1TB Seagate hard drive is included, alongside a 128GB Plextor M5S SSD. A plug-in card adds 802.11n Wi-Fi and Bluetooth 4.0 connectivity.

A very stylish AOC i2369VM monitor is included. It features a frameless design with a very thin bezel, while an excellent IPS panel delivers superb picture quality and wide viewing angles. It's easier on the eye than any other display in our round-up and well suited to a family environment in which appearances matter. The aggressive-looking Xigmatek case may not be to everyone's taste, though.

Separate DVD \pm RW and Blu-ray drives are installed, and a Trust eLight full-HD webcam is included in the box.



A three-year warranty includes parts for one year. Should the PC fail in the first 30 days it will be collected for free.

VERDICT: This is a very fast PC, featuring the latest Intel processor and a high-spec motherboard. It delivered the best overall application performance and very good gaming results. The supplied monitor is excellent. At £899 it's more expensive than most, however.

	BRAEBO £800 inc VAT	CHILLBLAST £799 inc VAT PC ADVISOR BEST BUY	COMPUTER PLANET £930 inc VAT	
Product name	Aphrodite	Fusion Commando	F2000 Family PC	
Processor	3.4GHz Intel Core i5-3570, quad-core	3.2GHz Intel Core i5-4570, quad-core	3.4GHz Intel Core i5-3570, quad-core	
CPU cooler	Standard Intel cooler	Arctic Cooling Freezer 7 Pro	Arctic Cooling Freezer 7 Pro	
RAM	8GB 1,600MHz DDR3	16GB 1,600MHz DDR3	8GB 1,600MHz DDR3	
Storage	1TB HDD + 32GB SSD	1TB HDD + 120GB SSD	2TB HDD + 120GB SSD	
Power supply	Alpine 600W	CIT 600W	Cooler Master GX 600W	
Motherboard	Asus P8H 77-V	Asus B85M-G	Gigabyte B75M-D3H	
Operating system	Windows 8 64bit	Windows 8 64bit	Windows 8 64bit	
Display	21.5in LG IPS224V (1920x1080, IPS)	23.6in liyama X2377 (1920x1080, IPS)	23.6in liyama X2377 (1920x1080, IPS)	
Graphics	VTX 3D AMD Radeon HD 7750	Zotac nVidia GeForce GTX 650 Ti	Gainward nVidia GeForce GTX 660, 2GB VRAM	
Sound	Onboard, Logitech LS21 speakers	Onboard, Logitech S220 speakers	Onboard	
Connectivity	802.11n, gigabit ethernet	802.11n, gigabit ethernet	802.11n, gigabit ethernet	
Ports	3x USB 3,0, 6x USB 2.0, HDMI, DVI, VGA, 6x analogue audio, S/PDIF out, PS/2	3x USB 3.0, 6x USB 2.0, HDMI, 2x DVI, 3x analogue audio, 2x PS/2	2x USB 3.0, 7x USB 2.0, HDMI, DisplayPort, 2x DVI, 3x analogue audio, PS/2	
Optical drive	Lite-On BD-ROM, LG DVD±RW	LG BD-ROM/DVD ± RW combo	TSSTcorp 24x DVD±RW	
Case	Cooler Master CM Force 500	Cooler Master CM Force 500	Cooler Master Elite 335U	
Keyboard & mouse	Logitech MK260	Logitech MK260	Logitech MK260	
Other	Card reader, PowerDVD, 500GB online storage	None	Card reader, 12-month Webroot, PowerDVD	
Warranty	2-year RTB, 30-day collect-and-return, lifetime telephone support	2-year collect-and-return, lifetime phone support, subsidised out-of-warranty repair	2-year RTB, 1-year collect-and-return, lifetime telephone/email/live chat support	
PCMark 7 Overall	3,842	6,177	6,134	
Sniper Elite V2 (fps) ¹	59, 21, 5	147, 59, 14	205, 59, 15	
Alien vs Predator (fps) ²	22, 11	52, 27	77, 41	
Power consumption ³	44W, 135W	40W, 210W	38W, 211W	

QUIET PC SERENITY HOME VALUE

£696 inc VAT • quietpc.com • tinyurl.com/kpe3bad

We're used to receiving high-quality systems from Quiet PC, typified by excellent build quality, premium components, quiet operation and a correspondingly high price. The Serenity Home Value has its emphasis shifted toward affordability, but this PC retains the company's famed near-silent operation.

The slimline ZM-T1 mini-tower case is made by Zalman, known for its quiet components, and houses a Gigabyte GA-H61M-USB3V motherboard and a low-power Intel Core i5-3475S processor.

This processor runs at a basic clock speed of 2.9GHz, which is boosted to 3.6GHz under load. That's 700MHz of Turbo Boost, compared to the usual 400MHz you'll get with the Core i5-3570.

The low-power chip enables the Serenity Home Value to maintain a far lower level of power consumption than any competing system here, requiring only 26W when idling. This also enables the system to run cooler and quieter than most.

Quiet PC relies on the HD Graphics 4000 integrated to the CPU for gaming, meaning graphics performance is severely limited.

The system achieved a creditable 4,464 points in PCMark 7, however, helped in part by its Seagate Momentus XT SSD/HDD hybrid drive. Its 500GB capacity is a little stingy, but it's around 50 percent faster than a standard hard disk.



A hefty 16GB of RAM is included and you also get a 72Op webcam. But the system includes neither a Blu-ray drive nor even a monitor.

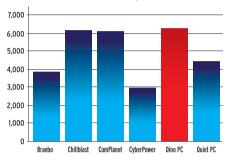
A two-year collect-and-return warranty is provided, along with free lifetime telephone and email support for the original purchaser.

VERDICT: This affordable PC runs quietly and consumes less power than its rivals, but performance and peripherals have been compromised.

CYBERPOWER £699 inc VAT	DINO PC £899 inc VAT	QUIET PC £696 inc VAT
***	★★★ ☆	RECOMMENDED
Ultra Scylla SE MKIII	Raging Lizard	Serenity Home Value
4.2GHz AMD FX 4350, quad-core	3.2GHz Intel Core i5-4570, quad-core	2.9GHz Intel Core i5-3475S, quad-core
Standard AMD cooler	Standard Intel cooler	Standard Intel cooler
8GB 1,600MHz DDR3	16GB 1,333MHz DDR3	16GB 1,600MHz DDR3
2TB HDD	1TB HDD + 128GB SSD	500GB hybrid HDD/SSD
Cooler Master 500W	Corsair VS450 450W	Zalman ZM450-GS 450W
Asus M5A78L-M/USB3	Gigabyte GA-Z87M-HD3	Gigabyte GA-H61M-USB3V
Windows 8 64bit	Windows 8 64bit	Windows 8 64bit
24in BenQ GL2450E (1920x1080, TN)	23in AOC i2369Vm (1920x1080, IPS)	Not supplied
MSI AMD Radeon HD 7770, 1GB VRAM	Gigabyte nVidia GeForce GTX 650 Ti	Intel HD Graphics 4000
Onboard	Onboard	Onboard
802.11n, gigabit ethernet	802.11n, gigabit ethernet	802.11n, gigabit ethernet
2x USB 3.0, 6x USB 2.0, HDMI, DisplayPort, DVI, 6x analogue audio, S/PDIF out, PS/2	6x USB 3.0, 2x USB 2.0, HDMI, 2x DVI, VGA, 3x analogue audio, PS/2	2x USB 3.0, 6x USB 2.0, DVI, VGA, 3x analogue audio, PS/2
Lite-On BD-ROM/DVD ± RW combo	Lite-ON BD-ROM, Samsung DVD \pm RW	Sony DVD±RW
Cooler Master Elite 430	Xigmatek Asgard 382	Zalman ZM-T1
Logitech MK330	Logitech MK260	Gigabyte GK-KM7580
Card reader	Card reader, Trust eLight full-HD webcam	Microsoft LifeCam Cinema 720p webcam
3-year return-to-base (1-year parts)	3-year return-to-base (1-year parts), lifetime telephone support	2-year collect-and-return, lifetime telephone/ email support
2,957	6,282	4,464
130, 43, 9	154, 62, 14	26, 7, 5
47, 24	53, 27	8, 5
67W, 255W	40W, 170W	26W, 82W

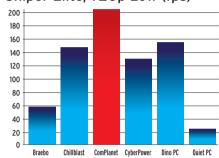
OVFRALL SYSTEM PERFORMANCE

PCMark 7 Overall (points)



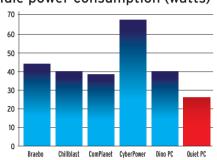
GRAPHICS PERFORMANCE

Sniper Elite, 720p Low (fps)



POWFR FFFICIENCY

Idle power consumption (watts)



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 yes, look to Chillblast, Computer Planet or Dino PC for smoothaction gaming. Computer Planet has the edge here, but at a high price. It also uses a third-generation Ivy Bridge processor rather than the fourth-generation Haswell model found in the Chillblast and Dino PC.

The Dino PC offers slightly higher performance and a superior motherboard, but Chillblast's Fusion Commando costs £100 less and adds stereo speakers to its broadly similar specification. The Chillblast therefore wins our Best Buy award for its combination of performance, up-to-date components and overall value. Applications run smoothly and it'll have a good stab at most games. Its use of a B85 Express chipset motherboard gives it upgrade potential for future processors.

For a quiet, energy-efficient system the Serenity Home Value is both affordable and powerful. You'll need to supply your own monitor but, provided you don't play many games, this is the most family-friendly PC in the group, earning our recommendation.

Least expensive of all (if you take the monitor into account), CyberPower's Ultra Scylla SE MKIII has a lot to offer. It's capable of some gaming, and it offers Blu-ray playback for less than £700.

How we test

General system performance

Core system performance is measured using PCMark 7, which uses 25 workloads to assess storage, computation, imageand video manipulation, web browsing and gaming. All core components are stressed, including the processor, graphics and storage subsystems. A fast SSD can make a big difference to the overall score - and to how quick the PC feels in use.

Gaming performance

A family PC may be called upon to play Windows games 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 the challenging Sniper Elite V2 and Alien vs Predator to test the graphics capabilities of each family PC here.

Sniper Elite V2 is configured with Low quality settings at 1280x720-pixel resolution, followed by Medium and Ultra quality settings at full-HD (1920x1080 pixels), while Alien vs Predator is run at Maximum quality and measured at both these resolutions.

Overclocking

We allow overclocked systems to be submitted only for our dedicated gaming PC reviews. All other systems, and especially family-friendly PCs, are run at stock speeds. The exception can be factory-overclocked graphics cards.

Subjective assessment

We also pay close attention to the physical characteristics of each desktop PC, to 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 and noted in our reviews.

Support

Differences in warranty terms can impact our scoring. Long warranties and good customer support are always preferred, 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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It's a confusing time to be buying a Windows 8 tablet. Should you go for a hybrid laptop-tablet or a 'proper' tablet, and what about Windows RT? Cliff Joseph answers these and more questions

ill Gates recently gave an interview in which he suggested that the millions of people who are buying iPads and Android tablets are frustrated because "they can't type, they can't create documents, they don't have Microsoft Office".

He then stated that Windows 8 and devices such as Microsoft's own Surface tablet were the solution to that problem. "You've got the portability of a tablet, and the richness of a desktop PC in terms of the keyboard and Microsoft Office," Gates said.

It's nonsense to suggest that you can't type or create documents on an iPad or Android tablet. Apple has its iWork suite for the iPad (Pages, Numbers and Keynote), which are compatible with Office file formats. Plus, there are third-party apps, such as QuickOffice, that are available for both Apple and Android tablets and can read and write to Office formats.

Typing isn't an issue either, as there are plenty of wired and wireless Bluetooth keyboards available for most types of tablet.

But Gates does have a point about Microsoft Office. QuickOffice may allow you to open and edit Office documents, but you still have to learn how the new app works, and transferring files back and forth between your tablet and your main PC can be fiddly. There are many people - particularly business users - who might feel more comfortable with a tablet that can run the productivity software with which they're already familiar and give them instant access to their important work files.

However, the former CEO of Microsoft's argument is undermined by the fact that the lack of Microsoft Office hasn't prevented the iPad and Android tablets selling like hotcakes. That's partly because most people primarily use their tablet for entertainment - browsing the web, reading e-books or playing Angry Birds - rather than doing serious office work.

That's where the 'modern' touch-based interface of Windows 8 comes in, as even Microsoft's harshest critics have conceded that the new touch-oriented Start screen is well-suited for apps and games.

Windows tablets offer you the best of both worlds by combining modern touch-driven apps with the familiarity of Office and other Windows software.

It's taken a while for Windows 8 tablets to capture the public's attention, but recent sales figures show that Microsoft's Surface is the fifth most popular tablet on the market. It's still a long way behind the likes of Apple and Samsung, of course, but don't forget that there are plenty of other PC manufacturers producing their own tablets that bring overall market share of Windows 8 and RT tablets to almost 4 percent.

We've included reviews of some of the best Windows tablets overleaf but, before you can decide which is right for you, there's a couple of question we need to answer.

Windows 8 or Windows RT?

This is where things get confusing. If you're looking for a Windows tablet then the first thing you need to do is decide whether you want one that runs Windows 8 or RT.

Windows 8, like all previous versions of Windows, is designed specifically to run on the Intel processors that are used in most desktop and laptop PCs. The advantage of this is that a Windows 8 tablet works just like an ordinary PC and can run any of the thousands of existing Windows programs. If you've already got a copy of Microsoft Office it will happily run on a Windows 8 tablet, along with other Windows programs such as Adobe Photoshop Elements, Windows Movie Maker and, of course, hundreds and hundreds of games.

That's a huge advantage, especially for business users who need compatibility with Microsoft Office and other Windows software that they use at work. There are already several Windows 8 tablets that are specifically aimed at business users, such as Lenovo's extremely thin and light ThinkPad Tablet 2, and Dell's Latitude 10.

The disadvantage with Windows 8 is that you need powerful hardware to run it, and the prices for these tablets tend to start at around £500 compared to £399 for the latest iPad and as little as £99 for some of the cheap-and-cheerful Android tablets. More expensive models, such as HP's Envy X2 with its detachable keyboard/battery, can set you back £800 or more.

Windows RT, in contrast, is designed to run on the more power-efficient ARM chips that are widely used in tablets and smartphones. It may look like Windows 8



- and it even allows you to view the traditional Windows desktop so you can organise files and folders - but it's a completely different OS underneath.

In some ways that's a good thing, as ditching some of the decades-old baggage of traditional Windows means Windows RT is a lot more streamlined than Windows 8. It runs well on less-expensive hardware and we've seen Windows RT tablets such as Dell's neat little XPS 10 selling for just £199.

The drawback - and it's a big one is that Windows RT can't run traditional Windows software. All you can do is install apps from the Windows Store.

Microsoft realises that this is a problem, so it has written a special RT version of Microsoft Office that is bundled with all Windows RT tablets. This solves the problem of Office compatibility, but it still means that you can't run any of your other key Windows programs. That might include business software, or something as simple as iTunes or the drivers for your old printer.

Even now the Windows Store looks a bit threadbare compared to the vast numbers of apps that are available for the iPad and Android tablets. For instance, you can get the Netflix, but there's no RT app for UK services such as Lovefilm or BBC iPlayer.

Until the Windows Store is stocked with all the apps you need you're better off buying a tablet that runs the full version of Windows 8. Most PC makers seem to agree on this too, as tablets running Windows RT are very much in the minority.

Tablet or laptop?

The other big decision you have to make is whether you should buy a tablet or a laptop. As always, this very much depends on what you need to use it for.

If you're going to spend hours typing in Word or entering data into Excel for your office or college work then you're probably better off opting for a laptop that has a comfortable, full-size keyboard and a screen large enough to stop you going all squintyeyed after a couple of hours.

Don't forget, too, that you can buy a laptop with larger screen sizes of 13-, 15or even 17in for multimedia work such as photo or video editing. Conventional laptops can be cheaper than tablets - especially if you aren't bothered about having a touchscreen, which can easily add around £50- to £100 to the price of a laptop.

The great strength of a tablet is the sheer convenience of having a slim, always-on,

SUPER-SIZE ME

One trend we've noticed is the arrival of mega-tablets, such as Dell's XPS 18 and the Tap 20 from Sony. As their names imply, these are giant tablets with 18- and 20in screens respectively. Both models start at around £850, and can be configured with anything from an Intel Core i3 to i7 processor and packed with as much memory and hard-disk storage as you want. They are, in effect, all-in-one desktop PCs with a touchscreen that allows you to use them like a tablet.

You're obviously not going to slip one of these into your backpack when you go away for the weekend, but these huge Windows 8 tablets are great for browsing the web and streaming video, and the size of the screen means that a couple of young children can quite easily play games together.

Mega-tablets also include rechargeable batteries, and are light enough that you can easily pick them up and carry them from room to room. If prices start to come down then we have a sneaking feeling that this type of PC could become popular as an internet/entertainment terminal that can be shared by the entire family.



lightweight device that you can hold in one hand. Even lightweight Ultrabook laptops tend to tip the scales at around 1.5kg, yet an 11.6in tablet such as the Lenovo Lynx is just 9.5mm thick and weighs 640g.

Even a sturdier model such as HP's Envy X2 only just nudges up to 700g. Like Microsoft's Surface tablets, the Lynx and the Envy X2 can both be used with a small detachable keyboard, so they're fine for taking notes and doing a spot of writing now and then, although we're not sure that we'd want to type a full-length novel on them.

These tablets have modest Intel Atom processors and just 2GB of memory, which means they're not powerful enough to replace a conventional laptop for heavy-duty work such as photo editing or video presentations in PowerPoint. And don't even think about trying to run 3D action games on them.

It is possible to get more powerful Windows 8 tablets, though. The recently released Surface Pro is a good example, boasting a Core i5 processor running at 1.7GHz, along with 4GB of memory and 64GB of storage. It's relatively chunky for a tablet, weighing in at 900g and measuring 13.5mm thick, but it's still slimmer and lighter than any Ultrabook we've seen. It'll cost you between £700 and £800, which is a lot more than an iPad or Android tablet, but it's not a bad price when compared to laptops with a similar specification.

Hybrid devices

Windows 8 has also given rise to a new category of hybrid or convertible devices. These are laptops equipped with a touchscreen that can be folded over the keyboard so you can hold the device in your hands and tap on the screen like a tablet.

Although these sound like the best of both worlds, the truth is that many of the hybrid devices we've seen fall rather uncomfortably between the two camps: they don't work particularly well as either a laptop or a tablet.

There are some honourable exceptions, though. Dell's XPS 12 is a very attractive 12in Ultrabook with an ingenious mechanism that allows you to flip the screen over into tablet mode, for example. And Lenovo's Yoga 13 lives up to its name with a 13.3in screen that bends and folds into a number of positions – completely flat for use as a tablet, or folded into an upside-down 'V' shape that can stand up on its own while you sit back and watch some streaming video (the Lenovo Yoga is pictured on the previous page).

These both weigh around 1.5kg, which is heavy for a tablet - as is the near-£1,000 price tag. But if you treat the device primarily as a workhorse laptop that can also switch into tablet mode for some off-duty entertainment then they work pretty well.

The award for the most insane convertible device has to go to the Asus Taichi. This £1,500 laptop is equipped with two 11.6in screens - one that faces toward you while you type (and isn't a touchscreen), and another on the back of the laptop's lid and faces away from you. This outer screen could be handy for presentations, giving your audience a clear view without them having to peer over your shoulder.

The two screens can also work independently of each other. This allows you to tap away on the keyboard while someone else uses the second screen as a tablet to, say, watch a video.

Taking the tablets

The market for Windows 8 tablets, laptops and convertibles is confusing, and many manufacturers appear to be simply throwing stuff at the walls to see what sticks. As always, the best advice is to think carefully about what you really need from your new laptop or tablet before buying one.

You don't need a powerful processor to browse the web or do a spot of word processing, but if you're doing video presentations in PowerPoint or photo editing in Photoshop then you'll still be better off with a straightforward laptop that provides you with a big screen, a powerful processor and plenty of memory. You'll probably get on fine without a touchscreen as well.

However, a Windows 8 tablet can be a great companion for your laptop, and if you use Microsoft Office at work then the ability to run Office and other Windows software on your tablet is a genuine advantage that the iPad and Android tablets simply can't match.

The small screens and modest processors used by most Windows 8 tablets means that they'll never replace a more powerful laptop, but they can work really well if you just need a notepad-sized device that will allow you to quickly check your emails, browse the web or make a few changes to some work documents.

More powerful tablets such as the Surface Pro can rival the power of a traditional laptop, but we're not convinced that its small screen and keyboard are suited to using productivity software all day long. It's just about the best Windows 8 tablet out there, but it doesn't even begin to rival a good Ultrabook when productivity comes into the equation.

Windows RT certainly has a lot of potential, but before we could even consider recommending a tablet running this OS over iOS or Android the Windows Store needs about another 100,000 apps. Until then, most people are better off buying an iPad or Android tablet.

WHY YOU NEED A WINDOWS TABLET

You've probably seen Microsoft's advert for the Surface tablet. Scores of dancers throw their Surface tablets around and they click and snap loudly into their colourful keyboard docks.

What you don't see is any good reason to buy a Windows tablet over any other tablet. Here are four features Microsoft should have advertised, but didn't:

Multiple user accounts. If you want to share your iPad or Android tablet with others they will gain access to pretty much all your stuff, including emails, photos, perhaps even Facebook. With Windows 8 and RT tablets you get multiple user accounts. Android Jelly Bean 4.2 and Barnes & Noble Nook tablets are the only other options if you want to use more than one login.

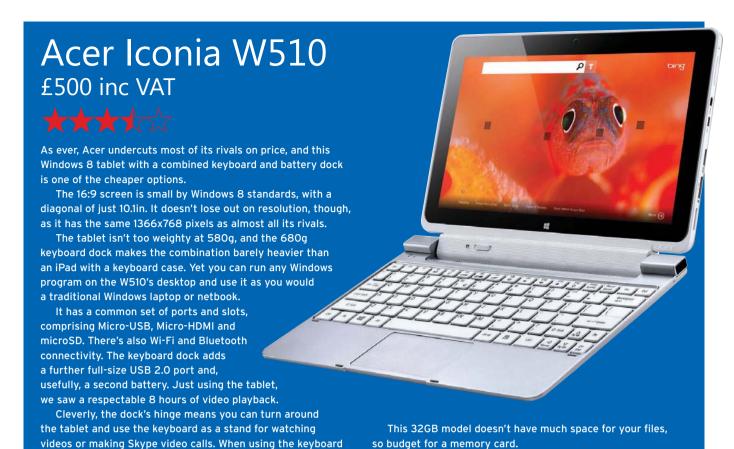
On the Surface (and most other Windows tablets) you get an HDMI output that lets you connect a large-screen TV or monitor and use it as an extended desktop.

You could, for example, run the desktop interface on the large screen, and Windows 8's new Start screen on the tablet. Many Android devices also offer HDMI; the iPad needs an adaptor.

File Explorer. Even on Windows RT tablets, the desktop can be used for more than just Microsoft Office. You also get the full File Explorer, so you can organise and manage files just as you do on your Windows PC. Thanks to full networking and shared drive support, you can also transfer files from other computers or devices on your network.

On a Windows 8 tablet you can also run any Windows software you like on the desktop.

Remote desktop. Windows 8 tablets include Remote Desktop, with a free app available from the Windows Store for use in the Modern UI. This lets you connect to any PC that's configured to accept remote desktop connections, and control it via your Windows tablet. Jim Martin



Asus VivoTab Smart ME400



is sufficiently responsive.

On paper, the VivoTab is difficult to separate from any other Intel Atom-based Windows 8 tablet. Like Acer's Iconia W510 (above) it has a 10.1in, 1366x768 screen, and even weighs the same at 580g.

It has the same 1.8GHz dual-core processor and 2GB of RAM, too. The only difference in the spec is the 64GB of built-in storage. In PCMark 7, all Atom-based Windows 8 tablets tend to score around 1,400 points.

The screen – like all the tablets here – uses an IPS panel, which provides good viewing angles and rich colours, but the glossy finish is reflective. We've yet to see a tablet with a matt screen. The ME400 isn't as bright as its rivals.

An optional £89 TranSleeve is both a keyboard and a cover, but we're not huge fans. The keys have precious little travel and it doesn't have a battery like the keyboard docks available elsewhere. Our streaming video test ran for more than 7 hours before the ME400 conked out.

Annoyingly, there's no full-size USB port – the tablet has only Micro-USB. You also get microSD, Micro-HDMI and NFC,

for word processing, typing is a dainty affair and the touchpad

plus front and rear cameras (the rear is a good 8Mp snapper).

Given the price, and the fact it runs full Windows 8, the VivoTab ME400 offers good value when compared to Microsoft's Surface RT.



PC ADVISOR TEST CENTRE

With so-so looks and performance, the Acer might not be

your first-choice Windows 8 tablet, but the price is competitive.



Dell XPS 10

£349 inc VAT



Although for most people we wouldn't recommend a tablet running Windows RT, we've included the XPS 10 here as it's probably the pick of the RT crop. In common with some of the full-blown Windows 8 tablets, it has an optional keyboard dock that doubles battery life to 16 hours.

Plus, at the time of writing, Dell was offering the 32GB version of this tablet without the dock for just £249.

It's still a bit of a gamble buying into Windows RT the choice of apps is limited when compared to Apple or Google's app stores.

At £249, though, you get a lot of tablet for your money. The 10.1in screen has a 16:9 aspect ratio, which is good if you watch a lot of TV shows (movies still display black bars, of course) but, as with all other Windows tablets, it's slightly awkward for reading books, magazines and newspapers.

Dell has opted for a 1.5GHz Qualcomm Snapdragon ARM processor rather than the Intel Atoms that Windows 8 rivals use. It can play 1080p video with no problems, but it's downscaled on the 1366x768-pixel display.

The tablet's 40-pin dock connector requires an adaptor to get an HDMI output, but there's Micro-USB and a microSD card slot. Front and rear cameras are standard fare.

> If you want the keyboard dock with the 32GB tablet it will cost you just £349, making it considerably cheaper than any Windows 8 tablet, but the combination won't be nearly as versatile without the ability to run older Windows programs.



HP Envy X2 £700 inc VAT



The Envy X2 is a Windows 8 tablet that comes with a keyboard dock to turn it into a 'proper' laptop, and it bears more than a passing resemblance to a MacBook Air. The dock also includes a second battery, so the combination should last a whopping 14 hours - longer than most real laptops.

Despite this and the fact it has a relatively big screen, it weighs only 1.4kg and measures 19mm thick, but the tablet on its own is 700g.

The 11.6in touchscreen has the usual 1366x768-pixel resolution. It's a good-quality display that's very bright and colourful. The speakers aren't much cop, though, despite their Beats Audio branding.

Like other Intel Atom-powered Windows 8 tablets, the Envy X2 scored fairly poorly in PCMark 7 (1,402 points). It can handle undemanding tasks, but not the latest 3D games or HD video editing.

Crucially, the keyboard dock is a good one. The keys are comfortable to type on and there's a reasonable touchpad, too. It houses a pair of USB 2.0 ports, and there's an HDMI output, full-size SDXC and microSD. You also get front and rear cameras.

The Envy X2 is one of the best Intel Atom-based Windows 8 tablets, especially if you'll use the keyboard a lot, but its high price is difficult to swallow.





£800 inc VAT



The Lynx is an 11.6in Windows 8 tablet that's just 9.5mm thick and 640g, making it about 20g lighter than the Retina iPad.

It doesn't have the high screen resolution of the iPad, but the Lenovo's IPS panel provides a very bright and colourful image with its native 1366x768 pixels.

Closer inspection of the Lynx reveals a cheap plastic back panel, and the buttons and port covers feel a bit flimsy. The speakers sound tinny, too, but headphone and Micro-HDMI connectors allow you to hook up the Lynx to some decent standalone speakers or a larger screen.

The dual-core Intel Atom processor scored only 1,415 points in PCMark 7. That's fine for basic tasks such as web browsing and a spot of Word or Excel work, but don't expect to render HD video in seconds.

Out of the 64GB storage built into the tablet there's only 37GB free for your own files, but the microSD slot allows you to add another 32GB.

The Atom processor isn't much good for 3D games, but it's thrifty on power - we saw 8 hours of streaming video.

Search online and you can get the Lynx and its optional keyboard dock for around £600. This includes a pair of USB 2.0 ports and a second battery that doubles the battery life.

The HP Envy X2 is a better built tablet but, at just £600, the IdeaTab Lynx offers reasonably good value for a full Windows 8 tablet and keyboard dock.

Lenovo ThinkPad Tablet 2

£700 inc VAT



Lenovo's ThinkPad Tablet 2 is a plain-looking Windows 8 slab. It's reasonably thin at 10.2mm and weighs a comfortable 574g.

Build quality isn't great. The Tablet 2 is worryingly bendy and the seams come apart far too easily, exposing the tablet's delicate internal components. Those components don't match the quality of those of Microsoft's Surface Pro either.

In place of the Surface Pro's Core i5, the Tablet 2 has an Intel Atom processor with 2GB memory. It managed 1,427 points in PCMark 7. This level of performance will be fine for word processing or swishing around the Modern interface using Windows 8 gestures,

but harder work is likely to make the Lenovo struggle. Waking the

Tablet 2 from sleep takes a frustrating 20 seconds.

The 10.1in touchscreen has a resolution of 1366x768 pixels and good

viewing angles, but it lacks brightness.

The provided 64GB of storage won't be enough for many people. After installing a few programs that are used in our benchmarking process we found there was only 26GB of free space available, which will quickly fill up.

Like the Surface Pro the Tablet 2 includes a USB 2.0 port for attaching external drives or a mouse, keyboard or camera. It doesn't have enough power to run a DVD drive, though.

There's no kickstand: Lenovo sells a Bluetooth keyboard with stand (£133). With questionable build quality, specs and performance, the Tablet 2 can't justify its high price.



Microsoft Surface Pro

£719 inc VAT



Compared to a normal tablet the Surface Pro feels thick and chunky, but place it next to even a thin laptop and it's a lightweight gadget.

The 22-degree kickstand is neat, and the way the optional Touch or Type keyboards click in is a joyous thing to behold.

It has a 1920x1080, 10.6in screen. This is a decent panel for a tablet, but on size alone it can't match up to that of a decent laptop. Viewing angles are pretty good, but we found it all but useless outside (in common with just about all reflective tablets).

There's 83GB of usable storage, but with USB 3.0 you can plug in a fast external drive, and there's also a microSDXC card slot.

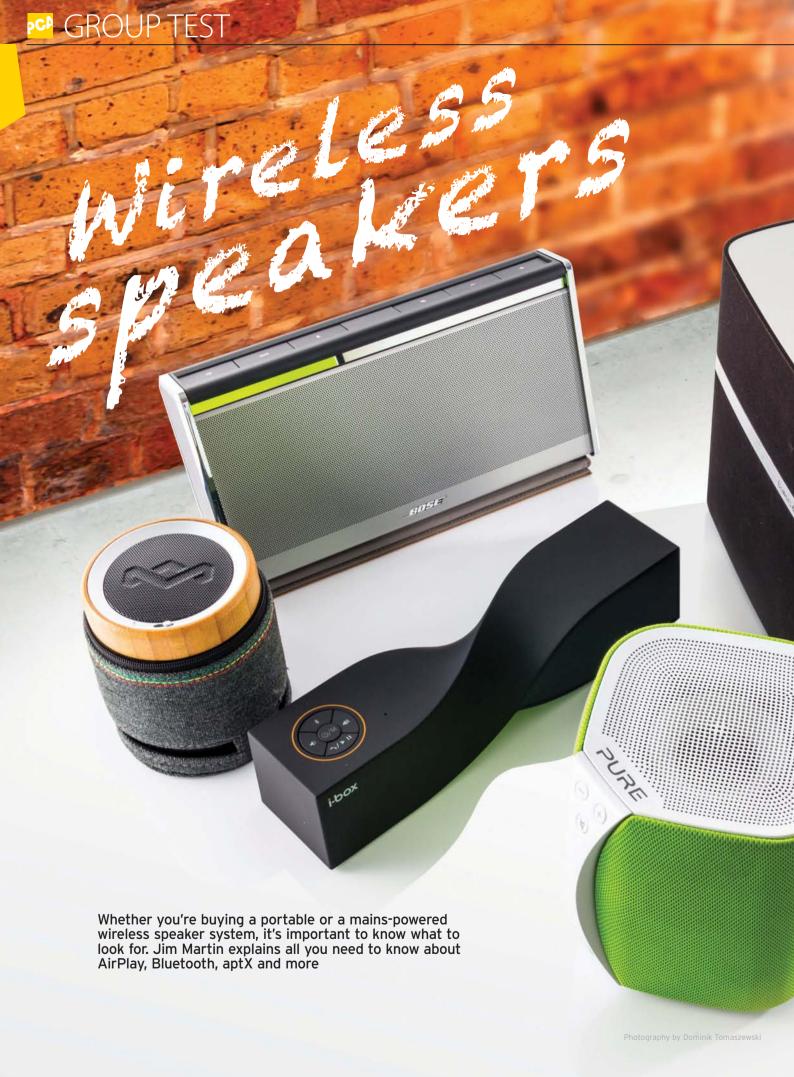
With an average PCMark7 score of 4,751 points the Surface Pro is as quick as a high-end Ultrabook. Its integrated graphics aren't much use for gaming, however.

Battery life is good, but perhaps not good enough for the new category of device that the Surface Pro represents. It lasted around 5 hours when playing a video - around half that of an ARM-based tablet.

Overall, we like the Surface Pro: it's the most portable power PC you can buy. But it does demand a compromise in terms of keyboard and battery life.









By far the most common standard is Bluetooth, since

virtually all smartphones and tablets have it. Within the

Bluetooth standard are different levels of quality. Stereo

A2DP delivers MP3-like quality, but near-lossless aptX is preferable. You'll get the benefit of aptX's higher quality only if your smartphone, tablet or other Bluetooth sending device also supports the standard.

As of yet, Apple hasn't included aptX in any iPhone or iPad. Instead, iDevices support Apple's own AirPlay standard, which is less common in portable wireless speakers (it's more popular in high-end mains-powered wireless speakers). This gives the best quality for iDevices as it's lossless and doesn't further compress the music tracks you're playing.

Bear in mind that AirPlay works only with iDevices, so it's worth opting for a speaker that has Bluetooth as well as AirPlay connectivity to ensure you'll be able to use it with other gadgets you might already own or buy in the future, or those owned by friends.

Bluetooth has a range of about 10m, so it's best used within one room. AirPlay uses a Wi-Fi connection, so your playback device doesn't need to be in the same room - it just needs to be within range of your router.

Bluetooth tends to be easier to set up than speakers that use Wi-Fi: no special apps or other hardware are required. Check out the wireless speaker reviews overleaf and on our site to find out how easy it is to set up and use a particular model (see tinyurl.com/7jLskj2).

Almost all wireless speakers have a wired input as well. This means you can connect a music player that doesn't have Bluetooth or AirPlay: you simply use the device's headphone output.

You might find a wireless speaker that has Wi-Fi and/or an ethernet port. This opens up more possibilities, including multiroom systems, internet radio and streaming audio from PCs or NAS drives.

Controls, remote control and speakerphone

Most wireless speakers offer no control over the sound they produce, save for volume. It's rare to find bass and treble adjustment, but some manufacturers provide this via apps for iOS and Android devices.

Some, but not all wireless speakers allow you to control music playback with play/pause and skip track buttons. This can be useful, but isn't essential.

Finally, some portable Bluetooth speakers have a built-in microphone, which means they can double up as a hands-free speakerphone. If you're already playing music from your smartphone, they should allow you to seamlessly take an incoming phone call.

Whatever your requirements, we've rounded up a selection of seven speakers that will transform your enjoyment of music, videos and more on your smartphone, tablet or laptop.



*** Build *** **Features** Performance *** Value **Overall**

BOSE SOUNDLINK II

£249 inc VAT • bose.co.uk • tinyurl.com/kts6364

Most portable Bluetooth speakers can't compete with mains-powered speakers on sound quality or volume. Enter the Bose SoundLink II. At 1.4kg, it isn't the lightest or smallest, but what it lacks in portability it more than makes up for in audio finesse. Plus, thanks to a built-in cover that doubles as a stand, the SoundLink is practical, too. (You can buy additional covers as accessories).

This model is a relatively minor update to the original SoundLink, with new drivers and an updated signal processor that can produce a cleaner sound. The new folding cover is held closed with magnets, which also serve to turn on and off the device.

The top edge is full of big buttons, and lights on the front show whether you're using Bluetooth or the aux input (there's a minijack on the back). It's very easy to pair a Bluetooth device, and the SoundLink can now store pairing details for up to six devices.

What you don't get is a remote control or a microphone. This means that whereas rival Bluetooth speakers can act as a speakerphone, the SoundLink II cannot. Plus, despite its high price, there's no aptX support. Standard Bluetooth sounds very good, mind.

Bose doesn't offer many technical details about the specification of its amps and drivers, but there are four neodymium full-range drivers and two opposing passive bass radiators. Bose says that by facing each other the two radiators can cancel out unwanted vibrations and keep your music distortion-free.

The SoundLink II impressed us with its big sound. In our tests vocals had excellent clarity and, although there wasn't much stereo separation, music of all types remained distortion-free up to maximum volume, which is surprisingly loud.

Those bass radiators do a great job, delivering lower frequencies than you might expect to hear from a speaker this small. As they emit sound forward and backward, you'll get the best sound when the SoundLink II is placed on a shelf or near a wall.

Battery life varies between three and eight hours depending on the playback volume - hardly surprising, given the power on offer.

VERDICT: The SoundLink II isn't cheap, but it delivers well aboveaverage quality. We like the built-in cover and stand, but it's a shame that it lacks speakerphone capabilities.

BOWERS & WILKINS A5

£399 inc VAT • bowers-wilkins.co.uk • tinyurl.com/Luotpo7

Bowers & Wilkins is a premium speaker manufacturer that is renowned for its Zeppelin dock for iPods and iPhones. The A5 is smaller than you might imagine, but it retains a similar design with black cloth and polished metal details.

The stainless steel band hides a tiny status LED and, on the left side, a power button. On the right side is a volume control, and on the rear a bass port and a 3.5mm aux input. Only the egg-shaped remote has a button to switch between AirPlay and aux inputs.

Configuring the A5 for AirPlay is easy using the free B&W Control mobile app (once you realise that the name has changed - the instructions refer to an AirPlay Setup app). This guides you through connecting to the A5's Wi-Fi network, then configuring it for your own wireless network.

If you have deep pockets you can buy and link up multiple A5s (or the larger A7) for use in a multiroom setup. Although you can send music to only one speaker at a time using AirPlay, a MacBook can stream to several devices when you want to host a party.

Along with the minimalist looks you get a minimal set of features. There's no Bluetooth support, nor is there a USB port or dock for charging your iPhone. You get no control over the sound either, with no bass control or an equaliser. Fortunately, the B&W A5 delivers good sound for its size.

It will happily sit on a shelf, yet fill a medium-size room with distortion-free music. We played a variety of test tracks, from pop to rock, jazz and classical, and the A5 handled all with aplomb.

Vocals are crisp, as is the high-end. Bass is also tight, but don't except the kind of thunderous kick you get from a Zeppelin. The A5 provides a smoother, more laid-back sound.

The power supply is an external model, which isn't ideal if you're planning on putting the A5 on a bookshelf - you'll have to find some way to hide the unsightly black brick that sits half way along the power cable.

VERDICT: B&W speakers are never cheap, but the A5 seems overpriced. Sound quality is good but not excellent, and with no Bluetooth it's restricted to Apple devices only. For £70 less the Minx Air 100 is much more versatile, yet sounds just as good.



BRAVEN 650

£160 inc VAT • braven.com • tinyurl.com/ke8c3fo

Braven is a new name to us, but its 600 range of Bluetooth speakers is worth a look if you need some sturdy, compact travel speakers.

Three models are available, with the 650 reviewed here topping the range. Its compact dimensions make it easy to slip into a backpack or even a jacket pocket when you're out and about. Despite the sturdy aluminium body it weighs just 340g, and is more durable than many of the plastic portable speakers here.

The buttons are a little confusing, but once you've memorised their functions the Braven is a doddle to use. The volume buttons double as skip controls (you can control playback from the speaker as well as your smartphone or tablet). There's also a button to check the battery level, although it would have been nice to see the four-LED display now sported by most USB batteries rather than a single indicator that warns you when less than 10 percent is remaining.

The 650 sounds good. Bass isn't exactly floor-rattling, but it's definitely a notch above most speakers of this size and sounds respectable on bass-heavy pop songs.

Higher frequencies do get a little harsh when you turn it up to maximum volume, so it's worth keeping the Braven one notch below.

As well as using standard Bluetooth for wireless streaming the Braven 650 also supports the higher-quality aptX codec, but your phone or tablet must be compatible (note that Apple's iPhone and iPad don't support aptX.)

What's most impressive about the little Braven is its built-in battery. It's rated at 20 hours, and that claim held true in our tests. With occasional use of the 650 for an hour so at a time, the Braven lasted almost four weeks between charges.

Plus, a full-size USB port means you can use that battery power to top up your smartphone or tablet. A further bonus is the built-in mic, allowing you to use the 650 as a hands-free speaker phone. Call quality is reasonable, but we've yet to find a Bluetooth speaker that can match a smartphone's built-in microphone.

VERDICT: If you don't own a device with aptX support, you can save some money by opting for one of the cheaper models in Braven's range. Of course, the £70 i-box Twist is cheaper still. In terms of battery life, though, the Braven 650 can't be beaten. **Cliff Joseph**



CAMBRIDGE AUDIO MINX AIR 100

£330 inc VAT • cambridgeaudio.com • tinyurl.com/kb59Lff

It might not look as fancy as some of the other wireless speakers in our group test, but the Minx Air 100 makes up for this in several ways. As well as supporting AirPlay, Bluetooth connectivity means it also plays nicely with non-Apple devices.

Not only that, but the Minx Air 100 can use your home network to stream internet radio and other services such as Spotify, Last.fm, iPlayer Radio and more. The speaker comes with 10 preset internet radio stations, but you can switch these for your favourites using the free MinxAir app for iOS or Android devices.

You can use the wired network socket on the back of the unit for streaming high-quality, uncompressed music, and there are minijack and RCA connectors for use with devices that lack wireless connectivity (your TV, for example).

Playing music via Bluetooth is as simple as it should be. There's a pairing button on top of the unit, and we had no problems using it with a variety of Android and Windows Phone 8 handsets. A bonus is support for aptX, but you need a compatible sending device.

Setting up the Minx Air 100 for AirPlay is a slight faff, but the big printed guide steps you through the process. In essence it temporarily acts as a wireless hotspot, so you can connect to its web-based management pages. Once you've configured it for your router the Minx will connect to your Wi-Fi network.

It's good to see a bass control on the back of the Air 100, but you get more control in the app, which offers a range of EQ settings, plus volume. The bundled remote isn't great, but you don't *need* to use it.

Cambridge Audio has specified a pair of its 4in balanced mode radiator (BMR) drivers, which move more air than traditional cones of the same size. Bass is strong - if you want it to be - and there's good mid-range punch. Being the smaller brother of the Air 200 the 100 may not fill as big a room but, for the compact size, you won't be disappointed with the sound quality.

VERDICT: While it isn't a portable speaker, the Minx Air 100 is one of the most versatile wireless speakers around. Its ho-hum looks matter not when you consider it has aptX Bluetooth and AirPlay support, and it sounds great to boot. You can get better sound if you spend an extra £100, but it offers good value at this price.





£80 inc VAT • thehouseofmarley.co.uk • tinyurl.com/mum7qqr

House of Marley is all about Earth-friendly audio products, and its Chant Bluetooth is a small wireless speaker that's designed to be both portable and convenient.

It's made from recycled plastic, and the carry case mixes crushed recycled bottles with reclaimed hemp and organic cotton. A ring of wood around the top, plus the House of Marley logo embossed in the speaker grille, add an air of sophistication.

Don't mix up the Chant and Chant Bluetooth: only the latter is wireless. The cheaper Chant looks the same, but doesn't have Bluetooth or a built-in mic for use as a hand-free speakerphone.

You don't get a choice of colours with the Chant Bluetooth either: it comes in a grey case, while the Chant is also available in green.

Build quality is very good, as is the design. The top of the case unzips when you want to listen to music, and a handy carabiner means you can clip the speaker on to a rucksack for audio on the go.

It's simple to pair a Bluetooth device such as a smartphone or tablet, but there's also a standard minijack input for playing music from non-wireless devices.

The internal battery lasts around six hours and is charged via a Mini-USB cable. No mains charger is included, but any PC USB port or your smartphone's USB charger will do the job.

Inside the Chant Bluetooth is a 2in driver and a passive 2in bass radiator. With no support for the higher-quality aptX standard, audio is transmitted via the standard Bluetooth codec. This isn't a huge problem, since the Chant doesn't produce top-notch sound even when you connect a device using the bundled cable.

The 2in driver, despite being larger than the speakers in rival portable speakers, simply wasn't able to deliver a full-bodied sound. Bass is relatively weak, and mid-tones (such as vocals and guitars) sound muddy in comparison with the i-box Twist.

Volume levels are reasonable enough - the Chant Bluetooth will fill a small room with sound - but there are no playback controls on the device itself, so you'll have to use your phone to adjust volume.

VERDICT: The Chant Bluetooth is cheaper than some speakers here and has decent eco credentials in its favour, but the sound it produces isn't the best. The i-box Twist is £10 cheaper and sounds better.



I-BOX TWIST

£70 inc VAT • iboxstyle.com • tinyurl.com/Let9rdf

i-box is a new name in portable audio, but don't let that put you off: the company clearly knows a thing or two about sound.

This portable player stands out from the group with its unique twisted design. It's bigger than the Braven 650, but a soft plastic rather than aluminium finish means it weighs about the same.

Its built-it battery is much smaller and lighter than that of the Braven, so it will last around five hours when playing streamed Bluetooth audio. Braven's 650 will last 20 hours, or you can use some of this capacity to top up your smartphone's battery.

A noise-cancelling mic also allows the i-box Twist to work as a hands-free kit for phone calls, with the music pausing as you speak.

If you want to play music from a gadget that lacks Bluetooth you simply use the included minijack cable. Charging is via Mini-USB; no mains adaptor is included, but chances are you already have one.

Buttons on top of the Twist let you adjust the volume, play and pause music and turn on and off the unit.

Given the low price, we were surprised at both the quality and volume of the Twist. Two 38mm drivers sit on the right, in front of a passive bass radiator with its own grille.

For such a small speaker, the Twist is capable of punching well above its minimal weight and gives speakers more than twice the price a run for their money - matching or beating some models. The only niggle is a lack of stereo separation.

Although the bass isn't room-shaking, it's still better than other speakers of this size, although it helps if you place the Twist in a corner or near a wall.

Listening to Eric Clapton's 'Old Love' the guitars were bright and clear, as were the vocals. Those who prefer music with more bass will appreciate the extra clarity in pop tracks compared with even the Braven 650.

There's no aptX support but, even with compression, the i-box sounds great for the money. Given that you can pick up the i-box Twist for less than £50 online, it offers unbeatable value.

VERDICT: It's difficult to fault the i-box Twist, given how cheaply it can be picked up online. It sounds great and works well as a speakerphone. Battery life isn't the best, but acceptable.





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PURE JONGO S3

£170 inc VAT • pure.com • tinyurl.com/Ld7uca3

The Jongo S3 is a reasonably compact unit that comes in a range of colours. It's more versatile than many of its rivals, allowing you to stream music via Bluetooth or Wi-Fi. Plus, the built-in battery stretches to 10 hours, so you can take the Jongo wherever you go.

The S3 can form part of a multiroom system with other S3s or the forthcoming Pure T6 or A2. You can't use a pair of Jongos as a left and right stereo pair, but that might come in a firmware update.

There's a 3/4in tweeter on each of the Jongo S3's four sides, and an upward-facing 3.5mm driver in the middle. You can choose various setups, including 360-degree stereo, stereo forward facing and outdoor boost. A small LCD on the rear displays this information.

Bluetooth is provided by a tiny USB dongle that sticks out of the rear, or you can use this port for the optional ethernet adaptor. The S3 is simple to use via Bluetooth - there's no aptX support, but the quality is more than acceptable.

To control the Jongo S3 via Wi-Fi you'll need to install the Pure Connect iOS or Android app or access connect.pure.com. The app lets you play music on your device, internet radio and on-demand content. It also ties in with Pure's own music-streaming service.







We were impressed with the volume and sound quality. Bass is lacking, but the overall sound is well-balanced, detailed and rich.

VERDICT: For a compact wireless speaker, the Jongo S3 sounds great and is flexible. It also offers a considerably cheaper way to build a multiroom system than were you to go down the Sonos route.

	BOSE £249 inc VAT	BOWERS & WILKINS £399 inc VAT	BRAVEN £160 inc VAT	
Model	SoundLink II	A5	650	
Product code	49997	A5	BZ650SBA	
System type	Portable Bluetooth speaker	AirPlay speaker	Portable Bluetooth speaker and speakerphone	
Drivers	4x drivers, 2x passive bass radiator	2x 100mm, 2x 25mm	2x 40mm	
Power rating	Not stated	4x 20W RMS	2x 3W RMS	
Frequency response	Not stated	Not stated	145Hz-15kHz	
Inputs	3.5mm minijack	3.5mm minijack, 10/100 ethernet	3.5mm minijack, micro USB	
Finish options	Chrome, matt, white	Black/stainless steel	Silver	
Extra features	Integrated cover	None	Lycra carry bag, USB charging port, 3.5mm output	
Power supply	Integrated battery (capacity not stated)	Mains powered	Integrated 2,000mAh battery, mains USB charger	
Claimed battery life	3-8 hours	N/A	20 hours	
Dimensions	244x48x130mm	300x180x120mm	157x45x64mm	
Weight	1.4kg	3.6kg	340g	
Warranty	2 years	2 years	1 year	



Conclusion

With the exception of the Chant Bluetooth, all the wireless speakers here produce respectable audio quality. The mains-powered units win out over the battery-powered models for sheer volume, but the Bose SoundLink II in particular does a respectable job of keeping up.

No single speaker will be the best choice for every user. If you're looking for a versatile indoor speaker, the Cambridge Audio Minx Air 100 should fit the bill. Unlike AirPlay-only speakers such as the B&W A5, it will work with just about any Bluetooth smartphone or tablet. It also serves as an internet radio.

Those who are after a portable wireless speaker on a budget need look no further than the i-box Twist. Don't let the no-name brand put you off: this quirky gadget pumps out music at better quality and volume than you have any right to expect. The fact you can find it online for just £50 seals the deal.

If you've more money to spend and would like to invest in a multiroom system, Pure's Jongo S3 is the obvious choice. It sounds good, given its size, and the 360-degree sound it produces makes it ideal for use at outdoor parties. $oxed{\boxtimes}$

CAM AUDIO PC ADVISOR RECOMMENDED	HOUSE OF MARLEY £80 inc VAT	1-BOX £70 inc VAT PC ADVISOR RECOMMENDED	PURE £170 inc VAT PC ADVISOR RECOMMENDED
Minx Air 100	Chant Bluetooth	Twist	Jongo S3
Minx Air 100	EM-JA004-MI	79085R	Jongo S340B
Bluetooth and AirPlay speaker	Portable Bluetooth speaker and speakerphone	Portable Bluetooth speaker and speakerphone	Portable Bluetooth and Wi-Fi speaker
2x 100mm	1x 50mm, passive bass radiator	2x 38mm, passive bass radiator	4x 19mm, 1x 89mm
100W RMS	Not stated	2x 3W RMS	4x 2.5W, 1x 10W RMS
Not stated	Not stated	Not stated	Not stated
3.5mm minijack, RCA, 10/100 ethernet	3.5mm minijack, mini USB	3.5mm minijack, mini USB	3.5mm minijack, USB
White/silver	Black/bamboo	Black	Black, green, yellow, red
Internet radio presets	Canvas carry bag with carabiner	None	Multi-room compatible
Mains powered	Integrated 1,100mAh battery	Integrated battery	Integrated battery (ChargePAK F1)
N/A	6 hours	5 hours	10 hours
354x118x182mm	85x85x100mm	246x59x56mm	131x139x135mm
4.1kg	382g	380g	1.25kg
1 year	2 years	5 years	2 years

MOBILE BROADBAND TEST 2013 IN ASSOCIATION WITH BROADBAND GENIE

What's the best mobile broadband?

In association with Broadband Genie, we take to the road to discover which is the best network for mobile broadband. You might be surprised by our results, writes Matt Egan eing able to access the internet wherever you can take your laptop, smartphone or tablet is a wonder of our age. Or that's the theory. In practice mobile internet is a mixed bag. You may be able to stream live TV from your phone at the bus stop, but half a mile down the road is a dead spot. And little irritates quite as much as having to move to the kitchen or even hang outside a window to get a better signal when you need to download a big file. A first-world problem maybe, but digital is an all-or-nothing proposition, and if you are paying for mobile internet the least you can expect is a robust connection.

Not all mobile networks are equal. They differ in the areas they cover and the way that they perform in general. That's why we decided to put mobile broadband in the dock, in our biggest ever mobile web test. Alongside our friends at Broadband Genie, we asked all the major mobile broadband providers to lend us a dongle. Then we hit the road: the rail road in this case.

Over the course of two days we travelled the length of the country, simultaneously testing eight different mobile networks on a variety of connectivity disciplines. We can't tell you which mobile network will work best in your home, but we can with confidence tell you which networks perform best overall.









The contenders, and how we tested

The eight mobile broadband providers who agreed to take part in our test were, in no particular order, Vodafone, Three, T-Mobile, EE, Samba, O2, Virgin and Globalgig. Both Globalgig and Samba are third-party dongles that use the Three network, and T-Mobile is closely related to EE (the third partner in that triumvirate is Orange, which declined to take part in the test).

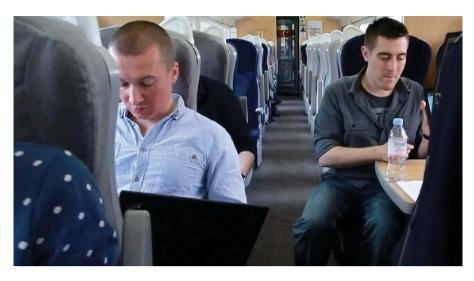
We asked each vendor to provide us with a dongle. Vodafone sent us the Huawei K3772-7 (branded as the Vodafone K3772), Three the Huawei E3256 (Three E3256 Premium Dongle), and T-Mobile the Huawei E583C (T-Mobile Wireless Pointer). EE gave us access via a Huawei E392, Samba the ZTE MF190, O2 an Alcatel X230D, Virgin the Alcatel X230S and Globalgig the ZTE AC30. We mention the hardware here because although we were primarily testing the networks as they would work on your smartphone, the dongle model will have some impact. Three's version supports DC-HSDPA for example.

The differing hardware might also explain some of the discrepancies between mobile virtual network operators (MVNOs) and their host networks. In the UK, for instance, EE provides the connectivity to Virgin Mobile. But, as you'll see from the test, EE performs much better than Virgin. In part that may be the hardware, and it may also reflect a certain second-class status on the network for Virgin users.

Over the course of two days we took a train from London to Edinburgh and back, carrying out 37 tests along the way. Each network was tested by a dedicated individual, so that each test took place at exactly the same time, in exactly the same location.

We carried out a variety of tests that fall into three categories: speed tests, video tests, and downloads and uploads. For each test a maximum time was allowed.

Speed tests are straightforward: at the appointed time each connection was put



through Broadband Genie's own speed test, and the results recorded. For the video tests we streamed a range of clips from a variety of sources, recording what point in the clip each connection allowed the viewer to reach. if they allowed them to play at all. And for downloads and uploads each network was used to down- or upload a specified file to or from the web. In each case we recorded whether the network succeeded or failed, and if the latter how far it got.

Speed tests

The star of the show here was EE, with average download speeds of 3.43Mbps and upload speeds of 1.79Mbps. EE completed 11 of our 13 speed tests. That may not sound impressive, but when you consider that the tests took place on a fast-moving train all over the country it is a great result. EE's best figures were 7.11Mbps down and 8.11Mbps up.

The total average for all eight networks was 1.24Mbps down, and 0.72Mbps up. Not great, but usable. Mobile broadband has come a long way.

Three completed 12 of the 13 speed tests in the time allowed, and it managed respectable average figures of 1.87Mbps

down and 0.94Mbps up. Those averages were bettered only by EE. The only other networks that managed average download speeds in excess of 1Mbps were T-Mobile and O2.

T-Mobile - EE's network partner completed nine of the 13 tests with average speeds of 1.31Mbps down and 0.32Mbps up. 02 completed seven tests with average scores of 1.2- and 0.4Mbps.

Of the other major networks Vodafone and Virgin Mobile fared particularly badly. Virgin managed average speeds of just 0.26Mbps down and 0.51Mbps up, but completed only two of our 13 tests. Vodafone was similarly afflicted, completing three tests for figures of just 0.19- and 0.23Mbps.

Globalgig and Samba both performed reasonably, although not as well as the Three network they use. Globalgig, which is designed to work in multiple countries. completed 10 of the 13 tests for average scores of 0.76Mbps down and 0.84Mbps up. Samba, which offers free, ad-supported mobile broadband, completed seven tests and scored 0.97Mbps down and 0.74Mbps up.

Video tests

None of the networks could complete even half of the video tests we set. It is only fair to point out that the challenge could hardly have been greater for mobile connectivity, but results were disappointing. There's work to be done on watching video on the move.

Once again EE performed well, streaming all of five of the 11 videos in the short time allowed, and showing more than half of three more. EE, Three, T-Mobile and Globalgig all managed to show at least some of each video we tried to watch.

The Three network managed to show four of the 11 videos in full, and more than half of two others. Intriguingly, Globalgig (which uses Three's network) did even better, showing five videos in their entirety and more than half of a further two. T-Mobile enjoyed some of its stablemate EE's reflective glory, showing the full span of four videos and half of another.

At-a-glance results for each network

Tests completed: 72 percent Average speeds: 3.3/1.79Mbps

02

Tests completed: 24 percent Average speeds: 1.2/0.4Mbps

Tests completed: 81 percent Average speeds: 1.87/0.94Mbps

Tests completed: 56 percent Average speeds: 1.31/0.32Mbps

Tests completed: 13 percent Average speeds: 0.26/0.51Mbps

Vodafone

Tests completed: 18 percent Average speeds: 0.19/0.23Mbps

Average speeds show downloads and uploads respectively



What's the best OS for mobile broadband?

Speed of connection is not the only consideration when you are surfing on the move; you also need to choose with what device to use that web access. It is impossible for us to test every mobile device (although you read our reviews of the best devices at pcadvisor.co.uk/reviews), so we looked at three of the biggest mobile platforms in terms of users accessing the internet: iOS, Android and Windows 8 (sorry BlackBerry, get a BlackBerry 10 tablet on the market and we can talk).

We found one person who had never used each platform and gave them a tablet. Then we set them a series of tasks.

Using iOS on the move

Our Apple tester is a BlackBerry and Windows guy. When exposed to iOS for the first time he was impressed: he found it well laid out, and the app system simple, intuitive and consistent. This, he said, made him feel confident and in control of the experience. Our tester found plenty of positives about the entertainment and app experience as a whole.

It wasn't all good, however. Our iOS tester just couldn't get on with the onscreen keyboard. There were also problems with some of the tasks we set: he couldn't watch a clip on 4oD without Wi-Fi, the lack of Java and Flash support occasionally reared its ugly head, and he struggled to download and edit an Office document.

Using Android on the move

Our Android tester is a regular user of iOS and Windows. She quickly became familiar and comfortable with the interface. Finding, installing and deleting apps was a cinch, and she found Google Voice search to be a big a positive.

She had some issues getting started, but they were more to do with the inexpensive hardware on which Android often runs than the software. Our tester also struggled to get Flash or Java working, but did manage to edit Office docs.

Using Windows on the move

Our Windows 8 tablet tester is used to Windows, but that of the Windows 7 desktop variety. She also uses iOS.

Her initial experience of using Windows 8 on a tablet with a mobile-broadband connection was poor. While our tester felt that things look simpler than Windows 7 in terms of layout, she found the user experience anything but simple, and struggled to complete simple mobile web-related tasks.

She was also confused by what she perceived as a lack of distinction between what is an actual app and what is an old-style Windows program. Because of this even traditional Windows staples such as Word and Excel became a problem. Using SkyDrive was a particular challenge when using a flaky mobile-broadband connection.

Ultimately she found she could achieve all the tasks we set her, but that it was more of a struggle than she would have liked.

What's the best platform to use on the move?

It is impossible to draw firm conclusions based on this test, but there are some general points that we can gather.

iOS is a stable and intuitive platform. It is the most immediately easy to use mobile OS. But it is limited: even with the plethora of apps available our tester found it difficult to complete tasks involving Office or Flash. These things are possible, but in the time we allowed he found the constraints of iOS prevented him being entirely productive.

Windows 8 offers almost the opposite conundrum. It can do it all, but the learning curve is steep. There is literally nothing you can't do on a Windows 8 Pro tablet that you can do on a PC.

Android sits somewhere in the middle. Now that Google Play offers a comparable selection of apps and media, it is a genuine rival to Apple's platform. But this customisable OS remains a compromise: it is not as polished as iOS, and it offers not as much in the way of true functionality as does Windows 8 Pro.

Of those that couldn't play at least some of all the videos Samba turned in the most creditable performance. Hardly surprising, given that it is on the Three network. Samba streamed three videos all the way through, and more than half of another one.

There was bad news for the two Vs again, however, as Virgin Mobile and Vodafone could manage to show only a single video clip each. Neither managed more than half of any of the other 10 videos, either. But both still outperformed O2, which failed to show even half of a single video.

Downloads and uploads

Prepare to be shocked: EE was not the best network for downloads and uploads. In this test Three just managed to pip EE, managing to down- or upload 10 out of the 11 files in our tests. Indeed, Three only just missed out on a perfect score: the 11th file was nearly half way to being downloaded when the time was up. EE did perform well, however, managing a healthy nine out of 11. It narrowly pipped

its stablemate T-Mobile (eight) and the Three-running Globalgig (seven). The other commendable result was the other Three user Samba, which managed to complete six of the 11 down- and upload tasks.

Vodafone and Virgin Mobile suffered, however, alongside O2. Vodafone managed to download only two files and uploaded none, but even that paltry performance was better than O2 and Virgin, both of which could only download a single file.

Conclusion

Three was our top performer, with 30 out of a possible 37 tests completed (a success rate of 81 percent). EE was close behind, ticking off 27 tests (72 percent). And those networks are clearly the best: Globalgig completed 24 tests for a 64 percent success rate, and T-Mobile was successful 56 percent of the time, completing 21 tests.

Using the other Three device, from Samba, we could complete 17 percent of tests, a 45 percent success rate.

At the bottom end of the scale was Virgin. On that network we could complete only five of the 37 tests (13 percent). Marginally better was Vodafone, with seven completed tests (18 percent). Which leaves us in the could-dobetter corner with O2 (nine tests, 24 percent)

Overall, then, it is a close-run thing between Three and EE for the title of best mobile broadband network. Three completed more tests and was better on downloads and uploads. But EE topped the charts for video and speed tests, and its speed-test results in particular left the rest of the field trailing a long way behind. Given the relatively good performance of the other Three network users Globalgig and Samba, we can safely say that Three is a great mobile network.

But so is EE - and if you need the fastest speeds that's the network for you.

T-Mobile performed well but is very much second-best in its own camp, trailing behind EE. The news for Virgin Mobile, Vodafone and O2 is less good. In our tests they were consistently outperformed in all areas.

The results >>





Our mobile-broadband road test took us from London Kings Cross through Peterborough, Grantham, Doncaster, York, Newcastle, Alnwick, Berwick Upon Tweed, Edinburgh and back. Along the route we ran 37 various tests on each mobile network, the results of which are displayed in our table.

THE RESULTS

ILE VESOFIS	
Speed test	
Download Firefox (20.3MB)	
Vimeo - Stranded (HD, 2:24)	
Speed test	
'Homes Under the Hammer' (5:00)	
Upload Roadtrain.jpg to Facebook	
Speed test	
Download Avast (112.04MB)	
Speed test	
Vimeo - Spy vs Guy (HD, 16:49)	
Spotify - Foals/Inhaler (4:53)	
Speed test	
Vimeo - The View (HD, 4.34)	
Download uTorrent portable (2.53Mb)	
Torrent download	
Speed test	
YouTube - Funny kitten clips (4:23)	
Download WinRAR	
Speed test	
Fast & Furious trailer (1080p, 3:22)	
Download California Cove video	
Upload California Cove video to Facebook	
YouTube - Kavinsky/Protovision (1080p, 3:08)	
Download Paint.net	
Speed test	
YouTube - From the Future with Love (720p, 12:21)	
Spotify - Queens of the Stone Age/Go with the Flow (3:07)	
Vimeo - Spacebound (HD, 2:48)	
Speed test	
Download Winamp (15MB)	
Fail video (360p, 5:31)	
Upload Edinburgh.jpg to Facebook	
Speed test	
Speed test	
PC Advisor Video (0:19)	
Speed test	
Speed test	
TOTAL COMPLETE /37	



PC ADVISOR RECOMMENDED

PC ADVISOR RECOMMENDED

VODAFONE	THREE	T-MOBILE	EE	SAMBA	02	VIRGIN	GLOBALGIG
FAIL	1.59/0.62Mbps	3.2/0.27Mbps	5.88/0.95Mbps	0.95/0.92Mbps	0.54/0.41Mbps	FAIL	1.43/1.23Mbps
FAIL	FAIL (44%)	3 mins 46 secs	FAIL (49%)	FAIL	FAIL (98%)	FAIL (43%)	FAIL
FAIL	FAIL (1%)	FAIL (1%)	FAIL (32%)	FAIL	FAIL	FAIL (1%)	FAIL (11%)
FAIL	0.23/2.15Mbps	1.34/0.37Mbps	5.13/0.99Mbps	0.08/1.18Mbps	1.4/0.63Mbps	0.34/0.37Mbps	FAIL
FAIL	FAIL (89%)	5 mins 32 secs	5 mins 32 secs	FAIL (96%)	FAIL (55%)	FAIL (6%)	FAIL (93%)
FAIL	12 secs	1 min 59 secs	55 secs	1 mins 5 secs	FAIL	FAIL	FAIL
FAIL	0.29/0.53Mbps	0.62/0.43Mbps	1.19/0.66Mbps	0.24/0.38Mbps	1.18/0.13Mbps	FAIL	0.23/0.37Mbps
FAIL	11 mins 5 secs	FAIL (75%)	FAIL (76%)	FAIL (52%)	FAIL (>1%)	FAIL (10%)	FAIL (53%)
FAIL	2.75/0.98Mbps	0.59/0.24Mbps	1.62/1.68Mbps	0.62/0.68Mbps	0.22/0.16Mbps	FAIL	0.76/0.98Mbps
FAIL (1%)	FAIL (50%)	7 mins 9 secs	FAIL (37%)	FAIL (12%)	FAIL (12%)	FAIL (>1%)	FAIL (18%)
4 mins 55 secs	5 mins 1 sec	FAIL (82%)	4 mins 53 secs	4 mins 55 secs			
0.16/0.48Mbps	1.48/1.27Mbps	0.57/0.42Mbps	1.32/0.33Mbps	FAIL	FAIL	0.18/0.66Mbps	1.02/0.8Mbps
FAIL	FAIL (43%)	FAIL (45%)	FAIL (2%)	FAIL (6%)	FAIL	FAIL (2%)	FAIL (44%)
3 mins 27 secs	4 mins 18 secs	FAIL	22 secs	1 min 9 secs	1 mins 42 secs	FAIL	FAIL
FAIL	7 mins 47 secs	FAIL	6 mins 31 secs	FAIL (60%)	FAIL	FAIL	7 mins 30 secs
FAIL	0.14/1.27Mbps	FAIL	FAIL	FAIL	FAIL	FAIL	FAIL
FAIL (12%)	4 mins 34 secs	5 mins 15 secs	5 mins 35 secs	5 mins 12 secs	FAIL	FAIL	5 mins 15 secs
FAIL	18 secs	1 min 1 sec	14 secs	29 secs	FAIL	FAIL	1 min 10 secs
FAIL	1.67/1.02Mbps	FAIL	1.4/0.99Mbps	0.89/0.57Mbps	FAIL	FAIL	0.44/1.61Mbps
FAIL (3%)	3 mins 55 secs	FAIL (40%)	4 mins 8 secs	4 mins 2 secs	FAIL	FAIL	3 mins 41 secs
FAIL	2 mins 55 secs	7 mins 34 secs	3 mins	8 mins 40 secs	FAIL	FAIL	3 mins 50 secs
FAIL	4 mins 58 secs	1 min 15 secs	5 mins 32 secs	5 mins 10 secs	FAIL	FAIL	2 mins 50 secs
FAIL	3 mins 31 secs	FAIL (40%)	FAIL (63%)	FAIL	FAIL	FAIL	3 mins 52 secs
12 secs	17 secs	17 secs	4 secs	FAIL	FAIL	1 min 58 secs	25 secs
FAIL	0.47/0.4Mbps	0.59/0.13Mbps	1.04/2.17Mbps	FAIL	FAIL	FAIL	0.84/0.72Mbps
FAIL (1%)	FAIL (44%)	FAIL (2%)	FAIL (80%)	FAIL	FAIL	FAIL	8 mins 12 secs
FAIL	4 mins 28 secs	FAIL (72%)	3 mins 7 secs	FAIL	FAIL	FAIL	3 mins 7 secs
FAIL	2 mins 48 secs	FAIL (2%)	FAIL (98%)	FAIL (49%)	FAIL (7%)	FAIL	FAIL (72%)
FAIL	4.11/0.42Mbps	1.86/0.22Mbps	4.17/1Mbps	FAIL	FAIL	FAIL	FAIL
FAIL	4 mins 55 secs	4 mins 31 secs	5 mins	FAIL	FAIL	FAIL (43%)	5 mins 5 secs
FAIL	FAIL (99%)	FAIL (88%)	6 mins 59 secs	FAIL (32%)	FAIL	FAIL (32%)	6 mins 5 secs
FAIL	11 secs	2 mins 14 secs	1 min 19 secs	1 min 21 secs	FAIL	FAIL	1 min 10 secs
0.14/0.07Mbps	8.66/1.18Mbps	2.4/0.33Mbps	7.11/8.82Mbps	1.34/0.7Mbps	2.88/0.41Mbps	FAIL	0.99/1.37Mbps
FAIL	1.78/0.99Mbps	FAIL	FAIL	FAIL	FAIL	FAIL	0.19/0.33Mbps
19 secs	2 mins 10 secs	24 secs	20 secs	19 secs	FAIL	20 secs	FAIL (42%)
0.26/0.13Mbps	0.14/0.54Mbps	FAIL	5.08/0.68Mbps	3.33/0.76Mbps	1.17/0.43Mbps	FAIL	1.04/0.34Mbps
FAIL	0.82/1.02Mbps	0.65/0.47Mbps	3.81/1.45Mbps	FAIL	1/0.63Mbps	FAIL	0.63/0.69Mbps
7 (18%)	30 (81%)	21 (56%)	27 (72%)	17 (45%)	9 (24%)	5 (13%)	24 (64%)
							lload sneeds respectively

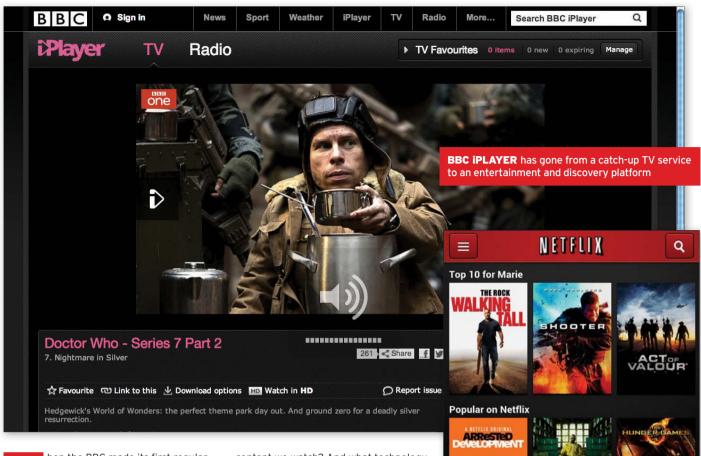
Speed test results show download and upload speeds respectively

FUTURE OF



TELEVISION





hen the BBC made its first regular 'high-definition' broadcasts from Alexandra Palace in 1936 there were said to be only two thousand television sets in the entire world. Now, just over 80 years later, 26.8 million UK homes (97 percent of UK households) have at least one TV, while global figures are estimated to be around 1.5 billion. In that time we've seen a steady evolution in devices from black-and-white to colour, analogue to digital, standard-definition to HD, a resurgence of 3D and now the arrival of 4K.

PVRs have also made it so much simpler to control the content we receive, with services such as Sky+ and YouView even allowing you to record a show or series of programmes from your mobile phone. With those systems, gone is the feeling of dread as you're halfway up the M1 and realise that you forgot to set 'Dr Who' to record.

Not that this matters as much as it used to, thanks to the myriad catch-up services such as BBC iPlayer that now exist. In the past the large networks had the audience all to themselves; today we're seeing an online challenge to their dominance.

On-demand services such as Netflix and Lovefilm are growing in popularity, YouTube is expanding and diversifying its content, and audiences are beginning to consume their entertainment on devices other than the traditional big-box TV. These developments pose interesting questions for the future of television as we know it. Will scheduled programming cease? Who will make the

content we watch? And what technology will we use to consume it?

Here we speak to a collection of industry experts who are working toward the answers to these questions, and who also pose a few of their own.

Will TV schedules disappear?

As the new digital landscape emerges, many have begun prophesying the death of traditional broadcasting. After all, Netflix offers a wide range of TV shows that you can watch in chronological order, at a time to suit, on a range of devices, and for only £5.99 per month.

But after so many years of ubiquity in the living room, broadcast TV is still the one that dwarfs all others. That doesn't mean that things will always be this way, and broadcasters know they need to embrace the opportunities as well as the challenges that the internet offers.

Leading the way is the BBC. "What we're seeing at the moment is this hugely complimentary relationship between broadcast and on-demand," says Victoria Jaye, head of IPTV at the BBC.

"About 89 percent of the TV audience is still watching live broadcasts on the big screen, and the percentage that is only consuming on-demand content is less than a fraction of a percentage. So this idea that broadcast television is dwindling is just not playing out. But simultaneously, and in parallel, on-demand is growing," she adds.

Since its launch in 2007, iPlayer has been a huge success for the corporation. Last year as a simple catch-up service for shows that various BBC channels, recent analysis shows that audience behaviour is changing.

"What we're seeing in terms of usage," Jaye explains, "is that today 42 percent of those who come to BBC iPlayer do so without anything specific in mind to watch, up from 25 percent in 2008. This tells us that for the audience iPlayer is beginning to evolve from a catch-up utility into an entertainment and discovery platform."

This is significant, because it gives the BBC an audience that is looking for something new, and affords the chance



Br eaking

Bad

NETFLIX offers a range of TV shows

on any device for just £5.99 a month

that you can watch when you want and

NEW EPISODES

Critically-acclai



to gauge reactions to pilot shows without having to sacrifice precious airtime on broadcast channels.

"Last year we commissioned original comedy for BBC three under the 'Feed my Funny' comedy brand," says Jaye. "These were seven comedy programmes broadcast exclusively by iPlayer, available to the audience over a 10-day period, and promoted within iPlayer. It received a one million reach and was the top performing content for BBC three in that week. One title - 'People Just Do Nothing' - was the most shared programme in iPlayer for the whole month, and one of those pilots - 'Impractical Jokers' - has now become a series on BBC television.

"We're moving into online commissioning in a paced, measured way. Obviously we have a huge amount of content to showcase on iPlayer, so the original online content is very much exploring comedy as a genre. Our broadcast slots for comedy are constrained - it's a very risky genre to create hits for - so we're looking at iPlayer as a fantastic way to grow new comedy. To work with a really broad range of up-and-coming talent both on and off screen, and get that content in front of an audience," says Jaye.

The BBC has recently announced eight more iPlayer pilots, and that 'People Just Do Nothing' is to become a BBC three show.

The corporation isn't alone in harnessing the power of an engaged audience when it comes to new content. Amazon, Netflix, and YouTube have all announced various forms of original digital content, with plans to continue down that path in the months ahead. The challenge for these new networks, as Victoria Jaye sees it, remains one of consistency.

I'M A CELEBRITY...

While Netflix is bringing 'Arrested Development' back to its grateful fans, the internet at large is proving to be a good place for celebrities to launch the shows networks were reluctant to commission, or just directly deliver content to their audience.

Having completed the long-running 'Stargate SG:1' series, Canadian actress Amanda Tapping decided to release her new venture 'Sanctuary' as webisodes. After building a large fan-base the series was bought by the SyFy channel, which paid for it to be remade and expanded. Sanctuary ran for four seasons and totalled 59 episodes.

US comedian Louis CK made more than \$1m in 2012 when he sold one of his stand-up concerts on his site for \$5 per download (subsequently showing himself to be a fine chap by donating \$280,000 to charity).

And 'Friends' alumni Lisa Kudrow has taken her new, mainly improvised, show 'Web Therapy' from the internet to two seasons on the US channel Showtime.

"It's still a handful of discrete titles they're originating, and that's something that will be interesting to see as it develops - how much they originate on an ongoing basis," she says. "The BBC has been doing this for many, many years. Every year we originate around 5,500 hours of original output, which we deliver to all the homes in the UK on an ongoing basis. So this is familiar territory to us."

Original programmes, not on TV

Netflix might not have the financial backing of a licence fee to pay for the hours of programming the BBC offers, nor the high subscription rates charged by Sky, but that hasn't stopped it from taking a big step into the world of content creation. Earlier

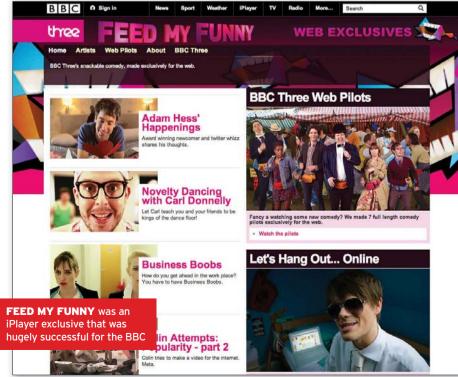
this year the internet-streaming service announced that it would be releasing the first season of 'House of Cards', a remake of an old BBC series from the 90s.

In the principal role of congressman Frank Underwood stars two-time Academy Award winner Kevin Spacey. This casting is impressive, given that the show is available exclusively online, and Netflix also managed to secure the services of Hollywood A-list director David Fincher (Fight Club, The Social Network), Robin Wright (Forrest Gump, Moneyball), and Kate Mara (Iron Man 2, American Horror Story). CNN reported that the total cost of the show was around \$100m,

week, all 13 episodes were made available on Netflix at once, without advertisements or additional costs. It was a bold move, thought to represent how its customers view media. The series is magnificent, with compelling performances from the cast, a crisp script, and styling that wouldn't look out of place on HBO or even a movie screen.

wake of 'House of Cards', and the company announced that it would release four more new series this year, starting with 'Hemlock Grove'. Netflix is also planning to revive some classic shows that were cancelled on other stations, with 15 new episodes of 'Arrested Development' available to subscribers.

"To some degree a shifting paradigm is happening," says Kevin Spacey, "and it's exciting to be part of it. I think you're going to see more companies step up and start green-lighting their own productions, and I think it's great for the business."







Amazon did exactly that. It announced that its newly formed Amazon Studios division would be releasing a number of pilots for potential shows, and that viewers could help decide which would enter production. It also solicited scripts and ideas from creators who wanted to be included in the initiative. Lovefilm subscribers saw the various shows appear, including one based on and bearing the same name as the film *Zombieland*.

It may be a far cry from the prolific output offered by traditional broadcasters, but Netflix and Lovefilm don't have a schedule to populate. They are in an enviable position in which they can buy content from the likes of Sky, BBC and overseas corporate partners, cherry pick the best projects to make themselves, then monitor the viewing results with a high level of accuracy and detailed audience feedback. Their content is available through smart TVs, games consoles, phones, tablets, various set-top boxes and even Blu-ray players, so customers can consume the content wherever they are provided that they have an active internet connection.

With online viewing beginning to rise, it looks certain that this area will be hotly contested by all networks. The BBC has a huge head start with iPlayer, which is likely to remain the go-to on-demand service for many people. Sky has recently launched Now TV, a movie- and sports-streaming service that will set you back £15 per month and is limited to two devices.

If anything, the future of TV looks to be an increasingly fractured one. When you consider that so many services are vying for your attention, and creating exclusive content to lure you in, it seems likely that there will never be a service that offers everything you want in one place.

Thankfully, most providers don't lock you into a long-term contract, and as the content isn't tied to a weekly release schedule you can watch a series as quickly as you like. Audiences may become actively itinerant, always looking for the best shows and switching their subscriptions on a monthly basis. It's a far cry from the old mantra of 'turn on, tune in, drop out'.

YouTube

Google executive chairman Eric Schmidt made a rather bold statement when asked whether YouTube could ever overtake traditional broadcasting. "That's already happened," he said.

While his remark may be seen as rather optimistic, the incredible rise of YouTube is a strong indicator of how future entertainment media might be created and delivered.

Since its initial launch in 2005, Google's user-generated content portal has grown into the most popular online video site in the world, with around one billion users collectively watching more than four billion hours of content every month. It's impressive to note, then, that YouTube itself makes

almost no content. What it does offer is a platform for creators and audiences to use, and an inexhaustible number of channels to fill.

"Back in the earlier days of linear television," explains Zayna Aston, communications manager for YouTube, "you would have a handful of channels - three or four - and viewing would be aggregated around more common programming. Then with cable you got a few hundred channels, with satellite a few hundred more, to the point where you got the internet, which is limitless.

"With global access you can aggregate a sufficient audience around even some of the more niche areas of programming. That allows for the likes of a vegan baking channel or a how-to drilling channel, for example."

It can be argued that the sheer quantity of content available on YouTube (a figure that grows by 100 hours of video every minute) is no guarantee of quality. After all, someone sitting in their poorly lit bedroom talking about Justin Bieber doesn't compare with the sartorial magnificence of 'Downton Abbey'.

But to think that it's all Vloggers and cat videos would be missing much of what's taking place on the site. Delve deeper into YouTube and you'll find a rich collection of documentaries on subjects as varied as hacktivism, auditioning for the Cirque Du



Soleil, and the Japanese Bullet Train. Visiting the Khan Academy channel gives you access to thousands of tuition videos through which you can learn algebra, the intricacies of economics, history, or a wide range of other subjects... And then there's PC Advisor's own channel (youtube.com/pcadvisor), for reviews of the best new tech.

This is in addition to the aforementioned Vloggers who offer commentary on the world, comedic channels that create content specifically for the site and, yes, plenty of cats doing hilarious things. It's an interesting development that the BBC was created with the Reithian values to 'educate, inform and entertain', but it could well be YouTube that eventually fulfils those ideals.

Google last year began the YouTube Originals program, an attempt to invest in premium-level content.

"We launched 100 original channels," explains Aston. "The idea was to kickstart the creation of original programming specifically for a YouTube audience. We gave an advance on future advertising revenue to a number of content providers that we thought were making interesting channels.

"We'd said for such a long time that this was a fantastic platform for content creators to host original content and reach a global audience. We felt this would be a good way to kickstart it, get ahead of the curve, and incentivise some channels to give it a shot. The top 20 to 25 US channels are now seeing more than one million views per week."

In October 2012, 60 more channels were opened across the US, UK, Germany and France, including an interesting collaboration between an already established channel and a face you'd usually expect to find on TV.

"Jamie Oliver partnered with an existing YouTuber called Sorted Food," reveals Aston. "Sorted Food started on YouTube, but Jamie partnered with it to learn about audience development, and learn to do what it does on YouTube because that skill set is quite different. For a content creator it's great as you get feedback from the audience, and can then adapt to what the audience likes.

"We've also recently announced that Simon Cowell is producing an Original channel for YouTube called the 'You Generation' - a global online audition channel. He's doing a talent show specifically for YouTube."

The secret weapon of YouTube programme makers is the back-end report the site produces called Insights. This gives the creators detailed statistics about the viewing behaviour of the audience, and allows them to fine-tune their programmes in response. It's one of the things that differentiates YouTube from traditional broadcast mediums, whose viewing figures and analysis have never been accurate.

The site has also added a live-streaming capability for programme makers. Eight million people watched Felix Baumgartner complete the record-breaking Red Bull Stratos Jump. The Royal Wedding was also streamed live, as was the IPL cricket and a

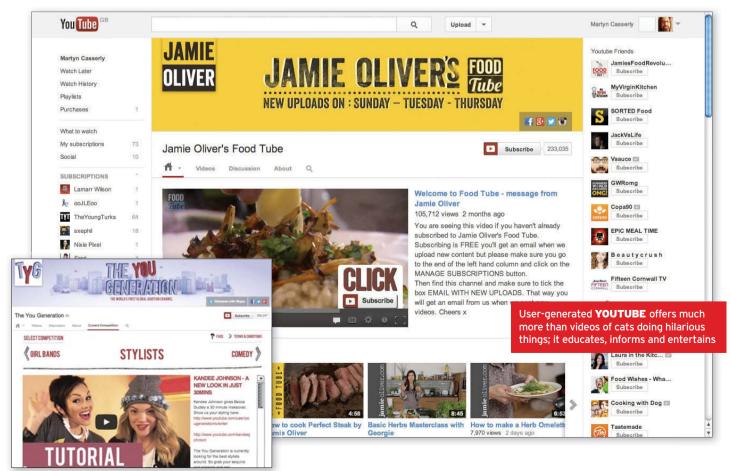
number of music festivals. It might still be a good few years before you see the Premier League appearing as a live channel, but the technology, and audience, are in place.

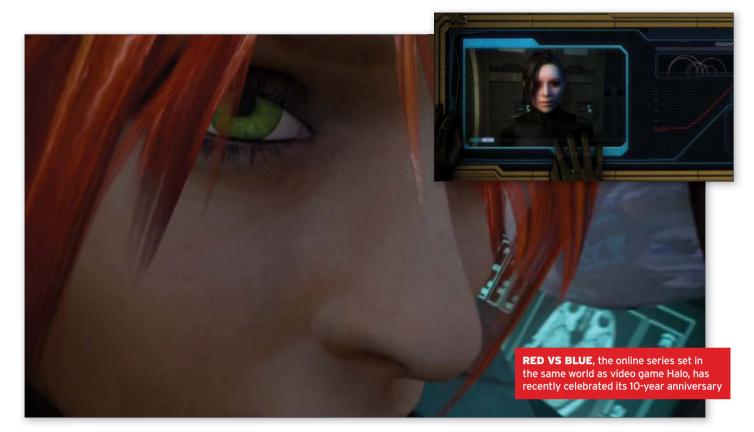
So, with hundreds of original channels producing regular high-quality content, coverage of live events, the ability to watch YouTube on almost any device with an internet connection, and a growing audience that actively engages with the shows and their creators, you can see why Fric Schmidt was so bullish in his assessment of YouTube's reach and potential.

But rather than looking to take the place of existing networks, YouTube has maintained a healthy relationship with them. This is something that seems likely to continue, and it could even grow the network's audiences.

"A number of traditional broadcasters, television channels, and networks use YouTube," says Aston, "Channel 4, for example, has long offered 4oD content on YouTube. It's no longer just putting up content wholesale, but rather using the platform for what it's good at - connecting with audiences. YouTube is a complement to television. People often pit it as one against the other but, in effect, traditional TV broadcasters are able to put programme clips on YouTube, create a buzz and drive viewers to their showings."

As we went to press the Financial Times reported that YouTube would begin charging for subscriptions to a number of premium content channels. A press release from





YouTube read: "We have nothing to announce at this time, but we're looking into creating a subscription platform that could bring even more great content to YouTube for our users to enjoy and provide our creators with another vehicle to generate revenue from their content, beyond the rental and ad-supported models we offer."

If the company does move in that direction then it could offer potential content creators an interesting dilemma. Should they go to the established networks, with their resources, programming expertise and known revenue structures, or does the open nature of the internet, its dynamic audience, adaptability to the differing methods of viewing technology, and instant worldwide reach offer more opportunities? Where they decide to ply their trade will no doubt have a strong influence on the content they create, and in turn the entertainment we receive.

Be your own producer

Broadcasting is hardly a precise medium, yet for many years it has served us well. Now, as online content starts to mature and delivery methods become more reliable, the restrictive nature of traditional TV is appearing more obvious.

With only a relatively small amount of space available on each channel, programme planners have to be ruthless in the way they commission new content, ensuring that viewing figures will be large enough to warrant a show's inclusion, and in many cases fit with a demographic that will attract advertisers. This doesn't leave much room for specialised interests.

The internet offers a very different scenario. In the past if a content creator wanted to reach an audience it required the help of a network; today, creators can take their content directly to the people. This freedom has seen the emergence of a huge new realm of content, often aimed at niche areas that would never have been possible before. From the likes of super-sites such as YouTube or Vimeo, down to an individual with a webcam, the internet is alive with ideas and entertainment that people can not only consume, but also influence. So, whereas many a viewer will previously have moaned that there was nothing on TV, the same can never be said for online.

One company that has more experience than most when it comes to web-based content is Rooster Teeth Productions, whose hugely popular show 'Red Vs Blue' has just celebrated it's 10th anniversary. Set in the world of the video game Halo, the show follows the travails of two opposing sets of soldiers – Red and Blue.

To recreate the Halo universe Rooster Teeth used an animation technique called Machinima, which uses the actual 3D engine of the game - the animators control the characters as would a player. It's a strange form of digital puppetry, but it allows the team to produce impressive, authentic scenes in a world in which fans of the series have already spent many immersive hours.

The show has become something of a benchmark for independent, online creators: it has proven to be an enduring, high-quality and, through the selling of merchandise, profitable entity.

"We've just put out a 15-disc Blu-ray box set," says Matt Hullum, CEO of Rooster Teeth, "that was a compendium of everything we've done over the past 10 years in 'Red Vs Blue'. We sold over a million discs in the fourth quarter last year, which is pretty amazing."

A key reason for the success of 'Red Vs Blue' is the relationship the creators share with their fans.

"Online we have almost a direct conduit to the audience," says Hullum. "You can make stuff really fast, and you can put stuff out really fast, and get feedback really fast. That has a multiplying effect towards the next thing you put out.

"Another thing that is essential to being an online content creator, as opposed to working in a traditional network model, is that the content producers are kind of all on the same playing field. Anyone can put out a video online, and if people like it then it will be a smash. It doesn't matter whether it was made by the biggest studio in the world and cost mega bucks, or it's one guy with a camcorder, a good idea, and his friends in the back yard. It really strips away all that. That's disconcerting to networks, because it's difficult to apply the old models into the new paradigms," says Hullum.

One of the criticisms often aimed at online content is that it is nothing more than a quick-fix medium; somewhere for people to watch two-minute videos between other tasks. This may have been true in the past, with the restrictive nature of slow internet connections a key factor, but trends are emerging that suggest that the nature of online viewing is in transition.



"We've definitely seen a change where people are willing to watch longer," Hullum continues. "They want longer, and that's great because it enables guys like us to expand our horizons. If we can have the liberty of telling a story over the course of two hours instead of two minutes then we can do a lot more interesting things.

"People have got used to the format of online video - it's not a different thing any more. It's not a novelty. It used to be that you were only watching it on a computer, now you can be watching a YouTube video on almost any screen. You watch on a computer, you watch on a phone, you watch on TV at home through some kind of connected device. It's got to the point where the content is crossing all technology barriers, which also means the creative limits imposed by technology are going away as well."

As content is freed from the confines of the front room, and mobile devices continue to increase in power and performance, are we seeing the emergence of the next generation of a media audience, one whose expectations differ greatly from those of us who grew up in an age where the television set was the sole repository of video-based entertainment?

"In general, the heaviest concentration of online video viewers are what they call the lost generation," states Hullum. "There's a segment of the population, more male than female, who are around 15- to 25 years old. and do not have TVs, cable television or landlines - they do everything on their mobile phones, or perhaps a laptop or a tablet.

"They won't ever own a TV - they come to roosterteeth.com instead. That's a big demographic, and as they age we're going to see a technological shift."

Broadcasters still hold enormous control over the content people consume: 89 percent of the BBC's audience continue to watch live programming on their TVs.

How guickly that figure changes is a matter of debate, with many still viewing online content as complementary to the traditional services. Either way the landscape has changed and, as has been demonstrated in other areas of media, companies will need to adapt to the new environment if they want to remain relevant in the years ahead.

"Newspapers thought that the internet was supplemental to their publications," Hullum concludes. "How many newspapers are going to be left in existence in the next two years?

"Ultimately, I don't think it matters. People are going to want to get content, and they're probably going to dictate how they want it to be delivered. The networks, studios and everybody else who makes the content are just going to have to roll with that. You can't dictate to your audience how they should view your material: the audience has the power in that scenario." 区

THE FUTURE OF TV: TECHNOLOGY

We've talked mainly about the future of content here, but the big screen will continue to be a fixture in living rooms, kitchens and bedrooms for a good while yet. PCs, laptops, tablets and smartphones have their place for watching TV shows and movies, but the TV is set to remain most people's primary viewing device.

HD has become the norm, and it's difficult to find a TV that doesn't support 720p (HD) or 1080p (full-HD). Plenty of larger, premium models support 3D, although precious little 3D content is available to those who want it.

There are several reasons for this. First, you'll need special glasses to view the 3D effect and, while passive polarised glasses are cheap, the active shutter glasses required by many 3D sets cost upwards of £50 a pair. That's not much good if you want to invite all your mates round to watch the latest 3D blockbuster.

Second, to some people the 3D effect is invisible - some surveys suggest 12 percent of the population can't see 3D. And for those who can see it, headaches and eye strain are a problem.

Active shutter glasses suffer unwanted flickering from artificial and natural light sources in the room, while those using passive 3D glasses will see only half the resolution since the image for each eye is displayed simultaneously.

With shutter glasses, the images are shown in quick succession, and the shutters cleverly block the view in alternate eyes in sync with the image onscreen. This has its drawbacks, too: some systems suffer from crosstalk, in which the remnants of the previous image are seen briefly by the 'wrong' eye as it fades and the next image is displayed on screen. This can cause the 3D image to appear blurry or create 'double vision'

The future is unclear for 3D. It's more expensive and difficult to record and broadcast 3D content. Various glasses-free 3D systems are being developed, but so far none is available to buy.

A more certain development in the future of TV is 4K, also known as Ultra-HD. 4K TVs have four times the resolution of 1080p full-HD. Although some models went on sale in 2012 for around £25,000, Sony has just announced the 55in X900, which will soon go on sale for 'just' £4,000.

There's clearly still a way to go before such sets become affordable to the average guy on the street, but it's a step in the right direction. 4K TVs offer staggering image quality, but it's unlikely you'll see sets smaller than 50in any time soon. This is because its difficult to see those extra pixels from normal viewing distances on smaller screens.

Like 3D, the main problem with 4K is a lack of content. Sony and all other TV manufacturers will tell you this is a non-issue: the TV will upscale any video to 4K. However, while its true that well-produced Blu-ray content does look a little sharper on a 4K TV, most people will struggle to notice the difference.

Even with the HEVC video codec, which is more efficient than the currently used H.264, 4K will likely require more bandwidth than full-HD, which presents a problem for broadcasting.

Netflix, Sky and the BBC are already trialling 4K broadcasts and internet streaming, but the best quality would come from less-compressed formats such as Blu-ray. Currently, there's no agreed standard for distributing 4K video on physical media such as an optical disc, with HDD systems used instead. Jim Martin



What's the best

Rosemary Hattersley offers her expert advice on choosing the best smartphone OS for your needs

martphone makers take it in turn to trump each other on storage, processor speed and camera megapixels with their flagship handsets, but it's the largely software that makes the most difference in daily use.

We're not talking about just the interface. It's the features the software offers, plus the depth and breadth of apps available for the mobile OS that make a difference.

It's all very well being able to download big-name apps such as Twitter, Facebook, Angry Birds and BBC iPlayer, but what about those for online banking, catch-up TV and more? If your chosen mobile OS doesn't have apps for the features you want to use, its usefulness will be limited.

Popularity isn't necessarily the best guide. The iPhone quickly stole market share from BlackBerry and Nokia, but now plays second fiddle to Android in number of devices sold.

A resurgent BlackBerry - thanks to the recent launch of the BlackBerry 10 OS and a consumer-friendly Z10 handset - could win back former fans.

Windows Phone 8 isn't out of the running either. It's one of the 'big four' mobile OSes, and has its own strengths to offer.

It may be that you already have an iPhone or Android smartphone and would prefer to stick with what you know, but with every high-profile handset launch and mobile OS update the competition gets stiffer. The Android or iOS device of three years ago is barely recognisable from its 2013 incarnation.

Price versus OS version

The cost of your contract partly reflects the hardware capabilities and amount of storage of your phone, but you might instead judge its value by what the mobile OS offers.

Any current iPhone can be updated to iOS 6 for free, but whether you can update an Android phone to 4.2 Jelly Bean depends on the operator and device manufacturer.

For example, Samsung's Galaxy S III is upgradable to Jelly Bean, but the cheaper Galaxy Y supports only Gingerbread (v2.3). Some budget phones such as Sony's Xperia tipo ship with Android 4.0 Ice Cream Sandwich, and are unlikely to be upgraded.

To get the latest BlackBerry OS you need to either the BlackBerry Z10 or the business-focused Q10 handset.

Windows Phone 7 smartphones can't be upgraded to the latest Windows Phone 8 OS, but Windows Phone 7.8 adds a similar home screen. Again, availability of the update depends on the manufacturer and operator.

Apple iOS 6

The latest version of Apple's mobile OS runs on the iPhone, iPad and iPod touch. It offers the broadest choice of apps and comes with plenty of Apple's own apps.

The Safari browser supports multiple web pages, but a lack of support for Flash means some sites don't work properly. Synchronised bookmarks (via iCloud) and the ability to save pages for offline viewing (Reading List) are handy. Private browsing is supported, too.

Typing is swift once you master overriding Apple's autocomplete suggestions. Good note-taking, reminders and calendar apps are also provided.

Email support is equally solid. You can add multiple email accounts from Outlook to iCloud Mail, Yahoo, Google and Exchange, then designate contacts as VIPs. You can view separate inboxes or see all your messages in a single pane. Mail is searchable by name or subject.

Voice search via the Siri digital assistant is largely a gimmick and requires a Wi-Fi connection to use. The ability to view documents sent as attachments is welcome, but they can be locally saved only if you have apps that support the file type installed.

iOS 6 has a handy Notification Centre, and notifications appear on the Lock screen. You can also disable all notifications between preset hours (the Do Not Disturb feature) to avoid distractions.

A central Settings app is used to manage almost every element of iOS, with on/off toggles for Bluetooth, roaming, in-app purchases and third-party app integration. Some parental controls are provided, and it's easy to sync and back up your data using iCloud or iTunes.

You need an Apple ID to buy apps and manage most elements of your iOS life. Purchases can be viewed or installed on any other iOS device you own (up to five PCs can be registered to your iTunes account).

Music, games, TV shows, film rentals and other iTunes purchases can all be deleted to free up space and subsequently downloaded for future viewing. You get 5GB of iCloud storage, against which photos, videos and purchases don't count. You can pay for more storage space or use Dropbox, Box.com and other cloud providers.

Apple replaced Google Maps with its own Maps app in iOS 6, but you can still use Google's superior Maps app which includes Street View. On the iPhone 4S and 5, you get turn-by-turn driving directions and the pretty-but-pointless 3D view in major cities.

Integration with audio hardware is impressive, via both Bluetooth and Apple AirPlay wireless streaming.

Aside from the sheer number of apps in the App Store, one of the advantages of iOS is that Apple curates all apps, so rogue installations and malware are unlikely.

Google Android

While iOS is managed with a firm hand by Apple, Android is more of an open-source renegade. Alongside the ability to gamble and view porn

(a no-no for Apple users) are security issues. Provided you install apps only from Google Play and use recommended security software (tinyurl.com/6d5xvjg) you should be fine. NFC and mobile payments are supported, so ensure you don't make payments or log on to financial websites unless security is active.

Google Ice Cream Sandwich (the version before the current Jelly Bean) covers all the basics, with fancy media-management options and prettier weather and contact features added on by some manufacturers.

More confusingly, mobile operators such as Vodafone and Orange pimp their handsets with preinstalled entertainment extras and their own lists of recommended apps. In the past these extras have interfered when upgrading to new Android versions.

Google is doing plenty right, though. Android advocates are a fastgrowing army. One clear advantage is the welldeveloped Google Maps app. Strong mapping, 3D and satellite views are accompanied by built-in voice control and turn-by-turn navigation. Android also offers built-in voice search, screen mirroring and contactless content

mobile OS?

sharing. You can 'throw' photos and music to devices across the room and queue up actions in a form of home automation (that's all dependent on the particular handset, as not all support NFC).

Android's app selection exceeds 700,000, with anything you've bought on one device automatically available to any other you use everything is linked to your Google account.

This contrasts with Apple's separate apps list for iPhone and iPad - not all apps are 'universal'. There's a limited magazine



stronger for kids' games and educational content, as well as creative apps.

Some users will be put off by Google's apparent ability to know everything about their web use, email accounts and personal details. Being logged into the default Chrome web browser won't help. A Google account is used to manage app and other purchases.

Google Now (a limited version of which is now available for iOS) serves up useful information based on your past behaviour, but also on location and time of the day. Travel information, currency rates when overseas and other pertinent information is served up as a flash card when Google reckons you'll find it most helpful.



Windows Phone 8

Windows Phone 8 takes full advantage of the large-screen handsets that run it. Luxuriously

large tiles that carry live information and are updated in real time offer access to People, Calls, Music & Videos, Xbox games, apps, Calendar, Camera and Photo gallery. Swipe down to reveal Office 365, SkyDrive and Local Scout. If you need to drive to a location, your Windows Phone 8 will dig out an appropriate app from its Marketplace app store or launch one you've already installed.

A Microsoft ID is required (Hotmail, Live, Xbox or Outlook.com email addresses all work, but you can use any email address) to manage your account. You can then access Xbox Music Pass unlimited streaming (it costs £8.99 per month after a 30-day trial). Film rentals are also managed through the Xbox portal. As with Apple's iTunes, you can preview 30 seconds of any track. Text messages, photos and emails can be automatically synched – photos are posted to your SkyDrive, and you get 7GB free storage.

Windows Phone 8's app repository mimics the slickness of the Google Play Store and



Vodafone loaned us a BlackBerry Z10 and HTC 8X for this article

offers 120,000 to choose from. If Find My Phone is switched on you can browse the Marketplace on your laptop and have apps install automatically over Wi-Fi. NFC and contactless photo and message sharing are supported, too, so you can beam shots to friends on Android Ice Cream Sandwich and Jelly Bean phones.

One of the highlights if you have young children is Kid's Corner. This is a walled-off area of the OS in which your child can access games, apps and more without the danger of them accidentally emailing your boss or deleting your photos.

Although there are some great smartphones running Windows Phone 8, the lack of choice in the app store holds it back. BBC iPlayer has only just arrived, and there are still many useful apps that are available only to Android or iOS users.



BlackBerry 10

BlackBerry lost out when other platforms used apps and multimedia to tempt

users and touchscreens began to prevail over keyboard-driven interfaces.

BlackBerry 10 is the former business and teen-messaging brand's comeback. It's a decent revamp, with an infinitely swipable screen that takes you through all the content stored on your phone.

It makes the few home screens on Android and iPhone handsets seem a bit passé.

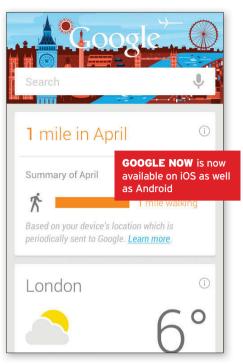
Navigation is still a little strange, though. You swipe upwards from the very bottom of the Z10 to unlock the phone, and can then peek at incoming messages and friends' status updates via a vertical split screen. A 3D effect sees you zooming in and out of panes. BlackBerry's mantra is that everything is seamlessly connected and you don't need to dive in and out of separate apps.

Messaging support is unsurpassed, with amazingly fast text entry possible. Word suggestions pop up as you type, but without distracting you. There are Contacts, BBM and text messaging apps, plus a Remember app to prompt you about appointments are included.

Web browsing is very slick and, as with previous BlackBerry OSes, media management is very good. You can rename as well as enhance photos, then search for anything within your media library. Disappointingly, you can use BBC iPlayer only in its browser incarnation and downloads are not supported.

More than 100,000 apps are available for BlackBerry 10, many of them high-profile such as Kindle and WhatsApp. Business apps are well represented, while social-media must-haves Facebook, Twitter and LinkedIn are preinstalled. Skype is promised soon.

Installing apps is straightforward, although app reviews on BlackBerry World



are understandably scant. Music, Games and Books are presented as sections of a single app and content hub.

Video editing via the excellent Story Maker joins the standard photo, music and video libraries in BlackBerry 10. Docs To Go offers native document editing. Store and sync them via Dropbox or Box online archives. You can even Print To Go.

NFC smart tags and voice controls ensure BlackBerry 10 covers most bases, but there's no standout feature to put this slick OS ahead of its rivals. However, for many people, it's the dearth of apps that makes BlackBerry less appealing than an iPhone or Android handset.

Verdict

Apple is still ahead of the game for sheer app numbers, but Android is quickly catching up. Even with its useful updates and tweaks, iOS 6 is starting to look tired; Apple is widely expected to announce iOS 7 imminently.

Android suffers from quality issues, especially where apps are concerned. Unlike Apple's tightly controlled world, Android devices have all sorts of screen sizes, resolutions and performance.

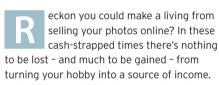
It has support from top brands such as Sony and Samsung, which also offer entertainment portals. It's flexible, and there's a good choice of hardware at any budget.

BlackBerry 10 and Windows Phone 8 are playing catch-up with app functionality and integration, but both offer slick performance and have been designed for dual-core handsets - performance is universally good.

Microsoft suggests Windows Phone 8 is the best choice if you already use a Windows PC, have an Xbox or even a Windows 8 tablet. There are some benefits to a unified interface, but nothing really compelling.

Sell your photos

If you're handy with a camera, you could make some extra cash from your hobby. Nik Rawlinson shows how to sell your photos

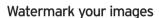


Selling your photos is easy, and we'll show you three surefire ways to get started: with your own website, through stock image agencies, and on everyone's favourite snapsharing super-site, Flickr.

Selling through your own site

You'll have the best chance of success if you research your market before you begin. Spend some time doing searches through Google Images (images.google.com) and see which turn up the fewest relevant results.

If you're setting out to take pictures with the specific intention of making a sale, these will be the most appropriate - and profitable - areas on which to focus your attention (not to mention your camera).



Bear in mind that just as you can find other peoples' images this way, they'll be able to do the same with yours; less scrupulous users might go further by downloading them without payment and killing your business before it's even got off the ground. With that in mind, always watermark your work before putting it up for sale through your own site.

Create a new file in your image editor of choice, then design a white watermark with a transparent background. Copy this watermark on to a new layer on the photo you want to sell. Set the blending mode to Soft Light and adjust the opacity. (See tinyurl.com/Lqqs38g.)

How much should you charge?

Think carefully about how you want to price your photos. It's often easier and a lot less work to attract a lot of sales at lower prices than fewer sales at higher ones, and thus make the same amount of money over time.

Google iphone



Many entry-level stock libraries sell images for web use from as little \$1 (60p), from which they subtract their commission. This can leave you with mere pence. Remaining competitive here won't earn you a great deal,



but at least you'll not lose any takings to the library owner, and you'll probably see your work used more widely than you would if it cost several hundred pounds a shot.

If that sounds like small fry, consider bundling several related images in a zip file, such as a road trip through Europe, a record of a particular event or pictures of people in generic poses that can be used to illustrate human interest stories. These can be sold at higher prices, with the inducement of a discount on the price of buying solo images.

However you decide to package your pictures, you'll still need to deal with taking payment and shipping the actual goods. You can automate much of this by signing up to a service such as e-junkie.com, which puts a personalised shopping basket on your own website, processes your customers' payments through PayPal or Google



Checkout, and then serves your images from its own servers to your buyers.

Not only does this automate the entire process, allowing you to sit back and watch the money coming in, but you won't incur extra bandwidth fees from your ISP.

e-junkie operates a tiered membership structure. You can start out from as little as \$5 (£3.20) per month for up to 10 products and 50MB of storage. Once your photography business takes off, you can increase both the range and space available up to a maximum of 7,999 products and 7,999MB of storage.

Host your own website

Integrating the e-junkie shopping cart is a simple matter of copying and pasting a few lines of code from your personalised e-junkie dashboard into your own web page, but you'll still need to design the website yourself. If that's beyond your level of expertise, consider selling through a self-hosted photography blog instead.

The WordPress (wordpress.org) blog engine is free, easy to set up, and well supported should you run into problems. It can also be extended through the use of plug-ins. iSell Photo (tinyurl.com/m42wkfy) is ideal for the photographic entrepreneur.

Installing this plug-in (click Plugins, Add New, then type iSell Photo into the search box) lets you add standard galleries of your images using the WordPress media uploader. You can then tweak the shortcode in the posts to which they're attached to add prices and PayPal links. Shortcodes are a bit like macros, which are used to create entire web pages on WordPress.

Once you add a gallery to a post, switching to the HTML view in the post editor will reveal that WordPress has inserted the required code (look for the line that reads '[gallery]').

To put the gallery images up for sale, simply edit this code to specify a price. For example, if you want to sell them for £2.50, and you've already set Pounds Sterling as the active currency in the iSell Photo options page (if you haven't, click Settings, WP iSell Photo), you'd edit the code to read: [gallery amount="2.50"].

All the images in the gallery will go on sale at the same price, so if you want to price particular items at a higher or lower rate you'll need to create a second or third gallery to accommodate them.

Sell images via an image library

Selling through an image library means you can cut out much of the admin involved in selling images through your own website. However, going down this road does mean you need to fulfil various strict requirements.

that we recommended using Google Images to search for areas that are currently under-represented in the realm of high-quality photography, you will need to check out what the various photo libraries are looking for.

Sell Stock

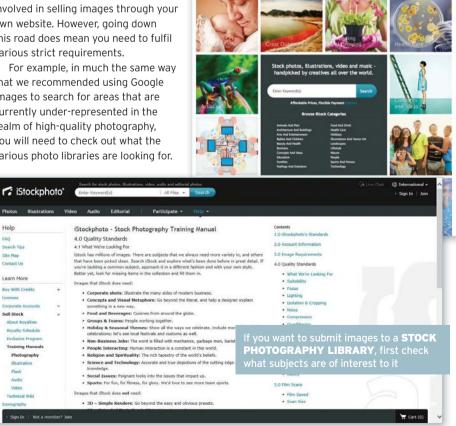
Pictures of your cat are unlikely to be accepted, and neither are well-lit, plain images of fruit on a white background, whatever their artistic integrity.

However, images with editorial or journalistic merit will always be in high demand, and so will those of new and emerging technologies. iStockPhoto maintains an extensive list of what it does and does not want at tinyurl.com/3cje5ch, while Shutterstock outlines the categories for which you can submit images at tinyurl.com/yrLsvc.

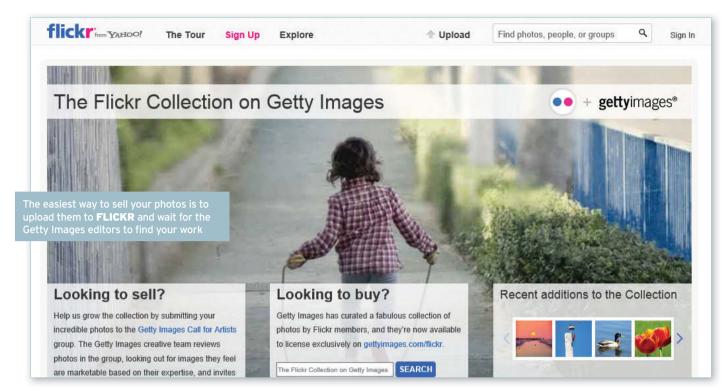
When submitting your photos to other libraries, look for links to their contributor guidelines to see which images they'll take, and which will be turned away.

You'll also have to exceed a set quality threshold, with at least your initial submissions checked for suitability by in-house editors. If you don't meet the library's standards you may be asked to submit a further batch of images.

Always submit as wide a range of images as possible to demonstrate your photographic skills, but don't overwhelm the scrutineers. Unless they specifically request more, restrict your work to just five or six samples, and only ever include your very best images.



iStockphoto



Don't watermark your images, but do check they meet the size requirements. You don't necessarily need a dSLR: iStockPhoto, for example, accepts images of 1600x1200 (1.9Mp) or higher, while Shutterstock will take pictures of 2.5Mp from existing contributors and 4Mp from new members.

These can easily be achieved using a smartphone but, unless your phone has a sufficiently good sensor and lens to perfectly focus and expose your subject, it's advisable to invest in a dedicated camera, even if it's just a simple point-and-shoot.

Photo libraries charge different prices for various image sizes on the basis that higher-resolution photos are likely to be used by professionals, often in print or as the basis of artwork, while lower-resolution shots are more commonly bought by amateurs for use online. Don't be tempted to resize your images by more than 5 percent in an image editor before submitting them, though, as you'll usually be found out in the vetting process and risk having your membership suspended, terminated or refused.

Sell images via Flickr

If either of the above two options sounds like too much hard work then try our third option: passive selling.

Flickr has teamed up with Getty Images, one of the world's biggest photo libraries, to allow photographers to sell images direct from their Flickr libraries. You'll still need to achieve a certain standard of quality but, in fairness, if you don't then it's unlikely you'd

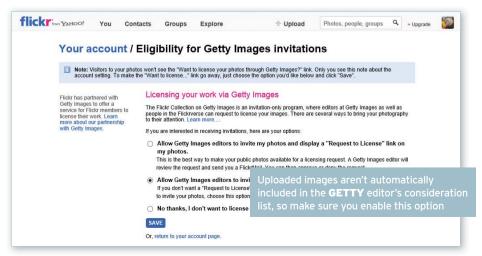
make any sales anyhow, so you have nothing to lose by trying.

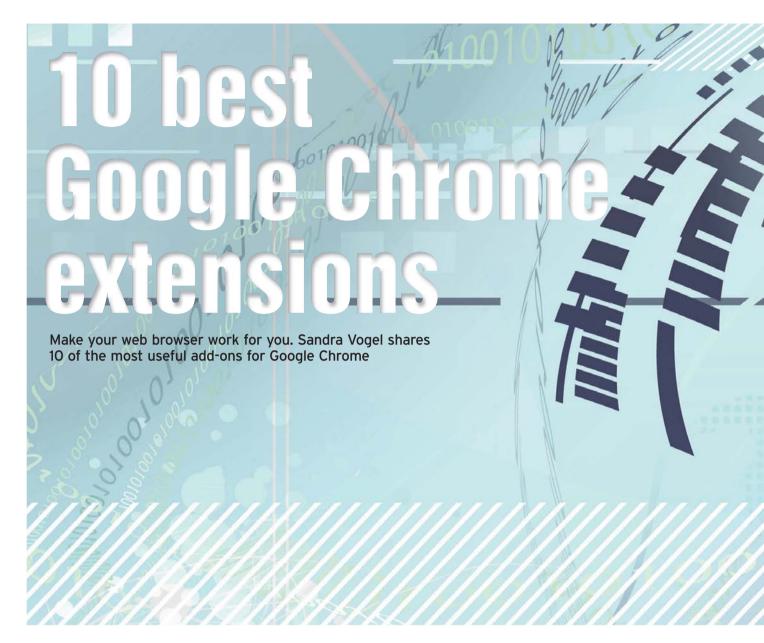
The key to successfully selling your images this way is to make sure that they are accurately tagged and captioned so the Getty editors can find the kind of work that would bolster their existing library. It doesn't explicitly point you toward its list of current requirements, but it makes sense to check out Getty's general contributor guidelines for non-Flickr contributions (head to tinyurl.com/nxh8rqr). Apply as much of the advice you'll find here as possible to your Flickr upload, paying particular attention to the points on writing captions and the minimum required image size, which stands at 3Mp.

With this in mind, sign up for Flickr (a free account will be fine to get you started)

and upload your first batch of images. These aren't automatically eligible for consideration by Getty's editors, so open an image from your library and click 'Want to license your photos through Getty Images?' below Owner settings. Select either 'Allow Getty Images editors to invite my photos and display a "Request to License" link on my photos' or 'Allow Getty Images editors to invite my photos (but please no link)' on the following page, then click Save. Repeat the process for the other images you'd like to sell from vour photo library.

There's no guarantee that you'll make a sale, but if you're happy to sit back and wait, and in the interim continue populating your Photostream each time you've taken a new batch of photos of which you're particularly proud, your chances will only increase.





ne of the things that makes Google Chrome so popular is its ability to accommodate extensions. These add functionality to Chrome, allowing you to customise your browser.

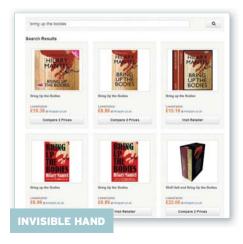
There are hundreds of third-party Chrome extensions, and together they are capable of adding a huge range of features and functions. Many of these extensions can link with Google's apps and services, such as Gmail and Drive. Your favourite applications may also have Chrome extensions – if you use Evernote, Dropbox or Pocket, for example, you'll find compatible extensions.

It's not all serious; there are fun extensions, too. Spotify is one such example, and there are games and art-related add-ons.

Some of the best extensions have very simple functionality. With Right-Click Search Wikipedia, for example, the description says it all. You simply highlight a word, right-click and a 'search Wikipedia' option will appear in the context menu.

You'll find extensions in the menu (look for three horizontal lines at the top right of the screen); just select Tools, Extensions. Alternatively, type chrome://extensions into Chrome's address bar.

Click 'Get More Extensions' at the bottom of the browser window that opens to visit the online store.



Take care not to install too many add-ons or Chrome will increasingly hog system resources and become unwieldy to manage. Also make sure the extensions you install are secure and won't compromise your system.

It's easy to install and manage your extensions at chrome://extensions, so there's nothing to stop you experimenting.

In no particular order, here are our top 10 Chrome extensions to get you started.

Invisible Hand

Invisible hand is a shopping tool that compares products from a range of sources to find the lowest price. It specialises in flights, hotels and car rental, with coverage of hundreds of airlines and thousands of hotels.

Invisible Hand also supports general shopping, covering more than 600 retailers in the UK, Germany and the US.

The add-on is easy to use: once installed you just tap its icon and enter what you're looking for. The results open in a new browser







tab, from which you can browse directly to the product on a particular site.

Invisible Hand also pop ups when you're shopping online to alert you if the same product is available cheaper elsewhere.

Ghostery

Ghostery is one of many security-focused Chrome extensions. It checks the websites you visit for tracking elements. These include advertisement placement and those used for website analytics.

Ghostery tells you what it has found, then gives you the chance to learn more about the companies that are tracking you.

You can also choose to block certain trackers if you'd rather they didn't record your every move. But bear in mind that not all trackers are bad. If you disable everything, you might find some sites don't work properly or don't remember your preferences.

Quick Notes

Quick Notes isn't the best-looking Chrome extension, but it does a simple task really well. It should appeal if you like to make a few notes while you're browsing the web.

When you tap its icon it opens a notes window into which you can jot

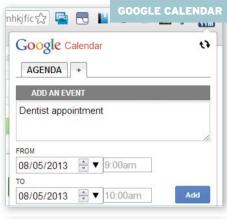
down information. You can cut and paste information from a website into Quick Notes just by highlighting and then right-clicking, or you can write freeform.

The notes you create stay put during subsequent Chrome browser sessions until you manually delete them. A direct link to Gmail means you can email notes, too.

Google Calendar

Plenty of extensions link into Google's various apps. We particularly like Google Calendar due to its flexibility and pure simplicity. You can see upcoming events simply by clicking

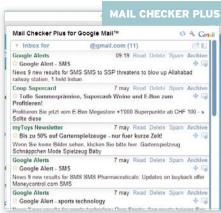














its icon in the Chrome toolbar, and it will pick up events from shared calendars too.

You can also use Google Calendar to add events to your Calendar. You can do this manually or from websites that use the appropriate encoding. The extension icon even shows you how long it is until your next appointment.

Session Buddy

If you've found a particularly useful site, but closed the browser without remembering to create a bookmark or jot down its name, Session Buddy can be invaluable. It remembers the state of open tabs in earlier browsing sessions, and allows you to easily restore them.

You can save sessions, too, meaning the websites you browsed for holiday research or birthday ideas will be at your fingertips the next time you need to call on them.

Session Buddy will also help you recover from those rare system crashes when your session history gets lost.

Mail Checker Plus for Google Mail

Email can arrive at inopportune moments, and you don't always want to stop what you're doing to check your inbox. A Chrome extension such as Mail Checker Plus for Google Mail can be very helpful here. The icon tells you how many unread emails you have, and clicking it lets you preview, mark as read, delete, archive or mark as spam individual messages.

Clicking any email that requires your immediate action opens Gmail.

PixIr Grabber

Sometimes you need to grab an image from a website and edit it for use elsewhere. Provided such activity doesn't fall foul of copyright concerns, PixIr Grabber could be exactly the tool you need. It allows you to grab a selected part of or an entire web page.

Once the selection has been made you can save the image locally or send it to the web-based PixIr editor. PixIr works just like a traditional desktop image editor; read our guide at tinyurl.com/LvnsocL.

Slick RSS

Google may be abandoning Reader (see page 112), but many people still regularly use RSS feeds. Slick RSS is an RSS reader that is integrated into your browser.

Having added some RSS feeds to Slick RSS you simply click its icon to visit a web page that amalgamates all your feeds.

You can add feeds from bookmarks or do so manually, and the extension icon alerts you to new feeds.

Simple Adblock

While many free-to-visit websites rely on advertising for revenue, including *PC Advisor's* own, flashing banners, wraparound ads and those that sit in front of YouTube videos can be annoying.

Simple Adblock is an extension that works in the background to automatically remove these irritations.

You can allow advertising on particular websites while rejecting it elsewhere. This option allows you to continue supporting your favourite websites, but do without the headache of annoying advertising elsewhere. (No pressure.)

Radio Player live

There are scores of games you can add to Chrome if that's what you want, but we prefer to sit back and relax with Radio Player Live. It lets you keep at your fingertips a library of internet radio stations.

Add stations from the extension's own web page or from a number of other internet radio locations, including Shoutcast.com.

You can also manually add streams, so if you like a particularly obscure station you can still play it from Radio Player Live. Once you've added some radio stations you can select which to play from the extension's icon.





Expert advice

Time was when you had a single PC and just a few files to manage. Organising documents, music and a couple of digital photos was easy. These days, our hard disks are bursting at the seams, and you probably have multiple PCs and external hard drives.

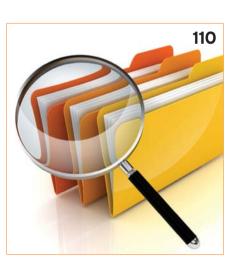
Windows 7 and 8 have a handy Libraries features that makes it much easier to group things into logical folders, without physically moving anything on your hard drives. We explain how to get to grips with this under-rated yet powerful tool on page 110.

Another thing for which few of us have time is checking our favourite websites for new articles. That's where RSS feeds come in. Now that Google has shut down its popular Reader service, we explain on page 112 how to use Feedly.

Flipboard offers an interesting way to read the things you like and it now allows you to curate your own 'magazine' for others to read. Turn to page 118 to learn more.

You could encrypt the sensitive information you don't want others to see, but it's more fun to hide it in a photo. Find out how steganography works on page 114.

The night sky is fascinating, and with the help of a free piece of software (see page 116) you can search for stars or planets, or simply find out what you can see from your garden.







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Windows 8 Libraries......110

Feedly......112

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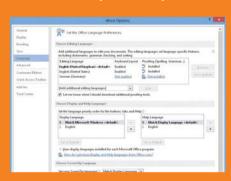
QUICK TIP: CHANGE THE LANGUAGE IN WORD 2007, 2010, 2013

Launch Microsoft Word and highlight all text in the document on which you're working. Click the Review tab.

Click the Language drop-down menu and choose Language Preferences. Chances are you'll see at least two languages listed in the 'Choose Editing Languages' section. Click 'English (United Kingdom)' or whichever language you want as the default, then click the 'Set As Default' button on the right. If you like you can remove any languages you don't use, too.

You can also define the proofing language, which is another option on the Language drop-down menu. Again, set this to the language you want to use.

If you have Word 2003, click Tools, Language, Set Language. Select English (UK) and click 'Set As Default'. Note that your changes will affect all documents created with the Normal.dot template.





YOUR QUESTIONS ANSWERED

Expert computing advice

We tackle readers' hardware and software conundrums

VOLUME CONTROL

I frequently use Google Chrome to listen to internet radio, but opening other browser tabs can introduce unwanted sound from other sites. How can I switch off the audio emanating from these pages, yet continue listening to internet radio?

Audio remains problematic for many web browsers, particularly in regard to managing multiple windows and tabs. We don't know of a way to solve this problem in Google Chrome. However, if you're using Windows Vista or later you can control the volume of individual web browsers. This means you could stream your internet radio using one browser, such as Internet Explorer, and continue browsing the web in a silenced Google Chrome.

Click the speaker icon in Window's taskbar, then choose Mixer. If your speaker icon is missing from the taskbar go to Start, Control Panel, Sound options. You should now be able to adjust individual volume sliders for Internet Explorer and Chrome.

WRITE-PROTECTED FLASH DRIVE

I have a SanDisk Cruzer Blade 4GB USB flash drive on to which I can no longer store files due to a 'write-protected' error. How do I fix this?

It's difficult to say what's at fault without more information, but we found several people with the same problem in SanDisk's support forum (see tinyurl.com/otax7tt).

Many solutions are offered, each of them successful for some users, but the only guaranteed fix is to back up your data and return the drive for replacement. It's worth only a few pounds, however, so it's for you to decide whether doing so is worth the effort.



SKYPE ROTATION

I prefer to use my Android tablet in portrait mode when using Skype. However, since updating to the most recent version of the app the display no longer rotates. I know Skype hasn't removed this functionality because it still works in a vertical format on my phone, so how can I use Skype in portrait mode on my tablet?

Microsoft recently updated its Skype Android app with different interfaces for tablets and smartphones. Regardless of its orientation, open the app on both your phone and tablet and you'll see that it looks quite different.

The main tablet interface cannot be rotated, so is stuck in landscape mode, although you can use portrait mode when making video calls. A workaround is to use

the smartphone version of the app on your tablet.

Touch the options icon at the top right of the screen (three squares in a vertical line), then select Settings. Choose Appearance and select the Classic view.

You will have to restart Skype for the change to take effect, but you'll then be able to use Skype on your tablet in either portrait or landscape mode.

SCREENGRAB ON GALAXY TAB 2

I recently updated my Samsung Galaxy Tab 2 10.1 to Android Jelly Bean and now the onscreen icon that enables me to take screenshots is missing. How can I take a screenshot?

The built-in screen-capture function is still there, although the icon has been removed. To take a screenshot in Jelly Bean you simply press and hold the power button, then press volume down. Don't let go until you see a white border flash around the edge of your screen (you may also hear the sound of a camera shutter).

Your screenshot will be automatically saved in the Gallery. You can access the image to edit or share it either from Android's notification bar or the Gallery.

USB-TO-IDE HDD PROBLEM

I bought a USB-to-IDE connection kit so I could back up my photos and video to a spare hard drive. It is visible in 'Devices and Printers' as 'USB to ATAPI bridge', but the drive can't be accessed from My Computer. I would like to format





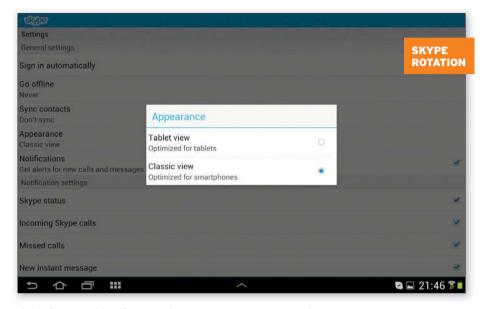
the drive and store folders on it, but I have no idea how to proceed. Any advice will be gratefully received.

It sounds as though you're most of the way toward getting this to work, since the USB-to-IDE adaptor has installed correctly. The next part of the installation will involve hooking up the IDE hard drive to the adaptor.

Depending on how it was last used, you may have to adjust a jumper or two on the drive to enter it into Master mode. Two cables will need to be used on the drive - one for data and the other for power. Make sure both of these are connected according to the manufacturer's instructions.

You should be able to hear and possibly feel the drive spinning into action once it's properly connected and the USB to IDE adaptor is plugged in. If this isn't happening, it's a good idea to test the drive in another PC to make sure it's not faulty. If you have another IDE drive available try that too.

Once the drive is properly connected and has spun up, go to Control Panel, find Administrative Tools and then click Computer Management. Look under Storage in the left pane and click Disk Management. All connected drives should show up to the



right. If you can identify your drive here you may find it requires formatting.

If there are files you need to recover from the drive then you should copy them now or, if Windows is unable to read the drive, use recovery software such as Recuva or EaseUS Partition Recovery.

Before proceeding, make absolutely sure you have identified the correct drive: you do

not want to inadvertently erase data on any other connected drives.

Right-click the drive in Disk Management and look at the available options. You may be able to assign a drive letter, in which case the drive should become accessible in My Computer. Otherwise you may have to delete any volumes on the drive and reformat it, after which a drive letter will be assigned.

RECOVER DELETED EMAIL FROM HOTMAIL OR OUTLOOK.COM

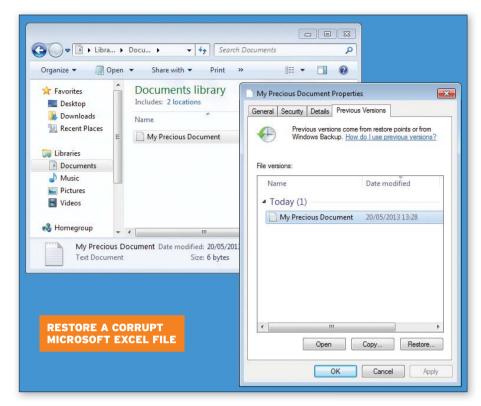
Accidentally deleting an important email can be distressing. Thankfully, most email clients will place deleted messages in a Deleted folder that functions in much the same way as Windows' Recycle Bin. However, once purged from the Deleted folder, these messages are far more difficult to retrieve. Depending on your email client, the Deleted folder may be automatically purged at regular intervals. Nevertheless, all is not necessarily lost.

If you're using Hotmail or outlook.com then it is sometimes possible to recover messages that have already been removed from your Deleted folder. Open the Deleted folder, then look for a 'Recover deleted messages' option. Clicking on this will return as many messages as possible to the Lost a message? When you recover deleted messages, we bring back as many as we can. Learn more

them to your inbox or other folder. (Don't leave them in the Deleted folder or you may find yourself in the same situation!)

If your important message isn't retrieved by this method then there's no more that can be done online. However, if you're using a desktop email application

such as Outlook Express, Windows Live Mail or Mozilla Thunderbird, you can try data-recovery software such as Piriform's Recuva (piriform.com/recuva). This is a free data-recovery program with specific support for retrieving lost email. If you're using Thunderbird, you can also try the steps outlined at tinyurl.com/o6hmwvs.



RESTORE A CORRUPT EXCEL FILE

I'm running Windows Vista Business Edition and I have attempted to import a 2,300-line Excel spreadsheet into Access. The data failed to import and the original Excel spreadsheet now appears to be blank. I can't explain how important this spreadsheet is and I know I should have had a backup. Can I recover the spreadsheet?

Since you're running the Business Edition of Windows Vista it's worth trying the 'Restore Previous Versions' feature.

Open Windows Explorer and right-click your Excel file. Select 'Restore Previous Versions' from the context menu. Provided that a system-restore point has been created since you created the file, a previous version may be available. However, there's no guarantee that there will be a useful if any - version available.

If you had accidentally deleted rather than overwritten your file, you could use the 'Restore Previous Versions' feature on the folder containing the file. An earlier version of this folder might contain the file you accidentally deleted.

The 'Restore Previous Versions' feature is not available in the Home editions of Windows Vista, but it is included in all versions of Windows 7 and 8.

If you are using Vista Home Basic or Home Premium then it's worth noting that earlier versions of each file are still recorded - it's simply the retrieval mechanism that's missing. Use the free ShadowExplorer (shadowexplorer.com) to access them.

HELP ME SPY ON MY KIDS

I need to check what my tech-savvy kids are up to. How can I recover or view their deleted web browser history in Windows 7?

The answer to this question depends on exactly how tech-savvy your kids are. If they know how to use features such as Internet Explorer's InPrivate browsing mode or

Google Chrome's Incognito mode, their history won't be saved in the first place.

One guick way of listing every internet site accessed (whether or not by the browser, plus those visited during privatebrowsing sessions) is by viewing the DNS cache. To do this, open a command prompt (enter cmd in the Start menu Search bar), type ipconfig /displaydns and press Enter.

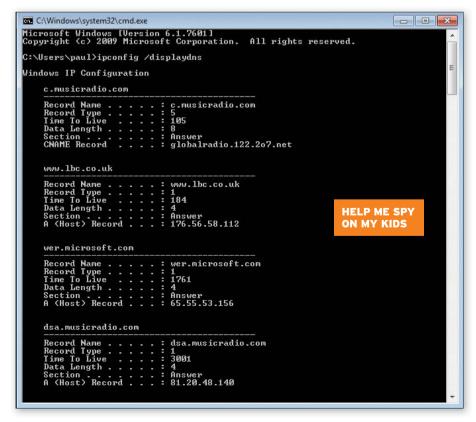
This will produce a list of all the websites accessed from your PC. Be aware that this includes not only web pages that have been directly accessed, but also any content that is indirectly accessed by these websites. This could include questionable content that has been placed on otherwise innocent pages, so be absolutely certain your child has been up to no good before you start throwing around accusations!

Web pages that have been directly accessed through the browser's address bar will generally display the prefix 'www.', but this isn't always a given.

Of course, a truly tech-savvy individual will know that the command ipconfig / flushdns will empty the DNS cache.

A more robust, if more technically complex, way to monitor web use is to configure your broadband router to maintain its own logs using the SysLog system. This will allow you to keep your own records of the browsing history of all computers on your network, and these cannot be deleted without administrative access to your router.

Nearly all routers have a SysLog function, although its use requires advanced knowledge and will vary from router to



PC settings

Your account

Sign in with a Microsoft account

Use your favourite email address to sign in to Windows. If you already use an email address to sign in to PCs running Windows, enter it here.

MyWife@hotmail.com



When you sign in to Windows with a Microsoft account, you can:

- · Download apps from Windows Store.
- · Get your online content in Microsoft applications automatically.
- Sync settings online to make PCs look and feel the same this includes settings like browser favourites and history.

CHANGING USER ACCOUNTS

router. It's also worth checking your router's features to see what parental-control and data-logging features it has to offer.

A simpler option is to use a service such as OpenDNS to capture web-access logs. It also offers sophisticated parental controls. See tinyurl.com/nt2dueh.

CHANGING USER ACCOUNTS

When I set up my wife's Windows 8 laptop I used my Microsoft Live ID. My wife would like to change it to her own Live ID, but I don't want to have to reinstall the programs and apps we've loaded. Is there a way to do this?

To change the Live ID used as Windows 8's primary account you must first convert it to a Local User account.

First, go to the Start screen and type users, then click Settings. Choose Users from the search results on the left.

In here you will see the option to switch to a local account. Select this option and enter your Microsoft Live ID password to continue. You will be asked to provide a username and password for the local account, after which you will be signed out so you can sign in with the local account.

Once you have signed in, repeat the process up until switching account types. Now you will have the option to switch back to a Microsoft account. Select this option and enter the details of the Microsoft Live ID you wish to use.

Follow the onscreen instructions and restart the computer to sign in with your new Microsoft Live ID.

This should leave you with the system much as before, but using your wife's Microsoft Live ID instead of your own.

WHAT'S EATING MY BANDWIDTH?

My BT internet account is restricted to 10GB per month. Generally this isn't a problem, since I tend to use less than half of that amount. However, something is now notching up the megabytes, and I don't know what it is. I have a piece of software that measures in and out data transfer, but its statistics cannot distinguish between local network- and web traffic. Do you know of a piece of software (preferably freeware) that is able to identify which programs are hogging my internet connection?

Continues >>

TECH JARGON BUSTER

EXFAT: A Microsoft file system used primarily on removable drives. As a replacement for the FAT32 file system it removes the 4GB size limit on individual files. It is also supported by recent versions of both Window and OS X, making it the file system of choice when using a removable drive across platforms.

INTEL IRIS: Currently the most powerful integrated graphics chip from Intel, Iris is built into the company's fourth-generation Core processors. It comes in standard and Pro variants, the latter including 128MB of embedded RAM and capable of delivering more than double the performance of previous-generation Intel graphics chips.

OPEN-SOURCE SOFTWARE: Software designated as 'open source' is supplied with all the programming (or source)

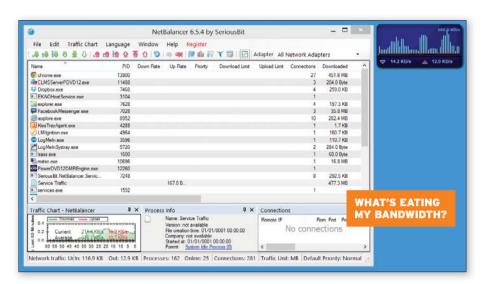
code, along with the rights to change and distribute it for any purpose. Benefits of this approach include rapid porting of the software to new OSes and the increased speed of collaborative development and bug-fixing. Open-source products include Linux, Android and Firefox.

OVERCLOCKING: Running a processor, graphics card or memory at higher speed than it was designed to operate. This can result in considerably better performance, but increases power requirements, internal temperatures and the risk of component damage. Some processors are designed to prevent such modification; others are designed specifically to make it easy.

ISO (STANDARDS): The International Organisation for Standardization sets a wide variety of standards covering

everything from Quality Management Systems (ISO 9001) to the specification for an official wine-tasting glass (ISO 3591). Digital cameras calibrate light sensitivity according to ISO 12232:2006.

ISO (PHOTOGRAPHY): Digital cameras use a sensor to capture the image produced by the lens. The sensitivity of this sensor can be varied according to ISO 12232:2006, commonly referred to simply as 'ISO', which is analogous to the ISO speed designation found on film stock. A setting of ISO 200 is twice as sensitive as ISO 100 and will result in an image twice as bright (assuming all other parameters remain equal). Higher ISO numbers incur a penalty in the form of increased image noise or grain. Cameras able to shoot at high ISO settings with minimal noise exhibit superior low-light performance.



NetBalancer (seriousbit.com/netbalancer) should provide the information you need. There is a paid-for version (\$29), but the free utility should be sufficient.

Installing NetBalancer will interrupt any current online transfers, including downloads or streaming audio/video, so make sure you're not doing anything important online before you start. You may also see a couple of warning messages about driver signatures - you can safely ignore these warnings and continue.

Following installation reboot your PC and launch NetBalancer. It will return information about all the processes that are using your network, including the amount of bandwidth they consume.

Go to the Edit menu and click Settings. then select 'Show only online processes'. This will restrict the information displayed to those applications currently using your internet connection. You should now be able to over time see which application is using the most of your bandwidth.

If you wish, you can use NetBalancer to impose bandwidth restrictions on individual applications or types of application. You can also import general rules based on your 10GB allowance. For example, you could deliberately slow down all traffic when you get close to this limit.

If NetBalancer doesn't reveal the culprit, there's always the possibility that this extra bandwidth consumption isn't coming from your PC at all. Any other internet-connected devices will also consume bandwidth. These could be devices such as smartphones, tablets and audiovisual equipment such as smart TVs and Blu-ray players.

If you're using a wireless network, there's also the possibility that a neighbour is piggybacking on your internet connection. Make sure your Wi-Fi security is enabled, and consider changing your password.

CONTACT US



Email your Helproom questions to use 'Helproom' as the subject header and give your full name, the operating system you're using and other product details. We will let you know by email if your guery has been selected for inclusion in these pages. If your query is urgent, you may find it useful to visit our forum at pcadvisor.co.uk/helproom.

Helproom aims to give you the best assistance possible. But, given the

limitations of this type of advice, we can't guarantee what we say will work any damage arising as a result.

Always back up your system before you make any changes, including software installations.

to respond to letters or telephone requests, but we will endeavour to answer queries submitted by email or via our Helproom forum.

For more PC help go to: pcadvisor.co.uk/helproom



SEARCH THE PC ADVISOR FREE ONLINE HELPROOM

The PC Advisor online Helproom contains an indispensable database of answers to common questions regarding all aspects of PC problems. This ranges from general Windows issues to problems with specific apps, and covers all types of PC hardware and software, including system components and peripherals.

Alternatively, you can ask for help from the experts on our online forums. Sign up to be a registered user - which is free - and then browse to one of the discussion forums. In the Helproom your first stop should be the searchable database of frequently asked and previously answered queries. With more than 1.5 million forum posts, you'll almost certainly find your answer in this archive of queries - just enter a few keywords.

If our online database can't solve your problem, try posting a question in the Helproom forum, where more than 200 queries are answered every day. The forum is manned by our team of Helproom Angels, who are ready and willing to lend a hand with anything from system crashes to virus alerts.

helproom@pcadvisor.co.uk pcadvisor.co.uk/helproom

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Virtual grouping for your scattered files



Is your file system in a bit of a mess? Mike Bedford explains how to virtually organise into logical directories the files scattered across your hard drive



Wouldn't it be great if all the files associated with a certain project or activity were stored in a single place, with you not having to remember on which PC and in which folder you saved them? If your file organisation has previously been somewhat lax, the good news is you can create a virtual system that helps you find what you need but doesn't require you to move a thing.

Libraries were introduced with Windows 7, but many people don't know what they are or what to do with them. We're here to help.

At first sight a Library looks like any other folder; open it and you'll probably find a handful of files stored inside. But these files aren't really there at all – they're better described as shortcuts to the files scattered around your PC, with the Library offering a virtual grouping system.

Rather than putting files and folders into Libraries (although you can do that too, after a fashion) you just tell it which folders to include. This is a convenient way to pull together all files of a particular type or associated with a particular job, especially since they don't need to be on the same disk or even the same machine.

A Library on your desktop PC could include files on that computer's hard disk, on one or more external drives, and on several other desktop or laptop PCs connected to your home network.

In the following workshop we'll see how to use one of Windows' four default Libraries: Documents, Music, Pictures and Videos. We'll show you how to start making use of Libraries and give you a good feel for what they offer. We'll also show you how to create your own Libraries.

We're using Windows 7, but the principles are much the same with Windows 8. Libraries are not supported in earlier versions of Windows.

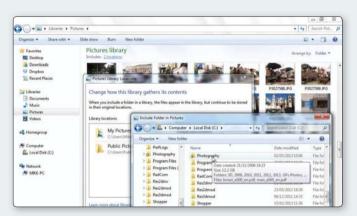
Note that Libraries cannot include folders stored on NAS drives, CDs, DVDs or memory cards. The use of USB memory sticks depends on their exact specification.

USING WINDOWS LIBRARIES

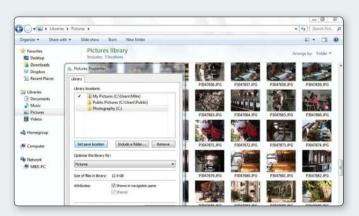


TART

For our example we'll use the Pictures Library. Open Windows Explorer and examine the navigation pane on the left. Click on Libraries and icons for the four default Libraries (Documents, Music, Pictures, Videos) will be displayed to the right.



By default My Pictures and Public Pictures are included; only if you've used these folders before will you see anything in the Pictures Library. You can add other folders, too: click Add, navigate to the folder, click Include folder, then press Ok.



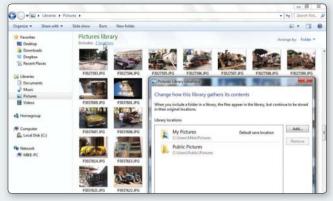
You can change the default save location to another folder on your hard drive if you prefer. Open the Properties dialog box, select one of the other folders included in the Library, then click 'Set save location'.







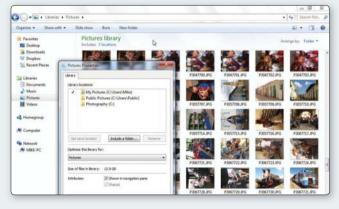
Click on the Pictures Library (either in the navigation pane or double-click its icon to the right). Depending on where you store your pictures, you may already have some images stored here or it may be empty.



To understand what files you're seeing here, look to the top of the File Explorer window and click on the blue text next to 'Includes:' (which will probably read '2 locations'). The 'Picture Libraries Locations' dialog box will appear onscreen.



Although Libraries contain only shortcuts to files and folders stored elsewhere, you can move or copy files or folders into a Library. Try moving or copying some files or folders into the Pictures Library now just as if it were a normal folder.



To see how this is possible, right-click the Pictures Library in File Explorer's navigation pane and select Properties. This will list the included folders and you'll notice there's a tick against My Pictures. This is where files written to the Library are saved.



It can be useful to share a Library with your Homegroup, allowing your pictures to be accessed from other PCs or a smart TV. Right-click the Pictures Library, select Sharing and choose with whom you want to share the Library.



To create a new library, right-click Libraries in File Explorer and select New, Library. A new Library will appear, and you can change its name to something more memorable just as you would with a new folder.

Life after Google Reader



Google's popular Reader service will shortly be closing. Martyn Casserly explains how to transfer to Feedly and continue enjoying your RSS feeds



Using an RSS reader is a great way to gather into a single place all the news and blogs you frequently read. You can simply sign up to a free service, select the various websites you want to follow, then let the program automatically search for and bring you new content.

Google Reader has long been a popular RSS client, but the firm has now closed its doors. So, now's the time to experiment with an alternative RSS reader.

Many people have already signed up to Flipboard, which is a beautifully designed, magazine-style mobile app for iOS and Android that can incorporate news and links from your social-media streams as well as RSS feeds. (See our guide to creating a Flipboard magazine, page 118.)

Google also offers a mobile client in the form of Google Currents, which presents your news feeds in a similar way to Flipboard.

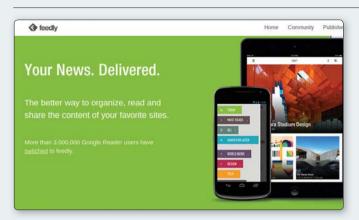
If you prefer to read your news on a PC, or simply want to sync your feeds across all your devices, a few other services deserve attention.

Pulse is an excellent option, especially on mobile devices, and lets you connect your account to Facebook so you can share any interesting stories you find. With so many boxes vying for your attention the design can be distracting at times, but Pulse is a robust and easy-to-use client.

The RSS reader that seems to have gained the most from Google Reader's demise is Feedly, which recently announced that more than 3 million people have switched to the service from Reader. Presumably one of the main reasons for this is the ability to transfer your existing feeds to Feedly, alongside the site's simple, clean design.

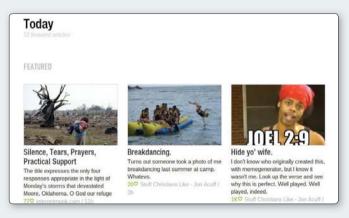
Feedly also offers Android, iOS, Web and Kindle versions, which should cover most people. In the following workshop we'll explain how to set up the web application, import any existing Google Reader feeds you might have, and add some new ones to your must-read list.

TRANSFER YOUR RSS FEEDS FROM READER TO FEEDLY

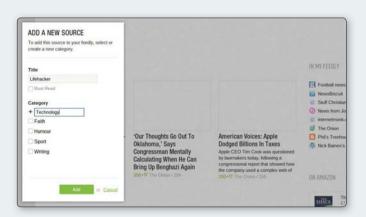


TART

First you need to download Feedly's browser app. Head to feedly.com and click Get Feedly. We'll be using Google Chrome for the purposes of this tutorial, but you can use whichever web browser is your current favourite.

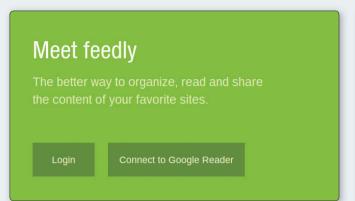


With your Google Reader RSS feeds synched with Feedly, the latest content should appear in the main body of the page. Feedly says it is updating the back-end so your feeds will continue to work following Reader's eventual demise.

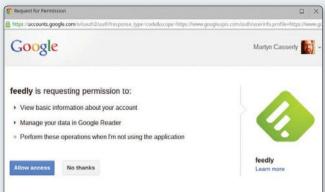


Having created an account you'll see another pop-up box that contains the news feed you selected. Create a new category to organise your feeds by pressing the plus sign, assigning the category a name, then clicking Add at the bottom of the box.





Once Feedly is installed on your PC you'll need to set up a free account. On the first page you'll find various options; if you don't have an existing Google Reader account that you wish to transfer then skip to Step 5.



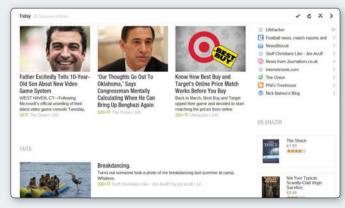
Transferring an existing Google Reader account is simply a case of pressing the 'Connect to Google Reader' button, then allowing access to your Reader data. You'll need to log in with your Google account, then click the Allow Access button.



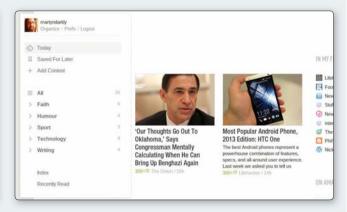
If you want to set up a new Feedly account without transferring existing RSS feeds then click the Start button at the top right of the Start menu. A pop-up box offers a choice of topics; click on a subject you like to list popular feeds in that category.



Select a content feed by clicking on the plus sign to the right of the list. You'll see another pop-up box that offers you the choice to either sign up to Feedly with your Google account details or create a new account.



Now you'll see the normal front page of your Feedly reader, which will display new content as it is delivered by your RSS feeds. Click on any article to read it, or click 'Mark as Read' to remove it from the list.



If you wish to navigate by category, add new feeds or change your preferences, use the column on the left. Depending on your screen size this will be constantly displayed or accessible by clicking on the three grey lines symbol.

Hide confidential data in plain sight



Mike Bedford explains how to use steganography to securely exchange your sensitive information without using encryption



When we're exchanging sensitive information we need to be sure that the communication will be unintelligible if it falls into the wrong hands. This is normally achieved using encryption software, which scrambles the message so it appears as gibberish to anyone but the intended recipient.

While encryption might prevent unauthorised access to secret messages, coded text can draw unwanted attention to your data. For example, if you were to send a Word file containing the text 'WTNHE UUCPR HJAQW LUVHH ZIRKM', anyone intercepting it would be in no doubt that it contained an encrypted message. There's got to be a better way.

In 499 BC the Persian tyrant Histiaeus wanted to send a message to Aristagoras without detection. Histiaeus shaved his slave's head, tattooed the message on his bald scalp, waited for the hair to grow back, then sent the slave to Aristagoras. Knowing what to expect,

Aristagoras shaved the slave's head to reveal the message.

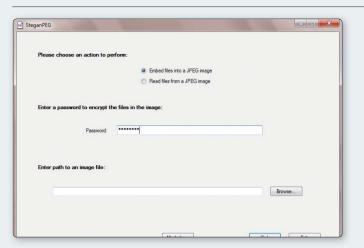
This is one of the earliest examples of steganography, a word that comes from the Greek for covered writing. A more modern, but not particularly high-tech, parallel would be to write a message in invisible ink between the lines of a letter printed by an inkjet printer. Unless someone had reason to be suspicious, this would appear to be nothing out of the ordinary.

In the following workshop we'll show you how to use software-based steganography that involves hiding files, for example Word documents or line drawings in Tiff format, in a Jpeg image file (known as the carrier).

If the image is intercepted it would appear to be a standard picture file, yet someone who was expecting your communication could use the same free software to expose the hidden data.

We're using SteganPEG in this workshop, which you can download for free from tinyurl.com/SteganPEG.

GET STARTED WITH STEGANOGRAPHY



TART

Launch SteganPEG and click 'Embed files into a Jpeg image'. Most Steganography packages allow you to specify a password that is used to access the data; SteganPEG uses that password to encrypt the data before hiding it. Enter a strong password.



Click Add files... and choose the file(s) you want to hide; these are listed at the left of the window, with an 'Image space occupied' gauge showing how much hiding space remains. If you try to add too large a file it'll be automatically removed.

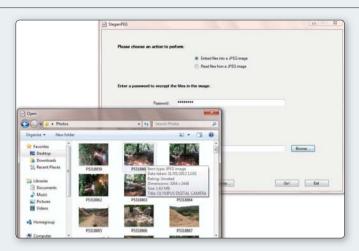
DIY USING A WORD PROCESSOR

It's also possible to hide a message within a Word document. This type of steganography isn't as secure as using SteganPEG, but it requires no extra software. While SteganPEG uses clever techniques that'll be meaningless to anyone who doesn't understand Jpeg encoding, this method couldn't be simpler to understand.

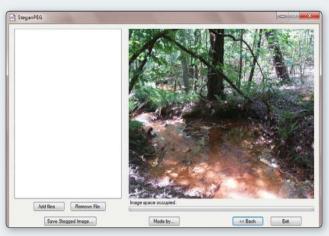
Open a Word document that's longer than the message you want to hide. Change all the text to black and view it on a white background. Start writing your secret message by substituting the space between each word with the individual letters of your message. For example, if your Word document starts 'Once upon a



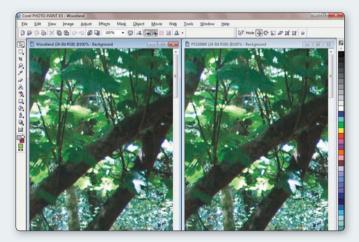




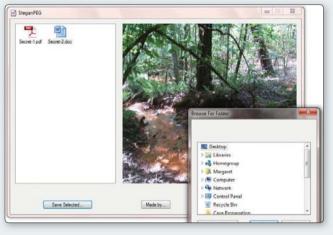
Choose a Jpeg into which the data will be hidden. Ideally it shouldn't contain large areas of one colour because it's possible that the data might reveal itself. A photo of woodland is a good choice. Click Browse..., choose an image, then click Go.



Your photo will be displayed, giving you a final opportunity to make sure the image is suitable. Now select the files you want to hide, which must be smaller (in file size) than the Jpeg image. You may have to edit your files to reduce their size.



Click 'Save Stegged Image...' and, in the Save As dialog, provide a name for the Jpeg image that will contain the hidden information. Using a photo editor compare this image against the original: you might notice small changes, but nothing suspicious.

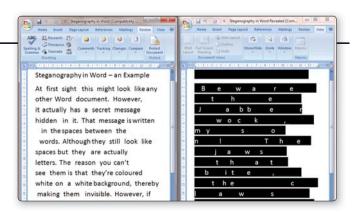


You can then separately send the image and password to your recipient. To read the hidden files they need to launch SteganPEG, choose 'Read files from a Jpeg image', enter the password, browse to the image and click Go. ⊠

time in the land of purple giants' and your secret message is 'HELLO TOM', the edited text would appear as 'OnceHuponEaLtimeLinOthe landTofOpurpleMgiants'.

We've used capitals so the example is easier to read, but it works with both upper- and lower-case letters. Colour the secret characters white on a black background so you can see what you're doing, but once you've finished switch the background to white. Your hidden message, now white text on a white background, will be invisible.

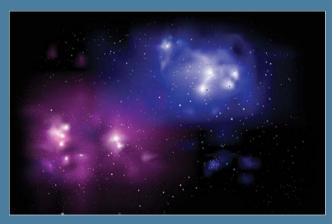
To read your hidden message the recipient simply needs to select all the text and switch the background colour to black.



Stargazing from the comfort of your PC



If you've ever been mesmerised by the night sky, free computer software can help you to ascertain exactly what you're looking at. Mike Bedford explains



If you've ever gazed into the sky on a dark, clear night and been mesmerised by the sheer number of stars, you may want to find out more about those tiny dots of light.

While that quest for knowledge might not go as far as wanting to know the difference between a white dwarf and a red giant, or an elliptical and a spiral galaxy, many people like to have at least an inkling of what they're looking at.

Software can provide you with that information, and make your stargazing experience all the more satisfying. In addition to identifying the various stars and planets in the sky, these apps can help you to observe something you've been hankering to see. For example, you'll be able to find out when and where to look for Jupiter.

One of our favourite packages is Stellarium, which is free for Windows, OS X and Linux. You can download it from stellarium.org.

In many ways, Stellarium works in just the same way as large-scale planetariums, such as the one at the Royal Observatory in Greenwich. It can display the sky as it would look from any place on the Earth's surface, and at any time past, present or future. However, whereas a public planetarium beams the image on to the domed roof of the auditorium, Stellarium shows the sky on your PC screen.

If you have a laptop, you could take it outside to assist your viewing of the sky at night. Alternatively, you could print a sky map.

You can search for any astronomical object and, if it's not currently visible or it's still daylight, fast-forward to find out when you'll next be able to see it.

You can also use your smartphone or tablet as a portable planetarium. Mobile apps aren't as fully featured as PC software but, because some phones and tablets contain gyroscopic sensors, you only have to point your device in a particular direction for it to display the scene as it would appear after dark.

You might also be interested in Google Sky (google.com/sky). As well as seeing astronomical objects in visible light, you can view them in ultraviolet and X-rays.

USE YOUR PC FOR ASTRONOMY WITH STELLARIUM



TART

Move the pointer to the bottom left edge of the screen to bring up the toolbar, then click the top icon to open the Location window. Choose a town or enter your latitude and longitude. Give the location a name and select 'Use as default'.



Try searching for something that isn't currently visible. Select the fourth icon in the left toolbar to open the Search window. On the Object tab enter the name of an object, then click the magnifying glass. The display will rotate until the object is centred.

ASTRONOMY APPS

The best mobile app we've tried is Star Walk (£1.99, iOS only). It has a slick user interface and can view the sky at all wavelengths, not just those visible to the human eye. More than 2,000 objects can be located. Just point your iPhone at the sky and, thanks to its gyroscope and compass, it knows in which direction you're facing and the display reacts accordingly. Star Chart (£1.99 iOS; £2.99 Android) is also worth a look, although it nags with in-app purchases.

The free Android application Google Sky Map gives a similar view, although it contains only 1,000 stars, and we didn't find it especially polished in operation.





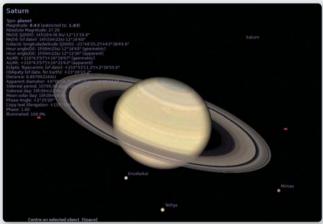
Now select the third icon on the toolbar to open the 'Sky and viewing options' window. Try the various options and sliders on the Sky and Markings tabs that dictate what's displayed and labelled, but don't deselect Cardinal points.



The initial view will be looking south (indicated by a red letter 'S'). Change the view by dragging left, right, up or down. If you're using Stellarium on a laptop outside, select the Night mode icon in the bottom toolbar.



If something you searched for isn't visible, try fast-forwarding to see if it'll appear any time soon. Increase and decrease time speed icons are in the bottom toolbar. Also here are icons for 'Set normal time rate' and 'Set time to now'.



Some objects can be viewed in more detail than you'd achieve with the largest Earth-based telescope. For example, find and click on Saturn, then select the 'Centre on selected object' icon in the bottom toolbar. Repeatedly tap Page Up to zoom in.

In Windows or OS X, the de-facto astronomy program is Starry Night, available in several versions ranging from the \$80 (£50) Enthusiast edition to Pro and Pro Plus at \$150 (£100) and \$250 (£160) respectively. The Pro version enables telescope control, while the Plus edition includes a full CCD capture of the entire sky. See our review of Starry Night on page 47.

Planetarium apps are just the tip of the astronomy iceberg, and there are plenty of other apps for stargazing. Various astronomical encyclopedia and educational resources are available for iOS, Android and other platforms although, in the main, you have to pay for them.

Several free apps that provide additional information on the objects you're seeing in the sky on your planetarium app. Star Odyssey for Android lets you search for stars (but not planets) and displays textual information and key data, such as their distance from the Earth and magnitude (brightness).

Doing a similar job for the planets is Solar System Explorer Lite but, since these objects are more visually interesting, you're presented with photographic images as well as textual information, facts and figures. Major moons are included, too, and the images can be usefully rotated onscreen.

Create a magazine with Flipboard



iOS users have long been able to read personalised news, but now they can curate it in the form of a magazine, too. David Bayon explains



Personalised 'magazine' apps on mobile devices are more popular than ever. Whether you prefer Zite, Flipboard, Pulse or another app, there's something great about a tool that can pluck out the news you want to read, rather than leaving you to hunt the signal among all the noise.

These services work by dragging in content from a huge variety of websites and sorting it into hundreds of increasingly granular categories. You choose your categories and the apps bring you stories, learning over time which content you tend to read or ignore. Plus, by connecting your social-media accounts, an app can see what kind of links are being shared among your contacts and bring you more of that.

As good as they can be at varying your reading material, though, none is the perfect curator. This is why a new feature added to the recent Flipboard 2.0 update on iOS is so appealing. If you've ever wanted to edit your own magazine, this is your chance.

Okay, you're not technically editing anything – the content is still produced, edited and published elsewhere – but you are curating it. You're deciding what content is good enough for others to read, and you're packaging it with a gorgeous newspaper-style layout.

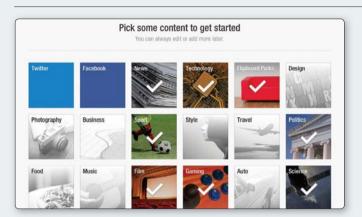
The broader topics have already been given the full treatment, but Flipboard lets you add anything you find so the real fun comes in creating something more personal.

For example, do you like pictures of cats wearing clothes? Create the *Cats in Clothes* magazine. Search for and fill it with pictures of cats wearing clothes. Share it around and become the go-to Flipboard user for images of clothed cats.

Magazines can be as public or as private as you want them to be, so it's just as useful to create a magazine of articles you want kept in one place for a research project. Or use it as an alternative to services such as Instapaper: create a Read Later magazine and fill it with stories throughout the day for a more leisurely catch-up in the evening.

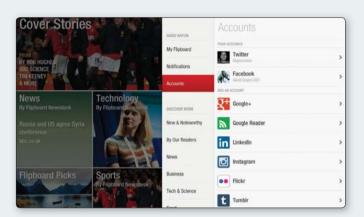
The Magazines feature is available only on iPhone and iPad for now – an Android update is coming soon.

GET STARTED WITH FLIPBOARD



TART

Download and open the free Flipboard app. You'll be prompted to choose some categories that interest you so the app can pull in relevant content. Pick a few that interest you, but don't worry too much – you can change all of this later.



Flipboard draws content from social media. Tap the Options button in the top corner and choose Accounts, then sign into any networks from which you'd like to read news content. A section for each network will be added to your home page.



You can read your magazines by tapping your name on the home page. Every good magazine needs a good front cover, and if Flipboard has chosen poorly just open an item with a better picture, tap the share icon and choose 'Promote to Cover'.





That's all it takes to produce a basic personalised news reader. Categories are laid out across multiple pages; swipe left and right to see more. Right now the content probably won't perfectly suit your needs, so we need to refine it.



The first step is to create an account. Tap the Account button in the bottom corner and choose a username and password. You can also add a profile picture that will enable other users to more easily recognise your magazines.



For real control over content you need a magazine. When you find a story you like tap the plus icon. Give the new magazine a name and an optional description, select the category under which you'd like it to appear, and decide whether it should be publicly visible.

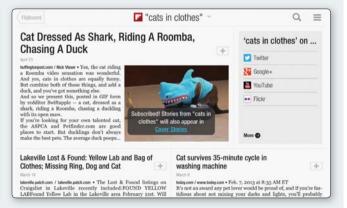


That's your first magazine started, but it needs more content, so repeat the process with other relevant stories.

Tap the plus icon, but this time simply select the existing magazine and tap Add to include the story.



When your magazine is ready for public consumption, open it and tap the Share button. You can choose either Share Magazine, which creates a link to send via your social networks, or Email magazine, which does the same in an email.



That's your bit done, but other people are editing their own brilliant magazines, too. The 'By Our Readers' section has some great examples - tap the Subscribe button to add any of these magazines to your personal Flipboard.



ONLINE REGISTRATION REQUIRED

Ashampoo Core Tuner 2

FULL PROGRAM

Installation details
Go to My Computer.
Right-click the disc
icon and open the
disc. Select Files
218\Ashampoo Core
Tuner 2 and open
the file

Online registration required: follow the links during installation before 4 Sep 2013

System requirements Windows XP/Vista/7; 30MB drive space

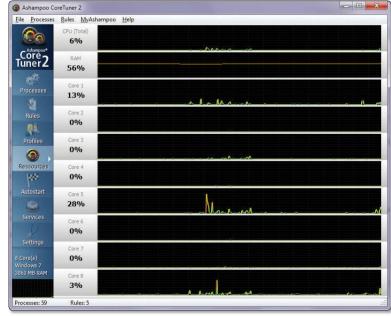
Ashampoo Core Tuner 2 enables you to utilise the full power of your PC's processor, without placing extra demand on system resources. It can optimise single processes automatically or on demand, while the Live Tuner accelerates startup of your applications by reassigning resources when the system is working to full capacity. Advanced users can also create optimised profiles for playing video games or other purposes.

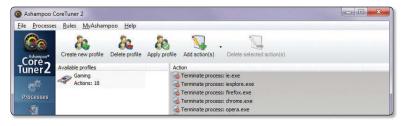
With Ashampoo Core Tuner 2 you get a clear overview of workload distribution. In addition, the program offers detailed ratings and functions for the adjustment of services and autostart entries.

Features

- Optimal use and management of up to eight-core processors
- Automatic or manual assignment of cores and priorities
- Rule management
- Ability to create function-specific profiles
- Optimised startup of applications
- Management of autostart entries
- Visual display of system stats and individual processes
- Intuitive user interface 🗵







Visit our website for more software special offers: pcadvisor.co.uk/special-offers

Bitdefender Total Security 2014



FULL PROGRAM (THREE-MONTH LICENCE) AVAILABLE ONLY ON THE DISC+

Installation details
Go to My Computer.
Right-click the disc
icon and open the
disc. Select Files
218\Bitdefender Total
Security 2014 and
open the file

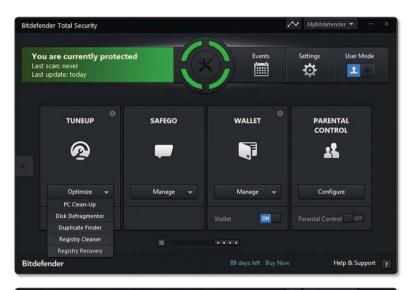
Online registration required: follow the links during installation before 4 Sep 2013

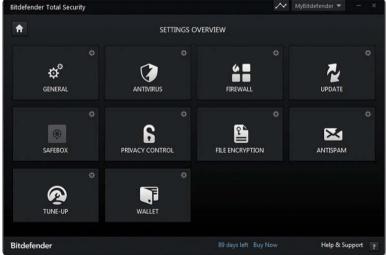
System requirementsWindows XP/Vista/7;
1.5GB RAM; 800MB
drive space

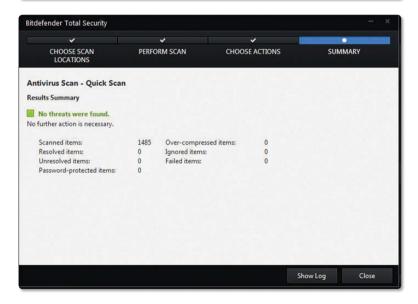
Welcome to the next generation of the number-one-ranked antivirus technology. Bitdefender Total Security 2014 builds on awardwinning antivirus technology to secure your online transactions, protect your mobile devices from loss or theft, automatically back up your files, and tune up your PC.

Features

- Locates, locks and wipes lost or stolen laptops
- Autopilot makes security-related decisions on your behalf
- A two-way firewall prevents strangers piggybacking on your Wi-Fi
- Enhanced parental controls
- USB Immunizer protects USB flash drives from carrying PC viruses
- Safebox stores your sensitive files in a secure online location
- Tune-Up optimises performance of your PC or Android phone/tablet
- Antispam deters unwanted email messages
- Social Network Protection filters the links sent by your friends and monitors your privacy settings
- Antiphishing blocks scammers in their tracks
- Search Advisor warns of dodgy websites in your search results ⊠







Abelssoft FileWing Pro

REGISTRATION REQUIRED

ONLINE

FULL PROGRAM AVAILABLE ONLY ON THE DISC+

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 218\Abelssoft FileWing Pro and open the file

Online registration required: follow the links during installation before 4 Sep 2013

System requirements Windows XP/Vista/7/8

Recover accidentally deleted data FileWing Pro checks your internal, external and USB disks to identify deleted files. If any of these were accidentally removed, in most cases FileWing Pro will be able to recover them. Specify a folder into which your files should be recovered and FileWing Pro will do the rest.

The DeepScan feature can also recover damaged files - if you desperately want to recover a partly overwritten document, you might be able to retrieve some of the text it contains. Every little helps!

If you know what you're looking for, FileWing Pro's filters let you define what file types to search, be it documents, pictures, video or music. You can also create your own filters by entering file extensions.

Securely delete your data

FileWing Pro uses seven algorithms to securely delete your unwanted data. It will overwrite your files with various patterns as many as 35 times, so you can be sure that your deleted data will never be recovered.

FileWing Pro can also overwrite unused disk space, destroying any remnants of files that you thought were gone forever.

FileWing Pro implements scientifically proven deletion algorithms that leave any recovery attempts doomed to fail.





DISC INSTRUCTIONS

Place disc in drive. Open the file 'Click here to begin.pdf' for extra information.

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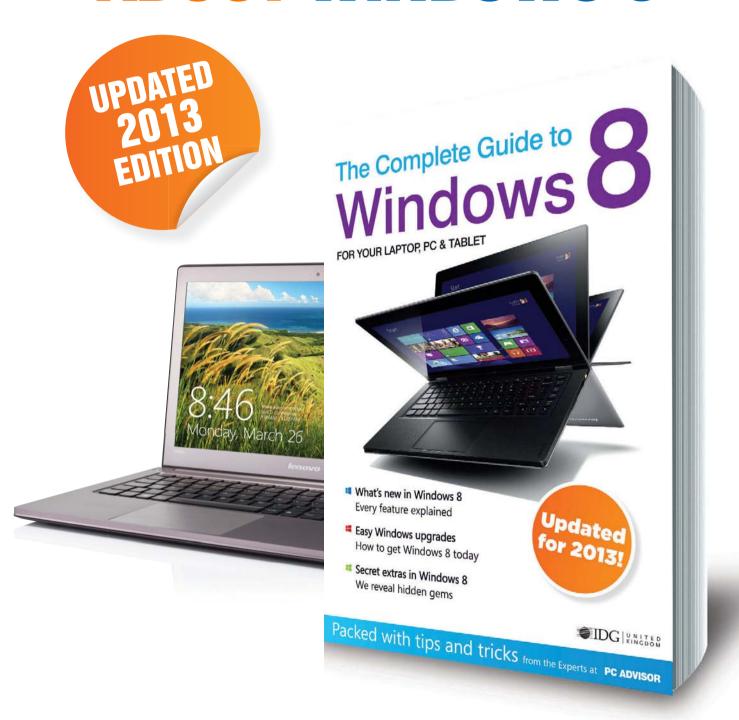
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ALL YOU NEED TO KNOW ABOUT WINDOWS 8









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Ultraportable laptops



Laptops



Gaming PCs



Mini PCs



All-in-one PCs



Business PCs



Tablets



Smartphones



Security software



Wireless routers



USB drives



Projectors



Solid-state drives



Graphics cards



Flat-panel displays

Prices

Laptops
Laptops up to £500
£501 to £1,000
£1,001 and over

Printers
Printers under £150
£151 and over

Graphics cards Graphics cards under £150 £151 and over

Flat-panels Flat-panels under £200 £201 and over Prices listed are those quoted by the distributor or manufacturer and include VAT. They are intended only as a guide and you may see products on sale for less or more than our quoted price.

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Ultraportable laptops	PC ADVISOR GO.D	2 PC ADVISOR RECOMMENDED	S PC ADVISOR BEST BUY	4	5
	Apple MacBook Air 13in	Apple MacBook Pro 13in Retina	Apple MacBook Air 11in	Lenovo ThinkPad X1 Carbon	Sony Vaio T13 Touch
Price	£1,129 inc VAT	£1,449 inc VAT	£849 inc VAT	£1,700 inc VAT	£700 inc VAT
Website	Apple.com/uk	Apple.com/uk	Apple.com/uk	Lenovo.com/uk	Sony.co.uk
Build rating	***	****	***	***	***
Features rating	****	****	***	***	***
Performance rating	****	***	***	***	****
Value rating	***	***	***	***	***
Overall rating	***	***	***	***	***
Processor	1.8GHz Intel Core i5-3427U	2.6GHz Intel Core i5-3230M	1.7GHz Intel Core i5-3317U	1.8GHz Intel Core i5-3427U	1.7GHz Intel Core i5-3317U
RAM	4GB DDR3L	8GB DDR3L	4GB DDR3L	4GB DDR3L	4GB DDR3
Storage	256GB SSD	256GB SSD	64GB SSD	180GB SSD	128GB SSD
Screen size	13.3in gloss (anti-glare)	13.3in gloss (anti-glare)	11.6in gloss	14in matt touchscreen	13.3in glossy touchscreen
Screen resolution	1440x900	2560x1600	1366x768	1600x900	1366x768
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	802.11b/g/n	802.11b/g/n
Ethernet	Via adaptor only	Gigabit with adaptor	Via adaptor only	100Mbps with USB adaptor	100Mbps
Bluetooth	✓	✓	✓	✓ (optional)	✓
USB	2x USB 3.0	2x USB 3.0	2x USB 3.0	1x USB 3.0, 1x USB 2.0	1x USB 3.0, 1x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	✓	√ (2)	✓	×	×
DisplayPort	✓	✓	✓	✓	×
HDMI	×	✓	×	×	✓
DVI	×	×	×	×	×
VGA	×	×	×	×	✓
eSATA	×	×	×	×	×
Media card slot	✓	✓	×	✓	✓
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	HD webcam, multitouch trackpad, backlit keyboard	HD webcam, multitouch trackpad, fingerprint reader	HD webcam
Operating system	Mac OS X 10.8 Mountain Lion	Mac OS X 10.8 Mountain Lion	Mac OS X 10.8 Mountain Lion	Windows 8 Pro	Windows 8 64bit
Bundled software	iLife 11	iLife 11	iLife 11	None	None
Fear (Max detail)	29fps	29fps	28fps	Not tested	Not tested
Battery	50Wh lithium-ion	74Wh lithium-ion	35Wh lithium-ion	45Wh lithium-ion	Lithium-polymer
Battery life	8 hrs 20 mins	8 hrs 44 mins	6 hrs 10 mins	5 hrs	4 hrs 45 mins
WB 6/PC Mark 7 score	132/4,497	Not tested/4,596	129/not tested	Not tested/4,783	Not tested/4,389
Dimensions	325x227x4-17.5mm	313x219x19mm	300x192x3-17mm	331x226x22mm	320x220x19mm
Weight	1.34kg	1.64kg	1.07kg	1.54kg	1.6kg
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	1 year return-to-base	2-year return-to-base
Verdict	Now £50 cheaper Decent turn of speed Stunning battery life Nice 256GB SSD Ultra quiet	Big price cut and slightly more speed Strong performance Fantastic battery life Limited future expansion	Reasonable price tag Very light and compact Strong performance for size Good graphics Great build quality	Stylish casing Good performance Display not the most colourful Rather expensive	Bright, sharp touch panel Decent performance Disappointing gaming Sturdy magnesium and aluminium chassis
FULL REVIEW	TINYURL.COM/8C7LYCO	TINYURL.COM/BQBSHQC	TINYURL.COM/CCPOANM	TINYURL.COM/CTDUYOQ	TINYURL.COM/CCPDKBQ



Ultraportable laptops

Apple's MacBook Air sets the standard for thin-and-light laptops, which are usually referred to as Ultrabooks or ultraportable laptops.

Most run fast and silent SSDs for storage, which can partly explain their higher retail price, but some manufacturers are now fitting slim 7mm hard disks. All Ultrabooks run Intel CPUs (AMD variants are known as Sleekbooks), often a low-power version identifiable by its U suffix. The 1.7GHz Intel Core i5-3317U is a popular example.

Beware of cheap glossy panels with poor contrast and colour gamut and, if possible, judge in person the screen quality and viewing angles before you buy. Ports are limited due to space constraints, but look for built-in ethernet or dongles that allow full-size ports to be connected.

A smaller chassis means a smaller, often non-removable battery. Expect six-plus hours of life.

There's no room for an optical drive, but you can always connect an external USB version.
READ MORE: TINYURL.COM/CEAHEZK

Sub-£500 laptops	PC ADVISOR RECOMMENDED Toshiba Satellite L850D-120	2	3	Asus X501A	5
Price	£340 inc VAT	Acer Aspire V3-571 £450 inc VAT	Lenovo G580 £380 inc VAT	£340 inc VAT	Acer Aspire V5-571 £450 inc VAT
Website	Toshiba.co.uk	Acer.co.uk	Saveonlaptops.co.uk	Uk.asus.com	Acer.co.uk
Build rating	****	Acei.co.uk	Saveomaptops.co.uk	OK.asus.com	***
Features rating		****			
Performance rating					
Value rating	****			****	
Overall rating					
Processor	1.7GHz AMD E2-1800	2.5GHz Intel Core i5-3210M	2.4GHz Intel Core i3-3110M	2.2GHz Intel Core i3-2328M	2.3GHz Intel Core i3-2365M
RAM	6GB DDR3	8GB DDR3	6GB DDR3	4GB DDR3	8GB DDR3
Storage	750GB HDD	750GB hard drive	1TB HDD	320GB HDD	750GB hard drive
Screen size	15.6in gloss	15.6in gloss	15.6in gloss	15.6in gloss	15.6in
Screen resolution	1366x768	1366x768	1366x768	1366x768	1366x768 pixels
Graphics	AMD Radeon HD 7340	Intel HD Graphics 3000	Intel HD Graphics 4000	Intel HD Graphics 3000	Intel HD Graphics 3000
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11b/g/n	802.11a/b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	10/100	Gigabit	10/100	Gigabit	x
Bluetooth	✓	✓	✓	×	✓
USB	2x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0	2x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 2x USB 2.0
FireWire	×	×	*	×	*
Thunderbolt	×	×	×	×	×
DisplayPort	×	×	×	×	×
HDMI	✓	✓	✓	✓	✓
DVI	×	×	×	×	×
VGA	✓	✓	✓	✓	✓
eSATA	×	×	×	×	×
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	8x DVD ± RW	8x DVD±RW	8x DVD±RW	N/A	8x DVD±RW
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Windows 8 64bit	Windows 7 Home Prem 64bit	Windows 8 64bit	Windows 8 64bit	Windows 7 Home Prem 64bit
Bundled software	Nero 12 Essentials	Microsoft Office Starter	N/A	McAfee Security trial	None
Stalker (Low/High)	17/13fps	Not tested	37/24fps	10/17fps	Not tested
Battery	48Wh lithium-ion	48Wh lithium-ion	48Wh lithium-ion	47Wh lithium-ion	37Wh lithium-ion
Battery life	3 hrs 45 mins	5 hrs 18 mins	4 hrs 0 mins	4 hrs 35 mins	5 hrs 2 mins
PCMark7 score	1,265	123 WorldBench 6 points	2,614	1,389	Not tested
Dimensions	380x242x33.5mm	380x253x33mm	375x240x36mm	380x253x35mm	382x253x21-23mm
Weight	2.35kg	2.6kg	2.4kg	2.1kg	2.3kg
Warranty	1-year return-to-base	1 year collect-and-return	1-year return-to-base	1-year return-to-base	1-year collect-and-return
Verdict	Very low price Bright and clear screen Quality trackpad, keyboard Lacks performance A little heavy	Strong general performance Not much gaming potential Excellent trackpad, keyboard Reflective screen Decent battery life	Decent performance Screen very glossy and has narrow viewing angles Irritating touchpad Rather weighty	Low price Decent build quality Surprisingly good speakers Very poor for gaming No optical drive	Hard drive now 750GB 8GB of RAM No ethernet Onboard graphics Decent battery life
FULL REVIEW	TINYURL.COM/AXNXBB4	TINYURL.COM/CQKL4PD	TINYURL.COM/A786DEY	TINYURL.COM/B7YOHCJ	TINYURL.COM/CABAX8Z



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

£501-£1,000 laptops		2	3	4	
	Chillblast Genesis Mini	Toshiba Satellite P845t-101	PC Specialist Optimus IV	MSI CX61 ONF	Asus VivoBook S400E
Price	£699 inc VAT	£550 inc VAT	£968 inc VAT	£699 inc VAT	£600 inc VAT
Website	Chillblast.com	Toshiba.co.uk	Pcspecialist.co.uk	Uk.msi.com	Uk.asus.com
Build rating	****	***	***	***	****
Features rating	****	****	****	****	****
Performance rating	XXXXX	***	***	***	***
Value rating	XXXXX	***	***	****	***
Overall rating	XXXXX	***	****	***	***
Processor	2.6GHz Intel Core i5-3230M	1.7GHz Intel Core i5-3317U	2.4GHz Intel Core i7-3630QM	2.4GHz Intel Core i7-3630QM	1.9GHz Intel Core i7-3517U
RAM	8GB DDR3	6GB DDR3	8GB DDR3	8GB DDR3	4GB DDR3
Storage	1TB hard drive hybrid	640GB hard drive	1TB hard drive + 120GB SSD	1TB hard drive hybrid	500GB hard drive
Screen size	11.6in matt	14in gloss touchscreen	17.3in matt	15.6in	14.1in gloss touchscreen
Screen resolution	1366x768 pixels	1366x768 pixels	1920x1080 pixels	1920x1080	1366x768 pixels
Graphics	GT 650M/Intel HD 4000	Intel HD Graphics 4000	GTX 660M, Intel HD 4000	nVidia GT 645M/Intel 4000	Intel HM70 Express
Video memory	2GB	N/A	2GB (660M)	2GB	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	10/100	Gigabit	Gigabit	Gigabit
Bluetooth	✓	√	√	√	✓
USB	2x USB 3.0, 1x USB 2.0	3x USB 3.0	3x USB 3.0, 1x USB 2.0	2x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	×	×	×	×	×
DisplayPort	×	x	×	*	×
HDMI	✓	✓	✓	✓	✓
DVI	×	x	×	×	×
VGA	✓	√	✓	✓	✓
eSATA	×	√	✓	×	×
Media card slot	✓	√	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Speakers, mic
Optical drive	N/A	8x DVD±RW	4x BD-ROM	BD-ROM	None
Extras	Webcam	Webcam	Webcam	None	Webcam
Operating system	Windows 8 64bit	Windows 8 64bit	Windows 8 Standard 64bit	Windows 8 64bit	Windows 8 Pro 64bit
Bundled software	None	None	None	None	None
Fear (Max detail)	Not tested	Not tested	Not tested	Not tested	22fps
Battery	48Wh lithium-ion	48Wh lithium-ion	76.9Wh lithium-ion	49Wh lithium-ion	44Wh lithium-ion
Battery life	4 hrs 45 mins	4 hrs	2 hrs 55 mins	3 hrs	3 hrs 27 mins
PCMark 7 score	4,557	2,648	4,572	3,046	Not tested (2,928 PCMark 7)
Dimensions	287x207x37mm	349x234x24mm	405x270x50mm	383x250x38mm	339x239x21mm
Weight	1.8kg	2.2kg	3.3kg	2.5kg	1.9kg
Warranty	2-year collect-and-return	1-year return-to-base	3-year RTB (1-year parts)	1-year return-to-base	2 year International
Verdict	Not quite an Ultrabook Small but good-quality screen Decent gaming speed Hybrid HDD/SSD No optical drive	Large touchscreen Lacking power Decent battery life Strong speakers Slow hard drive	Excellent performance despite the price hike Massive 17.3in screen Blu-ray drive Battery life not great	Great full-HD display Quad-core processor Built-in Blu-ray drive Reasonably heavy Old-fashioned looks	Heavy price cut Poor battery life Trackpad and keyboard not the best No optical drive
FULL REVIEW	TINYURL.COM/C8E6MTK	TINYURL.COM/C6MN5LU	TINYURL.COM/ABQB6QP	TINYURL.COM/CK25BCY	TINYURL.COM/CZHXTYM

>> 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





£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.

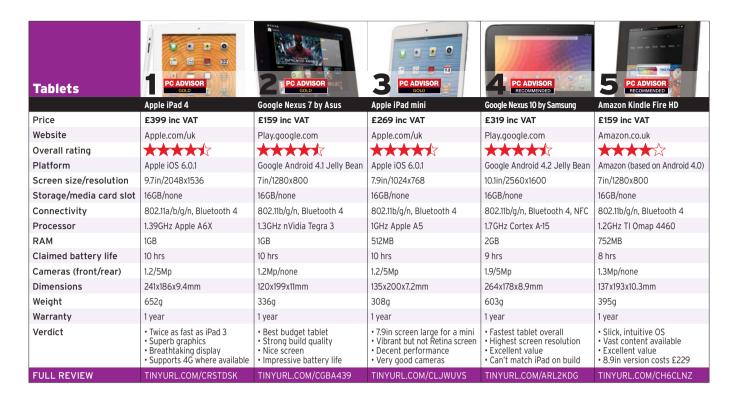
The best laptops should offer very good screens. Beware of glossy shiny panels that allow distracting reflections in certain lighting conditions.

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







Smartphones

The smartphone you choose to use is a very personal choice - while some prefer a small device that slips into a pocket, others prefer a large-screen handset that's better suited to watching video and typing on an onscreen keyboard.

The screen's resolution is just as important as its size. More pixels mean text and photos look

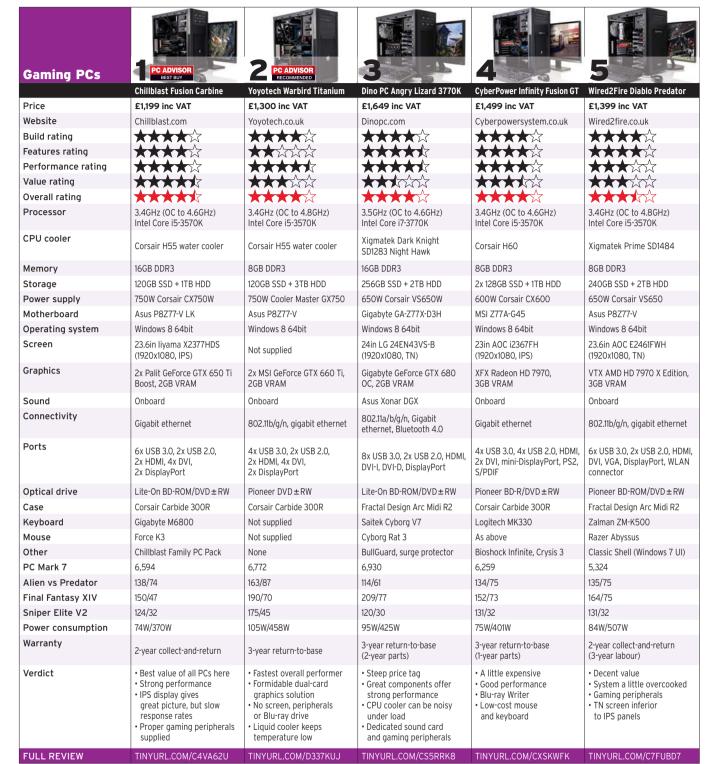
sharper, and more information can be shown onscreen at once.

Unlike Android, iOS doesn't support Flash. However, HTML 5 is slowly replacing the standard, and Adobe has discontinued development of Flash Player for mobile devices in any case. Mobile apps can also allow you to view sites that still use Flash.

Look for a fast processor and decent graphics if you want to play games or watch video.

It's common to see mobile operators offer expensive handsets free with 24-month contracts. It'll usually work out cheaper to buy the handset outright, however, and it won't be locked to a network.

READ MORE: TINYURL.COM/7SK2AS3



All gaming scores given in fps. Alien vs Predator 720p, Max/1080p, Max. Final Fantasy 720p, Med/1080p, Max. Sniper Med/Ultra



Gaming PCs

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.

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.
READ MORE: TINYURL.COM/CZXH443

		45			
Mini PCs	PC ADVISOR BEST BUY	PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED	Chillblast	5
	Zotac Nano XS AD13 Plus	Apple Mac mini	Sapphire Edge VS8	Chillblast Fusion NUC	Tinygreen PC Intense PC Pro
Price	£300 inc VAT	£959 inc VAT	£277 inc VAT	£549 inc VAT	£791 inc VAT
Website	Zotac.com	Apple.com/uk	Sapphiretech.com	Chillblast.com	Tinygreenpc.com
Build rating					
Features rating			XXXXX	XXXXX	
Performance rating Value rating	VVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVVV				
Overall rating		AAAWW			
Processor	1.7GHz AMD E2-1800	2.6GHz Intel Core i7-3270QM	1.6GHz AMD A8-4555M	1.8GHz Intel Core i3-3217U	1.7GHz Intel Core i7-3517UE
110003301	I.I OTIZ AMD EZ 1000	2.00112 litter core in 3210 qim	1.00112 AMD A0 4333M	1.00112 III.C1 C01C 13 3217 0	I. TOTIZ III.CI COTC II 3311 OL
CPU cooler	Custom heatsink and fan	Custom fan	Custom heatsink and fan	Custom Intel semi-active	Passive heatsink
RAM	2GB DDR3	4GB 1,600MHz DDR3	4GB 1,333MHz DDR3	8GB 1,333MHz DDR3	8GB 1,600MHz DDR3
Storage capacity	64GB mSATA SSD	1TB HDD + 128GB SSD	500GB 5,400rpm HDD	128GB Intel 525 Series SSD	500GB 5,400rpm HDD
Power supply	External	Internal	External	External	External
Motherboard	AMD Hudson-1, AMD K14	Custom Intel HM77	AMD Hudson-3, AMD K15.1	Intel QS77 Express chipset	Intel QM77 chipset
Operating system	None	OS X 10.8 Mountain Lion	None	Windows 8 64bit	Windows 7 Professional
Graphics	AMD Radeon HD 7340	Intel HD Graphics 4000	AMD Radeon HD 7600G	Intel HD Graphics 4000	Intel HD Graphics 4000
Sound	Onboard	Onboard, built-in speakers	Onboard	Onboard	Onboard
Connectivity	802.11b/g/n USB adaptor, gigabit ethernet	802.11a/b/g/n, gigabit ethernet, Bluetooth	802.11b/g/n, gigabit ethernet, Bluetooth	802.11b/g/n, Bluetooth	802.11b/g/n, 2x gigabit ethernet, Bluetooth
Ports	2x USB 3.0, 2x USB 2.0, eSATA/USB 2.0, HDMI, S/PDIF, mic	4x USB 3.0, HDMI, Thunderbolt, FireWire 800, line-in/out	2x USB 3.0, 4x USB 2.0, HDMI, Mini Displayport, S/PDIF, line-in/out	3x USB 2.0, HDMI, Thunderbolt	2x USB 3.0, 4x USB 2.0, 2x eSATA, HDMI, DisplayPort, S/PDIF, ultra-mini RS232
Card reader	SD	SDXC	SD	None	None
Other	Remote control, Vesa mount	Apple iLife, HDMI-to-DVI adaptor, IR	HDMI, S/PDIF cables, HDMI- to-DVI adaptor, Vesa mount	Chillblast Free Software pack, Vesa mount	None
Dimensions	106x106x37mm	197x197x26mm	183x198x32mm	117x112x39mm	190x160x40mm
Weight	Not specified	1.3kg	660g	1kg	750g
PC Mark Overall	1,985	3286	1150	3993	2628
Aliens vs Predator (fps) ¹	5/5	8/5	11/6	7/5	7/5
Power consumption ²	7.5W/23.5W	12.5W (6W in OS X)/75W	13W/33.3W	9W/19.5W	12W/35W
Warranty	2-year return-to-base	1-year return-to-base	2-year return-to-base	2-year collect-and-return	2-year return-to-base
Verdict	Tiny size Good performance for the dimensions Generous number of ports and connectors Only 64GB of storage	Superlative build and quality Strong speed Plenty of storage Fairly power hungry	Low price Sluggish general performance, but very fast at games No operating system preinstalled	128GB SSD drive is blisteringly fast, but low in capacity Stunning overall speed No USB 3.0, ethernet or card reader	Fanless design means quiet operation Good performance Interchangeable expansion modules Not cheap
FULL REVIEW	TINYURL.COM/CQ7N7S8	TINYURL.COM/C62LTOH	TINYURL.COM/BQ8JSXJ	TINYURL.COM/CRD3BQR	TINYURL.COM/CM3U8GS

¹ Alien Vs Predator tested at 720p and 1080p, High Quality respectively ²Measured when idle and under load respectively



Mini PCs

Mini PCs look good, fit into the smallest of spaces, and usually offer cooler, quieter operation and lower power consumption than their desktop counterparts.

However, there are a few down sides. For example, a mini PC doesn't have enough internal space for a discrete graphics card or a desktop (3.5in) hard drive. All other upgrades and expansion will usually be achieved externally.

With this in mind, pay particular attention to the connectivity options. If you want to hook up external storage, look for USB 3.0 ports. For connecting the PC to a standard LCD monitor you can use HDMI. If you have an external music system with digital inputs you may also want an S/PDIF

connector on your mini PC. Mini PCs typically ship without a keyboard or mouse, and often come without an OS. Remember to factor in the cost of these items.

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.
READ MORE: TINYURL.COM/D29YONN

All-in-one PCs	PC ADVISOR BEST BUY	2 PC ADVISOR BECOMMENDED	3 PC ADVISOR RECOMMENDED		5
All III Olic I O				Teshina I VOZO 12W	Acer Acrino ECOOL
Detec	Dell XPS One 27 Touch	Apple iMac 27in 3.4GHz	Apple iMac 21.5in 2.7GHz	Toshiba LX830-12W £800 inc VAT	Acer Aspire 5600U £870 inc VAT
Price Website	£1,679 inc VAT	£2,179 inc VAT	£1,099 inc VAT		
	Dell.co.uk	Apple.com/uk	Apple.com/uk	Toshiba.co.uk	Acer.co.uk
Build rating					
Features rating Performance rating		VVVV			
Value rating	XXXXXX	XXXXX	XXXXX	XXXXX	XXXXX
Overall rating	24015 1545 0555 17 27700	2.40Un Intel Com (7.2770)	2701-1-4-10	2.50Un Intel Come 12.2210M	2 ACUTE Intel Come 12 2410M
Processor	3.1GHz Intel Core i7-3770S	3.4GHz Intel Core i7-3770	2.7GHz Intel Core i5-3335S	2.5GHz Intel Core i3-3210M	2.4GHz Intel Core i3-3110M
RAM	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3	4GB DDR3
Storage capacity	2TB HDD + 32GB SSD	1TB HDD (integrated SSD)	1TB HDD	1TB HDD	500GB HDD
Screen	27in IPS touchscreen	27in IPS	21.5in IPS	23in IPS touchscreen	23in IPS touchscreen
Screen resolution	2560x1440	2560x1440	1920x1080	1920x1080	1920x1080
Graphics card	nVidia GeForce GT 640M	nVidia GeForce GTX 680MX	nVidia GeForce GT 640M	Intel HD Graphics 4000	nVidia GeForce GT 630M
Video memory	2GB	2GB	512MB	n/a	1GB
Wireless	802.11b/g/n	802.11a/b/g/n	802.11a/b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	✓	✓	✓ (10/100)	✓	✓
Bluetooth	✓	✓	✓	✓	✓
USB	6x USB 3.0	4x USB 3.0	4x USB 3.0	2x USB 3.0, 4x USB 2.0	2x USB 3.0, 1x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	×	√ (x2)	✓	×	×
HDMI	✓	×	×	✓	✓
Media card slot	✓	✓	✓	✓	✓
Max disc speeds	BD-ROM/DVD±RW	None	None	DVD±R	DVD±R
Extras	2Mp webcam, wireless keyboard/mouse, speakers	1.3Mp webcam, wireless keyboard/mouse	1.3Mp webcam, wireless keyboard/mouse	1Mp webcam, wireless keyboard/mouse	2Mp webcam, wireless keyboard/mouse
Operating system	Windows 8 64bit	OS X 10.8 Mountain Lion	OS X 10.8 Mountain Lion	Windows 8 64bit	Windows 8 64bit
Power consumption	79W (idle), 138W (load)	77W (idle), 132W (load)	40W (idle), 69W (load)	36W (idle), 57W (load)	42W (idle), 56W (load)
Aliens Vs Predator 720p	15fps	44fps	11fps	5fps	8fps
Aliens Vs Predator 1080p	28fps	81fps	22fps	8fps	15fps
PCMark 7 score	5,876	4,114	3,100	3,351	2,413
Dimensions	491x71x664mm	650x203x516mm	450x528x175mm	566x52x415mm	574x43x422mm
Weight	15.9kg	9.5kg	5.7kg	7kg	9.2kg
Warranty	1-year next-day in-home	1-year return-to-base	1-year return-to-base	1-year UK pickup & return	1-year return-to-base
Verdict	Superb build quality Stunning 27in IPS display Nice graphics adaptor Rather large and heavy	Gorgeous screen Great gaming power No optical drive or touchscreen Not a cheap configuration	Build quality hard to beat Excellent screen, even if only 21.5in Not the largest of all-in-ones No optical drive or touchscreen	Decent overall performance Poor for gaming Built-in TV tuner WMC remote, but no WMC	Competitive price Rather sluggish performance Average specifications Plenty of preinstalled software
FULL REVIEW	TINYURL.COM/CQW5ZY9	TINYURL.COM/D2GD77D	TINYURL.COM/BK83EB8	TINYURL.COM/CKH5J9L	TINYURL.COM/CG5F5HY



All-in-one PCs

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.

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READ MORE: TINYURL.COM/87VW5KJ

Business PCs	Chillet Engle Symbic	PC Specialist MPC-3470T	Quiet PC Serenity Value	Eclipse eBiz Precision 1322H61	Arbico 15357 Pro
Price	Chillblast Fusion Sapphire £549 inc VAT	£479 inc VAT	£795 inc VAT	£569 inc VAT	£579 inc VAT
Website	Chillblast.com	Pcspecialist.co.uk	Quietpc.com	Eclipsecomputers.com	Arbico.co.uk
Build rating	→	***	****	***	
Features rating					
Performance rating					
Value rating					
Overall rating				***	
Processor	3.4GHz Intel Core i5-3570K	2.9GHz Intel Core i5-3470T	3.4GHz Intel Core i5-3570K	3.3GHz Intel Core i3-3220	3.4GHz Intel Core i5-3570K
RAM	8GB DDR3	8GB DDR3	8GB DDR3	16GB DDR3	8GB DDR3
Storage capacity	1TB HDD	1TB HDD	1TB HDD	1TB HDD + 120GB SSD	1TB HDD + 60GB SSD
Motherboard	Asus P8B75-M LX	Asus P8H61-I R2.0	Gigabyte GA-Z77-D3H	Asus P8H61-MX/USB3	Asus P8B75-M LX Plus
CPU cooler	Standard Intel cooler	Standard Intel cooler	Gelid Tranquillo	Standard Intel cooler	Xigmatek Apache
Power supply	EzCool 500W	Power Man 160W	Nexus NX-5000 R3 530W	Generic 500W	Ace 650W
Screen	23.6in liyama X2377HDS	N/A	N/A	23.6in Edge10 EF240A	N/A
Screen resolution	1920x1080 pixels	N/A	N/A	1920x1080	N/A
Graphics	Intel HD Graphics 4000	Intel HD Graphics 2500	Intel HD Graphics 4000	Intel HD Graphics 2500	Intel HD Graphics 4000
Video memory	N/A	N/A	N/A	N/A	N/A
USB	3x USB 3.0, 7x USB 2.0	2x USB 3.0, 7x USB 2.0	5x USB 3.0, 7x USB 2.0	3x USB 3.0, 5x USB 2.0	2x USB 3.0, 6x USB 2.0
Sound	Onboard	Onboard	Onboard	Onboard	N/A
Speakers	Built into monitor	N/A	N/A	Built into monitor	N/A
Case	CiT Fortress	In-Win BM643	Nexus Thrio 310	NA-705B	CiT Templar Micro ATX
Keyboard	Logitech MK260 (wireless combo)	Microsoft Comfort Curve 3000, Logitech USB mouse	Gigabyte GK-KM6150 (wired combo)	Microsoft Optical Desktop 400 (wired)	Logitech MK120 (wired combo)
Optical drive	24x DVD ± RW	8x DVD±RW	24x DVD±RW	24x DVD±RW	24x DVD±RW
Operating system	Windows 8 Professional	Windows 8 Professional	Windows 8 Professional	Windows 8 Professional	Windows 8 Professional
Bundled software	Family software pack	PowerDVD, card reader	None	None	None
PCMark7 overall score	4,217	3,419	3,713	4,170	6,037
Power consumption	36W idle/84W load	27W idle/53W load	31W idle/105W load	43W idle/69W load	41W idle/108W load
Warranty	2-year collect-and-return	3-year labour, 1-year parts	2-year collect-and-return	1-year RTB	2-year RTB (1-year parts)
Verdict	Competitive price Strong performance Excellent 23.6in IPS screen Case could be more understated	Small-form-factor Conservative on power Not as fast as the more powerful models here Cramped internals make it difficult to upgrade	Rather expensive Very quiet operation Good all-round performance Lack of SSD affects performance in our benchmarks	Modest processor 16GB of RAM generous, but wasted Screen of only average quality Messy internals	Not the cheapest Price doesn't include a monitor Powerful processor probably not necessary for office use SSD could be of larger capacity
FULL REVIEW	TINYURL.COM/CX5T8X5	TINYURL.COM/ADM2BEJ	TINYURL.COM/9WP5SSS	TINYURL.COM/ABFZOA3	TINYURL.COM/COQEWFX



Business PCs

Provided you have sufficient RAM (at least 2GB, 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.

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PC ADVISOR





Internet security suites	PC ADVISOR RITY BEST BUY F-Secure IS 2013	Norton by Symantec INTERNET SECURITY PC ADVISOR RECOMMENDED Norton IS 2013	Bitdefender Bitdefender	PC ADVISOR RECOMMENDED Trend Micro Titanium IS 2013	Kaspersky IS 2013
Annual price	£39 inc VAT	£49 inc VAT	£44 inc VAT	£59 inc VAT	£49 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	F-secure.com	Uk.norton.com	Bitdefender.co.uk	Trendmicro.co.uk	Kaspersky.co.uk
Overall rating	***	****	****	****	****
Signature-based detection	99%	99.8%	98.8%	100%	98.1%
Malware blocking (full)	100%	100%	100%	100%	94.4%
Malware blocking (partial)	0%	0%	0%	0%	0%
Clean-up of malware	90%	60%	90%	80%	80%
On-demand scan speed	76 secs	79 secs	121 secs	110 secs	70 secs
On-access scan speed	230 secs	175 secs	341 secs	341 secs	368 secs
Interface design	Very good	Superior	Very good	Very good	Very good
Verdict	Good value for money Great scores in most tests User-friendly interface Fast scan speed	Real-world attack scores bode well for its efficacy Consumes few resources Polished, simple interface	Good value for money Exceptional in some tests Can slow startup MyBitdefender a nice touch	Brilliant performer Scan times a little low More guidance required Expensive	Excellent at cleaning up infections; not so hot on detection Impacts system speed
FULL REVIEW	TINYURL.COM/CKKPBWF	TINYURL.COM/8U7W6OA	TINYURL.COM/CAFEHS7	TINYURL.COM/CRZZ73Z	TINYURL.COM/BRY3CTZ

GLOSSARY: • IS: Internet Security

Antivirus software	Norton PC ADVISOR BEST BUY	Ditdefender ANTIVIRUS PRO BOND SOR RECOMMENDED	G Data AntiVirus PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED	TITANIUM ANTIVIRUS +
	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	Smooth user interface Large 'Fix Now' button Moderate impact on system performance	Very good performance for malware removal Average scan speeds Three interface tiers	Strong malware detection, blocking and removal Good user interface, but poorly translated	Well-designed interface Easy to use On-demand single-file scans Impacts PC performance	Set-it-and-forget-it security Cloud-based protection Requires web connection Good performance
FULL REVIEW	TINYURL.COM/4P5YCXP	TINYURL.COM/66SK77U	TINYURL.COM/6BFXWCS	TINYURL.COM/6HQA2WB	TINYURL.COM/4HUORV3



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

Sub-£150 printers	PC ADVISOR GOLD	2 PC ADVISOR DEST BUY	3	PC ADVISOR RECOMMENDED	5
	Samsung ML-2955DW	Oki C110	Pantum P2050	HP Photosmart 7520	Epson Expression XP-605
Price	£98 inc VAT	£126 inc VAT	£45 inc VAT	£120 inc VAT	£80 inc VAT
Website	Samsung.com/uk	Oki.co.uk	Pantum.com	Hp.com/uk	Epson.co.uk
Overall rating	***	***	***	***	***
Technology	Mono laser	Colour laser	Mono laser	Colour inkjet	Colour inkjet
Max print resolution	1200x1200dpi	1200x600dpi	1200x600dpi	9600x2400dpi	5760x1440dpi
Actual print speed	B=22.2ppm	B=15.8ppm/C=2.5ppm	B=15.8ppm	B=17.6ppm C=7.9ppm	B=11ppm C=4ppm
Scan/fax facilities	none	None	None	1200x2400 scans	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, HP ePrint	USB 2.0, 802.11b/g/n
Cost per page	B=2.7p	B=3.6p/C=5p	B=2.4p	B=2.4p/C=4.8p	B=3p C=6p
Media card/auto duplex	×√	××	××	√ √	√ √
Input capacity	251 sheets	100 sheets	150 sheets + manual	125 sheets + 20 tray + 25 ADF	120 sheets + 20 photo
Dimensions	348x338x197mm	396x380x275mm	380x260x236mm	454x551x220mm	390x341x138mm
Weight	7.2kg	14.4kg	6.1kg	8.6kg	7.1kg
Warranty	1 year	3 years	1 year	1 year	1 year
Verdict	Speedy for the price Slim but well-defined text Reasonable running costs Wi-Fi/wired network support	Good-value colour laser Performs better than an equivalent inkjet No duplex mode	Now available for just £50 Decent design No fancy features Solid running costs	Nice 4.3in touchscreen Separate photo/ADF trays Good speed for an Inkjet Competitive running costs	Impressively sharp output Intuitive 2.5in touchscreen Numerous features Auto-duplex a little slow
FULL REVIEW	TINYURL.COM/CCLSZDM	TINYURL.COM/YLNO5RV	TINYURL.COM/C764SZ2	TINYURL.COM/98G9XTE	TINYURL.COM/CZ6TXZS



GLOSSARY: • B: mono • C: colour • ppm: pages per minute



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



Wireless routers	PC ADVISOR RECOMMENDED	2	S PC ADVISOR BEST BLY	PC ADVISOR RECOMMENDED	5 PC ADVISOR BEST BUY
	Apple AirPort Express	D-Link Cloud Router N600	Cisco Linksys EA6500	Asus RT-AC66U	AVM FritzBox Fon 7390
Price	£79 inc VAT	£75 inc VAT	£150 inc VAT	£160 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√
ADSL Modem/Guest NW	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	Sleek, flat and square look Concurrent 2.4/5GHz Extremely easy setup Digital audio output	Cloud features Parental controls Interesting looks Up slightly in price	• Stunning performance • Excellent interface • Strong QoS • 802.11ac isn't cheap	Decent value Versatile antennae Great for file-hosting and media streaming	Supports landline and internet telephony Dual-band Wi-Fi USB port
FULL REVIEW	TINYURL.COM/6LH600S	TINYURL.COM/9LGFF8Y	TINYURL.COM/AWYOPYX	TINYURL.COM/BU79W64	TINYURL.COM/3QUJZBX



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

External hard drives	PC ADVISOR RECOMMENDED	C PC ADVISOR	3	1 2 3 4 5 6 2 6 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5
	WD My Passport Edge for Mac	1	Freecom Mobile Drive MG	iStorage diskAshur 256bit	WD My Book Thunderbolt Duo
Price	£75 inc VAT	£599 inc VAT	£170 inc VAT	£172 inc VAT	£400 inc VAT
Website	Wdc.com/en	G-technology.com	Seagate.com	Istorage-uk.com	Wdc.com
Overall rating	****	***	***	***	***
Capacity tested	500GB	8TB	1TB	500GB	4TB
Capacity range	500GB	4TB to 8TB	1TB to 1.5TB	250GB to 1.5TB	4TB to 6TB
Disk size	2.5in	3.5in	2.5in	2.5in	3.5in
Spin speed	5,400rpm	7,200rpm	5,400rpm	5,400rpm	7,200rpm
Transfer speed	94Mbps (USB 3.0)	329MBps	329MBps	94Mbps (USB 3.0)	223MBps
Encryption	Password protection	None	None	256bit	None
Other interfaces	None	None	USB 3.0	None	None
Software	WD utilities	None	Freecom utilities	None	WD Drive Utilities
Dimensions	112x83x11mm	235x130x85mm	120x81x15mm	19x85x120mm	165x157x99mm
Weight	164g	2.3kg	170g	176g	2.2kg
Warranty	3 years	3 years	2 years	1 year	3 years
Verdict	Not just for Macs Password protection Faultless build quality Great value	Fast Thunderbolt interface Real-world speed can exceed 200MBps Pricey, but huge capacity	Thunderbolt interface Light and compact Doesn't get the full potential performance	256bit encryption PINs, self-destruct passwords, anti-hacker tools 2.5in disk stifles speed	Thunderbolt interface Not as fast as some Thunderbolt Raid drives Quiet and cool operation
FULL REVIEW	TINYURL.COM/BMG7SW9	TINYURL.COM/CXEF6MH	TINYURL.COM/C5SQU20	TINYURL.COM/CX3DNHY	TINYURL.COM/C6TADAH





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



¹Ansi lumens GLOSSARY: • CM: component • CP: composite • ET: ethernet • SV: S-Video

Solid-state drives	PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED	SAMSUNG PC ADVISOR RECOMMENDED	NEUTRONE OF THE PROPERTY OF TH	######################################
	Plextor M5 Pro	Crucial M500	Samsung 840 Pro	Corsair Neutron GTX	Toshiba THNSNH512
Price	£174 inc VAT	£320 inc VAT	£370 inc VAT	£190 inc VAT	£380 inc VAT
Website	Plextor.com	Crucial.com/uk	Samsung.com/uk	Corsair.com	Toshiba.co.uk
Overall rating	***	***	***	***	***
Capacity tested	256GB	480GB	512GB	240GB	512GB
Price per GB	68p	67p	72p	79p	74p
Memory cache	512MB DDR3	512MB DDR3	512MB LPDDR2	256MB DDR2	not specified
Controller	Marvell 88SS9187	Marvell 88SS9187	Samsung MDX (3-core ARM)	Link_A_Media LM87800	Toshiba TC58NC5HA9GST
Encryption	AES 256bit	AES 256bit	AES 256bit	None	None
Flash	Toshiba Toggle NAND	Micron 20nm MLC NAND	Samsung 21nm Toggle NAND	Samsung/Tosh Toggle NAND	Toshiba 19nm MLC Nand
Firmware updated via	ISO boot disc	ISO boot disc	SSD Magician for Windows	SSD Toolbox for Windows	None
ATTO peak sequential	R: 547MBps; W: 457MBps	R: 539MBps; W: 433MBps	R: 562MBps; W: 519MBps	R: 557MBps; W: 511MBps	R: 554MBps; W: 519MBps
CDM peak IOPS	103.3k (read)	89.8k (read)	103.8k (read)	92.8k (read)	98.5k (read)
AS SSD (points)	1,124	1,038	1,094	1,057	954
Warranty	5 years	3 years	5 years	5 years	1 year
Verdict	High performance figures Excellent value Very durable Uses custom firmware	Best value of all SSDs here Good security Decent speed Multiple OS support	• Impressive speed • Three-core ARM processor • Limited platform support • Bluetooth issues on test	Strong write performance Nice weight and warranty Choice of models available Unusual choice of controller	Good read performance Low energy consumption Availability not great Poor warranty
FULL REVIEW	TINYURL.COM/PTYGG27	TINYURL.COM/M2NCSMJ	TINYURL.COM/OU4LEJG	TINYURL.COM/KV954FC	TINYURL.COM/PH6XNK5



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

Sub-£150 graphics cards	PC ADVISOR GOLD	2	3	4	5
B :	MSI GTX 650 Ti OC Boost	Sapphire HD 7770	Asus AMD Radeon HD 7790	MSI GeForce GTX 650	Sapphire Radeon HD 7750
Price	£150 inc VAT	£96 inc VAT	£130 inc VAT	£90 inc VAT	£80 inc VAT
Website	Uk.msi.com	Sapphiretech.com	Uk.asus.com	Uk.msi.com	Sapphiretech.com
Overall rating	***	***	***	****	***
Graphics processor	nVidia GTX 650 Ti Boost	AMD Radeon HD 7770	AMD Radeon HD 7790	nVidia GeForce GTX 650	AMD Radeon HD 7750
Installed RAM	2GB GDDR5	1GB GDDR5	1GB GDDR5	1GB GDDR5	1GB GDDR5
Memory interface	192bit	128bit	128bit	128bit	128bit
Core/memory clock	1,098MHz/1,502MHz	1GHz/1,125MHz	1,075GHz/1,600MHz	1,071MHz/1,250MHz	800MHz/1,125MHz
Ramdac	400MHz	400MHz	400MHz	400MHz	400MHz
Stream processors	768	640	896	384	512
Power connectors	1x 6-pin	1x 6-pin	1x 6-pin	1x 6-pin	None
Interface	PCI Express	PCI Express	PCI Express	PCI Express	PCI Express
DirectX	11	11.1	11	11	11.0
Digital interface	2x DVI, HDMI, DisplayPort	DVI, HDMI, Mini-DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, Mini-HDMI	DVI, HDMI, DisplayPort
Warranty	3 years	3 years	3 years	3 years	2 years
Verdict	Fantastic performance 192bit memory interface Boost clock to 1,098MHz Fairly quiet for the power	• Faster than 650 and 7750 • Decent value for money • Plenty of stream processors • Low sound levels	650 Ti Boost much faster Becoming better value Only 128bit memory interface Low noise	Marginally slower than 7770 Superb overclocking Very different to 650 Ti MSI version has second fan	Cheapest card in the chart Low specs include 800MHz core clock Lacks power in some games
FULL REVIEW	TINYURL.COM/DYE30W8	TINYURL.COM/BWJ7BL9	TINYURL.COM/BPRUYS5	TINYURL.COM/AKT2XOM	TINYURL.COM/7ZB50E3





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







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 bar 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





All's well that Haswell

y now you've probably read all about Haswell, Intel's fourthgeneration Core processor, in our Hardware reviews (pages 32-33) and Family PCs group test (page 56).

These Haswell chips do exactly what next-gen processors are supposed to: they perform better and use less power. But that doesn't sound particularly exciting until you realise just how much less power.

Apple claims all-day-long battery life for the new MacBook Air (around nine hours), while Sony says its new Duo 13 - a Windows 8 hybrid tablet/laptop - lasts an amazing 15 hours.



It's all down to the addition of a new power state, which Intel calls Active Idle. However, unlike in years gone by, we can't imagine that anyone is in the least bit interested by this nugget of information.

Time was when people cared about how fast their processor ran; they might even base their choice of new PC around it. These days, nobody cares about clock speeds or even model numbers - they care about what the gadget in their hands allows them to do.

The technology might be in the processor, but the benefit is longer battery life. It's a laptop that will last not just an entire working day, but one that has the performance to do the work you need to get done.

Intel's masterstroke, then, is its marketing. Everyone knows the Intel Inside logo, and the jingle that accompanies it on TV ads. When they go shopping for a new laptop, they look for one with this logo and are probably wary of those with AMD stickers, despite its lower prices.

With no battery-life issues to worry about, the benefits of choosing a Haswell-equipped PC are less obvious. However, the faster built-in graphics might mean you can get away with buying a cheaper computer and still be able to play the latest games. We'll bring you many more reviews of Haswell-equipped PCs and laptops over the coming months. $\ensuremath{\boxtimes}$

Next issue

ISSUE 219 ON SALE 8 AUGUST 2013



TEST Haswell laptops

We round up a selection of laptops with CENTRE Intel's new power-sipping processors to find out whether they can last all day away from the mains.



Office PCs

We review at a range of desktop PCs that CENTRE are not only primed for business use, but

won't get the finance director's knickers in a twist.



Premium headphones

We look at a selection of premium headphones that will improve your

audio experience with movies, games and music.

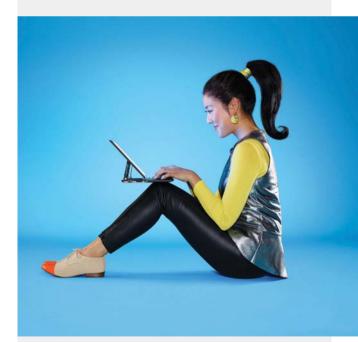
Smartphone cameras tested

Is your smartphone your main camera? Do you want it to be? We test six of the best smartphones, including the new Samsung Galaxy S4, to see how their cameras compare for photos and videos.

Mapping

We investigate the best maps for hiking, driving, cycling and navigating cities on foot.

PLUS: We round-up the best free word processors and free email services





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