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IDG | UNITED KINGDOM

JIM MARTIN

Head in the clouds

Storing your files online is easy and free, and brings a host of benefits. Here's why you should sign up now

I don't know about you, but having a PC, a laptop and a smartphone has caused me a few problems. Each device has its own storage and, unless I email important files to myself, manually sync them or carry them around on a USB flash drive, I can sometimes end up stuck without the documents I need.

Of course, this was all before I discovered cloud storage. With a free Dropbox account, I can keep in sync and accessible from any device with an internet connection my images, music, photos and documents.

Depending on the device, files can also be locally stored, so there's no problem if, say, my smartphone doesn't have an internet connection. If I edit a document, the revision is available almost instantly on all my devices, and I can collaborate with others on those very same files.

We've reviewed all the major cloud-storage services (see page 78) to help you choose which is best for you. For many people, the small amount of free storage offered by each of these services will be sufficient for crucial documents, so it needn't cost you a penny.

Privacy is naturally a concern with sensitive or private files, so we've included SpiderOak. It operates a zero-knowledge policy, locally encrypting your files before they're uploaded.

Sign up to every service and you'll have almost 50GB of free cloud storage, and that's before you earn extra space by referring friends. Spreading data over cloud multiple accounts puts you in a similar situation to that which I began with, but there is a solution: MultCloud. This web app combines several cloud storage accounts in one simple interface: turn to page 110 to find out more.

As I've said before, the humble PC is steadily being replaced by laptops and tablets. But there's one area it remains unbeatable: gaming. We challenged system builders to put together their best compact and quiet gaming rigs, which can sit unobtrusively in a living room. Buy any of the PCs reviewed from page 62 and no longer will gaming on the big screen be restricted to using an Xbox or PlayStation. ⊠

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LOW-COST DESKTOP PCs GET A SECOND WIND WITH AMD AM1

AMD's budget desktop processors expected to thrive as the company relocates its business to China

AMD's Sempron processor brand has polarised chip fans since its 2004 introduction in laptops, but a fresh batch of the processors is being targeted at its desktop fanbase under the name AM1.

AMD's Sempron chips will go into low-cost desktops priced up to $399 (£240). Barebones desktops could be built starting at $60 (£36) with just a Sempron chip and motherboard, said Adam Kozak, desktop product marketing manager at AMD.

The company also introduced new Athlon chips, which are typically more feature-packed and expensive than Sempron. Both the AM1 platform chips have been updated with the latest 'Jaguar' microarchitecture and Radeon GCN (graphics core next) technology. The chips will support up to four CPU cores, 16GB of memory and USB 3.0.
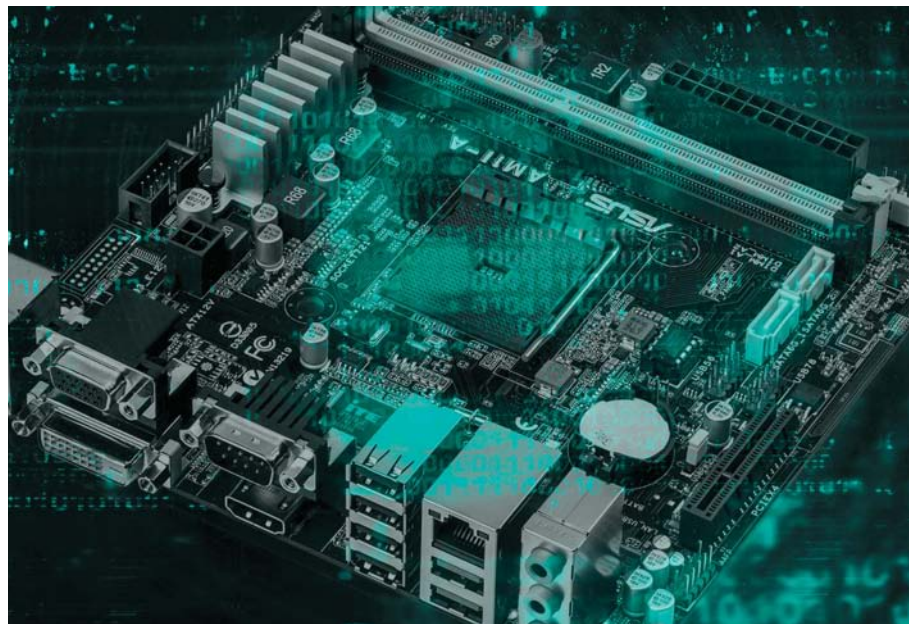
Poor performance, but low-cost

Sempron is at the lowest rung of AMD's chips and, in its decade of existence, has been derided for poor performance. But it has found a niche among buyers looking for inexpensive PCs and is used in some of the cheapest laptop- and desktop PCs available today.

AMD is unfazed by Sempron's reputation. The new desktop chips are targeted at Latin America, and the Asia-Pacific and Japan markets, where budget buyers shop for parts and build systems at home.

"On desktop we realised there is a lot of cachet over the brands that have served us well," Kozak said, adding that AMD's FX chips for high-end desktops are also among those brands.

Sempron has been trailing off in volume shipments, but chips with the latest processor cores could inject new life into the brand, said Dean McCarron, principal analyst at Mercury Research. "The existing Sempron products have aged. Sempron needed a product refresh," he added.

Kozak said Sempron is an alternative to AMD's chips that are integrated directly on the motherboards. The new Sempron- and Athlon chips are socket-upgradeable.

A low-end part such as Sempron is necessary for PC buyers who are "hyper-sensitive" to price, McCarron said. The popularity of Sempron has tailed off in mature markets where preconfigured systems are bought directly from vendors and people don't do socket upgrades.

Sempron desktop chips account for around 5 percent of AMD's chip shipments and will compete with Intel's latest Atom-, Pentium- and Celeron chips codenamed Bay Trail, which have started appearing in low-cost desktops and laptops.

Relocation, relocation, relocation

The chip maker has also moved its desktop processor business operations from the US to the growing market of China, adding to its research lab and testing plant already located there.

Despite global decline, the desktop market in China is growing at a fast pace and its shipments of desktops and laptops are equal in ratio, said Michael Silverman, a spokesman for AMD. "The desktop market in China remains strong," he said, adding that the company is also developing tailored products for users in China.

AMD's move of desktop operations to China brings it closer to key customers such as Lenovo, said McCarron.

Being in China also solves some desktop supply chain issues because it moves AMD closer to motherboard suppliers such as Asus and MSI, which are based in Taiwan, but get parts made in China. Chips will be shipped to customers faster and at a lower cost, which would reduce the time it takes for PCs to come to market, McCarron said.

AMD already has a plant in Suzhou, which Silverman said "represents half of our global back-end testing capacity". AMD's largest research and development centre outside the US is in Shanghai.

BBC LAUNCHES NEW iPLAYER • BBC THREE TO MOVE ONLINE ONLY

Digital platform favoured for its younger audience as Aunty Beeb attempts to claw back costs

The BBC has relaunched its iPlayer catch-up TV and on-demand streaming service.

Launched six years ago, iPlayer now handles 10 million requests per day. The updated service is currently available only online, while the mobile apps will be updated within the coming months.

"A major focus of this release is making it easier to find something to watch, helping you quickly and easily find the programmes you know you're looking for and, crucially, helping you discover something new. The current iPlayer's pretty good if you know what you want to watch, but we know that 42 percent of visitors are now coming without a particular programme in mind," said Dan Taylor, head of BBC iPlayer.

iPlayer now has an image-led interface that provides a "simpler and easier" experience. Hovering over a programme displays a short description of the episode, its duration and when it was first shown.

Other improvements have been made with playback and search, while a new Collections feature will bundle shows into series, events or themes.

The BBC also announced it will move BBC Three online only in autumn 2015. In doing so it hopes to save £100m, which is necessary following cuts in funding.

The spare spectrum will be used to extend CBBC by an hour each night and to provide a BBC1 +1 service.

"iPlayer will offer an opportunity to look at new forms, formats, different durations, and more individualised and interactive content," said director general Tony Hall.

Apple announces CarPlay 'iPhone in the car' system

Free iOS update lets you enjoy the iPhone experience and its content behind the wheel

Included in Apple's recent iOS 7.1 update is CarPlay, which aims to bring the iPhone experience to your dashboard.

CarPlay will allow users to make calls, use Maps, listen to music and access messages, either through a touchscreen interface or by pushing a button on the steering wheel to activate Siri. Apple says CarPlay will make driving smarter, safer and more fun.

A handsfree element allows Siri to read incoming messages and notifications, and for you to respond with your voice. Maps can anticipate your destination based on recent trips via contacts, emails or texts, and provide navigation instructions (read by Siri), traffic conditions and your ETA.

Selected vehicles from leading car manufacturers including BMW, Ford, Honda, Kia, Nissan, Land Rover and Subaru will arrive with CarPlay onboard this year. We are hoping the likes of Pioneer, Alpine, Kenwood and Sony will also make devices that allow you to install CarPlay in existing vehicles.

"CarPlay provides drivers with an incredible experience using their iPhone in the car," said Greg Joswiak, vice president of iPhone and iOS product marketing at Apple.

"iPhone users always want their content at their fingertips, and CarPlay lets drivers use it in the car with minimal distraction."

iOS 7.1, which includes CarPlay, is a free update to iOS 7, and is compatible with all iPhones with a Lightning connector.

Remembering Pat McGovern

He was the media tycoon who flew beneath your radar. And yet, Pat McGovern, who passed in March, is the reason *PC Advisor*, along with hundreds of other technology-oriented websites, publications and events, are here today. We celebrate the life of IDG's founder at:
tinyurl.com/m969c3v

Android steals iPad's crown

Android toppled the iPad from its top spot in the tablet market in 2013. According to Gartner, Android's market share rose to 61.9 percent, while Apple's dropped to 36 percent. It said Google's growth benefitted from the increased the popularity of budget mobile devices.
MORE: tinyurl.com/kfvlu43

UK, Germany partner for 5G

Prime minister David Cameron has announced that the UK will partner with Germany to develop next-generation 5G mobile broadband. Universities in both countries will develop tech that could let you download a film in just one second.
MORE: tinyurl.com/L7pebpL

EE TO LAUNCH FASTER 4G THIS SUMMER

Network about to turn up mobile-broadband dial to 300Mb/s in London

EE has confirmed that it will bring even faster 4G mobile-broadband speeds to London this summer.

Speaking at Mobile World Congress, EE CEO Olaf Swantee said the firm plans to double the speed of its 4G network to 300Mb/s. Using its wide spectrum, the network will upgrade to LTE-A (aka LTE-Advanced or 4.5G).

"We're working with Huawei on LTE-A," said Swantee. "It's really exciting actually. We will have 300Mb/s in London. First we will have the city centre covered – London south circular. That will probably be by the end of the summer."

Following the rollout in south London, EE will work on covering the entire city, inside of the M25, with the faster LTE-A standard.

Most smartphones do not currently support LTE-A, but the feature should become more common over time.

Swantee also commented on how voice is still an important part of its network. "Network differentiation is not possible without voice.

We do not treat voice as a commodity," he said, adding that Voice over LTE is not huge deal for the firm because it uses the same spectrum for 4G and 2G, meaning a fall back time of just 2 seconds.

Instead, EE will focus on improving voice in rural areas, which it says is important in the long run. It is deploying the 800MHz spectrum is these areas, where Voice over LTE "may play a more important role".

Virgin floats into the cloud-storage business

Virgin Media Cloud offers 10x 5GB online storage accounts per household
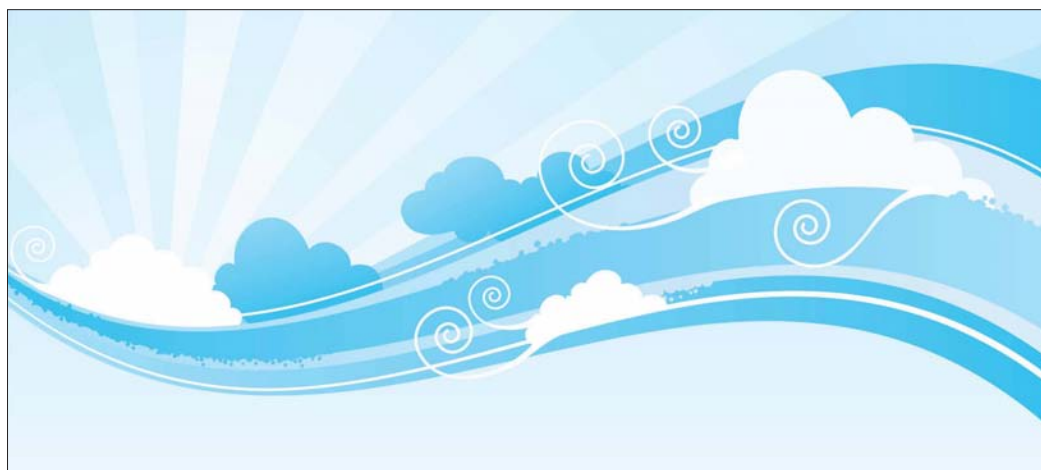
Virgin Media, in partnership with F-Secure, has announced the new online storage service Virgin Media Cloud, which is available now.

Up to 10 people in a Virgin Media broadband household can have their own account, each with 5GB of storage. The news comes as Virgin Media increases its broadband speed to up to 152Mb/s.

"We want to keep our customers, and their content, to be safe online. We're giving our broadband customers an easy way to instantly store and share content from any device, wherever they are," said Virgin Media.

Those willing to pay for extra storage can get between 50- (£3.99/month) and 500GB (£26/month).

With 500GB you can store in the cloud up to 125,000 songs, 700 standard-definition movies or 500,000 photos online. A Virgin Media Cloud app is free for PC, Mac, iOS and Android, with Windows Phone coming soon.

Features include the ability to back up content from an unlimited number of devices and the option to share files via email, Facebook and Twitter. There's also the option to synchronise your files across multiple devices. ⊠

A sk any security specialist what is the weakest part of a system and they'll tell you it's you. Time and again this is born out to be true, and often the problem is simply laziness. Securing our data and devices takes effort. It can often make life less convenient, too, so the easy option is not to bother.

It's understandable. Who wants to wait a few seconds for a confirmation text message before they can log into a service, or repeatedly enter passwords to buy music on their phone? Technology is meant to make life easier, isn't it?

The problem is there is now so much sensitive data online, much of which is daisy-chained together, that quick access for us is also quick access for hackers looking for an easy target.

Conventional wisdom states that you should never use the same password for multiple accounts, nor recycle older variants. But how many of us practise what we preach?

With so much of modern life transitioning online it can be a Herculean task to create individual complex passwords for every service we use. So we don't. In fact, it's all too often the case that the passwords we do create are ridiculously simple and used for every account.

> ❝
> **Criminals are not evil geniuses, they're opportunists. Make it difficult for them and they'll move on**
> ❞

AVG listed the top five passwords used in 2013, all of which are appalling:

1. 123456
2. password
3. 12345678
4. qwerty
5. abc123

AVG's chief technology officer Yuval Ben-Itzhak says "Complex passwords can be a real hassle to remember, often 'forcing' people to use the same password for multiple accounts. This is never a good idea: once your password is cracked – and, if it's a simple password, chances are that it will be – hackers have access to your most sensitive- and valuable information stored within emails, applications and social-networking sites.

"For years hackers have relied on simple passwords. Individuals should not take lightly password security and should ensure their login details are as robust as possible."

Treasure trove
Your email account is the cybercriminal's treasure trove. When you sign up to a service you nearly always need to confirm the activation via a link in an email. Your account details and other correspondence may also be sent to your inbox. By cracking your email login, a hacker has all they need: to gain access to your other accounts they visit the site and click the forgotten-password link; a new one will duly arrive in the inbox.

If this sounds far-fetched then just look to the story of *Wired* reporter Matt Honan, who had his entire digital life destroyed in a matter of hours thanks to some enthusiastic hackers and his own lax security.

Solutions are available that can make the process easier. Password-manager apps such as KeePass, 1Password and mSecure can create random complex passwords for each of your accounts, and require you

Are we too lazy to be safe?

Perhaps you can't be bothered to properly secure your data, but you'll regret having that attitude the second a digital pickpocket takes advantage

MARTYN CASSERLY
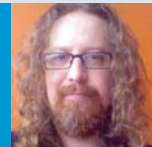
to remember only one master password to access them.

Some of these services are paid for but, given the £826m combined loss of some 12 million victims of cybercrime in the UK alone last year, we wouldn't argue over a few pounds.

Free alternative approaches are offered by Microsoft, Google and Apple's two-step verification, which requires you to enter a code sent to your mobile before you can log into your account. It's fast and secure, but not very popular with users.

Protecting your data

Passwords are only half the problem. We also have to take care of our data. Phishing attacks are still rife online, which suggests enough people are falling for them to make it worth the effort of spamming millions of email addresses every day.

A little common sense can do wonders here. Think about what an email is asking of you.

If you are told your account has been hacked, a complaint has been raised, or any other urgent provocation that causes you to immediately respond, do not panic. Open a browser and head to the site in question (do not click the link in the email), then see if you get the same alert.

Similarly, if you get a message containing a link from a 'friend' via social media, ask yourself whether that friend would really send you that link. Probably not. Don't click it.

Criminals are not evil geniuses, they're opportunists. All they need is someone to be in a hurry, or too trusting, and before they know it their money or identity can be digitally pickpocketed. Make it difficult for them and they'll move on.

Mobile security

In its annual security report Symantec noticed a worrying emerging trend. Whereas most people are aware of the dangers

that malware presents on their PCs, they fail to realise the same hazards prevail on mobile devices. Of those interviewed, only 22 percent had security software installed on their smartphone, and 54 percent didn't know it existed.

There are some mitigating circumstances: iOS is very difficult to hack due to Apple's closed system, and this same walled-garden approach also means that you can't run antivirus apps on iOS devices.

Android is more open to attack, but it's still a safe place to be if you stick to downloading apps only from Google Play, not third-party app stores, and be sure to check the permissions requested by each app.

We need to adopt this type of 'considered purchase' mindset if we hope to avoid a security breach sooner or later. At the very least, put a passcode on your device, so that if your very stealable handset ends up in the

hands of a ne'er-do-well it will not yield its data, too.

The Symantec report also revealed how smartphones and tablets are becoming more attractive to criminals, and 25 percent of those quizzed had been the victim of an attack.

As we move into the post-PC era it's important to remember that even though these devices are much simpler than our PCs, they are hugely powerful creations and can be used to gather information against us if we don't remain vigilant.

The internet is the same thing, whether we access it from a laptop or a tablet. And the passwords we use can easily be stolen by the chap at the table behind us running a snooping program on the open Wi-Fi hotspot to which we are both connected.

Having access to the digital super-highway is a wonderful thing – let's just make sure we don't fall asleep at the wheel. ⊠

'**Net neutrality'** & the death of the open internet

Net neutrality received a heavy blow in a recent US court case. We look at how this could affect how we access services online, and whether an open- and equal internet is even possible in the future

Net neutrality is the theory that we should expect unfettered access to the internet from wherever we are and no matter what we're doing online. Since the internet's inception, all sites have been regarded as equal; thus the only restriction you should encounter is the speed of your connection. But things could soon be about to change, as the line between internet providers and media companies becomes increasingly blurred.

According to government statistics around 21 million homes in the UK (around 83 percent of the population) could access the internet in 2013. More than 20 million of those people buy their internet access from one of four service providers: BT, Sky, Virgin Media and TalkTalk. This in itself isn't a problem: with four key players competition is healthy and customers are provided with adequate choice.

However, given that each also provides TV and film packages, concern is mounting that the ISPs are now in direct competition with services provided via their networks, such as iPlayer and Netflix.

This situation creates a conflict of interests, whereby smaller services are reliant on larger rivals for their businesses to survive.

Legislating competition

In the UK there are laws in place to stop anti-competitive behaviour, such as an ISP hampering the delivery of content from a rival service, to which none of the ISPs has fallen foul. But a recent ruling in a US Federal Court could set the precedent for a tiered version of the web, in which an ISP could restrict the speed of delivery for a given site or service unless they stump up some extra cash.

In a Washington courtroom in January 2014, Judge David Tatel presided over a case between Verizon, a US telecom behemoth, and the Federal Communications Commission (FCC), a government agency responsible for US communications. His judgement was that the FCC had no power to compel Verizon to adhere to net neutrality, opening the potential for a less egalitarian version of the web.

If the ruling is upheld it could mark a hugely significant moment in the history of the internet – and not just in the US. Net neutrality is an essential element of online proceedings, and the idea that the internet should remain open and free from toll gates has long been a battleground for sparring watchdogs and ISPs.

Once you introduce the idea of fast lanes for those who can and are prepared to pay for them, smaller companies could struggle to compete. Services such as YouTube, BBC iPlayer and Netflix might even curtail their services due to the sudden increase in cost.

But why should the services that use a greater amount of bandwidth than others – Netflix and YouTube alone account for 50 percent of US internet traffic at peak times – pay the same price as those who use only a fraction of that bandwidth? And is it really unreasonable that an ISP should expect such services to pay more for their greater use of its network?

Actually, perhaps it is unreasonable. The ISPs are already paid by customers for an agreed level of bandwidth; where they choose to spend that bandwidth is their business.

More worrying, then, is that ISPs hope to extend their media services in line with the growing customer appetite for on-demand- and streaming services. Artificially controlling the speed of the network would give each provider a distinct advantage, especially with their stranglehold on the majority of the population.

In theory, if Sky so wanted, it could stream services such as Netflix at a slow speed, making them virtually unusable, while giving its own on-demand services a high-bandwidth priority. This would ensure

MARTYN
CASSERLY

that Sky's offering was the only one customers would, or realistically could, choose to use (there's no suggestion Sky intends to do that).

There's even the possibility that ISPs could block services altogether, as we've seen happen in the US when AT&T removed the option for iPhone customers to use the built-in FaceTime video-messaging app on its cellular network, and the same was true of the video-calling feature in Google's Hangouts app. The company subsequently relented, presumably to consumer pressure, but the fact it could block those services is a worrying example of how the internet could be carved up by these gateway companies.

What's the solution?
As we said, these practices aren't allowed under UK law, and the bandwidth throttling you might suspect you are witnessing is far more likely a result of the number of users on the network at that time, and how much content they are consuming. Or it could be the case that you've overstepped your bandwidth limit, and your ISP is trying to slow down the rate at which you gobble up more.

This network management might be annoying, but it has a far more understandable rationale; after all, there's a finite amount of data that each network can handle at any one time.

But if the Verizon/FCC decision becomes law it could prompt other providers around the world to seek a similar competitive edge, and usher in a new age of elitism and control that might not have the customers' best interests at heart.

Solving this problem isn't easy. The incredibly fast-moving nature of technology and the glacial pace of law means that blanket government legislation often causes more problems than it fixes. Recent revelations about the NSA and GCHQ's

far-reaching surveillance techniques also cloud the issue of how much control can be entrusted to the government in relation to online communications.

"Internet users should be wary of any suggestion that there is an easy path to network neutrality," writes April Glaser on the Electronic Frontier Foundation blog. "It's a difficult problem, and building solutions to resolve it is going to remain challenging. But here is one guiding principle: any effort to defend net neutrality should use the lightest touch possible, encourage a competitive marketplace, and focus on preventing discriminatory conduct by ISPs, rather than issuing broad mandatory obligations that are vulnerable to perverse consequences and likely to be outdated as soon as they take effect."

When confronted with huge issues such as the very nature of the internet and the shape it will take in the next decade, it can feel overwhelming. After all, what difference can the normal person on the street make when governments and media giants go to war?

Actually, it is we who hold the real power in all this: we choose where to spend our money. If companies begin to remove services, or heavily favouring their own offerings, the way to make it stop is to simply move to another supplier that treats all services and sites equally. If enough people put principle above convenience then these companies will think twice.

George Orwell's *1984* is often quoted in these days of Big Brother government and corporations who would control our access to information. But in this instance there is a different passage that stands out – one which reminds us that we are not without influence.

"If there was hope, it must lie in the proles, because only there, in those swarming disregarded masses, 85 percent of the population of Oceania, could the force to destroy the Party ever be generated." ⊠

MATT EGAN

Chromecast: the £30 gadget that changes everything

Google has finally made its Chromecast device available in the UK. Here's why it will change the world

The Chromecast is a tiny gadget that connects to your TV via HDMI and is powered by USB. It's a £30 media-streaming device that allows you to play TV shows, movies and music from a variety of sources, on any display with an HDMI port.

The key thing about Chromecast is it is easy to set up. It doesn't tie you to a subscription service; it is simply a supremely easy and cheap way to turn any TV into a smart TV. A smart TV with benefits.

The major content sources are BBC iPlayer, Netflix, YouTube and Google Play. There's also Red Bull TV and Vevo, plus a couple of apps that allow you to stream locally stored media via your Chromecast.

BBC iPlayer speaks for itself. Using it you can watch live BBC TV, as well as catch up on virtually all the BBC's vast amount of programming over the past week. If you tend to catch up with 'EastEnders' via your laptop, the Chromecast lets you enjoy it in glorious HD on your large-screen TV. As a Licence Fee payer in the UK you get access to all of this content for free.

Netflix is the coming man of the on-demand TV world. It offers thousands of TV shows and movies, many of them big-name US series, and it's growing all the time. And that's not taking into account the burgeoning amounts of original programming such as the recent 'House of Cards' series, as well as 'Arrested Development'. You do, of course, have to pay for Netflix, at £5.99 per month.

YouTube isn't just cats falling out of trees. Indeed, more content is added to YouTube every day than has ever been broadcast on any (or indeed all) mainstream TV broadcasters. Increasingly high-quality original programming and livestream media is being uploaded to YouTube (including that of *PC Advisor*), and Chromecast allows you to watch it on the big screen.

And then there is Google Play. This is Google's alternative to iTunes and, although not as mature, it tends to be cheaper and the number of titles available is huge. You can watch a wide variety of Hollywood- and indie movies, as well as high-class TV programming from around the world. The documentaries are great, too. You have to pay for individual titles, but you can rent

them cheaply (and you can watch a film on your commute and finish it off on the TV). Play Music is supported, too.

Other sources include Red Bull TV, which offers up extreme sports, lifestyle and music programming, and Vevo music videos.

Finally there are couple of apps – Plex and RealPlayer Cloud – that allow you to watch locally stored media such as ripped DVDs.

Expect more apps to support Google Chromecast and other content providers to get in on the act soon.

Chromecast is a game changer

There's a battle going on for your custom and loyalty, and Chromecast is a key weapon in that battle. The TV and movies you watch are an important battleground for a diverse variety of tech players including Google, as well as BT, Sky and Virgin, Apple, Samsung and Microsoft, Amazon and more.

These companies became successful offering different types of products in vastly different markets. But the internet is a

unifying force, and so we find that a phone company (BT) is in an expensive battle with a TV company (Sky) to provide your broadband and TV. They won't both win.

They understand that in the future we are all likely to invest our time and money in just one or two providers, expecting in return digital entertainment and communications, connectivity and storage, home automation and hardware. Those companies listed won't all be independent entities in a decade.

Thus we find the search-engine company fighting with all of the above to take control of all your digital life.

Google started out as a free-to-use, ad-supported search engine. Now it is the owner of the biggest smartphone platform by volume in Android, and the biggest TV broadcaster in YouTube. Its tentacles reach into most of our lives as the provider of email, storage, productivity software and more. It sells apps, music and movies via Google Play, and recently it invested in the Nest home-automation service. Google wants you to use an Android phone and a Chrome laptop, but most of all Google wants you to use it and not its rivals.

Chromecast is cheap, very easy to use, and it doesn't trap you into a long-term contract. It doesn't tie you to a particular TV maker. It also provides a better smart TV service than you likely get from your Samsung- or Sony TV.

Unlike a traditional smart TV Chromecast will get regular software updates, and will always offer access to a wide variety of content sources. It's also easy to search, allowing you to type out or speak search terms into a smartphone, and – being Google – understanding semantic search terms: you can ask it to find 'World War II documentaries' or 'sports shows' rather than having to know the specific names of the programmes you want to watch.

The Chromecast is a potential game changer because it offers for a small price a great way to access a lot of digital TV, without tying you to a particular provider. It's an impulse buy that you will be unlikely ever to regret making. But paradoxically it offers Google a way into the most important screen in the house, which furthers ties you into its clammy embrace. ⊠

DAVID PRICE

No smartphone left behind

Given the relentless, typically annual upgrade cycle, for how long should we reasonably expect a smartphone manufacturer to support its older products?

In the past couple of months we've seen multiple smartphone launches, both at Mobile World Congress and in the weeks passed since. Plenty of readers will be excited by the brand-new HTC One, the Samsung Galaxy S5 and the Sony Xperia Z2, for example, but what about owners of the old HTC One, the Samsung Galaxy S4 and the Sony Xperia Z1? Some of these handsets are still being sold as new, yet they are now considered outdated.

The relentless pace of innovation and update cycle common to the smartphone industry throws up questions about a firm's obligation to support older hardware. Let's take the iPhone 4 as a case in point.

Perhaps the most popular article I've ever published is a tutorial about downgrading an iPhone from iOS 7 to iOS 6, a process that's now regrettably difficult to perform. One of my most unpopular, by contrast, is a video extolling iOS 7's virtues, and advising users to stick with it. Some of the comments it received aren't suitable for a family audience.

All of which might give the impression that iOS 7 is a hated failure – the Apple equivalent of Windows Vista or New Coke. But in most scenarios, and to most users, it's not; the adoption rate has been extraordinarily high, much faster than you'd see on any other platform.

It's what you'd call an opinion divider. Some love it; others can't stand the colour scheme, the iconography, the animations, perhaps even the feature set. But Apple isn't deaf to user complaints. In the iOS 7.1 update the colour scheme has been toned down, and an increasing number of animations can be switched off or simplified, in response to the understandably unhappy response from users with visual impairments and vestibular disorders. More significantly, it's not as slow on old devices.

iOS 7 on the iPhone 4 was noticeably slow; horribly, screen-punchingly slow. An iPhone that's three generations old isn't the sprightliest device in the world in any case, but this was something else.

Mind you, this is par for the course: new software, launched into a world of faster processors than its predecessor and kitted out with slick graphics and exciting features, can make old hardware struggle.

There are pay-offs, of course, and most of the people who upgraded their iPhone 4 to iOS 7 did so in the happy spirit of discovery. They wanted those lovely new features, and

> ❝ **Rapid ageing is one of the consequences of rapid innovation** ❞

the chance to see their device decked out in this year's look. It may even have been worth the sacrifice for many. But an operating system has one duty above all others: to get out of the way and run a device smoothly. iOS 7 on the lowest rung of compatible iDevices doesn't achieve that.

Apple was right to look at performance, although it's worth noting that an iPhone 4's speed on iOS 7.1, while faster than on iOS 7.0, is still slower than on any version of iOS 6. Which raises the question of why Apple should be so firm in its refusal to allow

backtrackers an easy way to reinstall the previous OS on their hardware.

The company should have made it clear to upgraders that iOS 7 would cause a substantial performance hit for older models, or allowed upgraders to go back more easily.

We talk about the iPhone 4 as if it's outdated, but the device launched in 2010. In most sectors a product bought four years ago would still be in its prime. But we have to allow that the tech industry is a unique or at least an unusual case in this regard, steeped as it is in a culture of rapid change.

If a car slowed down appreciably after less than four years, we would consider that unacceptable. But the technological differences between today's cars and those of 2010 aren't comparable to those between the equivalent sets of smartphones.

Mobile technology is full of examples of early obsolescence (cynics might use the phrase 'planned obsolescence'). The iPhone 4 became obsolete when Apple found it was able to produce a smartphone for the same price that could run apps twice as quickly.

It's a great shame that the iPhone 4 isn't the speed demon it once was, and Apple could have handled the situation with iOS 7 more compassionately. Ultimately, though, we should accept that rapid ageing is one of the consequences of rapid innovation. ⊠

Nokia and Android just don't mix

Nokia has just launched three smartphones running Android. But it really shouldn't have bothered

O ne of the worst-kept secrets of Mobile World Congress was that Nokia was planning to launch a trio of smartphones running not Windows Phone but, shock, horror, Google Android. And it did, with the dual-SIM Nokia X, XL and X+. (Did it forget that Microsoft just bought its mobile business?) But it really shouldn't have bothered.

Nokia's X line-up is interesting in that it offers something completely different in the smartphone category. The trio of brightly coloured handsets, blessed with the stylish design and excellent build quality for which Nokia is known, makes a nice change among a slew of samey-samey iPhones, Samsung Galaxys and their numerous copycats. Of course, 'new' and 'different' are not terms necessarily associated with 'good'.

Our main gripe is that, although the Nokia X line-up runs Android, the operating system is a custom version that is irrecognisable as Google's platform. Nokia has customised the interface to the point that these devices look and feel like Windows phones.

If it wants to make a point of not running Windows Phone, then make it. Perhaps Nokia fears upsetting its new sugar daddy, appeasing it with an 'Inspired by Lumia' tagline.

These are staggeringly cheap phones – we're talking less than £100 – and aimed at first-time buyers and emerging markets. But as a budget smartphone buyer you sit in one of two camps: that which likes Windows Phone, and that which prefers Android. (Forget iOS; the iPhone 4s and 5c are cheap only to the rich.)

For all its benefits, Windows Phone remains the inferior platform of the two: fewer apps; fewer handsets; fewer fans. And, with cheap phones available running each platform, there's just no reason to plump for a strange mash-up of the two.

Windows Phone is heavily criticised for its lack of apps. A phone that runs Windows Phone but has access to Google Play would therefore be an interesting proposition. The X family does neither.

Rather than accessing Google Play, you'll rely on third-party app stores such as Yandex, which offers just 100,000 apps. Yep, it lags even Windows Store. And we're almost back to square one.

Meanwhile, the range of Microsoft services on these handsets looks pretty good. So, does Nokia really want people to like Android, or push them into Microsoft's arms? Well played Nokia, well played.

Say a user buys a Nokia X handset and gets used to running Android apps on what looks like a Windows Phone. Then they upgrade to a premium Lumia handset. It looks the same but, hang on, where are the apps? Where are the widgets and proper notifications? This is rubbish. (To be fair, Microsoft's OS is expected to get notifications with a forthcoming update.)

Consumers can get a better experience by spending a little more money, whether they sit on the Android- or Windows side of the fence. Refusing to choose and sitting on top of the fence will give them only a metaphorical sore bum.

Go with Windows, and Nokia's own Lumia 520 offers fantastic value with a decent spec and a tiny £100 price. Unsurprisingly, it's flying off the shelves.

Go with Android and there's the £129 Motorola Moto G, which has shaken up the budget smartphone market with all the gusto of a tornado. It shares hardware specifications with phones that cost twice its price, and performance that's even better.

Why anyone would want a cheap phone with poor specs that confusingly blends Windows Phone and Android is simply beyond our comprehension. ⊠

CHRIS
MARTIN

Killing BBC Three is a big mistake

BBC Three is moving from TV to online, but we're not sure its audience is ready to make that leap

The BBC has announced plans to move BBC Three from broadcast TV to a new online-only iPlayer home next year. It's making a big mistake.

BBC Three has a huge fanbase, and within minutes of the announcement the *#SaveBBC3* hashtag was trending on Twitter.

We all know the future of television is in on-demand content streamed from the web. But that's *in the future*. So when did the future suddenly become now?

It's a scary thought, especially for the 16- to 34-year-old fanbase to which the BBC's other channels don't tend to cater on a daily basis.

And let's not forget, the younger generation are the licence-fee payers of the future: their loyalty is valuable. Turn them off TV and the BBC is in trouble.

BBC Three has been the launchpad for many hit, even cult, shows and careers – 'Two Pints of Lager and a Packet of Crisps', 'Little Britain', 'Gavin & Stacey', 'Him and Her' and 'The Mighty Boosh' to name just a few. It's not all fun and games either, with some gripping and serious documentaries such as 'Our War' and 'Growing Up With Down's' broadcast via the channel.

The Beeb argues that Three's younger audience, aka the digital generation, will be the easiest to move online. Try telling that to the parent of any teenager: no matter how many times they 'leave home' they always return. Sure, we'll go online, give it a try, but we'll be back on Sunday for a roast dinner.

By moving BBC Three online the viewing experience is going to suffer, and the BBC will have a much harder job selling content broadcast via the channel than it does now.

Netflix flies in the face of our argument: a phenomenally successful online-only streaming service – with, we might add, exclusive content such as 'House of Cards'. BBC Three's re-runs of 'American Dad', 'Family Guy' and 'EastEnders' don't have quite the same appeal (though appeal they clearly do).

iPlayer's growth has been massive since its launch a few years back, but the vast majority of its 10 million requests per day are for catch-up content. People rarely go looking for stuff on iPlayer without knowing they missed it on the TV. The BBC will have a tough marketing campaign on its hands if it wants BBC Three online to succeed.

Socially led marketing is crucial, too. When people form an opinion on a TV show very often they will make themselves heard via social media, in turn prompting others to tune in and find out what is the big deal. But with viewers tuning in at different times, this social engagement is going to get messy.

Not all the BBC's funding comes from the licence fee, and like any business it wants to save on costs. But why must BBC Three be the casualty? Here's an idea: rather than extending CBBC to 9pm, we'll send the kids to bed at a reasonable time, then kick back and relax with BBC Three. BBC One +1 can go, too (we've got iPlayer for that, remember.) ⊠

Intel lights up data transfers

Agam Shah takes a look at the new tech from Intel set to replace copper cables

After more than a decade of research, Intel's connector that uses light as a speedy way to shuffle data between computers is ready to replace slower copper cables.

The MXC optical cables will be first implemented at the rack level and use light and lasers to move data between servers, storage, networking and other computing resources. The cables will transfer data at speeds of up to 1.6Tb/s, outpacing the throughput on copper cables used for networking in data centres.

The cables are based on Intel's silicon photonics technology, which combines optical networking with silicon components. Component company US Conec is now shipping MXC parts, paving the way for distributors to sell cables to server makers and data centre companies. Corning, Tyco Electronics and Molex will sell MXC cables.

MXC makes the "connector wars non-existent", said Mario Paniccia, general manager of silicon photonics operations.

The cables are smaller, more durable and have a range of up to 300m, compared to copper, which can cover only a limited distance, Paniccia said. Ethernet is slower per lane and signals could degrade on cables that are longer than tens of metres, he said.

"It really drives the ability for bandwidth and distance separation," Paniccia said.

"We believe the transition's happening to move to fibre."

Pricing for the cables was not provided by Corning, which said it would start making cables for end customers in the third quarter. However, an MXC installation could be cheaper when accounting for the number of copper wires it replaces, said Claudio Mazzali, vice president of technology in the optical connectivity solutions group.

An MXC cable can have up to 64 fibres, with each fibre transferring data at 25Gb/s. The fastest cable that can transfer data at 1.6Tb/s will have 64 fibres. The pricing will depend on the number of fibres in a cable and the distance, Mazzali said.

MXC and data centres

Scaling copper wires in a data centre is challenging, Paniccia said. "It's going to be big, bulky, expensive, power-hungry and limited in reach," Paniccia said.

MXC could also change the way servers are designed, Paniccia said. The throughput provided by optical connections will allow the disaggregation of memory, storage and processing subsystems into separate boxes. Servers have memory- and storage limits, and removing those limitations could benefit supercomputing and applications such as databases, which could take advantage of larger memory pools in a dedicated chassis.

"The ability to take my memory and stash it a rack away can be enabled by optical," Paniccia said.

Fujitsu in November showed the optical fibre technology in use on two Primergy RX200 servers, which were connected to expansion boxes via optical cables. And Quanta last year showed a prototype server rack architecture that moved data using optical modules.

The technology could also reduce component costs by consolidating power supplies and fans in a data centre.

The cables could support existing protocols, including InfiniBand, ethernet and PCI Express. For example, Intel is proposing an Optical PCI Express (OPCI) protocol for use on optical wires. Support for existing protocols makes it easier to implement MXC in data centres, but servers will need to have a new port designed for the cables.

"This is about technology that can plug into standard interfaces and protocols," Paniccia said.

Intel is also opening up the technology so companies can put MXC ports in their servers, and Paniccia is open to rivals such as AMD adopting the technology. Intel is working with the Open Compute Project with the hope for wider adoption in open server designs. Backers for MXC also include Microsoft, Altera, Huawei and Hisense. ⊠

nVidia 800M GPUs to improve laptop framerates and battery life

nVidia's 860M, 870M and 880M bring 4k video and double a laptop's runtime, writes Agam Shah

Laptops will get console-like gaming framerates and run for up to twice as long with nVidia's GeForce GTX 800M mobile graphics processors.

The GeForce GTX 860M, 850M, 840M and 830M GPUs are up to 60 percent faster than their predecessors, according to nVidia. Built on the Maxwell architecture, the GPUs will go into laptops less than 22mm thick.

nVidia has also unveiled the GTX 870M and 880M high-end graphics processors, which are based on the older Kepler architecture but have been clocked up for bulkier enthusiast laptops. The company put Maxwell in lower-end GPUs because those products sell in larger volumes, said Kaustubh Sanghani, general manager of the mobile PC business unit at nVidia.

The company has already shipped desktop GPUs based on Maxwell, which will also be used in Linux-based gaming desktops better known as 'Steam Machines', due to ship later this year.

Most laptops today are sold with integrated graphics processors, which are good enough for casual gaming. The GTX mobile GPUs are embedded on a motherboard and will let laptops play some of the latest gaming titles, which are heavy on graphics and special effects.

PC makers will put the new GPUs in laptops, although it is not clear when the systems will ship. The fastest GTX 880M will go into MSI's GT70, Dell's Alienware 17 and Asus' G750, which have 17.3in screens. The GTX 870M will be in Razer's Blade laptop, while Lenovo's Y50 and Gigabyte's P34 will have the Maxwell-based 860M GPU.

Gaming PC maker Falcon Northwest will also be updating its laptops to include the new GTX 800M-series chips. CEO Kelt Reeves has yet to test the GPUs, but has high expectations.

"We'll be revving our laptop lines from 700- to 800 series, but don't expect any significant price changes. Hopefully the massive performance-per-watt increases shown by the first Maxwell desktop cards will be as good on the mobile side," he said.

Improved framerates

Games such as Assassin's Creed IV, Black Flag and Arkham Origins can be played at a 1080p resolution with the 850M and 860M, and at higher framerates with the 870M and 880M. The 860M, 870M and 880M can render graphics at a 4k resolution of 3840x2160 pixels, but laptops with 4k displays are not yet available.

On an 860M-equipped laptop nVidia measured 2 hours 11 minutes of gameplay time for Borderlands 2 at 30fps, 1080p – that's almost twice the battery mileage compared to predecessors, Sanghani said.

The power efficiency comes partly from a new feature called Battery Boost, which can adjust GPU operations depending on a game's requirements. Battery Boost balances performance and power consumption by assessing each game. The adjustments kick in once a game starts.

As on the PS4, laptops with the GPUs will be able to record gameplay through ShadowPlay. This can then be broadcast live or uploaded to the Twitch.tv gaming website. Games can also be streamed wirelessly over a home network to nVidia's Shield handheld gaming console, which has an HDMI port and can connect to an HDTV.

The 850M has 640 cores and is 60 percent faster than its predecessor, the 750M, according to nVidia. The 860M has 1,152 cores and is 40 percent faster than the older 760M. The Kepler-based 870M has 1,344 cores and is 30 percent faster than the 770M, while the fastest performing 880M has 1,536 cores and is 15 percent faster than the 780M. The clock speeds can be boosted depending on the performance needed.

nVidia's graphics business was strong in the most recent quarter, driven by desktop GPU sales, with overall GeForce GTX graphics processors growing by around 50 percent year on year. However, laptop GPU revenue declined slightly, in line with the overall decline in laptop shipments.

But Sanghani is expecting growth as the PC gaming market expands with the new chips and gaming titles coming out. ⊠

ASUS G750 with **nVIDIA GEFORCE GTX 860M**
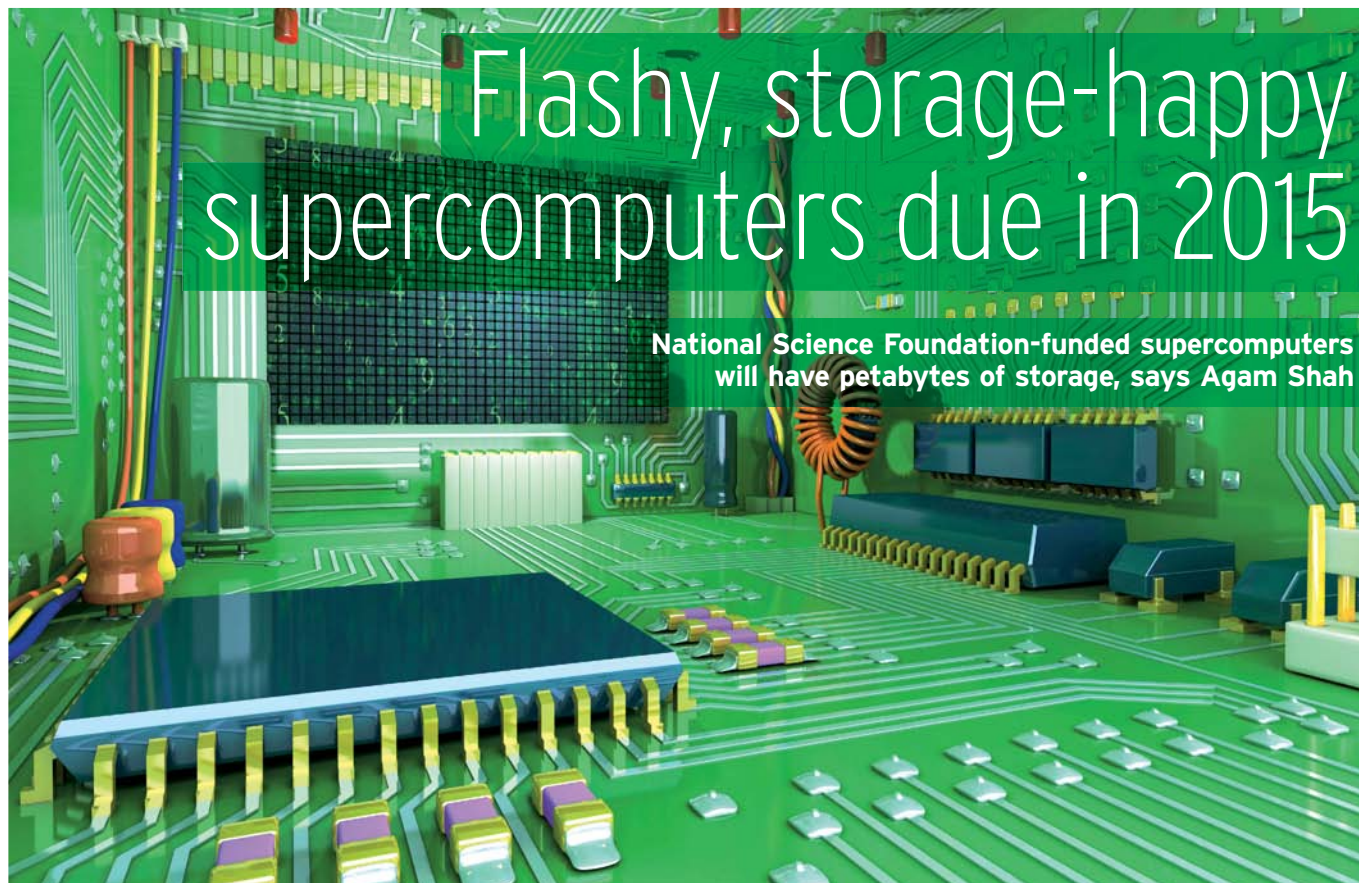
Flashy, storage-happy supercomputers due in 2015

National Science Foundation-funded supercomputers will have petabytes of storage, says Agam Shah

S upercomputing speed is typically boosted by adding more processors, but two systems funded by the US National Science Foundation due to go live in January 2015 will take an unconventional approach to speed calculations and analysis.

Arrays of memory and flash storage – totalling up to petabytes in storage – will be loaded on the Wrangler supercomputer at the University of Texas' Advanced Computing Center, and the Comet supercomputer at the University of California's San Diego Supercomputer Center. The supercomputers, still under construction, have high levels of storage relative to the number of processors.

The supercomputers will provide better throughput, in-memory and caching features, which could be a faster and more efficient way to solve complex problems, said NSF.

They will support research in disciplines such as economics, geosciences, medicine, earthquake engineering and climate and weather modelling.

NSF is requesting $7bn to fund scientific research, of which $894m is dedicated to research in areas such as software, chip manufacturing, semiconductors, cybersecurity and cognitive computing systems. NSF also funds the construction of supercomputers so scientists have access to computing resources for simulation and other tasks. The supercomputers are being built as part of NSF's Extreme Digital (XD) programme.

Compared to what NSF has funded in the past, the new servers have a different design, said Dan Olds, principal analyst at Gabriel Consulting Group.

Improved throughput

Processors and other computing resources already deliver high performance, but the real bottleneck has been throughput. NSF wants more sophisticated supercomputing designs so bits and bytes move faster between processing elements, Olds said.

"It has to do with the changing nature of high-performance computing," Olds said. "It wants to control massive data streams instead of handling batch jobs."

The Comet supercomputing is more "suitable for both high throughput and data-intensive computing," NSF said. "Its heterogeneous configuration will support not only complex simulations, but also advanced analytics and visualisation of output."

Servers are increasingly packing large arrays of DRAM for in-memory computing, which is considered beneficial for databases and other data-intensive applications. SSDs are being used as a cache layer on which data is temporarily stored before being processed. SSDs are also becoming the primary storage medium at the expense of hard drives, which are slower and more power-hungry.

Comet will be built by Dell, and will have a design attractive to processing tasks typically handled by up to 1,024 processor cores. It will have a massive 7PB array of high-performance storage and 6PB of "durable storage for data reliability", according to SDSC. The supercomputer will use Intel Xeon chips and nVidia graphics processors. Each node will have 128GB of memory and 320GB of flash. There will also be special nodes with 1.5TB of memory.

"The Comet project is designed to efficiently deliver significant computing capacity (two petaflops) for the 98 percent of research that requires fewer than 1,000 simultaneous and tightly coupled cores to be conducted," NSF said.

SDSC is not saying much more about Comet as it goes through validation and deployment, said Jan Zverina, director of communications and media relations.

TACC's Wrangler will combine 120 servers with Intel-based Xeon server chips codenamed Haswell. It was touted by NSF as the "most powerful data analysis system allocated in XD, with 10 petabytes (PB) of replicated, secure, high-performance data storage". It will have 3,000 processing cores dedicated to data analysis, and flash storage layers for analytics. The supercomputer's bandwidth will be 1TB/s and 275 million IOPS.

NSF's research priorities are relevant to the problems faced in computing today, Olds said, adding that the government agency is heading in the right direction on supercomputer development. ⊠

Cars get connected, and talkative

Augmentation Industries and Deutsche Telekom want to take advantage of myriad onboard computers, reports Mikael Ricknäs

C onnected cars were big news at this year's CeBIT tradeshow, with driverless cars and products to communicate with the vehicles' onboard computers on display. But cooler apps are needed for the sector to take off.

The first step on the connected car journey is getting cars hooked up to the internet. While manufacturers have begun integrating 4G mobile broadband, it will take a long time before the majority of cars have integrated mobile-broadband connections.

For people who can't or don't want to use their smartphone as a hotspot, Vodafone Germany has launched an LTE/Wi-Fi hotspot powered by a car's cigarette lighter. The operator has begun testing in Berlin, where selected taxi drivers are using the product.

Gathering information

At CeBIT, Deutsche Telekom presented a retrofit kit for cars that transmits vehicle status information to the driver's smartphone as well as to their car dealer. An adaptor is plugged into the onboard diagnostics system to access data such as mileage, battery voltage and brake status, which is then sent via Bluetooth to an app on the driver's smartphone.

The app also sends the data to servers hosted by Deutsche Telekom, which analyses the info and transmits relevant results to dealers. They can, in turn, use the app's message function to send tailored offerings.

It isn't just big car manufacturers and telecom operators that are interesting in this burgeoning sector. German Augmentation Industries participated in the Code_n startup contest at Cebit, where the company showed its Mobile Assisted Driving (MAD) system, which aims to take advantage of data from onboard computers.

The company has also developed a unit that can be plugged into the onboard diagnostics system to collect information. The information is sent to a back-end system or an app on a smartphone, CEO and founder Alexander Marten said.

The system would be a good fit for fleet management, used by leasing companies and logistics companies to keep track of cars. For the ordinary car owner it becomes easier to keep track of the car's status, thanks to the app's ability to translate complex error codes into something that's easy to understand.

Next year Augmentation Industries aims to add the ability to make eCalls, which are intended to bring rapid help to cars anywhere in the EU following an accident.

The system comprises open APIs and an SDK that will allow developers to use data from the car in their apps. Just like popular apps have helped sell hundreds of millions of smartphones, Marten hopes developers will do the same for connected cars.

The product will ship in June, with the companion app available for iOS and Android. In time a 3G version will also be available.

Driverless cars

These days every tradeshow needs a demonstration of a driverless car. At the CeBIT opening ceremony, Volkswagen CEO Martin Winterkorn demonstrated a prototype dubbed James 2025.

The demonstration showed how the driver can take part in a video conference while travelling on a smart highway. The driver hands over control to the car by simultaneously pushing two buttons on the steering wheel.

Getting driverless cars on the road is a big technical and marketing challenge. A new survey commissioned by the Institution of Mechanical Engineers in the reveals that 56 percent of those polled don't want to relinquish the controls of their car; just 20 percent said they would.

The survey found that older people were the most sceptical – only 13 percent of 55- to 64-year-olds backed the idea of driverless cars, compared to 31 percent of people aged 25- to 34 years old.

Manufacturers must also convince car buyers that they and their partners won't invade customer privacy. Winterkorn expressed his concerns, saying that manufacturers need to be as responsible about the use of personal data as they are about driver- and passenger safety.

Winterkorn called for self-regulation based on common standards on data privacy used by all manufacturers. ⊠

CeBIT is dead. Long live CeBIT
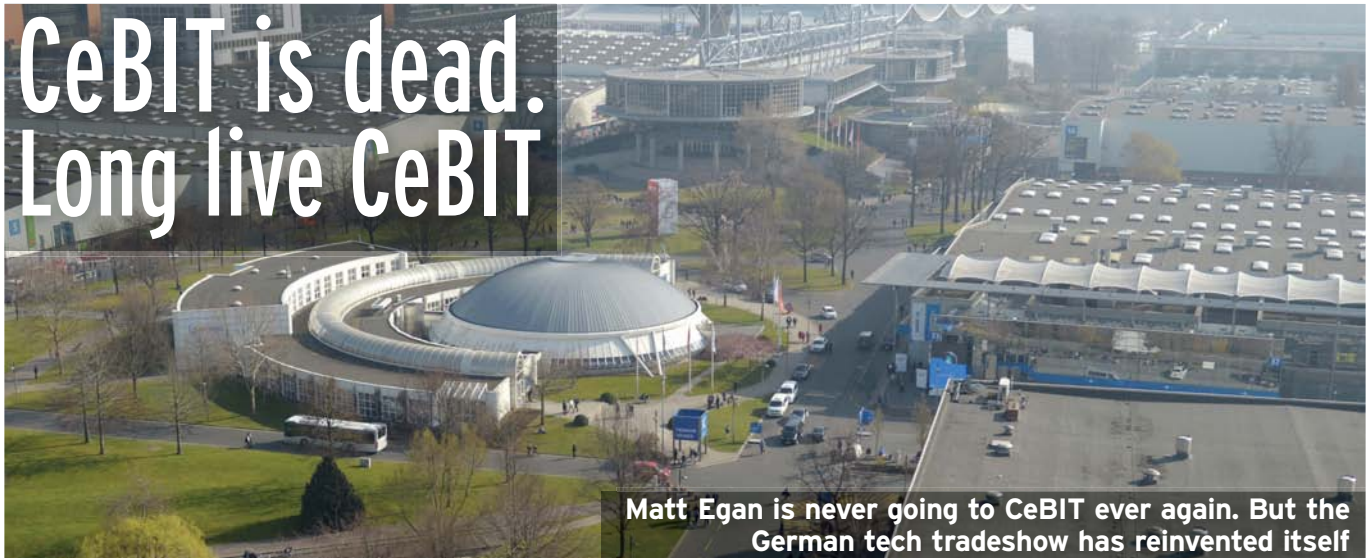
Matt Egan is never going to CeBIT ever again. But the German tech tradeshow has reinvented itself

CeBIT used to be inked into the calendar of every consumer tech journalist. Yes, this was in part because if you didn't book accommodation far enough in advance you'd end up (as I once did) sharing a waterbed with a colleague. And, yes, because the start of CeBIT meant the start of spring as you flew out of the UK, and the start of a new ice age as you landed in Germany. But mainly because it mattered. CeBIT was the only annual computer show worth visiting that was within a shorthaul flight.

I can't remember exactly how many times I went, but it was a few. Enough at least to know my way around Hanover and the world's largest exhibition centre. Long enough for me to know how to find the Irish bar in town, and to know that the one good restaurant in down-town Hanover is not the one everyone recommends. And, yes, long enough to top off the waterbed year with the years my flat in 'Hanover' was in fact 100km away in Hamburg, and the time I had to sleep for three nights in a baby's cot. (The baby wasn't present.)

That is no longer the case. Thankfully. This year we've sent out our pool reporters to cover CeBIT for general tech news, but the days are long gone when *PC Advisor* would send a team of editors to cover CeBIT. There are reasons for this both good and bad.

Why CeBIT died

CeBIT became less interesting for *PC Advisor* because the world got smaller, media got faster and tech went mainstream. Already this year we have covered CES and MWC. Both are relative newcomers to the tech event scene, and both cover areas that wouldn't traditionally have been considered either 'PC' or 'Mac'.

But computers are now consumer goods; smartphones and tablets are computers. Everyone cares about tablets, laptops, TVs and smartphones, and they all feature heavily at CES and MWC.

Not only do we not need a show that is strictly about computers, we actively avoid being pigeon-holed that way. *PC Advisor* offers advice on personal computing devices. We're in the consumer tech game now, as are all our readers.

Crucially, those shows happen earlier in the year than does CeBIT. So the relevant new products, and products that are in development, have often already been shown at CES and MWC by the time CeBIT comes along. And this is where the size of the world and the speed of the net makes a difference.

When our sole business was in making print magazines, there wasn't such a rush to get the latest information. When you publish only once a month you can wait for a US contributor to write about a product seen at CES. Or just miss out one mag and get the words and pictures in time for the next issue.

Now that we publish every hour of every day that's no longer an option. You don't have to be the first, but we certainly couldn't wait even a day to write about the Samsung Galaxy S5 after it launched at MWC.

Fortunately, travelling to multiple shows is no longer the trial it once was. Global travel is much cheaper and less time-consuming than it used to be, and so we can go to Vegas in January and cover CES mob handed. Once we may have waited until CeBIT to see the same kit launched or announced 10 weeks before in the States.

Why CeBIT lives on

All of which explains why CeBIT is no longer so important for *PC Advisor*. But don't believe the stories you'll read about CeBIT being on the downward slope to oblivion. There's life in the old dog yet.

This year around 3,500 exhibitors from 70 countries were at the messe. Around 300,000 people visited. It's not quite the 800,000 of the show's peak in the 90s, but it's not to be sniffed at. And some of those attendees are world leaders.

The low point for CeBIT came in 2007 (I know, I was there), when 'only' 200,000 visitors attended the show. CeBIT has bounced back, in part by setting its sights lower. (In 2007 one of the most striking things was the multiple halls that were only a quarter full. The following year they just didn't open as many halls.)

But CeBIT's main response to the consumerisation of tech squeezing its traditional market has been simple and effective. It now bills itself as 'New Perspectives in IT Business'. It is focused on a string of high-profile keynote sessions from world leaders and corporate execs. The flavour of the show is understanding- and discussing B2B tech trends. As such it is sufficiently different to other shows that South By South West can run at the same time without impinging on CeBIT's territory.

(It's also wonderfully German. This is a nation that likes its tech information to be technical and sober. You see a lot of print magazines about tech in Germany, and very few of them contain photos.)

Rather than attempting to compete with the likes of CES or MWC – or even Computex with its focus on components – CeBIT has retrenched into the world of computing in business. As such it has saved itself a specialist and technical niche. A niche that is potentially more lucrative than are those consumer-tech harlots (B2B media is more valuable because (a) it's harder to attract an audience and (b) a single sale of a server generates a lot more profit than does a single sale of a smartphone).

It should mean that CeBIT has a bright future. More importantly it should mean that I never again have to pound the snowbound streets of Hanover or sleep in a baby's cot. Although, you know, each to their own. ⊠

Rise of the sub-£100 smartphone

Get ready for an influx of cheap smartphones, says Matt Egan

Recently we visited the MWC 2014 tradeshow: the most important, scene-setting week of 2014 in terms of the smartphone market. Trawl the web and you'll find a bunch of articles talking about trends in the mobile world as evidenced by MWC. Some of these include ultra-HD tablets and phones, wearable tech and improved audio for smartphones and tablets. These all speak to the same thing: the requirement to get wealthy western punters to shell out for newer, more expensive tech.

We saw multiple HD+ tablets, capable of showing off super-HD content, and plenty of phones with better-quality speakers and audio compression. They offer marginal improvement to the mobile experience, and greater profits for manufacturers. Meanwhile, no-one needs a smartwatch, but the big guys are all betting the farm that you'll buy one.

These trends relate to-, but are separate from what's really going on in the smartphone world: the rise of the budget smartphone (aka the lowering of the price of good-quality smartphones).

In essence, in the developed world everyone who wants a smartphone likely has one, so any growth to be found in the UK is in sub-£150 phones for those who use email, internet and Facebook, and could be persuaded to upgrade. There's also a market for second smartphones – rough-and-ready connected devices for those times when you need to be connected, but you don't want to risk your £600 phone.

More critical yet is the rest of the world: in developing nations mobile phone connectivity is better than is fixed-line broadband, and there is going to be an explosion in smartphone use. The major players are all jostling for this market, and UK smartphone buyers will likely benefit.

Take a trip down to the high street and look into Carphone Warehouse, Phones4U or any of the other phone stores. You'll see the latest iPhone, Samsung Galaxy, Nokia Lumia and Sony Xperia handsets, and literally dozens of cheap smartphones and feature phones. Ask any salesperson working in those stores and they'll tell you that the £100 Nokia Lumia 520 walks out of the door at a rate of knots. Meanwhile rubbish Android phones such as the Samsung Galaxy Ace proliferate, and the major phone makers have cottoned on.

At MWC we saw multiple phones in the sub-£100 sphere: Nokia announced five of them; then there's the Firefox phone and the Acer Liquid Z4. These follow hard on the heels of such budget bargains as the staggeringly good-value Motorola Moto G, a snip at £129. Meanwhile, Lenovo has purchased Motorola with the intention of targetting global markets with cheap, quality smartphones.

Not all of these will make it to lucrative western markets such as the UK, and none of them is entirely aimed in our direction. But some, if not most of them, will be on sale over here, aimed at attracting first-time smartphone- and second handset buyers. ☒

Google eyes up smartwatch category with Android Wear

Google has announced a smartwatch OS. Chris Martin explains what is Android Wear and on which devices you'll see it running

Google has announced Android Wear – a version of its Android smartphone- and tablet operating system optimised for wearable tech. Here's everything you need to know about Wear.

What is Android Wear?

Android Wear is Google's project that "extends Android to wearables", starting with smartwatches. If you keep up to date with technology, you'll know that some smartwatches on the market already run Android – for instance, the Sony Smartwatch 2 and the original Samsung Galaxy Gear.

However, these existing smartwatches rely on adapted versions of the full Android OS. In Android Wear, Google is pushing a system specifically designed for wearables.

"Most of us are rarely without our smartphones in hand. These powerful supercomputers keep us connected to the world and people we love. But we're only at the beginning; we've barely scratched the surface of what's possible with mobile tech. That's why we're so excited about wearables – they understand the context of the world around you, and you can interact with them simply and efficiently, with just a glance or a spoken word," said Google.

What features has Android Wear?

Google says that smartwatches with Android Wear will be able to give users useful information when they need it most.

"Android Wear shows you info and suggestions you need, right when you need them. The wide variety of Android applications means you'll receive the latest posts and updates from your favourite social apps, chat from your preferred messaging apps, notifications from shopping-, news- and photography apps, and more," said Google.

Android Wear also gives straight answers to spoken questions, continued the firm. "Just say "Ok Google" to ask questions,

such as how many calories are in an avocado, what time your flight leaves, and the score of the game. Or say "Ok Google" to get stuff done, such as calling a taxi, sending a text, making a restaurant reservation or setting an alarm."

Wear can also help you to monitor your health and fitness. "Hit your exercise goals with reminders and fitness summaries from Android Wear. Your favourite fitness apps can give you real-time speed-, distance- and time information on your wrist for your run, cycle or walk," said Google.

Finally, the OS can provide a key to a multiscreen world. "Android Wear lets you access and control devices from your wrist. Just say "Ok Google" to fire up a playlist on your phone, or cast your favourite movie to your TV. There's a lot of possibilities of which developers can take advantage," it said.

When is Android Wear coming out?

Devices running the Android Wear operating system will arrive on the market this year. The first smartwatch will be from LG (pictured below), and will arrive before the end of June.

Also expected this summer is Motorola's Moto 360 smartwatch, which the company claimed would go on sale this summer in the US, with other territories shortly after.

Developers are already able to download a Developer Preview of Android Wear from Google, which will allow them to begin work on tailoring existing app notifications to Android Wear.

"Because Android for wearables works with Android's rich notification system, many apps will already work well. Look out for more developer resources and APIs coming soon," said Google.

LG G WATCH

How can I get one?

Details of from where you can buy an Android Wear smartwatch are thin on the ground right now, but we expect them to be available from UK retailers such as Amazon. It's also possible that Google will promote and sell them on the Google Play store.

Who will be making them?

As we mentioned, the first two smartwatches running Android Wear will come from LG and Motorola. Google is also working with partners including HTC, Samsung and Asus to produce more smartwatches.

In addition, Google is partnering with chip makers Broadcom, Imagination, Intel, Mediatek and Qualcomm, plus fashion brands such as the Fossil Group.

LG G Watch

LG has confirmed that it is one of Google's 'lead partners' for Android Wear and the G Watch looks set to be the first Android Wear smartwatch. However, it has yet to confirm the specification of this smartwatch.

"The opportunity to work with Google on the G Watch was the perfect chance for LG to really pull out all stops in both design and engineering," said Dr Jong-seok Park, president and CEO of LG Mobile.

"With the G Watch, LG is continuing the milestones it's set in wearables, following in the footsteps of the world's first 3G Touch Watch Phone in 2009 and the Prada Link in 2008. LG is confident that a well-designed device has the potential to take the smart wearable market by storm," Park added.

Motorola Moto 360

Motorola said of its Moto 360 smartwatch, due to launch in the US this summer: "It's time for a watch that looks and feels great, and gives you the information you need, when you need it."

MOTOROLA MOTO 360

As you can see from the images (above and below), the Moto 360 looks like a regular wristwatch with its circular design and display. Motorola said that alerts and notifications will be subtle and users can check their emails, who's calling, what time is their next meeting and any social posts with "just a twist of the wrist".

"The wristwatch has been through several evolutions since it first became a popular fashion accessory more than 100 years ago. From mechanical- to electronic movements, analogue- to digital faces, the wristwatch has been reinvented several times over, but the basic design has endured for a century because of its elegance and usefulness 'at a glance.' Our vision for Moto 360 was to celebrate that history as we reimagined the wristwatch for the future," said Motorola.

Like the LG G Watch, no specifications for the Moto 360 have been confirmed by the company. To get the latest updates you can sign up at Motorola's site or keep an eye on our news coverage at pcadvisor.co.uk/news.

How much will Android Wear smartwatches cost?

It's very early days for Android Wear and smartwatches running the operating system, so prices have yet to be confirmed. Prices will vary from device to device, but are likely to be similar to those of existing designs – in the region of £100- to £300. ⊠

Samsung Galaxy S5

Smartphone

Samsung is back with the latest version of its popular S-series smartphone. The Galaxy S5 retains the style of the S4, but adds a dust- and waterproof coating, plus a fingerprint scanner and - uniquely - a heart-rate monitor.

£549 inc VAT

samsung.com/uk

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GSMA. WORLDCONGRESS

Sony Xperia Z2 «

Smartphone

Sony has updated its flagship smartphone with the Xperia Z2, now with a larger 5.2in screen plus the ability to shoot 4k video. It's also equipped with the latest Qualcomm Snapdragon 801 processor.
£599 inc VAT
sonymobile.com/global-en

» HTC One M8

Smartphone

HTC's One M8 appeared after MWC at the end of March. It's an updated version of the original HTC One, with an improved design, a microSD card slot, Snapdragon 801 chip and BoomSound stereo speakers. A new Duo Camera lets users refocus images even after the event.
£550 inc VAT
htc.com/uk

Huawei MediaPad X1
Phablet
It might look like a 7in tablet, but the MediaPad can also make calls and send and receive text messages. The X1 has a thin, iPhone-esque design, and Huawei claims that it can last up to 25 hours on a single charge – and even charge other devices.
€399 (£330)
huaweidevice.co.uk

YotaPhone (Mk II)
Smartphone
The YotaPhone only recently went on sale, but the Russian firm has already unveiled its successor. The dual-screen smartphone now has a 4.7in E Ink screen with curved sides and full touch control. The firm touts a battery life of up to 50 hours.
Price TBC
yotaphone.com

Samsung Gear Fit
Fitness tracker/smartwatch
One of three new devices from Samsung running the Tizen OS, the Gear Fit is available in a range of colours and features a curved Super AMOLED display. On the underside is a heart-rate monitor.
£199 inc VAT
samsung.com/uk

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Sony Xperia Z2 Tablet »

Tablet

This new Z-series tablet from Sony is ridiculously thin at 6.4mm (thinner even than the iPad Air), yet it squeezes in a Snapdragon 801 chip and retains its dust- and waterproof coating.

£399 inc VAT

sonymobile.com/global-en

» LG G2 mini

Smartphone

LG has announced a mini version of its flagship G2. It has a smaller 4.7in screen, but retains the RearKey, look and feel of its bigger brother. The mini is available in four colours and features a removable battery and a microSD card slot.

Price TBC

lg.com/uk

Nokia X «

Smartphone

Just ahead of its Microsoft buyout, Nokia has launched three Android-powered smartphones, including this X model. Although it runs Android, the interface is heavily customised to look like Windows Phone, and there is no access to Google Play. The device itself has a 4in screen and just 4GB of internal storage. Turn to page 18 for our thoughts on Nokia's new Android family and why it really shouldn't have bothered.

£100 inc VAT

nokia.com/gb-en ⊠

Specification
13.3in (1920x1080) gloss IPS touchscreen; 1.6GHz Intel i5-4200U (2.6GHz Turboboost); Windows 8.1 (64-bit); 4GB DDR3; 500GB solid-state hybrid drive (5400rpm); Intel HD Graphics 4400 & nVidia GeForce GT 735M (1GB); 1x HDMI 1.4; 802.11b/g/n; Bluetooth 4.0; 2x USB 3.0, 1x USB 2.0; SDXC card slot; 1.3Mp webcam; headphone socket; 36.4Wh lithium-polymer battery; 324x255x18mm; 1.65kg

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

★★★★☆

LAPTOP
Acer Aspire S3-392G

Acer's S3 has always been one of the more affordable Ultrabook models on the market, partly because it used a conventional hard drive rather than more expensive solid-state storage. This latest model is a little more expensive than some of its predecessors, but its performance has been enhanced with a hybrid disk/flash storage drive and – unusually for an Ultrabook – a dedicated nVidia GPU.

The brushed-metal aluminium design of previous models has been changed – probably to fend off the frequent comparisons with Apple's MacBook Air (tinyurl.com/mLLqLzj) – and the screen is now backed by the same distinctive white panel as Acer's S7 range.

This Aspire S3 looks very smart and stylish. It measures just 18mm thick and weighs 1.65kg, so it's easy to carry around when you're on the move. Acer pays good attention to detail, too, with features such as the 'wobble-free' hinge that holds the screen firmly in position as you adjust the viewing angle.

You won't need to do that very often, though, as the 13.3in IPS panel is bright and colourful, and provides excellent all-round viewing angles. The screen is touch-sensitive and we were also pleased to see that the low 1366x768 resolution of last year's model has now been updated to full-HD's 1920x1080. This works very well for web browsing and streaming video, as well as business presentations or just browsing your photo library.

The speakers were also a pleasant surprise – the bass could be a little stronger, but the S3 produced a firm sound with enough volume that we had to turn it down on occasion as it was too loud for use in our office.

The keyboard may not suit everyone, though. The key pitch – the distance between the centre points of adjacent keys – is a standard 19mm, but the top row of Function keys is missing altogether.

This means that some keys – such as Esc – have been squeezed on to other rows, which results in the left-hand Caps Lock and Shift keys being unusually small. This gives the keyboard a rather cramped feel, and isn't helped by the way that other functions, such as the Mute and Wi-Fi controls, are scattered to unfamiliar locations around the rest of the keyboard.

We were also disappointed to see that the S3 doesn't include any ethernet port. Instead, it relies on Acer's proprietary Convertor Port, which requires a £20 adaptor in order to get fully wired.

This latest model is available in a single configuration at the moment; priced at £900 with a Haswell-generation Intel Core i5 processor running at 1.6GHz, 4GB of memory and 500GB solid-state hybrid drive (SSHD). The Seagate hard disk runs at the usual 5400rpm, and is backed up by a 16GB solid-state module that does a very effective job of boosting performance.

As a result, the Aspire S3 scored a respectable 4282 points when running the general-purpose PCMark 7 benchtest. That will be more than adequate for most routine computing tasks, such as web browsing or running Microsoft Office.

The increased performance of the SSHD was noticeable in other areas, too, as the S3 woke from sleep in just a couple of seconds and took just 10 seconds to boot into the Start screen, when using the default Windows 8 'fast start' option.

Graphics performance is above average for an Ultrabook, too, as the S3 includes an nVidia GeForce GT 735M with 1GB of video memory. That's in addition to its integrated Intel HD Graphics 4400.

The nVidia graphics allowed the S3 to hit a playable 34.5fps when running our Stalker test at 1920x1080-pixel resolution. Dropping down to 1280x720 saw that increase to a decent 62fps. It's no gaming rig, but it will be able to handle some casual gaming action.

The one real disappointment was the relatively short battery life. It did manage five hours (300 minutes) of streaming video, and less intensive use should allow it to reach to Acer's quoted maximum of six-and-a-half hours. To be fair, that sort of performance would have been impressive a year ago, but it falls conspicuously short of the 12 hours and longer offered by the best Haswell-based laptops.

Verdict
The Acer Aspire S3 has a lot going for it, including an attractive, slimline design and high-quality IPS display. It also provides good performance for the money, thanks to its hybrid storage drive and nVidia graphics. ⊠ **Cliff Joseph**
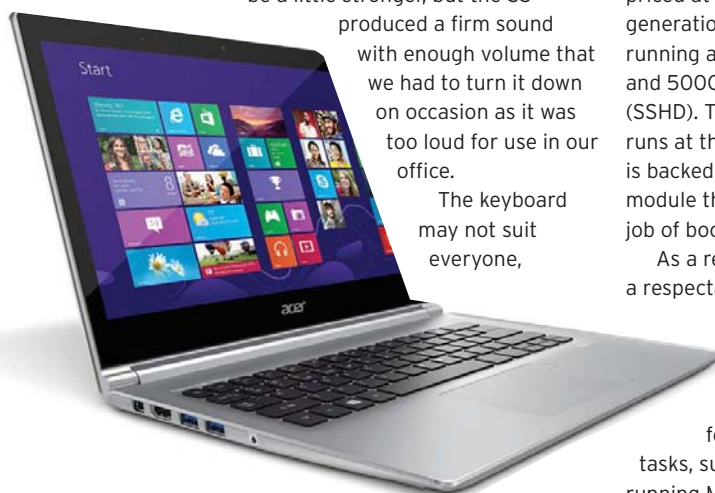
Specification
15.6in (1366x768) glossy TN display; 1.8GHz Intel i5-3337U (2.7GHz Turbo Boost); Windows 8 (64-bit); 6GB DDR3 SDRAM; 750GB hard drive (5400rpm); nVidia GeForce GT 710M (1GB RAM); 802.11b/g/n; 1x HDMI; 1x VGA; 2x USB 3.0; SDXC card slot; gigabit ethernet; 720p webcam/microphone; SuperMulti DVD burner; headphone/mic socket; 37Wh lithium-ion battery; 380x251x33.6mm; 2.4kg

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★½☆
Value: ★★★★☆

★★★½☆

LAPTOP

Asus X552CL

You're not going to get a full-on gaming rig for under £500, but the X552CL from Asus is a good attempt at providing respectable graphics performance at a competitive price.

Promoted rather tactlessly as a 'notebook for the masses', the 15.6in Asus X552CL keeps the price down by using older Ivy Bridge processors from 2012 rather than the latest 2013 Haswell chips.

Prices start at around £450 for a model with an Intel Core i3 processor, but our review unit typically costs £500 and has a 1.8GHz Core i5 chip, 6GB of memory and 750GB hard drive. And alongside the integrated Intel HD Graphics 4000, the X552CL also includes a discrete nVidia GeForce GT 710M to provide a 3D graphics boost.

That's a respectable core specification for a laptop in this price range, and the main real weakness here is the use of an ageing hard drive. This is definitely a little sluggish at times, particularly when first starting up.

A cold boot of the X552CL took 35 seconds before arriving at the tiled Windows 8 Start screen, followed by a further 15 seconds of cursor-spinning before the laptop was ready to start launching applications and start work. The Windows 8 fast-start option, which restores from a hibernated state, shaves about 15 seconds off that time. The X552CL wakes from sleep in just a couple of seconds, so getting started isn't too frustrating.

A score of 2700 points when running the general-purpose PCMark 7 benchmarks is also respectable for a laptop with a hard disk, and the X552CL will be able to handle such basic tasks as web browsing and running Microsoft Office. The healthy 6GB of memory will also help if you need to do the odd spot of photo- or video-editing.

And, of course, the Asus earns bonus points for including a dedicated graphics card. The nVidia GT 710M is an entry-level GPU, but it allowed the X552CL to hit 50fps when running our Stalker gaming test at 1280x720-pixel resolution. And if you don't mind turning off the DirectX 11 effects and anti-aliasing, it can also manage a playable 32fps when running the more demanding Batman: Arkham City at that resolution.

That's good performance for a low-cost laptop, but there are other aspects of the Asus that show a few signs of cost-cutting. The 1366x768-pixel resolution is a typical compromise at this price, and we aren't fussed about the lack of touchscreen controls.

Unfortunately, the screen's viewing angles are also limited – around 90 degrees both horizontally and vertically. It's fine for use on your own, but friends sitting beside you may not get a very good view when you're viewing your holiday snaps.

The laptop is solidly built, and the keyboard and trackpad are both spacious and comfortable to use. And thanks to the large air vent on the left-hand edge, the X552CL stayed cool and quiet even when we were running gaming tests with the nVidia graphics. It's well connected, too, with gigabit ethernet, HDMI and VGA video interfaces, and a pair of USB 3.0 ports.

It's relatively heavy, though, and the 15in screen and built-in DVD drive help bring the weight up to 2.4kg. Not much of that comes from the small 37Wh battery, though.

Even when switching to the integrated Intel HD Graphics 4000, we were able to get just three hours, 20 minutes of streaming video through the BBC iPlayer. That's a quarter of the battery life of the best Haswell laptops.

Verdict

The X552CL isn't perfect, and the limited viewing angles of the screen definitely leave room for improvement. However, it provides good performance for a laptop in this price range, and the inclusion of the GT 710M makes this one of the few budget laptops we've seen in recent months that can handle some decent 3D gaming action.
⊠ **Cliff Joseph**

Specification
15.6in (1366x768) glossy TN touchscreen; 1.6GHz Intel i5-4200U (2.6GHz Turboboost); Windows 8.1 (64-bit); 8GB DDR3 SDRAM; 1 TB hard drive (5400rpm); 802.11b/g/n; 1x HDMI; 2x USB 3.0, 2x USB 2.0; SDXC card slot; gigabit ethernet; 720p webcam/microphone; 8x DVD±RW; headphone; 65Wh lithium-ion battery; 376x259x33.3mm; 2.6kg

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★½☆
Value: ★★★★☆

★★★★☆

LAPTOP
Dell Inspiron 15R (5537)

The previous version of the Dell Inspiron 15R did well in our round-up of budget laptops last year. This model isn't drastically different, but adds a touchscreen for Windows 8 and brings things up to date with a new Haswell processor.

The basic design remains unchanged, with its 15.6in display housed in a sturdy plastic casing that's finished off with a smart metallic-blue tint. It feels more solid than most budget laptops, with a firm upper panel supporting the screen, and a spacious keyboard with moulded keys that feel comfortable when typing.

Our review unit included a touch-sensitive display, which pushes the price up from last year's price of £499 to £549. Other features include a 1.6GHz Haswell-generation Core i5 processor, 8GB of memory and 1TB hard drive.

Several other Inspiron 15R models are available, starting at just £379 for a model with a Haswell Core i3 processor and a regular display. There's also a top-of-the-range model that thoughtfully also omits a touchscreen and includes a Haswell Core i7 processor and an AMD Radeon HD 8670M graphics card for a competitive £599.

The touchscreen is something of a mixed blessing. It lets you use the tiled interface of Windows 8; but we suspect that many people would prefer to update the dated 1366x768-pixel resolution to a sharper 1920x1080 in order to make better use of the 15.6in screen.

To be fair, the image quality is still good, and the screen is bright enough and provides wide horizontal viewing angles. Vertical viewing angles are more limited, but the Inspiron 15R will still work well for watching video, browsing the web or showing off your photo collection.

The speakers lack bass, and the sound is loud and detailed enough to let you listen to some music without immediately reaching for your headphones. There's a built-in DVD drive, too, so you can easily watch films as well as streaming video.

Connectivity is good, as the Inspiron 15R includes gigabit ethernet for wired connections, HDMI, SD card slot, two USB 3.0 and two USB 2.0 ports. Our one complaint here is that the USB ports aren't clearly labelled, so it's not immediately obvious which are the high-speed USB 3.0 ports.

The Intel Core i5-4200U processor performed well. Its basic clock speed is 1.6GHz, compared to 1.7GHz for last year's Ivy Bridge edition, and it managed to increase its score in the PCMark 7 tests from 2834 to 2934 points.

That's a tiny increase, of course, and primarily reflects the somewhat sluggish performance of the computer due to its reliance on a slow hard disk. This proves to be the Inspiron's main real weakness, as even when using the Windows 8 'fast start' option, the laptop still takes a full 20 seconds to come out of hibernation into the main Start screen, followed by a further 20 seconds of cursor-spinning before it's ready to start launching programs and get down to work.

Fortunately, once the laptop is up and running, it feels smooth and responsive. The touchscreen controls respond well, and the Inspiron 15R is capable of handling Microsoft Office and web browsing. Its 8GB of memory will also help out with more demanding tasks such as photo- or video-editing.

Graphics performance is also improved, stepping up from 22- to 32fps when running our Stalker: Call of Pripyat benchmark at 1280x720 resolution. That will be fine for occasional casual gaming. There's that Core i7 model with the AMD Radeon graphics available for another £50, which will likely improve this, but by just a few frames per second.

And, of course, the Haswell processor provides better battery life too. There's a big improvement here, as the six hours of streaming video provided by last year's model now stretches to just over eight hours (495 minutes). That's excellent performance from such a low-cost laptop – which makes it all the more disappointing that the Inspiron 15R is so heavy.

Dell quotes a weight "starting at 2.35kg" for a model with a regular screen, while our review unit weighed in at a full 2.6kg. It's not the sort of thing you'll want to carry around with you, but at least the battery life might see you through a long journey on a train or a plane.

Verdict

It's a shame that the Inspiron 15R is so heavy, as it may limit it to occasional adventures in the outside world. However, it's well built and provides good performance and connectivity at a competitive price. Battery life is also excellent for a laptop in this price range, making the Dell a good choice for anyone that wants an affordable multi-purpose laptop for use at home or in the office. ⊠ **Cliff Joseph**
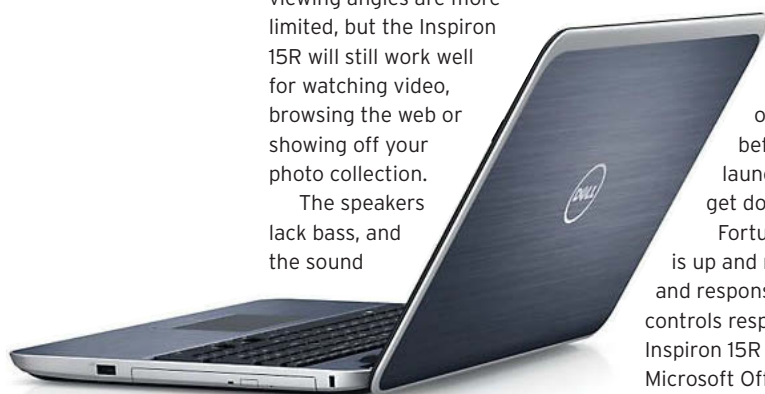
Specification
13.3in (1366x768) glossy TN display; 1.4GHz Intel Celeron 2955U processor; Intel HD graphics; 16GB SSD; 2GB DDR3 RAM; 2x USB 3.0; HDMI; SDXC card slot; 720p webcam; Bluetooth 4.0; Kensington Lock slot; 3.5mm headphone minijack; 454x268x56mm; 1.5kg

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

★★★★☆

LAPTOP
Toshiba CB30-102

Chromebooks are Google's vision of how a modern laptop should be. Generally they're lightweight, relatively cheap, and feature an interface optimised entirely for web use. This makes them excellent second computers, ones that you can hand to your children or take to places where a £1,000 Ultrabook might be too tempting a target for thieves. This mindset is bolstered by the small form factors that most models adopt, often sporting an 11.6in screen and tablet-level internal components.

Toshiba's first foray into Chromebook territory sees it opt for a 13.3in display and an Intel Haswell CPU – albeit one of the cheaper Celeron variants. This should give the unit a speed bump over its diminutive siblings and increase the battery life, while opening up possibilities for users who want more real estate on their screens.

One thing that the Toshiba Chromebook has in common with those that have come before is that it's made of plastic. No precision drilled aluminium here, but that's not a bad thing. The plastic shell is smart, featuring a dappled outer design, and has many elements of styling borrowed from the Apple MacBook Air (tinyurl.com/mLLqLzj). Ports are respectable, with two USB 3.0, HDMI, and SD card slots giving you ample ways to increase the 16GB of internal flash storage.

Lifting the lid reveals a clean, uncluttered layout. Silver, frosted plastic is the order of the day. A 720p webcam adorns the upper edge of the lid, while the one other aberration is a subtle Toshiba legend in the lower-left corner.

The large trackpad is responsive, executes two-finger multi-touch gestures efficiently, and is generally good to use. Keyboard response feels a little shallow initially, but you'll soon get used to it.

Some of the keys traditionally found on normal laptops are missing, though. For instance, there's no caps lock. In it's place is a Google search key. Hitting this opens a search box through which you can Google something online. It's a small change, but is incredibly useful.

The top row of keys also have dedicated online functions, such as Back and Forward buttons for navigating web pages, and the ever-useful Reload button. Of course, all of these functions are available on any browser, but the shortcuts make traversing the internet just that little bit smarter and negate the need in many cases for a touchscreen.

The LCD screen itself is perfectly usable, with a resolution of 1366x768, but it's lacking in detail when compared to the beautiful IPS display on the HP 11 Chromebook (tinyurl.com/kpftxmd). It can also be too reflective, but this issue is common with low-cost glossy screens, and for the most part it's good enough for writing, browsing, and watching HD video.

The machine feels responsive, helped in no small measure by the 1.4GHz Celeron processor and 2GB of memory, with less pauses and checkboarding when opening image-heavy sites than on some other models.

Battery life is uncertain at present, as our sample expired when it dropped to just 40 percent remaining. When we re-ran the test, we recorded a time of seven hours 25 minutes.

There are, however, important considerations to bear in mind when using a Chromebook. The first is that to get the best out of them, you need to live in the Google universe. Setting one up requires a Google account, and all of its features – Googlemail, Google Docs, Google Calendar, the Google Chrome browser – are ones provided by the advertising giant. Apps are available only from the Chrome Store, and you are expected to do most of your activities online.

There are also key programs that you can't use, such as Microsoft Office, iTunes, Skype and anything from Adobe. Alternatives exist, though, in the form of Google Play Music and Hangouts, which work well and can also be accessed by your iOS/Android device. You can even sync your iTunes library to Google Play Music, so your music collection is available from other devices, although this isn't the same as syncing your iPhone with iTunes.

Some myths continue to be pushed regarding how functional a Chromebook is when offline. Google Docs can create and edit documents without an internet connection, then sync them up once you find a Wi-Fi connection.

Verdict
For £250, the Toshiba CB30-102 is a great device if your creative and privacy needs are modest.
⊠ Martyn Casserly

Specification
HDMI dongle, requires web connection, powered via Micro-USB

MEDIA STREAMING DEVICE

Google Chromecast

After what felt like an interminable wait, Google has at last launched the Chromecast in the UK. The £30 device lets you make any TV 'smart' – all you need is a free HDMI input on your television and a Wi-Fi network. It's a low-cost competitor to Apple TV and allows you to stream media using smartphones, tablets, PCs and laptops. You can watch YouTube videos, Netflix, Vevo and other services, but on launch day, BBC iPlayer was the only UK catch-up TV service to support the Chromecast.

The device comes with a short HDMI extension cable in case you can't plug it in to your TV directly, and it's powered by an included Micro-USB cable and mains adaptor. However, if your television has a free USB port, you can use that to provide power instead.

There's no remote control since the idea is that you use your Android smartphone or tablet to decide what to watch and to pause, rewind or fast-forward the video. You can also use an iPhone or iPad running iOS 6 or later or – if you don't own a compatible device – you can use any PC, laptop or Google Chromebook and control things from Google's Chrome web browser.

Once you've installed the app (or Chrome extension) and connected the dongle to your router's Wi-Fi, you're ready to 'cast'. A pop-up box prompts you to choose a Chromecast, then returns you to the playback screen where you can tap the play button.

The video will buffer and begin playing on your TV. You can use the app's playback and volume controls, but you can also switch to another app to check your email, browse the web, play a game or anything else without interrupting playback.

There's no Chromecast interface as such. Apart from the 'home screen', which is presumably there just so you know the Chromecast is working, everything is controlled from a companion device's screen. 'Casting' is a somewhat misleading term since, for

the majority of the time, video isn't being sent from your smartphone or tablet. Instead, the app merely sets up a stream from the internet directly to the Chromecast. At least that's the way it worked in most of the apps we tried, including YouTube, iPlayer and Netflix.

The Chromecast button appears in Netflix for iOS and Android, too, and works like a charm. Once a video is playing, you can put your phone or tablet to sleep to save battery life, and still pause the playback from the lock screen, or pick up the controls from another device on the same Wi-Fi network.

Google's Play Music and Play Movies & TV apps on Android are also supported and let you cast content you've bought or rented from the Play Store. We were unable to play albums that we'd bought from Google Play, though – we tried playing both music that was downloaded to our smartphone as well as songs stored in Google Music, but nothing worked. The album art appeared on the TV briefly, but was then replaced by a ''cannot play side-loaded music'' error message.

Strangely, there's no way to cast photos and videos from your camera roll to your Chromecast, whether

you're using an iPhone, iPad or Android device. Third-party apps such as AllCast can do this but when we tried the free version, there was a 15 to 20-second delay before a photo we'd tapped was shown on screen. Videos wouldn't play at all.

Video and audio quality will depend on the source video. The worst-quality YouTube videos naturally look awful on a big-screen TV, but good-quality 1080p footage looks pretty good. The Chromecast supports 5.1 surround sound, but since audio is output through the HDMI connector, you'll need a TV with an optical or coaxial S/PDIF output, which is connected to a suitable surround-sound amp and speakers in order to hear multichannel audio. Similar to video quality, the availability of 5.1 sound will depend entirely on whether the video you're playing has a 5.1 soundtrack.

Verdict

The Chromecast is cheap and easy to use, but there aren't many apps that support it yet. This situation is bound to change over the coming months, but for now you might find your existing smart TV offers more. ⊠ **Jim Martin**

Build: ★★★★☆
Features: ★★★½☆
Performance: ★★★★☆
Value: ★★★★½

★★★★☆

PC ADVISOR
RECOMMENDED

Specification

50in LCD TV; 1920x1080 pixels; 1x Freeview HD, 1x Satellite DVB-S tuner; 7-day EPG; stereo speakers with 2x 8W amplifier; 4x HDMI, 1x SCART, 1x component (YPbPr)/composite; 1x SCART, stereo phono audio input; digital optical audio output; 3.5mm headphone jack; 10/100 ethernet, 802.11n Wi-Fi built-in/Wi-Fi Direct; CI slot; 2x USB 2.0; 51W avg power consumption; 656x1116x162mm; 13.6kg

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

★★★★⯪

SMART 3D LCD TV
Sony KDL-50W829

The 2014 iteration of Sony's W8 TV range is significantly different from that of 2013. A change in panel supplier has led to some significant picture differences and the brand's Smart TV portal user interface has been completely overhauled. The end result is a forward-looking LCD television that appears to offer remarkable value for money.

The Sony W8 – tested here in its 50in KDL-50W829 guise but also available as the 42in KDL-42W829 and 55in KDL-55W829 – is not a high-end proposition. At £900, it sits just above Sony's lookalike W7 models (available in 32-, 42- and 50in screen sizes) and below the fancy wedge-designed W85 and W95 models.

The design is suitably minimalist. A slim black metallic bezel barely seems wide enough to contain the image, while a thin mirrored stand bucks the trend for inelegantly wide feet; it certainly won't dwarf your AV furniture. The one sop to sensationalism is an illuminated logo and so-called Intelligent Core, which glows at the bottom of the screen.

Connections are generous and include four HDMI, component, phono AV, SCART, two USB (one of which records programmes from the single Freeview HD or HD satellite tuner) and ethernet. Wi-Fi is built in.

Image quality is outstanding. In terms of detail, colour fidelity and dynamics the W8 punches well above its weight and motion handling is superb. Adding a really crisp bite to pictures is Sony's X-Reality PRO picture processor, which works on any connected source. The processor delivers extra texture and nuance to images and seems to have no problems distinguishing between fine detail and unwanted noise.

Motionflow XR800 processing similarly does a cracking job of retaining full motion resolution. The set's Clear, Clear Plus and Impulse modes all deliver a full 1080-line moving image at 6.5ppf (pixels per frame) with no obvious artefacts.

Of course, the resulting hyper-clean high frame rate look isn't massively cinematic (unless you really dig the HFR visuals of *The Hobbit*), so for those that want a more traditional movie viewing experience, there's also a True Cinema mode. While this sacrifices moving-image resolution (we noted nothing much above 600 lines), it does give a pleasingly cinematic presentation.

The aforementioned panel supplier change has led to improved off-axis viewing (far less contrast is lost when you peer from the side), and a return of Active Shutter 3D technology (last year's models were Passive).

The 3D performance is fun, with pronounced depth; however, there is some crosstalk double imaging evident. It's unlikely users will find this trait distracting though for causal viewing. Two pairs of 3D glasses are bundled.

When it comes to the Smart user interface, the rather subtle approach of last season has been replaced with a more in-your-face Home screen apps. The user interface is a little slow to respond, so processing power is obviously not a core strength.

Still, there's a good deal of content on the Sony Entertainment Network (SEN), including BBC iPlayer, Netflix, YouTube and Sony's own Video Unlimited movie streaming service. Also new is the so-called One Flick Discovery search and recommendation engine. This comprises a set of horizontal thumbnail bars at the bottom of the screen which previews upcoming TV and radio shows, as well as filtering YouTube and movie content.

What makes the system particularly powerful is the ability to create customised bars with your own keywords. The W8 looks for hits from both broadcast TV and the internet. Keywords can be programme titles, genres or actors; the more generic the better the spread of results populating the Discovery bar. For example, if you have an ongoing penchant for baking, you can be sure whatever's cooking will be sitting within easy reach.

There's also neat interaction with Android mobile devices in the form of Screen Mirroring and content lobbing via Miracast.

The screen is DLNA compliant and will play AV content from local USB sticks and across a network. All popular file codecs and containers are supported, including MKV, AVI and WMV.

Despite its slender frame, the W8 sounds rich, thanks to a pair of ingeniously housed, downward-firing bass reflex speakers. If they don't deliver enough bass for you, Sony offers a dedicated wireless subwoofer priced at £250.

Verdict
Overall, the Sony KDL-50W829 can be regarded as something of a star. The interface could be more responsive, although priced at less than a grand, it delivers an uncompromising picture performance and well-rounded feature spec. Its Smart connected functionality is solid, although it lacks a full complement of catch-up services. We particularly like the new One-Flick Discovery search and recommendation bar. In all, the W8 is a superb Full HD flatscreen that won't break the bank. ⊠ **Steve May**

Specification
3LCD image engine; 1280x800 resolution; USB JPEG playback; horizontal/vertical keystone correction, Eco mode; integrated 2W sound system; HDMI, S-Video, phono AV, VGA, USB 2.0 A/B; Warranty: 24 months, lamp: 36 months or 3000 hours; 297x234x77mm; 2.4kg

Build: ★★★★☆
Features: ★★★☆☆
Performance: ★★★☆☆
Value: ★★★★½

★★★★☆

PROJECTOR

Epson EH-TW490

The EH-TW490 is a slim, gloss-black budget 720p projector (1280x800, 16:10 aspect ratio) aimed squarely at the gaming community, and intended for white wall use.

It's 2D-only, but given the modest price tag that's unlikely to put people off. Build quality is solid and at just 2.4kg it's eminently portable. A carry bag is included, making it easy to cart over to your mates.

Connections include HDMI, S-Video and composite for legacy kit, VGA and USB 2.0 A/B. The projector can read JPEGs from a thumbdrive, but not video files. Navigation through its menu is fast enough.

The EH-TW490 is a doddle to set up, with horizontal and vertical keystone correction to help square up the image, and top-mounted manual focus. The throw is generous, too. At 4m, you'll cast a 120in image; it's bright enough to go larger if you can squeeze more distance.

The dumpy white remote control offers access to the usual Epson user interface. There's a good selection of presets here: Dynamic, Living Room, Cinema and Game.

Like so many other sub-£1k multi-function projectors, there's a lo-fi sound system onboard. Driven by a 2W amp, it does the job when you want an impromptu gaming session, and can't be bothered with the faff of wiring up a proper sound system.

Operationally, the EH-TW490 is reasonably well behaved. An Eco lamp setting keeps fan noise down to around 29dB. However, opt for the Normal setting and the lamp's brightness intensifies, while the fan noise increases to a not inconsiderable 37dB. You'll quickly want to calm things down again.

There's no visual penalty running the projector in Eco mode, as it's so bright. Eco is said to extend the life of the 200W lamp, from 5000 to 6000 hours. With a rated best-in-class 3000 lumens output, the little device is perfectly usable in rooms with moderate ambient light.

Epson is the prime mover behind 3LCD projection, having produced over 90 million LCD panels over the past two decades. The HTPS (high-temperature polysilicon) TFT liquid crystal panels used in this model are notable for their vivid colours and comfortable, cinematic viewing.

Unlike rival DLP technology there are no niggling artefacts. There is a catch, though: the EH-TW490 just doesn't do blacks. As a

consequence, there's a limited sense of theatrical dynamics. This is fine if your source is a Wii U, but less so if you're planning a Werner Herzog marathon. A dynamic iris tries hard to add some shadow detail, but it's noisy and largely ineffectual. You'll end up turning it off.

As befits a budget 720p model, there are no fast frame rates or image interpolation tricks on offer, however, this isn't to the detriment of the projector nor a criticism.

The EH-TW490 handles motion well at 100/120Hz and 24Hz Blu-ray sources pan horizontally without judder. Of course, hooking a Sony PlayStation 4 up to a 720p projector doesn't deliver the crispness you'll see on a 1080p panel. Indeed, there are jaggies in the image which rather undermine that Next Gen vibe. Stick with the Xbox 360-era kit, though, and you'll be fine.

Verdict

For gaming, TV sports and bright, breezy movies, the EH-TW490 is good value for money. ⊠ **Steve May**

Specification
Single chip DLP projector; 1920x1080 resolution, 1080p; 2x HDMI; component video; composite; 3.5mm analogue audio; 297x234x77mm; 2.4kg

Build: ★★★★☆
Features: ★★★☆☆
Performance: ★★★★½
Value: ★★★★☆

★★★★☆

PROJECTOR

Optoma HD30

The Optoma HD30 is a sub-£1k 1080p home-entertainment projector that delivers an astonishing picture for the price.

The white cabinet with silver-grey trim is swish enough for coffee table use, and if you want to mount it on the ceiling, its compact dimensions won't draw too much attention.

Out of the packing box, setup is simple. The projector offers both horizontal and vertical image shift options to best align it with a free space on your wall, plus vertical keystone correction.

With a throw of 3.3- to 4.3m, you'll get a large 100- to 120in diagonal image. A quick tweak on the manual-focus ring and you're

all done; if you need to navigate the menus, they're relatively intuitive.

Connections include two HDMI inputs, composite video, PC VGA and analogue audio. There's also VGA out/monitor loop-through and RS232 control.

Dynamic range is quoted with a punchy 25,000:1 contrast ratio. In our tests, it showed convincing blacks with plenty of shadow. The projector employs a DarkChip3 DLP device beneath its bonnet, which is a familiar budget component.

Colour performance is candy rich, thanks to TI's BrilliantColor processing. This boosts primary hues and looks great with garish games and animation. If it's all too

lurid, there are a range of RGB calibration options that should make it possible to tailor images to taste.

Presets have most content types ticked – Cinema, Reference, Photo, Bright and User. There's no high framerate interpolation, but panning judder is negligible, so 1080/24 Blu-ray discs look extremely filmic.

Not only does the HD30 suit moody movies, it also looks sensational with the latest games consoles. The amount of detail to be seen in Killzone Shadow Fall on the PS4 is positively mesmerising.

What's particularly impressive, though, is the lack of overt rainbow fringing in the HD30's picture. Created by DLP's colour wheel, this

Specification
Single-chip DLP projector; 1920x1280-pixel resolution, 1080p capable; 3D, manual lens shift, eco mode; 1.5x zoom, integrated 10W sound system, backlit remote; 2x HDMI, component, phono AV, VGA D-Sub (640x480 to 1600x1200); 12-month lamp warranty; 330x257x128mm; 3.4kg

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

★★★★☆

PROJECTOR
BenQ W1300

The BenQ W1300 is a 1080p single-chip DLP projector specifically designed for home entertainment.

The design, with offset lens and forward-facing vents, is living room friendly. The white case is compact yet stylish. Build quality is excellent; there's nothing creaky or cut-price about the cabinet.

Setup is simplified by a manual lens-shift dial, located beside the focus ring, which allows for a considerable amount of movement within the lens housing. Used in conjunction with the 1.5x optical zoom, this projector is ideal for those using a white wall.

It's bright, too. BenQ rates the W1300's light output at 2000 lumens, which means you won't need to invest in blackout blinds. We found that while a moderate amount of ambient light will rob images of contrast, pictures remained clear and punchy.

Connectivity comprises two HDMI inputs, component and composite video and PC VGA. There's also a monophonic sound system onboard, useful for when you don't want to hook up a proper sound system.

Operating noise is slightly above normal. In general use, the W1300 growls along at 33dB; however, engage the Eco mode and the internal fan drops to 30dB. Lamp life is estimated at 6000 hours when restricted to this calmer setting; this halves if you use the lamp on its Normal setting.

Unfortunately, with 3D enabled (you get a pair of active shutter specs in the box), the fan spins into overdrive as brightness is cranked to maximum. The 3D presentation has depth, but can look washed out.

The overriding characteristic of single-chip DLP tech is almost clinical sharpness, and the W1300 delivers on that. It squeezes every ounce of detail from source material.

The colour performance is also notable, bolstered by TI's immodestly titled Brilliant Color system, which amps saturation for maximum pop. This works well for exterior scenes and animation.

The projector can also match the REC7098 colour gamut specification; although this industry standard is becoming increasingly irrelevant as wide colour gamut sources and processing become the norm. For enthusiastic tweakers, there's a fair amount of colour management control available, should you feel that way inclined.

The W1300's black level is generally good, certainly for the price point. You can find D-ILA and SXRD projectors, which go deeper and darker, but they'll typically sell for three times as much. The projector employs the familiar Texas Instruments Dark Chip 3 chipset, with contrast rated at 10,000:1.

We did, however, notice some low-level rainbow fringing on scenes of high contrast, a consequence of this single chipper's 6x colour wheel. While not overly intrusive, those susceptible will spot it immediately.

Verdict

The BenQ W1300 projector is at its best with HD sports. Its blistering detail and rich colour performance is spot on for live events. In daily use, though, we found the garish 3D and mild rainbow fringing are the only significant caveats. ⊠ **Steve May**

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multi-coloured flashing artefact can be particularly irritating to those sensitive to it; however, here it seemed virtually nonexistent. This gives the projector a definite edge over key DLP rival, the BenQ W1300.

Brightness is rated at 1600 ANSI lumens. While you can get away with gaming and TV viewing in partial ambient light, the Optoma HD30 offers the most contrast in full-blackout conditions.

The HD30 is 3D-capable and comes with two pairs of Active Shutter 3D glasses. A sync emitter (provided) has to be plugged into the projector for these to work. The stereoscopic performance of the HD30 can be considered immersive, with tangible image depth and few obvious crosstalk artefacts.

The Optoma can, however, prove exasperating in daily use. Slow to respond, it will routinely display an egg-timer graphic when asked to do something. Simply swapping inputs causes the projector to ponder the meaning of life before it locks on to an input.

As you might expect of a multimedia projector, there's a built-in sound system, but it makes for uncomfortable listening. The provision of SRS Wow audio processing doesn't help. The latter elevates dialogue, but makes the HD30 even more sonically fatiguing.

The HD30 is relatively quiet in use, though. The lamp-conserving Eco mode lowers fan noise to around 26dB. Lamp life in this configuration is listed at 6000 hours.

Verdict

Overall, the HD30 should be considered good value if you want a full-HD model that punches visually above its weight. ⊠ **Steve May**

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

★★★★☆

CAMERA
Samsung NX30

If you're spending £900 on a camera and want something that looks and handles like a proper digital SLR, yet aren't overly keen on a weighty device, then investigate Samsung's relatively lightweight NX30.

Technically, this is a mirror-less compact system camera (CSC). Handling wise, its APS-C sensor, offers the convenience of a point-and-shoot via its backplate buttons and smartphone-like touchscreen display. At the same time, the Samsung NX30 has enough manual top plate dials and customisable settings to keep anyone 'downsizing' from an actual SLR happy.

The handgrip is large and comfortable, a feature often sacrificed on smaller CSC models. While benefiting from this best of both worlds approach, it's also packed with features, including Wi-Fi connectivity and NFC compatibility.

The camera is also easy when it comes to framing and reviewing stills and, here, full-HD video. For framing shots there's a choice of

large 3in AMOLED display on the backplate, or a high-resolution electronic viewfinder (EVF) for those who prefer shooting with the camera held up to the eye.

The rear display offers deeper blacks and better contrast than a traditional LCD, and can be angled and tilted when required. The EVF meanwhile has a built-in eye sensor that switches it on while deactivating the larger screen below. In a first for this model, it can be pulled outwards from the body and tilted upwards so you can look down into it.

Exposures were spot on when left on auto settings, and colours were well saturated, with detail maintained into the corners of the frame. Shots looked stunning on the rear screen.

As well as being able to control this camera via touchscreen and physical buttons, the bundled 18-55mm iFunction lens allows

key camera functions to be operated with a twist of its barrel.

This feels like a handy extra, as there are enough physical and virtual controls already at our fingertips to make for easy and intuitive handling, with commonly used settings such as ISO given their own dedicated access points.

Verdict
The Samsung NX30 is a feature-packed camera that delivers great-looking shots with plenty of colour and contrast. ⊠ **Gavin Stoker**

Build: ★★★★☆
Features: ★★★½☆
Performance: ★★★★☆
Value: ★★★★☆

★★★★☆

HARD DISK DRIVE
Seagate NAS HDD 4TB

As Western Digital found with its WD Red hard disk (tinyurl.com/d4L7ogg), there's a healthy interest in high-capacity hard disks you can use in a NAS drive. Seagate's drive fills a gap in its range, a 3.5in SATA disk available 2-, 3- and 4TB capacities, and designed expressly for home servers and desktop NAS solutions.

Furthering its application for always-on servers, the drive has low power requirements compared to hard disks made for PC use, specified at 4.8W for typical operating consumption and 3.95W when idle. Its noise output is low, too – 23dBA when idling and 25dBA under load.

Specified operating lifespan is approaching the enterprise class, listed as one million hours mean time before failure (MTBF).

To assist in its use in RAID arrays in NAS drives, it boasts Seagate's proprietary NASWorks technology. This is said to include customised error recovery, along with improved vibration tolerance. Few details of how this is all achieved are

published, although 'dual-plane balance' may suggest some attention to the spindle bearings.

Seagate doesn't release the spindle speed, but we'd guess it's in the 5400- to 5900rpm range, rather than the 7200rpm or more used by performance-first disks.

We tested disk speeds using Ivy Bridge Intel Core i5, connecting to a SATA 6Gb/s interface. In the simple ATTO Disk Benchmark test, the drive reached maximum sequential read speeds of 154MB/s. Write speeds were a little slower at 151MB/s.

Those are good figures, if a little short of the performance of the WD Red, which we measured in its 3TB version – this hit 174- and 163MB/s in the same test.

Using CrystalDiskMark 3.0, we saw the WD Red pull ahead again, if only slightly, with maximum sequential figures of 163- and 159MB/s read and write, against 157- and 155MB/s for the Seagate NAS.

For very small files, at the 4kB level the Seagate measured

practically the same – just 0.58 and 1.5 for reads and writes, while the WD recorded 0.58- and 1.53MB/s.

In read performance it spanned 71.5- to 173.9MB/s, while the WD Red dropped to 67.3MB/s minimum on the slowest part of the platters, rising to 160MB/s at maximum.

Verdict
The Seagate NAS is a very quiet and low consumption hard-disk drive that looks ideal for desktop NAS and RAID use. ⊠ **Andrew Harrison**

Specification
23in IPS panel; 1920x1080 pixels, 16:9 aspect ratio; 0.265x0.265mm pixel pitch; 5ms specified response time; D-Sub; HDMI; MHL-HDMI; VGA; external power supply; fully adjustable stand for tilt, height and pivot; 532x325x213mm (with stand); 3.46kg (with stand)

Build: ★★★½☆
Features: ★★★★☆
Performance: ★★★½☆
Value: ★★★★☆

★★★★☆

MONITOR
Philips 234E5QHAW

If you want a monitor that offers IPS quality, but you don't want to pay a premium, then something has to give somewhere. The Philips 234E5QHAW is based on one of LG's new AH-IPS panels, 23in on the diagonal and with full-HD resolution.

We tested the white version, although it also comes in black, which would probably hide the wide 25mm bezel better. The screen image doesn't go right to the edge of the screen – it stops around a centimetre short, but it's still thin looking. At the bottom is a panel with controls to the right side that protrudes a little. This has a bizarre plastic tongue sticking out under the Philips logo.

Build quality is a little suspect. There's some light bleed evident on a black screen and the bottom panel flexes more than we'd like. The tilt-only stand is also a cheap plastic stick. While it feels rigid, it may not be particularly strong.

The power supply is external, plugging into the back alongside the interfaces and typically drawing 29W with the screen running, and 0.5W in standby.

For video input, there's D-Sub VGA, HDMI, and another HDMI with added MHL (Mobile High-definition Link), which also supplies power for charging a mobile devices connected to it. At present, MHL is only used by some Google Android devices.

The monitor has audio capability with twin-speakers driven by a 5W amp, and there's also a headphone socket and an audio input jack.

On some Philips monitors there have been issues with fonts being over-sharpened, but there's no problem here. They look fine straight out of the box, the only thing that didn't was that the display was distinctly warm, with very muddy whites until it was calibrated.

Performance
For colour gamut, we saw 98 percent sRGB coverage and 74 percent on AdobeRGB. The Tone Response test was okay, showing some variation in the middle brightness settings and giving a result of Gamma 2.3 when set to a value of 2.2.

On the brightness front, there was a decent maximum level of 269cd/m^2 at 100 percent setting, slightly more than the claimed 250cd/m^2. Contrast ratio was up to 770:1, a good result that's better than average.

Given that there was some visible light leak in the bottom corners, measured screen uniformity wasn't too bad, with 10 percent darker areas on the right side and lower right corner at 100 percent brightness. At a more usable 50 percent brightness this was still no worse than 10 and 11 percent. Elsewhere was much lower, suggesting reasonable consistency here.

Colours were accurate with only light grey and dark cyan being some way from exact, as is often the case, at Delta-E 5.59 and 5.77 respectively. All the main colours were at Delta-E of 1.21 or under, resulting in a decent average of Delta-E 1.88.

On colour uniformity, the top-right corner at 100 percent brightness wasn't great at Delta-E 4.0, with the rest under 3.0; but with brightness reduced down to 50 percent this dropped to 2.7 with everywhere else 2.2 and much lower. Overall, very good consistency, apart from that corner.

Verdict
The Philips 234E5QHAW is a good value IPS panel at the popular 23in size. It should have reasonable luminance consistency but good colour coverage and accuracy. There's some penny-pinching on the frame and the stand is weak, but this monitor offers good quality and stylish looks. ☒ **Duncan Evans**

Specification

31.5in monitor; 3840x2160-pixel resolution at up to 60Hz; 140ppi; 16:9 aspect ratio; IGZO & IPS panel technologies; 1.074 billion colours (10-bit); white LED backlight; matt screen with 3H hard coating; stand adjustments: height, swivel, tilt, VESA 100 mount; built-in cable management; 350cd/m² rated brightness; 1000:1 (typical), 2,000,000:1 (dynamic) rated contrast ratio; viewing angles (H/V) 178H/176V degrees; 8ms response time; DisplayPort 1.2, Mini DisplayPort, HDMI 1.4; 4-port USB 3.0 hub; 750x483-572x214mm; 9.2kg; 3-year warranty

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

★★★★☆

MONITOR
Dell UltraSharp 32 Ultra HD

Designers and graphic artists love big screens, with all their many palettes and menus jostling for valuable screen space. With its 31.5in widescreen display and Ultra HD 4K resolution, Dell's UP3241Q 32 Ultra HD is therefore an attractive proposition and also a competitively priced solution for viewing 4K video in all its glory.

Ergonomically speaking, the display is hard to fault. The bezel is pleasantly thin and the illuminating, proximity-sensing, touch-sensitive controls contribute to an expensive overall feel and a level of build quality you'd expect from a display costing around £2,000.

It has a height-adjustable stand and incorporates a USB 3.0 hub with four ports, one of which supports battery charging. Inputs include one each of HDMI, DisplayPort and Mini DisplayPort connections. There's no audio support as standard, but you can attach an optional soundbar, which will add a set of speakers below the screen.

The panel itself is coated with a hard, matt anti-glare coating which keeps reflections in check.

The ultra-high resolution of the UP3241Q is possible largely thanks to indium gallium zinc oxide (IGZO) semiconductor technology, which replaces the millions of tiny amorphous silicon (a-Si) transistors in a typical display panel with more efficient, transparent ones. These allow more light to pass through, thereby increasing brightness (or reducing power consumption), and for increased densities enabling higher resolution panels to be created more easily.

The specified 99 percent Adobe RGB gamut is great for those who demand the most accurate colour, but a potential pain for those who just want to plug and play. However, sRGB mode is also available for those who don't wish to calibrate their display. Ten-bit colour is also available, enabling a palette of up to 1.074 billion colours when paired with a workstation-class graphics card such as an nVidia Quadro.

As is often the case with bleeding-edge technologies, there are a few compatibility issues you'll almost certainly run into when using this monitor.

While many modern graphics cards are able to output 4K resolutions, there are a few conditions that must be met in order to fully exploit the Ultra HD capabilities with a 60Hz refresh rate.

To display the full 3840x2160 resolution at a 60Hz refresh rate, the monitor divides its input into two 'tiles' of 1920x2160 pixels, which are sent from your graphics card as if they were connected to two separate displays. The monitor then combines the two tiles into a single onscreen desktop.

To do this, you'll need to use DisplayPort 1.2 with Multi-Stream Transport (MST) support. Most modern graphics cards support this, including nVidia GeForce series 600 and newer, AMD Radeon HD600 and above, and the latest Intel integrated graphics processors.

Even if your graphics card supports MST, you'll need to enable it on the monitor manually via the onscreen controls. This will then enable the 60Hz refresh mode. If this fails for some reason or you subsequently plug the monitor into a GPU which doesn't support MST, you'll be met by a blank screen with no access to the menu system to revert to DisplayPort 1.1. Thankfully, Dell has provided a hidden menu option to switch it back.

On our test PC, rebooting Windows caused the graphics card driver to 'forget' to use DisplayPort 1.2 mode, forcing us to reset the monitor to DisplayPort 1.1 and back

to version 1.2 again using the reset option every time we started the PC.

Intel's most recent integrated graphics processors will support 4K mode at 60Hz on the UP3241Q, but to make the monitor function as a single display, rather than two virtual displays side-by-side, you'll need to enable Collage Mode in the Intel graphics control panel. However, expect to fight every step of the way. We were only able to get it to work by installing the latest beta version of Intel's driver, and even then it was horribly unreliable.

However, once set up correctly, the UP3214Q is a revelation. Fire up Adobe Lightroom and the increase in clarity and sharpness over and above even a 2560x1440 display is immediately apparent. Games also take on a whole new level of detail.

Colour reproduction is superb, covering 99 percent of the Adobe RGB gamut (our Spyder Elite calibration rounded it up to 100 percent) and delivering extremely accurate results, thanks to pre-calibration in the factory. This resulted in an average colour error of less than 1.0 DeltaE.

Maximum brightness and checkerboard contrast are also commendable, peaking at 312cd/m² and 550:1 respectively.

Verdict

The Dell UP3214Q is a pricey display, but offers extremely high resolution backed up by superb image quality.
☒ Paul Monckton

Specification
27in LCD monitor; 2560x1440 pixels, 16:9 aspect ratio; AH-IPS panel; 109ppi pixel density, 0.2335mm pixel pitch; white LED edgelight; 6ms specified response time; 10-bit colour support; 1x DVI, 1x HDMI 1.4, 1x Mini DisplayPort; 4x USB 3.0; external power supply; fully adjustable stand for tilt, height and pivot; 100mm VESA mount; 643x470x348mm (with stand); 8.54kg

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

★★★★☆

MONITOR
ViewSonic VP2772

The VP2772 from ViewSonic is a gentle update to last year's VP2770-LED. Both are 27in widescreen IPS monitors, boasting a healthy resolution of 2560x1440 pixels. These are meant to be serious low-frills designs aimed at designers using Windows on a budget, although at around £600 this monitor still represents a large investment.

The display is labelled SuperClear by ViewSonic, a reference to the AH-IPS panel from LG. This has a matt anti-glare hard coating, making it usable in most lighting conditions. The black bezel is similarly matt finished, an important touch for any practical screen.

External charger
Unlike the earlier VP2770-LED model, the VP2772 has an external power supply, a laptop-style little brick on a cable, which is a backward step in usability. A potential step forward is the specified 99 percent coverage of the AdobeRGB gamut, and 10-bit colour compatibility. The latter feature points this monitor toward the Windows rather than Mac user, since there's no support for 10-bit colour with current Mac hardware or OS X Mavericks.

Also indicating a preference for the Windows audience is how dreadful the image quality appears when first set up in OS X. This was resolved after adjusting the screen's Sharpness control. There are just four settings here – 0, 25, 50, 100 – and the default setting of '50' rendered onscreen text very poorly, over-sharpened and highlighting sub-pixel rendering colour artefacts. The '0' setting looked too defocused, while '25' was about right.

Adjustable stand
As a monitor aimed at professionals, the VP2770 has a fully adjustable stand, and it can be raised to sufficient height to enable the screen to swivel 90 degrees for use in portrait mode.

The monitor touch-sensitive controls, sited on the lower right of the screen bezel, are poorly designed. These adopt the system found on budget consumer displays of relying on four buttons to navigate through every screen menu.

In our standard chequerboard test for contrast ratio, the VP2772 met a consistent 560:1

result at 50, 75 and 100 percent brightness settings. The tone response was not so even, deviating slightly to 2.1 from the calibrated 2.2 gamma at lower brightness levels below around 40 percent brightness.

For colour accuracy (Delta-E) and colour gamut coverage, we recorded very strange numbers from our Spyder4 screen calibrator (Delta-E average 13.25; 89 percent sRGB, 69 percent AdobeRGB), which we believe to be anomalous and not indicative of actual performance.

Luminance uniformity reached a maximum deviation of 14 percent (top-left corner, 50 percent brightness). Most quadrants were kept within good 10 percent limits. We were unable to test the 10-bit credentials of this monitor.

This display may not suit the most parsimonious users, reaching 62W power consumption at full brightness (a high 334cd/m²). This figure fell to 39W at a more realistic 120cd/m² brightness setting.

Verdict
The ViewSonic VP2772 sits in the semi-pro market, with relatively decent performance and a decent adjustable stand, although overall build quality and attention to detail fall a little short of that found on high-end monitors from Eizo and NEC. But if 27in of better-than-HD resolution appeals the ViewSonic is one of the few select monitors that will deliver. ⊠ **Andrew Harrison**

Specification
3x A19 LED lightbulbs; 1x wireless bridge unit, Zigbee Light link protocol v1.0, 2400-2483.5MHz radio; E27 screw fitting; 9W power rating; 60lm/W luminous efficacy at 4000K; 16 million colours; requires iPhone 3GS with iOS 4.3 or later; 100x25mm bridge unit; 2-year guarantee

Build: ★★★★½
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★½☆

★★★★½

LIGHTBULB
Philips Hue

Sometimes a piece of technology appears that has the power to truly light up your life. It doesn't have to be another iPhone kicking off a smartphone revolution, but it can be something that simply makes your life more comfortable.

The Philips Hue is a remote-controlled lighting system for the home, using standard screw-fit lightbulbs that can be adjusted from a smartphone app. That control extends to brightness, colour and timing – you can set your lights to come on at preset times, or when you approach or leave the home, and even entirely remotely over the internet when you're miles away.

In the Philips Hue light kit are three LED bulbs, and a control hub that connects by ethernet cable to your home router. Each bulb is conventional looking, with an E27 screw-fit end; that's the larger screw type of the two types in common household circulation.

The bulbs communicate with the bridge unit using a wireless protocol called ZigBee, using the same 2.4GHz radio band as Wi-Fi and Bluetooth. Each bulb can talk to others without the hub; they can create a mesh network whereby distant bulbs communicate and relay with a closer one, rather than necessarily to a bridge unit which may be out of range.

With the system set up, you can have three bulbs in the same or different rooms, although many of the preset lighting schemes use complementary colours so work best with the three bulbs in view together.

From the Hue smartphone app for iOS or Android, you simply tap

PC ADVISOR
GOLD

on one of the preconfigured light scenes. 'Concentrate', for example, gives a vivid pure white that we found close to natural daylight, and serves well to reinforce light levels in dim daytime rooms, while 'Energize' takes this even further with a colder blue-white that's said to boost your energy levels.

Moving into the yellower end of the spectrum, there's the Reading scene, which we found has a good blend for most evening's neutral lighting. And further again in the warm direction is Relax, for even more of the old tungsten filament effect, although to our taste it was perhaps even too soporific.

You can also blend your own choice of white light from an onscreen palette that stretches from chilled blue-white to warm yellow-white. The attraction for many users will be the rainbow of colours with which you can paint your room. Each bulb comprises three coloured LEDs, roughly corresponding to red, blue and green, from which you can mix just about any colour the human eye can discern.

Blue shades are perhaps the least impressive as light output seems to drop off with cobalt type shades. But make no mistake, the gamut of coverage is still incredibly vibrant.

Used thus, you can even match the lighting to colours already in use, thanks to a colour dropper on the iPhone app. Use this to collect exact colours from photos of paintings, furnishing or decor in your room.

Perhaps the biggest drawback we found for effortless use at home was the inevitable reliance on your phone or iPad. Compared to the real hands-on experience of toggling a switch in a known location on the wall, you must now hunt around for your mobile device, unlock its

screen, open the app, and find the required page for adjustment.

You can still just turn the bulb off by its normal switch in a table lamp, for example. But when you switch it back on, it will revert to a default brilliant white at full brightness.

The timer function lets you set the bulbs to light at preset times. To make this more comfortable, the lights will gradually ramp up to the preset brightness rather than abruptly switch on. It's a very neat and useful asset, although even the initial lowest start point (5 percent output) could be lower.

Taking the customisation potential further, you can set up Hue so that certain events trigger your own presets, with the help of If This Then That (ifttt.com). Examples we've heard about include flashing bulbs in the team colours when your football team scores a goal, linked by RSS or news feeds that log results.

To use the geofencing facilities, you'll need to set up an account with Philips and remain logged in with your smartphone at all times. This shouldn't run down your handset's battery, though, as the Hue's geofencing feature doesn't rely on energy-hungry GPS technology.

Three bulbs are included with the starter kit, and more bulbs can be added, priced at £50 each. The bridge unit is specified to control up to 50 bulbs, and beside the standard E27 type there are now E26, GU10 and BR30 formats also available.

Verdict
The Philips Hue has been carefully developed to be a useful addition to the home. With a little exploration of its possibilities, and some of your own creativity to blend it with your home, it will literally light up your life. ⊠ **Andrew Harrison**

£500 inc VAT

Contact
- europe-nikon.com/en_GB

Read more
- tinyurl.com/L2fgoqk

Specification
24.2Mp; 23.5x15.6mm CMOS sensor; 18-55mm lens (3x zoom); 3in TFT display; ISO 100-12,800; RAW (NEF) and JPEG still format; SD card slot; 8.9Wh battery; 124x98x75.5mm; 460g

Build: ★★★½☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★★

★★★★½

CAMERA

Nikon D3300

In the D3300, Nikon has disproved the old adage about getting what you pay for. Here, you get an awful lot more than its £500 price tag would suggest.

The company's latest digital SLR is based on a 24.2Mp sensor (4800x1080 pixels), adding an 18-55mm kit lens that behaves like 27-82.5mm glass on a full frame camera. Clearly inspired by the collapsible lens of its 1-series compact system cameras, Nikon's engineers have made this lens smaller than its predecessor, courtesy of a clever locking button, to complement the compact body of the D3300 itself.

The camera's controls are well thought out and the display is one of the best we've used, adopting the three digital rings of the company's other DSLRs, which rotate in sync to show how changes to aperture, shutter or sensitivity affect the other parameters.

The rear display is bright and clear in direct sunlight, though, it isn't touch-sensitive or articulated.

PC ADVISOR
RECOMMENDED

Impressive photos

We tested the D3300 on a sunny day, set to aperture priority, so that we could control depth of field while it made all the other decisions about exposure and sensitivity. The results were impressive: vivid colours were punchy and bold, while muted tones were subtle, and a faithful match of the originals.

Fine detail was breathtaking, too, with pollen and tiny insects clearly captured on petals and foliage. Even under direct sunlight, which can make flowers and foliage difficult to properly meter, it kept everything under control for a very balanced result.

It wasn't perfect, though. There was evidence of green/pink colour fringing on some sharp contrasts along the edges of solid objects, and where branches and twigs overlaid the sky. There was also a very slight fall off in the level of clarity when comparing the centre of the frame to the edges, although as this is caused by the lens having to bend the light to a more extreme angle at the edges and corners, you can expect to see this in all cameras to some degree.

We were more disappointed by the limited 11 focus points clustered around the centre of the frame. They're easily selected and the D3300 did a good job of hitting our target when left to its own devices, but extra points would have been welcome.

Other than that, the camera is extremely flexible. It shoots RAW and JPEGs individually or side by side, sensitivity runs from ISO 100 to a high 12800, and if that still leaves you wanting, compensation is a wider-than-average five stops in either direction, in 1/3EV steps.

Tutorials

Behind the scenes, there's a series of built-in guides that show you how to take certain shots, play back your images and set up the D3300, all of which will be a boon to beginners.

So will the seven scene modes and 13 effects, like the ones you'd find on a compact, although to our eyes the effects were a little over-cooked and could do with adopting a slightly lighter touch.

Video mode lets you capture full HD footage at up to 60fps, with the bonus of a mini-jack input through which you can bypass the internal mics. The results were on par with the stills, with a clean soundtrack, sharp details and good colours. However, since the zoom is manual, you can hear the rotation of the cuff on the soundtrack.

Verdict

All in all, you get an awful lot of camera for not much money with the Nikon D3300, making it an excellent choice if you're new to digital SLRs. We'd like a few extra focus points for greater flexibility, but other than that there's much to like – not least of which is the price. ☒ **Nik Rawlinson**
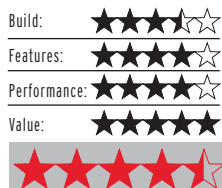
£99 inc VAT

Contact
- microsoft.com/en-gb

Read more
- tinyurl.com/Ld48hm7

Specification

Wireless Qwerty UK-English keyboard, numeric keypad, optical mouse; ergonomic design; USB Bluetooth dongle; soft-touch keys; 392x228x59mm and 836g (keyboard); 928x132x117mm; 100g (mouse)

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

★★★★☆

Microsoft Sculpt Ergonomic Desktop

A wireless mouse and keyboard combo, the Microsoft Sculpt Ergonomic Desktop will elicit comments once you place it on your desk. It's striking to look at, and a little different to use. But there's peripheral gold in these hills.

To utilise every feature, you'll need a computer running Windows 8.1, 8, RT or 7. You'll also need a spare USB port and two AA alkaline batteries (the latter are included in the box).

The Microsoft Sculpt Ergonomic Desktop consists of the main keyboard, the mouse and a secondary numerical keypad. There's also the USB-connected Bluetooth transceiver, aka the wireless dongle.

Build is Microsoft's usual solid peripheral quality, and the materials are once again mostly plastic. Design is of the slick black flavour – shiny black plastic combined with matt black plastic in fact, to make a stylish if understated melange of blackness. Detailing is mostly white with the occasional patch of Windows 8 blue.

As with many ergonomic keyboards, it is in essence a game of two halves. 'Qwert' lives on one side of an hour-glass shaped divide, 'yuiop' on the other. The spacebar bridges this gap, but is broken over the two sides.

A magnetic stand fixes to the underside of the keyboard, raising it up toward the typist. It connects magnetically, making the keyboard stable and unfussy. This stand supports the cushioned wrist rest, a generously proportioned area covered in smooth black foam. On the underside is also a flip-out door that hosts the batteries – two AAAs.

The keys themselves are of the scrabble-tile variety. They are matt black and set into a shiny black fascia. Letters and symbols are white out of black. It's not a small nor a light keyboard at 392x228x59mm and 836g. But it's not intended to be portable.

The separate numeric keypad is very much the upstart little brother. A small square of keyboard in a similar style to the main keyboard, it is, however, flat and traditionally oblong. It measures 928x132x117mm and weighs 100g.

And then there is the mouse, back on the non-traditional side of the fence – a squat circular beast. The bottom and sides are matt black, the left- and right-click buttons up top are shiny black. A scrollwheel is set into the middle of those and a bright blue Windows button sits where your thumb rests – if you are a right-handed mouser.

Again the mouse is a good size. We'll talk about the ergonomics later, but suffice to say that at 749x982x567mm and 155g, it's a big old chunk of rodent.

We've been using flat keyboards for a couple of decades of work, perfectly happily. There's no point in even pretending that a move from standard to ergonomic is easy.

Our early attempts at typing looked like this: myear artsmpts and tyeping. But we soon managed to get to grips with things typing this review on the Sculpt keyboard.

And the benefits are plain. The domed shape should, we're told, reduce what experts refer to as 'pronation' – unnatural twisting of your wrists so they face directly downwards for lengthy periods. This can cause problems such as carpal tunnel syndrome.

It's worth pointing out that an ergonomic keyboard truly helps only as part of an ergonomic setup. In our case, the weirdness of the keyboard forced us out of our normal hunched up position, making us address the keyboard straight on. Within this scenario, it was comfortable to use, and we didn't get the upper back pain we often experience at the end of a long day.

There's a lot to like about the typing experience. Keys are different shapes and sizes, in order to make them easy to find. It works. After a relatively short period, we found typing without looking was virtually error free. The keys themselves have a satisfying level of travel, and spring back against your digits.

Setup is simple. Pop in the Bluetooth dongle and away you go. Alas, this wasn't the case with the mouse. But let's first concentrate on the positives.

The big round shape of the Sculpt Ergonomic Mouse also takes some time to feel natural. It fits right into the palm of your hand, unlike a typical computer mouse. The position of the buttons and the scrollwheel felt natural straightaway, and when using Windows 8 in particular the addition of a Windows button is a good one.

We did have some problems, though. Initial setup was fraught – the mouse wasn't recognised until we removed everything else from our desktop PC's USB ports and restarted our Windows PC. Even then we found its tracking was extremely sensitive and inconsistent.

Using Windows' built-in settings we were able to get the Sculpt Ergonomic Mouse to a workable level, but unlike the keyboard we'll be putting it back in its box once this test is over. Which is a shame because it's a well-built device that feels comfortable in use.

Verdict

There's a lot to like about Microsoft's Sculpt Ergonomic Desktop. It's well-designed and although far from cheap, it offers a good feature set at a decent price. ⊠ **Matt Egan**

Specification
24in IPS panel; 1920x1080 pixels; 0.275mm pixel pitch; 6ms specified response time; DisplayPort; DVI-D; D-Sub; power supply built in; fully adjustable stand for tilt, height and pivot; 558x380-490x214mm (with stand); 6.3kg (with stand)

MONITOR

NEC MultiSync E243WMi

NEC's latest 24in full-HD IPS monitor, the MultiSync E243WMi, promises to save you money – not in the initial purchase price, but from its Eco power-saving mode.

Specified at just 13W, it should prove cost-effective over time; though, with a typical specified power drain of 19W in its regular non-Eco mode, it's hardly going to run up a massive electricity bill. It's fair to say that this 16:9 widescreen panel, with its chunky telescopic stand and solid base is designed for being left on all day in a corporate or studio environment.

It comes with a range of interfaces, including D-Sub, DVI-D and DisplayPort. There's also a headphone socket if you don't want to listen to the tinny speakers. These are driven by a 1W amp, but still produce a surprising amount of noise, even if it lacks any bass.

Build: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★½☆

★★★★☆

Functional design

As you might expect from a monitor that's been designed for use in an office, it's functional rather than aesthetically outrageous, and the tilt-and-rotate stand is handy. The monitor's power supply is built into the back panel.

The build quality is good, while the panel itself showed no darkening in the corners, nor any perceptible light leak. The onscreen menu is operated by touch-sensitive controls on the front of the bevel. These aren't illuminated, though, which will be a problem if you're working in a darkened room – in our tests the E243WMi's controls were obscured by light from the screen itself. We also found the menu to be a mess of icons and features.

As an IPS panel, we were able to view the screen from all directions and still read clearly rendered fine text, for example.

We tested the MultiSync E243WMi's performance with a Datacolor Spyder4 calibrator, and found reasonably good results of 98 percent sRGB, 74 percent AdobeRGB and 69 percent NTSC colour coverage. The maximum brightness reached 264cd/m^2, which may seem a little dim but is ample for most applications.

Accurate colours

The chequerboard contrast ratio was 650:1 at 100 percent brightness, a good result. Luminance uniformity at 100 percent brightness was tight, with only the right side of the screen showing much variation and all at under 10 percent. At 50 percent brightness, it fell to just four to six percent around the outside edges.

Colour uniformity was nearly as good, but tended to vary around the screen's top-right corner with a variation of Delta-E 3.0 and 3.1 at 100 percent brightness. This fell to a much better 2.2 and 2.4 on the right side at 50 percent brightness. An overall average of Delta-E 1.59 for colour accuracy was commendable.

Verdict

The NEC MultiSync E243WMi could prove ideal as a high-quality monitor you can run all day without adding to your electric bills. The display is neat and accurate, well-built and functional. ⊠ **Duncan Evans**

MUSIC EDITOR

Magix Samplitude Music Studio 2014

£80 inc VAT

Contact
■ magix.com/gb

Read more
■ tinyurl.com/q572s5j

System requirements
Windows XP (32-bit)
Vista/7/8, 32/ (64-bit);
1GB RAM (2GB
recommended); 1.5GHz
processor; 4.3GB drive
space; 1024x768 display

Magix is probably best-known in the UK for its consumer-based Music Maker software, a loop- and sample-based editor, but at the semi-pro level, it has Samplitude Music Studio 2014. This is a music production suite, handling recording, manipulation of samples and creation of finished media.

This isn't an ideal application to come to cold without having used similar software. It has a complex set of controls, not always in the most obvious places. For example, although you have full transport control – start, stop, pause, wind – of the current project from the main editing screen, overall volume adjustment is available only from the suite's mixer, which has to be called up separately.

The editor supports samples, direct recording and MIDI tracks and these can be freely mixed in the arranger view, which is similar to the timeline view in a video editor. You can directly edit clips using the handles overlaid on them, adjusting fade in and out and clip volume without moving to the track editor.

New features in the 2014 package include a new synthesizer, a vocal tuner and automatic mastering of the finished recording. There are also four new banks of sampled instruments: power guitar, vintage organ, pop brass and electric piano.
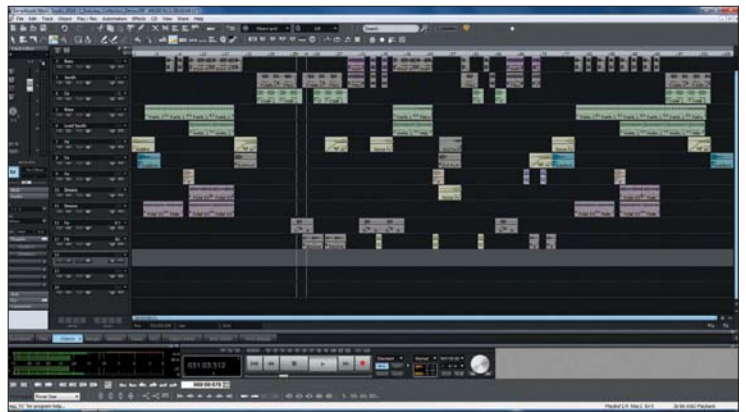
You too can sing like Cher with the help of the new **VOCAL TUNER**

The suite supports touchscreens, so if you're running Windows 8, you can tap and slide. With the size of some of the onscreen controls, though, you'll need a stylus.

The vocal tuner, which can also be used for solo acoustic instruments such as violins or cellos, adjusts notes or passages to improve pitch accuracy. The audio track is analysed and you're presented with a grid of blocks representing the notes. Dragging these up and down, singly or together, adjusts the pitch, while maintaining the overall sound envelope. The naturalness slider varies the sound from 'as performed' to a sort of pseudo-Cher.

The DN-e1 synthesiser has 256 presets, a phenomenal number, ranging from Crusty, to Plastic, to Trippy – yes, some of the voice names are none too descriptive. They are, however, a treasure trove of sounds that work into a wide variety of music types.

Final mastering of a track or a complete album can be a complicated process, with a lot of parameters to balance against each other. Magix now offers a preset approach to this, too, applying a series of equalisation, stereo enhancement, compression and other techniques to the overall sound of your recordings.

Verdict

There's no doubt that Magix Samplitude Music Studio 2104 is a flexible and very well-featured music production suite. The new features aren't window dressing and improve the overall functionality of the software. ⊠ **Simon Williams**

Usability: ★★★☆☆
Features: ★★★★½
Value: ★★★★½

★★★★☆

SCREEN CAPTURE SOFTWARE

Ashampoo Snap7/Snap for Android

£13 inc VAT

Contact
■ ashampoo.com/uk

Read more
■ tinyurl.com/p2oph6p

System requirements
Windows XP/Vista/7/8,
32/64 bit with 256MB
RAM; 60MB disk space

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

★★★★☆

It's surprising how many people need to use a program that captures screenshots. Anybody producing manuals, obviously, but also those creating any kind of PC-based tutorial or promotional materials. Ashampoo Snap 7 is the company's latest screenshot editor for Windows and there's also a version available for Android devices.

After a simple install, the Windows software hides itself away in a thin bar at the edge of the screen – at the top, by default, but configurable. Mouse over the bar and it expands to show the major capture modes, which include the active window, active menu, any rectangular area, a freehand

area or, new to this version, all the windows onscreen.

This last mode captures all windows as separate objects, including the parts hidden by any overlaps. There were some anomalies capturing in this mode, though – a Kodak printing utility window was captured entirely blank.

You can also capture a whole scrolling window in browsers such as Firefox, IE or Chrome. There's even video capture, though, without the editing sophistication of a dedicated video tool like TechSmith's Camtasia.

Once the screen is captured, Snap 7 opens as a semi-transparent overlay on the current Windows screen, offering tool bars on three of

its edges. Down the left are editing tools, which include crop, erase, pencil, marker, flood fill and blur.

Shape tools include rectangle, ellipse and straight and curved lines; these can all take a variety of line styles. Predefined arrows can be straight or, in this version, curved, and text can sit alone or in a hint box or info note.

There are a variety of stamps available, including arrows, buttons and emoticons, and a useful set of numbered buttons, which increment automatically as they're placed.

Shadows, borders and fades can be applied to the whole screen from the top bar and this is where you can also add a mouse cursor,

WINDOWS DRIVER MANAGEMENT TOOL
Avanquest Driver Genius 14 Professional

£25 inc VAT

Contact
- avanquest.com

Read more
- tinyurl.com/qy3wmqe

System requirements
Windows XP/Vista/7/8; 512MB RAM; Pentium or equivalent CPU; 10MB disk space

A surprising number of problems on a Windows PC can be traced back to drivers. These small programs sit between the operating system and pieces of hardware, enabling the two to communicate. Without a driver, you wouldn't be able to print pages, listen to music or watch videos.

Keeping them up to date is a constant task, as new updates are regularly released to take advantage of new features or to correct bugs.

Driver Genius 14 Professional aims to take most of the pain out of the update process, by scanning your system and downloading updates from its own database of more than 100,000 drivers.

The control screen is simply set out, with a menu down the left-hand side and status reports and controls in the corresponding panel on the right. Although most information is shown as text, this is easy to understand and it's just a question of selecting the drivers the program flags up as needing updates.

We ran the program on our test PC. It spotted five drivers that needed attention, including those for the graphics adaptor, sound chip and ethernet adaptor. We hadn't noticed any problems with these components, but some of the drivers were over a year out of date.

The scan took around 30 seconds, an improvement over

Usability: ★★★★☆
Features: ★★★½☆
Value: ★★★★☆

★★★★☆
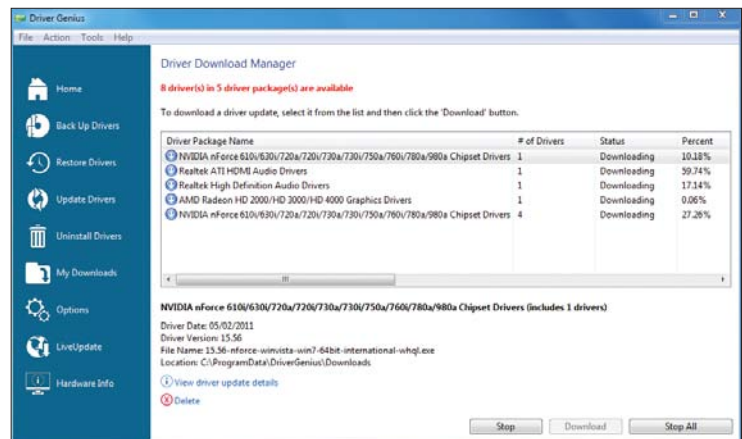
Driver Genius helps you **MAINTAIN WINDOWS** with the latest drivers

the last iteration of the software we reviewed and one of the claims Avanquest makes for version 14. The update process was more long-winded, with each of the drivers downloaded separately from the Driver Genius server and then installed on request, from the program's management screen.

Each driver is installed from its normal installation package, so the AMD video driver originally came from AMD and the chipset driver came from nVidia. Any vagaries in the installation are the same as if you'd downloaded the drivers manually, from their respective sites. As this is Windows, you are asked to restart your PC after each installation, but if you're updating multiple drivers, you can defer this until you've completed them all.

The software can be set to create restore points before updating drivers, so if anything goes wrong, you can revert to what you had before. One problem with driver updates is installing a driver for a slightly different version of a particular chip than the one on your PC. Differences in nomenclature can make this difference.

Using Driver Genius largely removes the wrong-driver problem by conducting its own scan of what's needed, but there are secondary functions that also help prevent erroneous driver being installed.

Verdict
Driver Genius 14 quickly scans you PC for out-of-date drivers, and downloads and installs those that need replacing. ⊠ **Simon Williams**

GRABBING WINDOWS is a snap with Ashampoo Snap 7

watermark and data and time stamp. The image can also be zoomed and you can undo changes or remove them all and revert to the original image with a single click.

In the right-hand bar are icons for all the things you can do with

your captured, edited and annotated screenshots. As well as saving in a number of formats, like JPEG, PNG and PDF, you can save directly to email, webmail, Facebook or the Windows clipboard. Screenshots can be printed directly, too.

Context-sensitive options for many of the tools appear along the bottom of the screen, when you select them. Below this panel, the program shows a thumbnail row of saved images.

Snap for Android
The newly released Snap for Android (free) does many of the same things for the Android platform. Geared for touchscreen use, it takes over from

the simple screenshot now built into Google Android and offers the same editing and markup as its more established sibling.

Although the smaller screen size of even a phone like the 4.8in Samsung Galaxy may be a little restricting, Snap for Android handles it well and it's relatively easy to add annotations and to crop and resize on a phone.

Verdict
Snap is an unobtrusive accessory, there when you need it, and works in a flexible, modern way to grab, edit and annotate screens, before saving them quickly and easily on- or offline. ⊠ **Simon Williams**

GAME

Banished

★★★☆☆

City-building games are traditionally associated with being able to indulge oneself. Improbable motorway systems, vast gleaming edifices, skyrocketing wealth, reshaping the very land – that sort of thing. Banished takes a different approach to the usual mayor simulator. This is about survival and subsistence, trying to keep a small community of medieval peasants alive in a cold and cruel land.

It's a game about gathering wood to build houses, and farming crops to feed mouths, which sounds familiar on paper but in practice the focus is more on how wrong everything can go. Go into it expecting a genteel experience of slowly building bigger and better structures and you may well bounce right off Banished, as we did during initial forays. Go into determined to eke out a basic existence living off just what the land yields and at least you're not in for a shock. You're still in for hard graft, though.

People die rather a lot in Banished, or at least they do if you haven't yet mastered most of its nuances. If you're not generating and stockpiling enough food, from fisherman, from hunters, from gatherers and from farmers, your townsfolk will slowly starve. If there isn't enough firewood and coal and coats, many of them may freeze when winter arrives. A few might fall prey to mining accidents.

Most, though, will simply perish of old age – and when they do, a crucial role may be left vacant. One less farmer or one less blacksmith can create a critical hole in your economy, so it's vital that you've got a generation of youngsters ready to fill the weather-worn boots of their fallen elders. Trouble is, more youngsters means more mouths to feed and hearths to fuel, and so there's a delicate and often stressful balancing act of trying to encourage your population to grow in order to provide new workers, but discouraging it from growing too early because you're not yet able to keep a higher head count alive.

The placing of buildings oddly becomes the least aspect of Banished. Erecting a new structure never brings excitement or even satisfaction. Expansion happens because you need, say, a third forester's camp or a fourth potato field in order to meet the ever-growing demand, not because you fancy building something new.

Banished, then, is an odd fish. It's all about the challenge and the difficulty, of trying to set down new buildings and allocate workers in the most efficient way possible. Some will find that a pleasure in itself, an impressively merciless simulation of harsh medieval life which demands a sharp and patient player. Others will find it too cruel and unforgiving, a world away from the atmospheric Lego set they were hoping for.

Both, however, are likely to find that once they have grasped most of the critical strategies, Banished loses its edge. It then becomes a matter of simply placing the same structures over and over, with no new challenge on the horizon.

Updates with new buildings and new goals are inevitable, especially as Banished has been a minor hit, so there is hope for it ultimately to have a life beyond the first few days of play. Right now, it feels like half of a game – but at least it's a strong and proud first half, determined to buck conventional wisdom and turn city-building into something new and admirably stressful.

Verdict

An admirably steely focus, but it's an uneven experience that requires a hell of a lot of work for, ultimately, not a great pay-off. But if you're a fan of better living through suffering, then this is the city builder for you. ⊠ **Alec Meer**

GAME

Thief

PC ADVISOR
RECOMMENDED
★★★★☆

A first-person game in which killing enemies is a last and often near-disastrous result? Thief's taking a big risk. This is a game about stealth, not combat – the trick is to try to remain undetected as you scoot around a gloomy, gothic, medieval-inspired city, pilfering whatever shiny trinkets you can lay your black-gloved hands upon.

At your disposal are an assortment of arrows. Some are potentially lethal, but most are used to douse or start fires, create a distraction or stun foes with a choking gas. You also have lock picks, wire cutters and other gizmos to facilitate breaking and entering. The challenge in Thief is to find your way into (and out) of heavily guarded buildings without being spotted. This means over rooftops and through windows, skulking in the shadows and hiding in conveniently man-sized cupboards.

If you're seen, it's usually wiser to disorientate and flee the angry guards, who are far, far tougher than you. It's refreshingly different and it's often impressively tense, although some robotic AI behaviour and perhaps too much ease of escape keeps Thief from being the heartpounding frightener it could have been.

A sequel/remake of the much-adored 90s series of the same name, Thief makes some controversial concessions to a different age of mainstream gaming. It's a little more forgiving, it's more focused on purchasing upgrades and there are

special controls designed to make swooping from cover to cover a little easier (or, if you're a purist, cheaty).

Whether or not this is a good thing will depend on whether you've played this light-fingered franchise before. It's best, perhaps, to think about Thief on its own terms, rather than focus on the past.

What's simpler to praise or criticise is what's on the surface. The City is an impressively large semi-open world. You're free to explore between the main, storyline-focused missions, sniffing out secrets, lockpicking safes hidden behind paintings and dodging or engaging the thief-hunting guards.

The City is Thief's finest achievement, and the freedom it offers puts your average first-person game to shame, even if some of its layout is a little too blatantly contrived to keep you out of somewhere or force you to take

an oddball route into somewhere else. While the main missions offer more elaborate puzzleboxes, careful, threat-filled obstacle courses to reach big goals, they're undone a little by dreadful dialogue and an over-inflated, unexciting plot. Tone shifts unevenly between period chatter and foul-mouthed modernity, and all told this side of the game seems like it was created by committee rather than having a clear focus. The storyline comes across like babble, while the characters are at best dull but more often obnoxious – especially when they're intended to be likeable.

There's stronger personality in the intricate nature of some of the missions and their impressively large settings. While less experienced players will likely miss half of their content, old hands will turn off or ignore the likes of an exaggerated gleam to loot, an X-ray vision mode and a floating arrow that forever tells you where to go next.

Certainly, the game is at its strongest and most atmospheric when you're playing without such aids, and instead exploring and hunting at your own pace. Played the other way – in a hurry, engaging enemies, going straight from A-B – it feels like a weaker, briefer game.

Verdict

Thief is a muddled but well-intentioned game that undermines smart, sinister stealth with weird controls and lousy characters. An atmospheric setting and plenty of freedom helps matters, but all told it's a strange compromise of a game. ⊠ Alec Meer

GAME
Broken Age

★★★½☆

Depending on how you look at it, Broken Age is either the vanguard of the Kickstarter era or a much-delayed return to unfinished business. It began life as a pledge by one of the main brains behind classic LucasArts point-and-click adventures such as Grim Fandango and Day of the Tentacle to revisit a genre he'd left behind. A few days later and what became Broken Age had netted $3.5 million in crowdfunding – quite a hike from the $400,000 it had asked for.

Expectations, naturally, were extremely high, which plays a part in why the (part) finished product feels underwhelming. Though, not so big a part as the lacklustre puzzles and a script that's surprisingly short on big laughs.

While the essential, ancient formula of using weird objects on other weird objects or weirder people in order to progress to new areas remains, Broken Age seems a little unsure about what to be. It attempts to be both a gentle entry point to lateral thinking puzzles and a treat for fans who have that stuff in their blood, but by focusing too much on the former, it winds up with very little cerebral meat on its bones.

It is, however, beautiful. While there have been grumbles about where all that Kickstarter money is going, given the game has been split in two, with a second part to follow later in the year, it's plain to see that its lavish, storybook-like artwork has been a careful and surely expensive endeavour. 2D throughout, but drenched in colour, detail, character and imagination, sticking this on your monitor will be just about the prettiest thing you see all year.

Relatively strong characters back this up. Broken Age has two stars, each in a different world experiencing their own adventure, and which you can switch between at almost any point. If and how they'll come together is part of a wider air of mystery, so for now we'll focus instead on their strange situations and companions. Broken Age is a parable of sorts for coming of age, young people choosing their own destiny instead of fulfilling the expectations of their elders, and the story is careful to play against type there with its girl and boy stars.

The former lives in a low-tech land of sea monsters and talking trees, the latter on a lonely spaceship with just an over-protective computer for company. Both crave an escape. Both need to use a series of weird objects on other weird objects to do it, and convince a supporting cast of predominantly prat-like oddballs to assist them.

There are a few celebrities onboard, such as Elijah Wood and Jack Black, but oddly everyone involved plays it low-key. It adds a pleasant, dreamlike feel to proceedings, but it too often means there isn't much weight to the gags. It's consistently likeable, sure, but it's hard not to feel short-changed on belly laughs, given how hard the game tries to set up absurdist situations.

There are a couple of pleasing offbeat puzzles, but in the main they're either obvious from some distance away or so far removed from any logic that tedious use-everything-on-everything trial and error is required. A certain spark of ingenuity seems lacking from the game's key component, and we can only hope at this stage that the forthcoming, concluding Act 2 demands more of us.

Verdict
Broken Age is extremely pretty and thematically ingenious, though, the puzzles and jokes feel lightweight. The first act isn't the great adventure game comeback we'd been hoping for. ⊠ **Alec Meer**
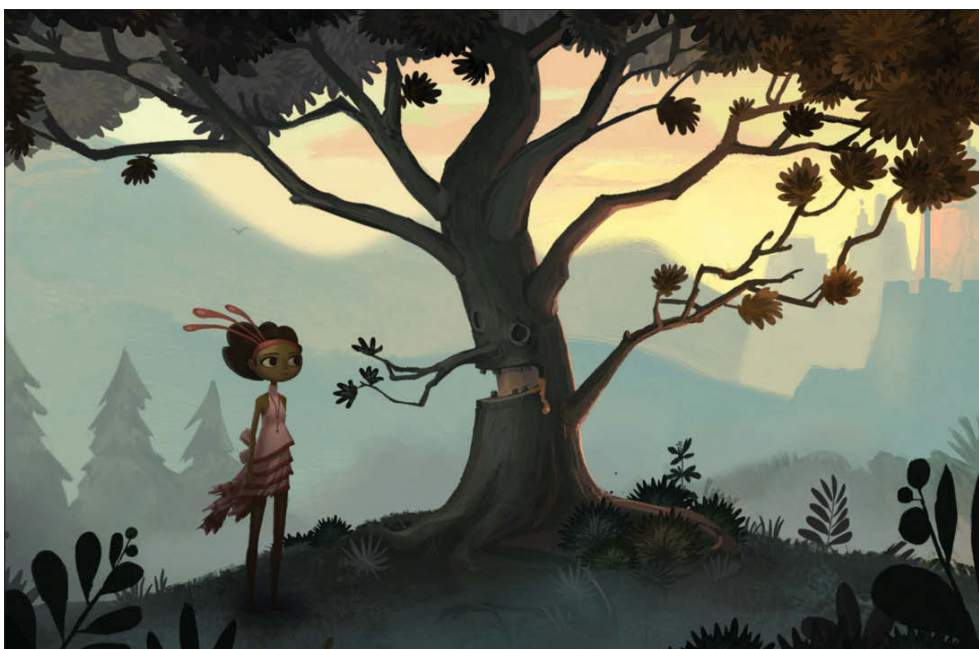
Two fun and useful apps for golfers

Apps that every golfer should have in their bag. (And by 'in their bag' I mean 'on their smartphone')
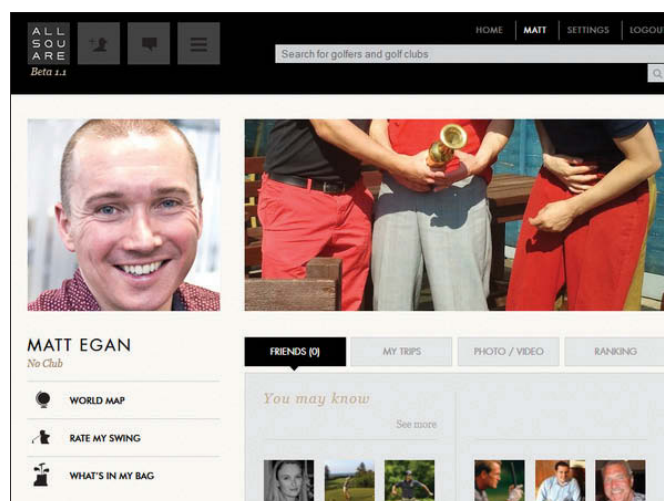
As I hack my way around the courses of England, I'm conscious that I don't bring much to my golfing group from a sporting perspective. As a consequence, I try to offer something from the technological world. Recently I discovered a couple of interesting apps for golfers, which I will now share with you. One shows potential, the other is a must-have for weekend golfers everywhere.

First up is All Square. This is a new social network for golfers, available for iPhone and iPad on the App Store, as well as online. The idea is to connect golfers all over the world so they can share tips and experiences. The network is still in beta but already includes around 20,000 courses, a number that is growing all the time.

It's a neat idea and the app itself is well designed and easy to use. As with any social network, however, the long-term health of All Square relies on people joining and using it. The portents are good, but it's very early days and we'll be maintaining a close watching brief. You can find me at allsquaregolf.com/mattegan.

More interesting to me is Golf GameBook. This is a live scorecard app available on the Apple App Store, Google Play, Samsung Apps and Blackberry World. In essence, it lets you score and see other people's scores as you play. Both on the website and via the app, you can watch your contacts' scores, and post and view photos and comments as you and they score. It's good-looking and easy to use, and the fact it's available on virtually all major smartphone platforms means it's likely to prove useful in group golfing situations.

The makers of Golf GameBook seem to want to make great play of the fact you can exchange something called 'banter' with your fellow golfers as you play. Leaving aside the dubious etiquette of using a phone to send messages from the course, I'm certain my fragile golfing ego wouldn't withstand the rigours of electronic horseplay.

But as a portable group scoring device it is a great idea for society days and the like. I'll certainly be introducing it to the biannual Brass Mamba Invitational weekends so everyone will know just how crucial is my fourth putt on the last, as I strive to get that all important 7 for a single point to bring home the trophy for the boys. ⊠ **Matt Egan**

NAVIGATION APP

Glympse

Free

Contact
■ glympse.com
Read more
■ tinyurl.com/qc7c6bz

System requirements
iOS 5.0 or later, Android, Windows Phone 7/8, BlackBerry

**PC ADVISOR
RECOMMENDED**
★★★★★

There are plenty of apps that know and track your location, but few allow you to selectively share this sensitive, personal data with only the people you want, for the amount of time you want. The only rival which springs to mind is Apple's Find My Friends, but this assumes that your friends also have an iPhone, which is going to be a problem for a lot of people.

Glympse is different, though. It's designed to let others track your whereabouts, and while you could use it to help someone find you, it can equally be used to let someone track your progress as you travel to them.
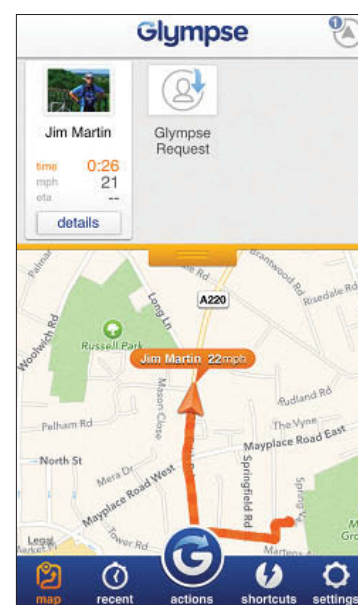
The app is available on more devices than you might expect, even Windows Phone 7, and doesn't even require the viewer to have a smartphone or tablet. The way it works is that you fire up the app when you're ready to share your position, choose to whom to send the 'Glympse' and how long you want your location to be shared.

Optionally, you can set a destination, send a personalised message or choose a preset phrase from the list, such as 'Stuck in traffic' or 'Heading home now'.

They receive – via SMS or email – your message and a link to track your progress on Glympse's website. In our experience there's a slight delay compared to your actual position, and it's reliant on a mobile data signal to send updates so won't work everywhere, but it's accurate enough for most purposes.

The app also allows you to request a Glympse from someone else, or create a group where multiple people can track each other's locations (just like Find My Friends). When you tap the details button below your name in the app, you get a big Expire Now button to stop sharing your location early.

In the options section, you can choose whether or not to broadcast your speed (off by default) and prevent your device turning off while viewing the map. Glympse isn't a satnav, but you can run a satnav app at the same time – at least we could on an iPhone running iOS 7.

Verdict

Glympse is a well-thought-out app and is nicely designed, too. Given that it's free, installing it is a simple decision. ⊠ **Jim Martin**

Five best Android satnav apps

Chris Martin reveals why you should let your Android smartphone do the work for you

If you own a smartphone or tablet, it's likely that it will be equipped with GPS, which means you can use it as a satnav device. There is, however, such a wide range of free and paid-for apps on the Google Play store that finding the one that's best for you can be tricky. With this in mind, we've rounded up the top five satnav apps.

Although you can go far with a 'free' app, you'll need a data connection, so these are suitable only for those with unlimited or generous tariffs. Paying for apps will mean they can be downloaded directly on to your device, so you don't need constant data as you drive; though, watch out for in-app purchases for additional features.

1. Waze (free): Waze isn't the best satnav just because it's free, it's because it manages to merge a great navigation app with crowd-sourced data to tell you in real-time about traffic jams, closed roads, speed- and red light cameras, plus local petrol prices.

This would be all for nothing if no-one used it, but Waze has millions of users around the world, with plenty in the UK. You're encouraged to participate, even if only passively, which is why it's such a success. Collecting data about your position and speed means that other Waze users can be alerted to slow traffic without anyone lifting a finger. You can report temporary speed cameras, accidents and other hazards, as well as map corrections.

The app itself is a breeze to use and looks great, though, maps aren't stored offline so you'll need a data connection. It even includes a Glympse-style option (see page 55) to let someone track your progress and ETA while you drive. Road speed limits aren't displayed, and you'll be warned of speed cameras only if you're driving too fast.

Our main criticism is the wide-open privacy policy, which means your data isn't anonymous and can be shared with too many third parties including the police. Waze is a black box for your car, in effect, so drive sensibly or don't use it.

2. Google Maps (free): Your Android device already has software installed that's capable of navigating you to a destination (iPhones, too, if you install Google Maps). Although Google doesn't do the best job of making this clear. Some devices will come with an app called 'Navigation', but if yours doesn't simply open Google Maps. Both use the same system, so it's a little confusing.

Set a destination and your starting point (probably your current location, hit Start and off you go. This will launch Google Maps

GOOGLE MAPS

TOMTOM
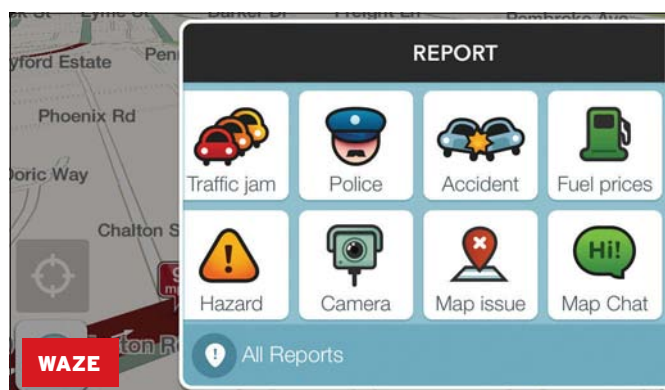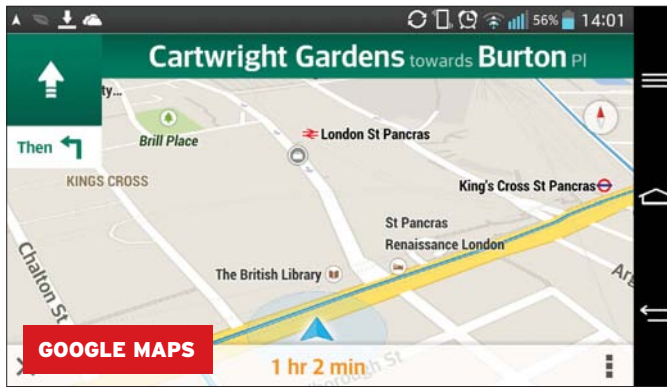
Navigation. Although this is still in beta and some warnings and crashes do occur, the app is excellent on the whole. You get that familiar view of Google Maps with a navigation interface carefully placed over the top. You can even switch to satellite view.

You get exactly what you need, including the next turn-by-turn guidance (onscreen and voice), road names and estimated time of arrival. Google Maps will suggest different routes and while you're driving live traffic, incident reports and dynamic re-routing are handy features. There are no speed limits or camera warnings though. Unfortunately, you'll need to use your mobile data connection so that's one reason why you might want to pay for an app such as the next entry in this list.

3. CoPilot Premium (£19): If you are going to pay for a satnav app, then CoPilot is the one to go for. If you're unsure whether you should buy the app, a free version is available for you to try, however, it's worth paying for all the extra features, as £19 is still a fair amount cheaper than a standalone satnav.

CoPilot works with more than 280 Android devices (including tablets) and contains detailed 2D/3D maps of the UK and Ireland, which you can choose to download and store locally. This means you don't need to rely on a data connection while you're driving.

For your money, you get all the features you'd expect from a satnav such as turn-by-turn voice guided navigation, alternative routes, favourite places and lane guidance. However, additional bits and pieces make CoPilot a very well-rounded bit of kit. You'll get a speed limit indicator and warnings, speed camera alerts with free

COPILOT PREMIUM

updates, automatic day/ night modes, five-day local weather forecast and Google searches.

Furthermore, you'll get a free 12-month subscription to CoPilot's Live ActiveTraffic, which finds the fastest route based on live traffic flow, automatically finds a new route if there's a delay, and provides a colour-coded live traffic map and status bar. Thereafter, it costs £7.99 per year.

4. TomTom (£37): One of the biggest and most recognisable names in the satnav market is TomTom. Its Android app is a little on the expensive side, which is why it's not higher up the
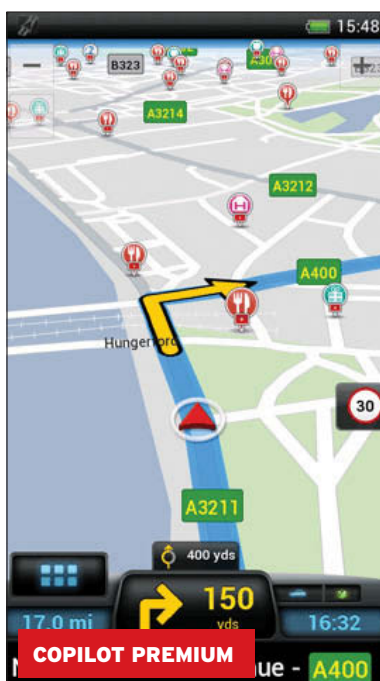
chart, but it does have a lot to offer. Since you're paying a lot for the app, it's no surprise that downloadable maps are included. You'll need to download them before you get going, though, so having some free space is essential. Handily, TomTom offers lifelong free updates to these maps, making it something of an investment.

As you'd expect, you get voice spoken turn-by-turn navigation (including street names), advanced lane guidance and a 2D or 3D view. The interface itself is clear and provides plenty of information including your speed, expected arrival time, distance and time to destination. This is good, but those with a smaller screen may find the map getting little space.

Another feature is IQ Routes, which calculate the fastest route to your destination and give accurate estimations based on information such as the time of day. Instead of a Google search, TomTom Places allows you to search for points of interest.

Live traffic information and warnings for fixed and mobile speed cameras are available but, considering the initial cost, it's disappointing that these require in-app purchases.

5. Navigon (£34): Garmin is a big name in satellite navigation. Navigon is its satnav app and, although it's a little pricey, it's worth a look. Users will, however, have to pay extra for features such as points of interest, live traffic information, petrol station locations and more. You'll be able to download the latest map at the time of purchase, but updates will cost extra, which is a shame considering the already high price. You'll need over 1GB of space, too, though this negates the need for data usage for navigation.

There are some good features you don't have to pay for, including Google Street View, support for Glympse location sharing (see page 55), turn-by-turn guidance and speed-camera alerts.

Navigon's Reality View Pro is one of its better features providing photo-realistic displays, so you don't up in the wrong lane and miss an important turning. Although there are some good features, the interface isn't as polished as the others. It's cluttered and difficult to pick out the information you need while driving. ⊠
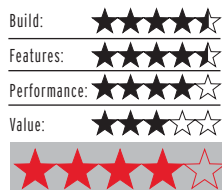

NAVIGON
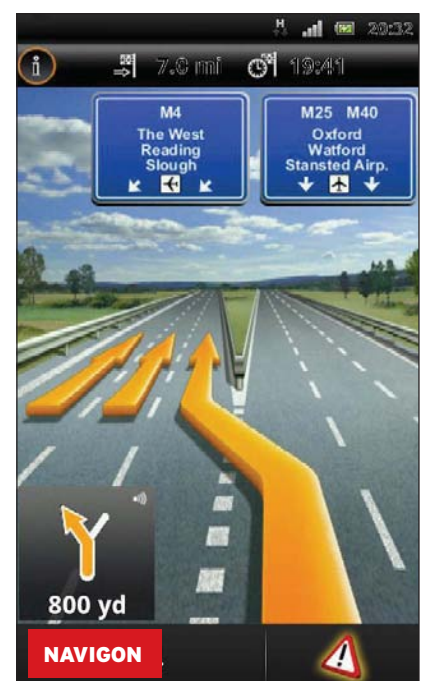
Specification

14in (1920x1080) display; 2.1GHz Intel Core i7-4600U (3.3GHz Turbo Boost); Windows 7 (64-bit); 8GB DDR3 memory; 256GB SSD; Intel HD Graphics 4400; 802.11ac Wi-Fi, 2x2 MIMO; Bluetooth 4.0; gigabit ethernet; SIM slot; HDMI; Mini DisplayPort; SDXC card reader; smart-card reader; 47Wh removable battery; 337x232x21mm; 1.63kg

Build: ★★★★½
Features: ★★★★½
Performance: ★★★★☆
Value: ★★★☆☆

★★★★☆

ULTRABOOK

Dell Latitude 14 7000 Series

Ultrabooks are usually high-end consumer machines, but they are also beneficial in business. Dell's new Latitude 14 7000 Series is a prime example: it's lighter, slimmer and better-looking than most corporate machines, and it's got impressive power despite its size.

It's 21mm thick and weighs 1.63kg, which is at the top of Intel's Ultrabook guidelines, but it's rock-solid – the Sony VAIO Pro 13 (tinyurl.com/ortteba) is smaller, but flimsy, too. Dell says that the Latitude 14 has a "tri-metal chassis", with aluminium and soft-touch material on the outside, and only the MacBook Air (tinyurl.com/mllqlzj) feels stronger than this machine.

The silver lid contrasts well with the darker interior, and the bezel and base are protected with powder-coated aluminium. It's unfussy, and we like its clean lines and curves.

It's a practical portable, too. Three USB 3.0 ports are split between the right-hand and rear edges, and the back houses Mini DisplayPort, HDMI and gigabit ethernet connections. There are also SDHC card-, smart card- and fingerprint readers.

Unusually for an ultraportable laptop, there's a trackpoint with accompanying buttons, and a docking station port and keyboard drainage hole. There's even a physical Wi-Fi switch, and the screen tilts to lie completely flat; in short, it's a range of features that consumer notebooks such as the MacBook Air or Sony can't match.

We looked at the priciest Latitude 7000, and the extra cost buys you a 1920x1080 resolution across the 14in LCD screen. It's not a touchscreen, but it's made from Corning Gorilla Glass and has a matt finish.

The measured brightness of 351cd/m² was excellent, and the 998:1 contrast ratio impressed; few screens provide this much punch and depth. That's good, but the Delta E figure of 7.6 was below average, and can't match the Sony's score of 3.1. This screen should be fine for work and watching films thanks to its brightness and resolution, but it's not up to colour-sensitive tasks.

Many Ultrabooks still include older, cheaper Core processors, but Dell has fitted a recent Haswell-based Core i7-4600U. Its 2.1GHz base speed rises to 3.3GHz with Turbo Boost. It's also Hyper-Threaded, although it has just two cores and a middling Intel HD Graphics 4400 integrated graphics processor – the down side of its low-power designation.

The chip performed well in PCMark 7, where its score of 4706 points squeaked ahead of the Sony and Apple laptops. The Dell's 22fps average in Stalker was sub-standard, though, and just for casual games.

The 47Wh battery lasted for five hours, 15 minutes in our video streaming test. It's an average result that couldn't even match the limited six-hour lifespan of the Sony, let alone the near-14 hours we recorded from the MacBook Air.

Elsewhere, there's future-proofed dual-band 802.11ac Wi-Fi – such as the MacBook Air, and similarly constrained at 2x2 MIMO specification.

This suggests a best sync speed of 867Mb/s, with real-world speed up to 300Mb/s. There's also a SIM slot for mobile broadband.

A 256GB Lite-On mSATA SSD helped the Dell to a Windows boot time of 14 seconds. We tested its sequential read and write speeds, which were 477- and 396MB/s respectively, both reasonable figures.

The keyboard has a rigid base, consistent action and concave keys, and it's one of the best we've used on an Ultrabook: better than the Sony and almost as good as the MacBook. The touchpad and its buttons are equally impressive, but the trackpoint has no clearance from the keys and is awkward to use.

As mentioned earlier, our review sample is the priciest Dell Latitude 14 7000 Series, although the middle model isn't much cheaper. The £1,390 gets you a touchscreen but a slower processor and less memory. The cheapest model, at £838, has no SSD and a low-resolution 1366x768-pixel non-touchscreen.

Dell offers numerous warranty and service options. The three-year warranty is generous, and five-year deals are available, with ProSupport options costing more.

BIOS customisations can be applied at the factory, accidental damage and data protection cover is available, and Dell can add encryption, anti-theft labels and privacy screens. An optional docking station adds USB and display ports.

Verdict

The Latitude 14 7000 Series is excellent, with rapid components, extensive connectivity, a good screen and comfortable keyboard, but it isn't the ultimate office Ultrabook. The battery life can't match the MacBook Air's longevity, and its £1,522 price makes it more expensive, too. ⊠ **Mike Jennings**

WIRELESS PRESENTATION KIT
Barco ClickShare CSC-1

£3,188 ex VAT
£3,826 inc VAT

Contact
■ barco.com
Read more
■ tinyurl.com/pkza4fw

Specification
Wi-Fi video presentation kit; 1920x1200 (HDMI) and 2560x1080 (DisplayPort); up to four simultaneous users; 2.4- and 5GHz Wi-Fi band wireless operation; 4x USB Buttons; USB Button container; mobile app compatible; dual-screen mode support; DVI, DisplayPort; analogue 3.5mm audio minijack; 5x USB 2.0; 260x181x276mm; 2.6kg

Build: ★★★★½
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆

★★★★½

ClickShare is the latest addition to Barco's range of commercial-grade display tools. Designed for boardrooms, classrooms and all points in between, it's an intuitive collaborative presentational system that's able to mirror your laptop's screen on a communal display at the touch of a button, simplifying the process of sharing presentations, images, video and so forth.

We've all sat in meetings and experienced that awkward pause in proceedings, often punctuated by a desperate cry for IT help, whenever a new laptop needs to be hooked up to a display.

What we have here is a plug-and-play antidote to all that. Anyone that needs to make a presentation, plugs the ClickShare USB dongle, known as a Button, into their laptop and connects with a single click.

ClickShare supports everything from Windows XP Pro to 8.1 Pro, plus Mac OS X 10.6 to 10.9. Alternatively, users can connect via the ClickShare app for iOS and Android.

The system comprises the CSC-1 base unit, four USB Buttons and a stylised Button bucket to ensure that the small devices don't get misplaced with office junk.

The Controller itself is well made, with a robust aluminium chassis and enigmatic black fascia. It's suitable for multiple installation configurations, from desktop to wall, ceiling and rack mounting. The accompanying USB buttonry is smart enough; Barco has resisted the temptation to make them too small, and they're maintenance free. No battery is required as they draw all their juice from the laptop USB port.

Setup is straightforward – the base unit communicates directly with the Buttons, utilising either a 5- or 2.4GHz

link. These pads are shipped pre-paired with the base unit. Presenters need only plug the USB device into their laptop. Device drivers loaded, the system is good to go. There's no need to install any client software, which makes it a breeze for anyone to jump in and present.

The base unit sports DVI and DisplayPort outputs (HDMI and VGA adaptors are provided in the box), and there's also minijack connections for audio, plus five USBs (one front facing), a LAN port and twin Wi-Fi antennae.

Once networked, you can access the CSC-1's setup interface with a web browser. From here a variety of setup changes and tweaks can be made.

The unit can be given a specific location (Boardroom, Meeting Room 1, and so on) and a customised onscreen greeting appended. You can also alter the wallpaper, change the host name of the unit, set the Wi-Fi password for those using an app on a mobile device or change the wireless frequency channel to avoid clashes.

The Barco CSC-1 itself supports 1920x1200 resolution via DVI, and will scale images to best match the main display automatically.

Up to four people can connect simultaneously. When you join an already active ClickShare session, the screen neatly divides so that all participating desktops are visible. This provides both the opportunity for multiple presentations, as well as providing a very neat transition between presenters. Like everything else about ClickShare, the process is fully automatic; it just happens when you click the button.

The system is best suited for Keynote, PowerPoint and JPEG slideshows. While sound and vision will stream to the base unit, video playback is limited to 30fps and there's no audio support over HDMI, which means you'll need to rig up a separate sound system. However, Barco hasn't ruled out fixing this in a future firmware update. The USB ports can also be used to apply firmware updates; there's no media support at present.

The Wi-Fi range of the base unit is said to be 30m, more than enough for even the biggest boardrooms.

Verdict
Overall, ClickShare impresses through its slickness and ease of use. The price is in keeping with its role as an enterprise-grade AV tool, and the no-nonsense one-click connection should pay dividends when it comes to time management. For smaller meeting rooms, Barco also offers the one-user-at-a-time CSM-1, which is a couple of grand cheaper. ClickShare makes any collaborative process infinitely more engaging. It's innovative and currently unique. ⊠ **Steve May**
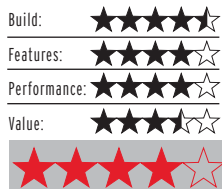
SHEET-FED SCANNER
Fujitsu fi-7180

The fi-7180 may come with a high £1,300 price tag, but for large- and medium-size businesses, this powerful super-fast sheet-fed scanner will soon justify its expense through its ability to process and convert large volumes of documents into an electronic format.

Fujitsu's scanner automatically feeds in up to 80 sheets at once, and it's even possible to use long-document support to cover source material that's up to 55.88cm long.

Many sheet feds struggle with items that aren't wafer-thin, but the fi-7180 can work with materials up to 1.4mm thick. That allows it to scan embossed business cards, for instance, although it can handle just three of these at a time.

It's directly connects to a PC through its USB 3.0 port. Managers can tweak the settings and workflow using Fujitsu's professional Scanner Central Admin suite.

One of the main concerns with any sheet-fed scanner is its ability to cope with potential paper blockages.

If the scanner doesn't feed properly, the resulting paper jam can often result in the destruction of the source material. If you're working with important documents, then that's an unacceptable prospect.

The fi-7180 tackles this with iSOP (Intelligent Sonic Paper Protection), a feeding device that listens to the sound and quickly calls a halt when it detects changes in the feed. Add to that the highly-effective paper straightener, and we found it very hard to catch out the fi-7180.

The fi-7180 is blisteringly fast, too, and offers speeds of 80/160ipm. When in use, you need to be careful to pull out all three sections of the fold-out output tray, as the paper can come out almost too quickly and ensnare itself, unless it has the full length of the tray to catch it.

The performance is stunning, though, and it took us just eight seconds to scan 20 pages – and a further two seconds for those to

be in the software and ready to use. This adds up to 150 pages a minute – an astonishing achievement. Little tinkering needs to be performed, with the PaperStream IP driver swiftly enhancing and tweaking the images on the fly. Colours were immaculately produced, and lines smoothly rendered.

Verdict
The Fujitsu fi-7180's price tag demands that you think carefully before buying this model, but its performance and features are right at the top edge. ⊠ **Robin Morris**
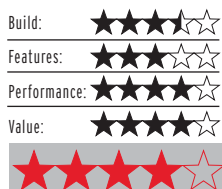

MONO LASER PRINTER
Brother HL-1110

Gone are the days when you couldn't find a laser printer for much under £300. Even so, the £59 HL-1110 is astonishingly affordable.

That's doubly so given that it's a rather smart little device. Very little, in fact, and it has a space-saving design that gobbles up a modest amount of your deskspace. Its input and output trays can be quickly pulled out and dropped into place in a clever design. The input tray can also hold up to 150 sheets – a not insubstantial amount for a modestly-priced model.

What you do miss out on is features. The rather spartan exterior – a brace of LEDs and a power button are the only adornments – is no deception, and there isn't a great deal to the HL-1110 other than reliable printing. The USB 2.0 port is the sole connection, so there are no wireless or ethernet interfaces. Neither is there support for USB drives or memory cards.

Provided all you want is reliable printing, though, that's unlikely

to be an issue. The HL-1110's clever design aims to keep paper jams to a low, and we experienced no problems while testing this model. That's an important consideration if you're looking at this price level, as some of the sub-£100 competitors have shoddy mechanisms that end up churning workloads. Admittedly, the print volume stretches to just 250 to 1800 pages, so you won't be wanting to use this model for sizeable jobs. For capable everyday prints, though, it makes a lot of sense. Noise can be an issue as well, and this is one of the louder models we've tested recently. In an office situation, though, that's unlikely to be a problem.

The speed is good, and we achieved 16.4 pages per minute in real-world testing. The 600dpi resolution is adequate, and text characters are well-rendered with plenty of depth and relatively crisp lines. It's maybe not so good for

graphics, lacking a versatile palette, and with imperfect rendering of blocks and shading. The 1MB memory would also be a bar to anything too complex. However, as an occasional text-churner, the Brother is both fast and effective.

There's no auto-duplex, so you can't save paper costs here. There's just one choice of toner, which offers 1000 sheets at a cost of around 2.7p a page. That's by no means extortionate, though, given the printer's low cost.

Verdict
The HL-1110 is a reliable model for an extremely low price point, and that makes it a highly commendable no-frills choice. ⊠ **Robin Morris**

COMPACT GAMING PCs

With people turning to laptops and tablets for their computing needs, the desktop computer is now more than ever a weapon of choice dedicated to gaming. Paul Monckton looks at six compact, stylish and unobtrusive gaming PCs

While games consoles such as Sony's PlayStation and Microsoft's Xbox offer a distinct advantage when it comes to ease of use and armchair convenience, you still can't beat a high-end gaming PC when you demand the ultimate in graphics quality and frame rates.

Ideally, compact gaming PCs should run relatively cool and quiet, too, even if the words 'small' and 'passive cooling' are rarely bedfellows. We're not looking for teenager bling, go-faster stripes or multi-coloured light shows; just sensible gaming PCs for grown ups.

A high-end system will easily outperform a console in graphics quality, not to mention being able to run a huge number of other programs. But a traditional tower PC is too obtrusive in a living room.

Mini PCs such as the Intel NUC D54250WYK (tinyurl.com/kdbLvnd) make great multimedia systems, thanks to near-silent operation and tiny physical size, but they can't offer the level of performance required for immersive gaming.

In between these two categories, sits the compact gaming PC. Based on smaller Mini-ITX or Micro-ATX motherboards and cases, they take up much less space than a full-sized desktop, yet provide enough room internally to support the full-sized graphics cards and overclocked processors gaming enthusiasts demand.

Processor

The Intel Core i5-4670K is difficult to beat today for all-round performance at a reasonable price. You can opt for the supreme power of the more expensive Core i7-4770K, which can process double the number of threads, but you'll pay a considerable premium and see minimal improvement in gaming speeds. However, we do see considerable speed gains from the Core i7-4770K in more demanding tests such as the PCMark 8 Creative benchmark.

Any of these 'K-series' processors will allow a reasonable amount of overclocking, but make sure your system uses a motherboard that supports this function if you want to make the most of such a CPU. And bear in mind that compact systems are usually already challenged in the cooling stakes, so you won't want to make things worse with a wound-up processor.

We use PCMark 8 to quantify the general performance of each machine. When most PC vendors are selling in essence the same box of bits, differences can be attributed to the level of overclocking and the use of fast memory and an SSD. Graphics cards still come into play for non-gaming tasks such as converting video formats, which is also reflected in PCMark 8 scores that make use of the GPU, such as the Home and Creative tests.

Graphics card

Graphics cards vendors fall in and out of favour as AMD and nVidia leapfrog each other with the latest technologies. It's wise to base your GPU decision on the type of games you like to play, since many titles are sponsored by one of these two graphics-card designers and are thus likely to run better on its own cards. In this group test, we see five examples sporting nVidia.

Never skimp on the graphics card in a gaming PC – it's the single most expensive component, but essential for the best Windows gaming. Accordingly, many of the systems here are fitted with powerful cards such as the nVidia GeForce GTX 770 or AMD Radeon R9 290X. In many games, a faster CPU will have much less impact than a faster graphics card, so spend your money appropriately. If there's a specific game you wish to play, it can be worth investigating the performance requirements to find out where your money is best spent.

PC ADVISOR TEST CENTRE

Photography by Dominik Tomaszewski

You can save money with a factory overclocked card that has a lower base spec, such as a GeForce GTX 770 with boosted clock speeds. These often cost significantly less, with a minimal reduction in performance. There's not enough space to install a second graphics card in any of these PCs, though, so make sure you specify the best graphics card you can afford at the time of purchase.

Cooling

Cooling is essential if any CPU is not to overheat, but especially one that's been overclocked. The basic Intel CPU cooler UK vendors often fit simply won't do. Airflow is much harder to manage in a compact computer case, so many vendors have opted for sealed liquid-cooling systems such as the Corsair H60, which places a radiator close to the case exterior, making it easier for cooling air to reach it.

There's nothing to stop you choosing a traditional fan and heatsink arrangement, but this must be accompanied by careful airflow management and tidy internal cabling. Additional case fans are often

advisable, too. A non-overclocked system will have less rigorous cooling requirements, so be careful if you're planning to tweak the system yourself and ensure that the supplied cooling system is adequate for your plans.

Gamers like their systems to look the part, but the case needs to be practical. Internal cable management aids airflow, while fan controllers let you reduce noise or boost cooling as necessary.

As these compact PCs will often be used hooked up to the living room TV, none of them have been supplied with monitors.

Peripherals

The type of controllers you require will vary depending on how you have your PC set up and only Chillblast has included a keyboard and mouse as standard this time around.

If you're using your PC on a desk with a monitor, you'll benefit from the improved responsiveness of wired rather than wireless devices. Look for high-resolution mice, and keyboards with programmable keys and backlighting.

High-grade mechanical switches in keyboards have a better 'feel' and provide

longer life than cheap membrane switches. Some draw attention to the W, A, S, D keys with a different colour or texture. A gaming sound card can provide a more immersive experience by adding multiple sound effects, with improved audio fidelity. Also consider a gaming headset with a built-in mic.

However, if you're planning on playing from the sofa, you'll want wireless controllers. For keyboard input, we would recommend a wireless model that comes with an integrated pointing device, such as a trackball or trackpad.

If you're using the PC as a home entertainment hub, you may also want to consider idle power consumption and noise. Also ask yourself whether you need an optical drive such as a Blu-ray player built into your computer or whether you will be using a traditional external player already connected to your television.

Warranty

Warranty terms are crucial when it comes to gaming PCs. The longer the better, but also look for a collect-and-return rather than return-to-base option.

CHILLBLAST FUSION XCALIBUR

£849 inc VAT • chillblast.com • tinyurl.com/nfq6ego

Build ★★★☆☆
Features ★★★★☆
Performance ★★★½☆
Value ★★★★☆
Overall ★★★★☆

Chillblast's Fusion Xcalibur stands out from the crowd, due to its £849 price – the lowest in this group – and the flat, horizontal format of the Silverstone RVZ01 system case. This may allow it to fit where the more cuboid systems can't – such as in living room AV cabinets.

The 1TB hard drive and 120GB Samsung 840 EVO SSD are both within easy reach and connecting cables can be plugged and unplugged without tying one's fingers into knots. The case also includes a slot for a slim slot-loading optical drive, although the drive itself is an optional extra on this PC. Sadly, the overall look of the case is unimpressive, thanks to its plastic construction which would really stand out when placed next to most home AV equipment.

The case offers limited support for liquid cooling options, but Chillblast uses a Scythe Shuriken low-profile cooler, incorporating a quiet 100mm fan. This is adequate for the installed 3.2GHz Intel Core i5-4570 processor, which doesn't support overclocking.

Graphics support is provided by an EVGA-branded nVidia GTX 760 graphics card, and this is the only system component that isn't immediately accessible when lifting the top cover.

When compared to the competition in this group test, the Fusion Xcalibur delivers only modest performance. The lack of overclocking limits general computation speed and the graphics card is one of the least powerful on offer. With scores of 6334 and 4386 points in PCMark 7 and PCMark 8 Home respectively, it's the slowest system for general use. Importantly though, this PC is capable of playing

PC ADVISOR
RECOMMENDED

most games at high resolution and with decent, if not the very highest-quality settings. And that's at a price that's considerably lower than any other. Wired2Fire's Hadron system, for example, offers very similar gaming performance but costs £300 more.

VERDICT: The Chillblast Fusion Xcalibur is the least expensive system in the group by a considerably margin, which is reflected both in its overall performance and looks. However, it's still capable of matching the gaming framerates of much more expensive systems.

DINO PC MICRORAPTOR GTX 770

£999 inc VAT • dinopc.com • tinyurl.com/mxmj6qt

Build ★★★½☆
Features ★★★★☆
Performance ★★★★☆
Value ★★★½☆
Overall ★★★★☆

The Microraptor GTX 770 from Dino PC is one of three systems here to be built into the Coolermaster Elite 130 system case. It therefore looks almost identical to Quiet PC's Serenity Nano and Yoyotech's Warbird RS4.0. While the front face is roughly square at 207x240mm, the case stretches almost twice as far backwards, allowing the use of lengthy graphics cards while maintaining a very compact appearance. The front also has a pair of convenient USB 3.0 ports and a single USB 2.0 port below a dual-function power/reset switch. Dino PC's offering distinguishes itself from very similar-looking brethren by the addition of a front-mounted tray-loading combo DVD burner. To find any other differences you'll have to look inside.

Like the Quiet PC and Yoyotech systems, the Microraptor GTX 770 uses an Intel Core i5-4670K processor, but this one's been overclocked to 4.3GHz, giving the PC a distinct performance advantage. With a PCMark 8 Home score of 4865 points, its right up there with the very fastest systems in terms of general computing.

Fitted with an nVidia GeForce GTX 770 graphics card, this PC is also capable of very good gaming framerates, beaten only by Mesh's Elite Mini Gaming OC, and very narrowly by Quiet PC's Serenity Nano, both of which are considerably more expensive systems. Expect more than 60 frames per second even playing Aliens vs Predator at maximum quality and full-HD resolution.

Inside the case, there's very little room to manoeuvre. The 600W Corsair power supply doesn't feature modular cabling and this

results in large bundle of wires tied together in the middle of the case. The DVD drive also blocks access to the processor, but doesn't compromise airflow thanks to the use of a Corsair H80 liquid cooler, which places a radiator and cooling fan right at the front of the case.

VERDICT: The Microraptor, delivers excellent performance for the price thanks to the combination of Intel Core i5-4670K overclocked to 4.3GHz and nVidia GeForce GTX770 graphics. It may look almost identical to the Quiet PC and Yoyotech, but outperforms both.

PC ADVISOR TEST CENTRE

MESH ELITE MINI GAMING OC

£1,499 inc VAT • meshcomputers.com • tinyurl.com/pwcacv2

Mesh's Elite Mini Gaming OC, is a stand-out PC. Housed in a gleaming white Fractal Design Node 304 Mini-ITX case with an entirely blank front panel, it looks somewhat like a tiny fridge. But don't let that fool you – this is far and away the fastest gaming PC in this round-up.

While many would regard the Hyper-Threading feature of the Intel Core i7 pure overkill for a gaming PC, this is exactly what Mesh has chosen. In this case, it's the 3.5GHz Core i7-4770K, overclocked to a speedy 4.3GHz, then chilled by a Corsair H60 liquid cooler.

When running general home computing applications, this processor enables the Mesh system to storm ahead of the field, achieving over 5000 points in the PCMark 8 Home test, and all but obliterating the competition in the PCMark 8 Creative test, where those extra processing threads give it a distinct advantage.

So does this processor really offer much of an advantage for gaming? Thankfully, the point is rendered moot by the inclusion of one of MSI's top-of-the-line Radeon R9 290X based graphics cards, packed with 4GB of memory. This Mesh PC was often significantly faster than the rest of the field, showing a whopping 36fps advantage over the next-fastest system in the Alien vs Predator high-quality test.

The Elite Mini Gaming OC also packs in some impressive features, such as a full 16GB of DDR3 RAM, running at 2133MHz and a spacious 240GB SSD. And that's alongside a 2TB hard disk. There's no room in the case for an optical drive, but the price includes an external 6x Blu-ray drive which you can hook up via USB.

Build ★★★★☆
Features ★★★★½
Performance ★★★★★
Value ★★★☆☆
Overall ★★★★☆

BEST OVERALL PERFORMANCE

The total price is, as you might expect, really very high. At £1,499 it costs £650 more than Chillblast's Fusion Xcalibur, but you do get around 50 percent more gaming performance for your money, along with case and components to match.

VERDICT: This is a smart-looking PC, with superb performance in gaming, general computing and creative apps. It offers excellent build quality and features, but is also expensive. Most people won't need this much performance and the Core i7 is overkill.

QUIET PC SERENITY NANO

£1,238 inc VAT • quietpc.co.uk • tinyurl.com/o4qdh7y

The compact gaming PC is the most difficult category of PC to keep quiet. While it's possible to build a tiny PC without fans or moving components, combining small size with competitive performance is next to impossible – especially when that performance is being poured into the graphics engine of a PC. There's no room for sound-proofing material and no space for large, slow-moving cooling fans – the best type for quiet and efficient cooling. All you can do is select the quietest components available and hope for the best, which is largely what Quiet PC looks to have done with the Serenity Nano.

This system is powered by an Intel Core i5-4670K, overclocked from 3.4- to 3.8GHz, which is hardly an overclock at all considering this is the rated Turbo speed of the processor. But this approach does avoid increasing the cooling requirements to the extent that noisy, high-speed fans would be required. Quiet PC has chosen the Noctua L9i cooler for the CPU, which is specially designed to cause minimal audible noise, if not designed for extreme overclocking.

The PC also uses a quiet 750W FSP Aurum Modular power supply. This may seem vastly over-specified considering the maximum power draw of the PC, which we measured at 330W, but keeping the power supply at under 50 percent maximum load enables it to run much more quietly than one which is straining near its full capacity.

A Palit GTX 770 Jetstream graphics card is installed, which features not two, but three cooling fans of its own. And when these kick in you can most definitely hear them. Placed as they are so

Build ★★★½☆
Features ★★★★☆
Performance ★★★★☆
Value ★★★☆☆
Overall ★★★★☆

close to the edge of the case, there's little you can do to mute them. However, this card delivers a little more performance than a standard GeForce GTX 770, enabling the Serenity Nano to outperform all but the Mesh in our gaming tests, despite its modest processor settings.

VERDICT: This system is over-engineered to provide maximum efficiency and low audible noise. To do this, some overclocking potential is sacrificed, although its factory overclocked graphics card makes it one of the best performers when it comes to gaming.

WIRED2FIRE HADRON

£1,149 inc VAT • wired2fire.co.uk • tinyurl.com/LqutLys

The Hadron is much like a standard gaming PC – only much smaller. Where many are built into cube-style cases, the Hadron lives in a tiny tower in the form of the EVGA Hadron Mini-ITX case.

Standing vertically on the desktop, it exudes a rather expensive feel. The meshed top surface houses a pair of quiet cooling fans that whir into action when necessary, while the front is blank save for the power switch and finished in a glossy piano black. The right-hand side provides a pair of USB 3.0 ports, as well as audio jacks and an almost invisible slot for a built-in DVD burner. Inside, there's an Intel Core i5-4670K overclocked to 4.2GHz and cooled by a Raijintek Aidos CPU cooler, fitted with a pair of bright red fans.

These components include 16GB of memory and a 250GB Samsung EVO SSD, paired with a 1TB Seagate Barracuda hard drive. Of more interest for this machine is the Asus GTX 760 Direct CU II graphics card powering core gaming performance.

Although this is a higher-performing model than nVidia's reference design, it's based on the GeForce GTX 760, which is inevitably slower than the GTX 770-based cards found elsewhere. Gaming performance was therefore similar to Chillblast's Fusion Xcalibur, which costs £300 less. Overall computing performance is generally very good. The Hadron's PCMark 7 score of 6890 points

Build	★★★★½
Features	★★★½☆
Performance	★★★½☆
Value	★★★½☆
Overall	★★★½☆

is the fastest of the whole group. Note that the newer PCMark 8 benchmark allows more powerful systems such as Mesh's Elite Mini Gaming PC to overtake the Hadron, by a significant margin.

VERDICT: The Hadron looks like a standard gaming tower, only one greatly shrunk in size. Unfortunately, its graphics card is slower than most of the competition, resulting in poorer gaming performance.

	CHILLBLAST £849 inc VAT ★★★★☆ PC ADVISOR RECOMMENDED	**DINO PC** £999 inc VAT ★★★★☆	**MESH** £1,499 inc VAT ★★★★☆	
Product name	Fusion Xcalibur	Microraptor GTX 770	Elite Mini Gaming OC	
Processor	3.2GHz Intel Core i5-4570	3.4GHz Intel Core i5-4670K (4.3GHz OC)	3.5GHz Intel Core i7-4770K (4.3GHz OC)	
CPU cooler	Scythe Shuriken low profile cooler	Corsair Hydro Series H80 liquid cooler	Corsair Hydro Series H60 liquid cooler	
RAM	8GB DDR3 1600MHz	16GB DDR3 1600MHz	16GB DDR3 2133MHz	
Storage	120GB SSD, 1TB HDD	128GB SSD, 1TB HDD	240GB SSD, 2TB HDD	
Power supply	450W Silverstone SFX	600W Corsair Builder Series CX600	750W Cooler Master GX RS-750	
Motherboard	Asus H81I-PLUS	Gigabyte GA-Z87N-WIFI	MSI Z87I Gaming AC	
Operating system	Windows 8.1/7 Home Premium	Windows 8.1	Windows 8.1	
Graphics	EVGA GTX 760 (2GB)	ZOTAC nVidia GeForce GTX 770 (2GB)	AMD Radeon R9 290X (4GB)	
Networking	Gigabit ethernet, 802.11n Wi-Fi	2x gigabit ethernet, 802.11n Wi-Fi	Gigabit ethernet, 802.11n Wi-Fi	
USB ports	4x USB 3.0, 4x USB 2.0	6x USB 3.0, 3x USB 2.0	6x USB 3.0, 2x USB 2.0	
Other ports	2x DVI, HDMI, DisplayPort	1x DVI-I, 2x HDMI, 1x PS/2, 1x Toslink, 5x audio jacks	3x DVI, 2x HDMI, 2x DisplayPort, eSATA	
Optical drive	Optional	LiteOn iHAS122 DVD writer	Blu-ray/DVD reader/writer	
Case	Silverstone RVZ01	Cooler Master Elite 130	Fractal Design Node 304	
Keyboard & mouse	Logitech MK520	None	None	
Warranty	2-year C&R, 5-year labour	1-year RTB, 3-year labour	3-month C&R, 2-year parts, 3-year labour	
PERFORMANCE				
PCMark 7 overall	6334	6861	6678	
PCMark 8 home	4386	4865	5030	
PCMark 8 work	5063	5310	5173	
PCMark 8 creative	4285	4888	6867	
Games score (fps)[1]	104/56, 263/124/31, 155/63	121/65, 313/150/38, 220/81	186/104, 387/169/43, 183/94	
Power consumption[2]	39/278W	71/384W	54/548W	

[1]Games tested: Alien vs Predator 720p/1080p, Max; Sniper Elite V2 Low/720p/1080p, Med; Final Fantasy XIV 720p Med/1080p Max [2]Measured when idle and under load respectively

PC ADVISOR TEST CENTRE

YOYOTECH WARBIRD RS4.0

£999 inc VAT • yoyotech.co.uk • tinyurl.com/mq8popq

Apart from the Pioneer Blu-ray drive, there's nothing aesthetically to distinguish it externally from Quiet PC's Serenity Nano or Dino PC's Microraptor. It also shares the same £999 price tag with the latter.

Internally, however, there are significant differences. The Warbird RS4.0 uses an Intel Core i5-4670 processor, running at 3.4GHz. This was chosen in preference to the overclockable 'K' variant of the same chip, says Yoyotech, in order to try to make a quiet gaming multimedia PC. Its built-in Turbo boost function allows it to reach 3.8GHz when running single-threaded applications, all kept cool by a Corsair H60 liquid cooler and powered by a 520W power supply.

There's 8GB of memory included as standard, ample for gaming, and there's a 128GB SSD and 2TB hard drive for storage. Graphics are provided by an Asus-branded nVidia GeForce GTX 770 card, running at the same speed as that found in Dino PC's nearly identical system.

Overall performance is hampered little by running a non-overclockable CPU, with the PCMark 7 score around five percent behind Dino PC, for example, which has an overclocked K version of the same Intel chip. It's a similar story with most of the PCMark 8 tests. But crucially, gaming performance is largely unaffected. Only Final Fantasy XIV shows a significant drop in performance when compared to Dino PC's overclocked and mains-hungrier system. Note

Build	★★★½☆
Features	★★★★½
Performance	★★★★☆
Value	★★★½☆
Overall	**★★★★☆**

PC ADVISOR BEST BUY

that for some games, the Yoyotech plays games better than those like the Dino PC that have been overclocked.

VERDICT: The Yoyotech Warbird is a very smart, compact gaming PC with a built-in Blu-ray writer and good gaming performance. This system ships with a standard Intel processor, and can play faster than some systems that have been overclocked.

| QUIET PC £1,238 inc VAT ★★★★☆	WIRED2FIRE £1,149 inc VAT ★★★½☆	YOYOTECH £999 inc VAT ★★★★☆ PC ADVISOR BEST BUY
Serenity Nano	Wired2Fire Hadron	Warbird RS4.0
3.4GHz Intel Core i5-4670K (3.8GHz OC)	3.4GHz Intel Core i5-4670K (4.2GHz OC)	3.4GHz Intel Core i5-4670K
Noctua L9i low profile cooler	Raijintek Aidos CPU Cooler	Corsair Hydro Series H60 liquid cooler
16GB DDR3 1600MHz	16GB DDR3 1600MHz	8GB DDR3 1600MHz
120GB SSD, 2TB HDD	250GB SSD, 1TB HDD	128GB SSD, 2TB HDD
FSP Aurum 750W Modular PSU	500W EVGA Gold-rated	Seasonic Evo 520W Bronze-rated
Gigabyte H87N-WIFI	Asus Z87I-Pro	Asus Z87I-Pro
Windows 8.1	Windows 8.1	Windows 8.1
Palit GTX 770 Jetstream (2GB)	Asus GTX 760 Direct CU II	Asus GTX770 (2GB)
Gigabit ethernet, 802.11n Wi-Fi	Gigabit ethernet, 802.11n Wi-Fi	Gigabit ethernet, 802.11n Wi-Fi
5x USB 3.0, 4x USB 2.0	8x USB 3.0 front, 4x USB 2.0	6x USB 3.0, 4x USB 2.0
2x DVI-D, HDMI, DisplayPort	2x DVI, 1x HDMI, 1x DisplayPort, 1x onboard DVI	2x HDMI, 2x DisplayPort, 2x DVI-I, 1x DVI-D, 1x digital audio
Optional	DVD writer slot-load	Blu-ray & DVD writer, Pioneer BDR-S07XLT
Cooler Master Elite 130	EVGA Hadron	Cooler Master Elite 130
None	None	None
2-year C&R	2-year RTB, 3-year labour	3-year 'Silver' (1-year parts, 3-year labour)
6403	6890	6525
4579	4627	4482
5096	5245	4868
5281	4541	4735
127/68, 303/161/40, 200/76	102/55, 265/121/30, 172/67	122/66, 274/153/39, 184/75
49/330W	46/330W	55/351W

>> How we test and our conclusion

OVERALL SYSTEM PERFORMANCE
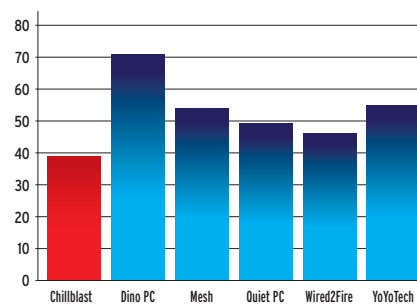
PCMark 8 Home(points)
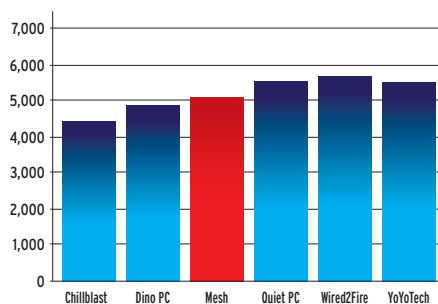
GRAPHICS PERFORMANCE

Sniper Elite 2, 1080p (fps)
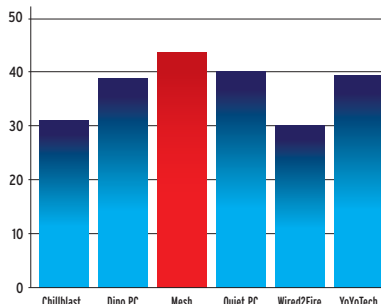
POWER EFFICIENCY

Idle power consumption (watts)

Conclusion

All of these compact gaming PCs offer considerable space savings over their full-sized counterparts. While they don't offer the same scope for upgrading with multiple drives and graphics cards or provide room for advanced cooling solutions and soundproofing, they perform every bit as well as a standard gaming PC.

Half of the PCs here are overclocked to deliver greater system performance, while the others were not. Gaming performance is, however, dictated by the choice of graphics card, which is reflected in the price.

If you have £1,500 to spend, then Mesh's Elite Mini Gaming OC offers unrivalled performance across the board, thanks to an Intel Core i7 processor and the fastest graphics card of the group. Usually the law of diminishing returns would dictate that spending this much more on your PC would provide only a modest improvement in performance, but in this case you really do get what you pay for with bottom-line framerate improvements in the region of 33 percent over the slowest systems. But do you really need all that performance?

If you have a more modest budget, then Chillblast's Fusion Xcalibur will deliver a competent gaming experience for just £849. That's more than £600 less than the Mesh system and by far the least expensive PC of the group, yet the fusion Xcalibur is able to keep up with PCs costing £300 more. This PC is therefore worthy of a Recommended award for value alone.

Our Best Buy award goes the Yoyotech Warbird RS4.0. While it may look the same as systems from Dino and Quiet PC, it's more than £200 cheaper than the latter and keeps pace with the latter in gaming, while drawing much less power. Its standard-clocked Intel Core i5-4670K processor and nVidia GeForce GTX770 graphics card provide an excellent balance of price and performance for a £1,000 gaming PC.

How we test

With this compact gaming PC group test, we've started testing with Futuremark's PCMark 8 v2.0 benchmarking suite. Unlike the previous PCMark 7 benchmark, the new version doesn't produce a single overall figure. Instead, results are divided into Home, Creative, Work and Storage tests.

The Home benchmark reflects command tasks for typical home use with lower computing requirements such as web browsing, photo editing and low-end gaming.

The Creative benchmark is aimed more at enthusiasts and professionals working with multimedia and entertainment content. It is more demanding on the processor and includes transcoding tests as well as further gaming workloads.

The Work test is geared towards office work tasks like creating documents, web browsing, spreadsheets and video conferencing. This test does not stress the gaming and multimedia capabilities of the PCs in this group test.

Gaming performance

We've used three games to evaluate graphics performance. We run our tests at 1280x720- and 1920x1080 pixels at various detail settings. Framerates are recorded using the following games and quality settings.

Final Fantasy XIV: 1280x720, Medium quality; 1920x1080, Maximum quality.

Alien vs Predator: 1280x720, all settings at Maximum quality; 1920x1080, all settings at Maximum quality.

Sniper Elite V2: 1280x720, all options set to Low quality, advanced shadows off, Supersampling off; 1920x1080, All options set to Medium quality, advanced shadows off, Supersampling off; 1920x080, all options set to Ultra quality, Advanced shadows – high, 4x Supersampling.

Power consumption torture testing

We measure the power consumption of each PC base unit when idle, and again while running at its performance limit. During the idle test, the PCs hard drives are still spinning and the power-management features are not enabled. For the full-load torture test, we run Prime 95 to force all CPU processing threads to maximum utilisation and stress system memory. At the same time we run the Geeks3D Furmark benchmark to stress any installed graphics cards. We leave these tests running for 10 minutes, then record the power consumption and the CPU temperature reached.

Overclocking

Because gamers demand the best performance from their hardware, we allow vendors to overclock PCs in this category. We require that any tweaked component is designed for overclocking, and that the PC vendor offers a comprehensive warranty.

Subjective assessment

We pay close attention to the physical characteristics of each PC, its noise output and its build quality, delving inside the case and taking note of the quality of components used, cabling and airflow.

Support

Differences in warranty terms can impact our scoring. Long warranties are sought after, but we also look at the terms and conditions – specifically, whether faulty PCs must be returned to the vendor at your cost and if both parts and labour are included. ☒

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Photography by Dominik Tomaszewski

USB Wi-Fi adaptors

We test six USB adaptors that will allow a Windows laptop or PC join the new world of 11ac Wi-Fi. Testing and reviews by John Taylor, additional reporting from Andrew Harrison

Wireless AC, or 802.11ac, technology is the up-and-coming replacement for the 11n wireless that currently runs the world. It's been available for well over a year now, but most laptops already in circulation can't take advantage immediately as 11ac requires a whole new wireless receiver module. Even now, almost two years after launch, only a fraction of laptops produced in the past six months have 11ac wireless capability – most still rely on the commonplace 802.11n Wi-Fi.

However, you can get a taste of 11ac wireless performance on any Windows laptop, with the help of a USB adaptor built for the new upcoming standard. To feel the benefit of increased throughput, you'll need a multiple-antenna setup. Modern laptops usually have their aerials arranged around

the inside of the screen or along the hinge, and having them as far apart as is physically possible improves reception. That's not so easy with a small dongle, though, which typically has one or two antennae inside.

What is 11ac?

The headline feature of 802.11ac networking is its 'gigabit wireless' capability. This isn't the same as 1Gb/s (gigabit per second) of real throughput, as is close to the case for gigabit ethernet, even on laptops employing up to three antennae.

The good news is that these devices still have the potential to unleash decent Wi-Fi performance thanks to revised technologies in the 11ac specification, such as beamforming and higher-density modulation schemes than found in 11n.

The beamforming technology allows the router to detect the approximate location of the wireless client, typically a laptop, and boost the signal in that direction. High-density modulation such as 256-QAM in 11ac allows the data transmission of the signal back and forth to be adapted to provide a greater throughput.

In real-world use, you should certainly expect to see faster and more robust connections at greater distances than was possible with short-range 5GHz version of 11n, and even the more common and literally pervasive 2.4GHz 11n Wi-Fi.

These adaptors can add wireless 11ac compatibility to any Windows based system (XP to Windows 8), but note there are currently no drivers for other operating systems such as Apple's OS X or Linux.

ASUS USB-AC53

£48 inc VAT • asus.com/uk • tinyurl.com/qb54hq3

Build	★★★½☆
Features	★★★★☆
Performance	★★★½☆
Value	★★★★☆
Overall	★★★★☆

Asus makes two 11ac dongles and the AC53 is the cheaper model. Its chequered pattern gives it a premium look, and its build quality is on a par with the competing products from D-Link and Netgear.

A single button on the device enables WPS connection to applicable wireless routers. Also included is a stand on the end of a 1m USB cable, which provides both a method of vertically mounting the adaptor and more flexibility for placing it for better signal. The stand is of a significantly higher quality than that on other models we've seen. A very nice touch is the inclusion of a second shorter cable and clip to attach the unit to the top of a laptop screen.

The main potential benefit of 802.11ac technology in this adaptor over an 802.11n setup, which is more commonly found in today's laptops, is data throughput at range. One way it does this is through beamforming, which allows the router to detect the direction of the adaptor and provide a stronger signal towards it.

Under the 1m test, the USB-AC53 reached a speed of 200Mb/s on the 5GHz spectrum (note that 11ac works only on this waveband). This is one of the best results we've seen for USB dongles, the fastest being 209Mb/s. Meanwhile, the test laptop on 802.11n saw a speed of 184Mb/s. So at short distances, you may see a modest but measurable performance increase with this 11ac adaptor over a good 802.11n setup.

At greater distance things become more interesting. In the 18m test, the adaptor sustained a speed of 176Mb/s, which eclipsed the

67Mb/s of the 802.11n laptop. So at this range, the AC53 showed over three times the data throughput. In the 82m test, the USB adaptor still produced an impressive 120Mb/s, which is considerably higher than the 86Mb/s of the 802.11 laptop.

VERDICT: The Asus USB-AC53 provided significantly higher speeds at range than our test 802.11n laptop. The included clip to attach it to your laptop screen is well designed and makes this adaptor much more practical when moving your laptop around.

ASUS USB-AC56

£58 inc VAT • asus.com/uk • tinyurl.com/mvoy536

Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★½☆
Overall	★★★★½

The Asus USB-AC56 is the slightly larger and dearer of Asus' two 11ac USB options. Unlike some models, it includes an external high-gain antenna. This should improve reception, especially when combined with the internal two antennae listed in the specification. Nevertheless, despite a potential three-aerial setup, this adaptor still seems to be a 2x2 model, limited to two data streams and a nominal 867Mb/s sync speed.

While this is a very small package in which to cram two antennae, it may provide a boost in speed using wireless diversity and beamforming technology. The unit itself feels to be of high-quality and the plastics don't creak or rattle as they do on some cheaper models. It's also worth noting that the antenna is connected by a standard screw connection, so if you wanted additional signal gain, you may be able to add a flat directional or a long 9dB antenna. The side of the device has a small recessed WPS button on it.

In the short-range test, the laptop's integrated 802.11n adaptor returned a throughput of 184Mb/s, while the AC56 achieved 209Mb/s. This is the highest data rate for an 802.11ac USB adaptor we've tested, and in line with the best-case performance you'd see from 802.11n with a 3x3 MIMO antenna setup.

At 18m, the 802.11n laptop dropped to 67Mb/s, while the AC56 maintained 201Mb/s. There was a similar story in the extreme range test. The 802.11n laptop recorded a speed of 86Mb/s, while the AC56 maintained a throughput of 142Mb/s.

PC ADVISOR RECOMMENDED

One of the most remarkable things about the testing of this and the other wireless AC units we tested was that you could see the new adaptive signal technologies working. For the first minute of connection, the data rate remained at a tiny 8Mb/s, before jumping to the maximum speed and staying there.

VERDICT: The USB-AC56 is the fastest 802.11ac USB adaptor we've tested. It provides the best boost to your data rate at range and lets you wander far from your router, while maintaining high data rates.

PC ADVISOR TEST CENTRE

D-LINK DWA-182

£43 inc VAT • dlink.com/uk • tinyurl.com/owdk54q

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

Portable USB adaptors don't have much space for multiple antennae, although the 'up to 867Mb/s' specification for D-Link's enclosed DWA-182 design suggests there are two inside. The design is slightly cheaper looking than some of the others in this group test and it feels a little flimsy. Like many such wireless adaptors, the device resembles a USB thumbdrive, especially with its removable end cap, which protects the USB contacts when it's not in use.

The dongle comes with a small support stand, which is useful for placing the unit on your desk. With this accessory, you can site the adaptor away from the computer and upright for potentially better reception. On the side of the D-Link adaptor is a button for initiating one-button WPS connections.

The throughput for the DWA-182 at 1m using 802.11ac was 180Mb/s, while the 802.11n laptop achieved 184Mb/s. So at short range there was no real advantage. For the first outside test, the device returned a speed of 125Mb/s, which was significantly higher than the 67Mb/s of the laptop's built-in 11n wireless. At 82m, the results were even more impressive, with the adaptor returning a speed of 140Mb/s, while the 802.11n sustained 86Mb/s throughput.

Our speed tests show that in our test setup at least, the D-Link could maintain a higher speed at distance than an 802.11n MIMO 3x3 solution, which was impressive.

It's worth noting that the DWA-182, in common with other 802.11ac adaptors we've tested, provided very low data rates for the first

minute of operation, generally 8Mb/s. After that the data rate shot up to the higher levels we recorded.

VERDICT: The D-link DWA-182 adaptor provided higher performance in our long-range 82m outdoor test when compared with built-in 802.11n. Short range speed was little different to that of a three-antenna laptop, which is impressive for a two-internal antenna dongle. It would be a good choice for these extended range scenarios, or to upgrade basic 11n Wi-Fi in budget laptops.

LINKSYS AC 580

£27 inc VAT • linksys.com/en-eu • tinyurl.com/nLvzqkh

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

This compact Linksys AC 580, along with many other USB 802.11ac adaptors, has a single antenna, which limits its theoretical sync speed to a maximum of 433Mb/s. But if you want a compact solution this is about as compact as you'll get. The total length of the adaptor is 35mm, and just 23mm protrudes when it's fitted in place.

It still includes a tiny WPS button for Wi-Fi Protected Setup configuration. The small space provided for an antenna doesn't bode so well for the signal strength, though. Like many such units, it has USB 2.0 specification, although that should not overly restrict the speed of this single-aerial solution.

Maximum throughput with the Linksys was 201Mb/s, slightly higher than the 184Mb/s achieved by our test laptop's built-in 802.11n card with three antennae.

In our second test, the adaptor returned a speed of 50Mb/s, compared to the 67Mb/s of the 11n laptop. This result is a long way behind all the other 11ac wireless adaptors. Under identical conditions other 11ac USB dongles could all reach speeds of 125- to 201Mb/s.

In the extended open-air range test, the Linksys AC 580 achieved only 2Mb/s and the connection proved unstable. By comparison most of the other 802.11ac USB units tested ranged between 120- and 143Mb/s. And the laptop's built-in 11n card using 5GHz also recorded 86Mb/s.

At close range, the performance was on a par, and in some cases better, than its competitors. But it would appear that the small size of

the AC 580 with its single antenna hampered performance at range, which is where 802.11ac devices should really shine compared to previous Wi-Fi standards.

VERDICT: The poor performance at range makes it hard to recommend this adaptor to someone with a laptop already containing a decent 802.11n Wi-Fi card. With rivals producing much higher performance at range, you'd have to be really set on the Linksys AC 580's small size to make the trade-off worthwhile.

NETGEAR A6200

£48 inc VAT • netgear.co.uk • tinyurl.com/o8rnoku

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

The Netgear A6200 USB dongle allows you to experience some of the performance of the latest 802.11ac Wi-Fi standard. Some care seems to have been taken over the design. It uses high-quality plastics, with many triangular-shaped vent holes on the back. The front of the body can be pulled outwards to extend the receiving area from the laptop. And the USB connector itself can be rotated, allowing the adaptor to stand up vertically when attached to a laptop's USB port.

More mounting options are available thanks to a 1m USB extension cable, with a small stand to fix the adaptor vertical and raked backwards slightly. The stand may not have the premium feel of that found with Asus' USB dongles, but it provides the necessary functionality. A single button makes connections using WPS rather than the safer password-only setup. The specifications for Netgear's USB solution suggest it has two antennae inside, and that it follows the slower USB 2.0 standard rather than USB 3.0.

In the first test, the A6200 allowed a data rate of 184Mb/s, identical to that achieved by the built-in 802.11n of our test laptop. So at short range, you may not notice much difference in speed between this 11ac dongle and older 11n technology – provided you already have a decent three-antenna 802.11n setup, of course.

Things changed in the second 18m test where the adaptor sustained a speed of 140Mb/s, which was considerably higher than the 67Mb/s reached by the 11n laptop alone. So at greater range this adaptor significantly improved our wireless data throughput.

In the final 82m test, the A6200 maintained its speed of 140Mb/s, which is in line with the other best-performing adaptors we tested. This was greater than the 86Mb/s achieved by the 802.11n test laptop.

VERDICT: The A6200 11ac adaptor provided good performance at range, which can be more than double that of a current 802.11n laptop with the best 3x3 MIMO setup. The addition of an attractive design and the ability to mount this in a USB slot vertically are an added bonus. For the best of the bunch, though, you should still look to the Asus AC56.

TENDA W900U

£24 inc VAT • tenda.cn • tinyurl.com/pv4q4nb

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

Tenda's W900U is a wireless 802.11ac adaptor with USB 2.0 connection. Like all such dongles today, it uses the Broadcom chipset. It contains two antennae and therefore its maximum theoretical 'speed' is 867Mb/s; and like all wireless speeds, you'll only achieve a small fraction of the numbers on the box.

The body is white in colour and wrapped in a clear plastic case, which seems designed to protect the adaptor and lend it a stylised look. The body also contains the standard WPS button for push-button pairing using the regular Wi-Fi Protected Setup system. The adaptor itself is light, just 19g, and reasonably well made. There are no rattles or creaks as you hold or insert it into the computer. The body is white in colour and wrapped in a clear plastic case, which seems designed both to protect the adaptor and lend it a stylised look. The case also contains a WPS button for push-button pairing using the standard Wi-Fi Protected Setup system.

In the first close-range test, the Tenda achieved a speed of 184Mb/s. This is in line with the speeds achieved by the current D-Link and Netgear 802.11ac USB adaptors, but a little slower than the 200- to 209Mb/s of the Asus models. At this distance, the 802.11n option built into our laptop also reached exactly 184Mb/s.

In the second test, the W900U reached a speed of 149Mb/s, compared to the 802.11n speed of 67Mb/s. This is beaten only by the 176- and 201Mb/s of the Asus units. In the final test, it returned a speed of 143Mb/s, almost twice the 86Mb/s the 11n laptop achieved.

PC ADVISOR
BEST BUY

As an additional extreme test, just for fun we took the adaptor 120m from the building. This even introduced an obstruction from trees, losing a clear line of sight. Even so, the adaptor still managed to return a speed of 11Mb/s.

VERDICT: The Tenda W900U is a well-made and incredibly lightweight 11ac wireless dongle. It performed extremely well in our tests, equalling or besting the performances of rivals from Netgear and D-Link. Given its price of just £24, it looks like a bargain.

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PC ADVISOR
RECOMMENDED

Conclusion

With the help of a relatively affordable USB dongle, costing between £25 and £50, it's possible to experience more than a taste of the benefit of 11ac Wi-Fi on an older computer. Those benefits run to faster networking speed at close range, enabling a lower-cost single- or dual-antenna USB dongle to compete with the very best three-antenna (3x3 MIMO) arrangement of a high-end laptop. Additionally, 802.11ac can maintain decent network speed at greater range, here surpassing the performance available from the best 11n setup.

There are some caveats, though, to adding an 11ac USB adaptor. First is the obvious – to benefit from 11ac, you'll need an 11ac wireless router, typically costing upwards of £100.

At present all the available USB adaptors we've seen from a range of manufacturers are using the same essential innards, based on chipsets from '5G wireless' sponsor Broadcom. So there's little to differentiate between them in their characteristics, other than external casing and sometimes arrangement of the aerials. Using reference designs there's little innovation among the manufacturers, and all rely on the same available software drivers, limiting support to just Windows at present.

Physically, using a dongle there's the inconvenience of keeping an often long and fragile stick jutting from your laptop, sometimes with unsightly antennae.

All of the adaptors tested were based on USB 2.0, with the exception of the Asus USB-AC56, which used USB 3.0. For most units this was not such a restriction, given the real-world capabilities of even the latest Wi-Fi – remember that USB 2.0's stated speed is 480Mb/s, but has a real speed closer to half that figure, at 240Mb/s. A two-stream '867Mb/s' 11ac arrangement might be able to provide around 300Mb/s in actual real user-data throughput, so last century's USB protocol won't be cramping 11ac's style as much as it first appears. And the latter Asus unit with its USB 3.0 interface was barely ahead of its USB 2.0 counterpart, the USB-AC53. But a USB 3.0-based dongle can only be a good idea as 11ac matures.

To choose between the group here, the Tenda deserves the value prize and Best Buy award as it offered decent performance up close and at range, and is half the price of most of the competition. The Recommended award goes to the Asus USB-AC56, which performed the best in wireless tests. It has a versatile external aerial option, but was also the most expensive at £58.

	APPLE CONTROL LAPTOP	ASUS £48 inc VAT ★★★★☆	ASUS £58 inc VAT ★★★★⯪ PC ADVISOR RECOMMENDED	
Product name	MacBook Pro	USB-AC53	USB-AC56	
Antennae	N/A	2	1x external, 2x internal	
USB	N/A	USB 2.0	USB 3.0	
Extras	N/A	None	Stand, external antenna	
Dimensions	N/A	96x26x12.4mm	115x28x19mm	
Weight	N/A	20g	50g	
Performance with 11ac (Mb/s)				
1m	N/A	200	209	
18m	N/A	176	201	
82m	N/A	120	142	
Performance with 11n/5GHz (Mb/s)				
1m	184	176	192	
18m	67	109	109	
82m	86	Not tested	Not tested	

PC ADVISOR TEST CENTRE

How we test

To test the performance of these dongles, and especially their performance at range, we checked the data throughput under different conditions.

In all the tests, the 11ac adaptor was compared against the wireless performance of an 17in Apple MacBook Pro (early 2011) with an internal 802.11n mini-PCI card that uses a 3x3 MIMO antenna setup. For the main tests, both the 11ac dongles and the 11n laptop were set to the 5GHz frequency band. The wireless router was a TP-Link AC1750 router, which has three external 5dBi antennae to provide a good three-stream radio signal.

The first test was conducted at a distance of 1m between the router and adaptor, to determine maximum possible throughput at short range. Our second test was at an 18m distance to check performance at range, with the lapop taken outside and the router stationed at a fifth-floor window. Finally, we tested at a much further 82m distance to see how each coped with extreme range.

Additionally, as all 11ac wireless adaptors are backwards compatible with older 11n and earlier standards, we also test each USB adaptor using the more common 2.4GHz 11n system, to ensure each would work with older routers.

D-LINK £43 inc VAT	LINKSYS £27 inc VAT	NETGEAR £48 inc VAT	TENDA £24 inc VAT PC ADVISOR BEST BUY
★★★☆☆	★★★☆☆	★★★★☆	★★★★☆
DWA-182	AC 580	A6200	W900U
2	1	2	2
USB 2.0	USB 2.0	USB 2.0	USB 2.0
Stand	None	Stand and 1m extension	None
97x29x13.5mm	35x15x16.5mm	95x31x14.3mm	93x28x10mm
21g	21g	20g	19g
180	201	184	184
125	50	140	149
140	2	140	143
140	67	138	143
83	25	92	44
Not tested	Not tested	Not tested	Not tested

PC ADVISOR TEST CENTRE

Best cloud storage services

A wealth of free cloud-storage services is available, but which is the best for your needs? Martyn Casserly takes a closer look at what's on offer

With more and more people owning multiple computing devices – laptops, tablets and smartphones – the idea of your data being locked away in the belly of a desktop PC seems antiquated. Cloud storage has freed us from these restraints, ensuring that the files we need are available where and when we want them.

Today you can sign up to a bewildering array of free services that offer to automatically upload your smartphone photos to the cloud, sync your documents across multiple devices, and enable you to work collaboratively on the web.

Sharing large files with friends is now easier than ever, as we no longer have to hope that the data we send won't bounce back due to limits imposed by email servers. Instead we just send a link to files stored within a cloud service, which friends or colleagues can immediately access. If this is all you want to do then the likes of WeTransfer.com and Hightail.com specialise in this area rather than long-term storage.

Choosing which service to use will depend on several factors: your preferred OS, how much space you need, and the level of security your data requires. In this feature we take a look at the most popular services to see just how much you can get for nothing.

Dropbox
★★★★★

Dropbox is one of the only online storage solutions to offer clients for Linux and BlackBerry, alongside the usual Windows, Mac OS X, Android and iOS standards – although an official Windows Phone app remains elusive. This goes a long way to ensuring that your data can be with you, no matter what flavour of technology you want to use.

The basic, free account comes with a rather small (relative to rival services) 2GB of storage. For documents this is plenty, but if you want to store any kind of media – photos, music or video – it will quickly get gobbled up. You can upgrade to a 100GB plan for around £6 per month, but Dropbox also offers 500MB of additional free storage for each friend you get to sign up to the service, with a limit of 16GB.

Other ways to bolster your account include linking it to Facebook, Twitter, or setting up a Mailbox (mailbox.com) account for an extra 1GB. Enabling the camera-upload feature will gain you another 3GB, and automatically back up to the cloud photos taken on your smartphone or tablet. It's also worth looking out for deals with new smartphones and tablets: Samsung recently offered 50GB free Dropbox space when you bought a new handset.

All this space becomes a moot point unless the synching and storage works, but there are no worries here. Dropbox functions by creating a local folder on your device or PC that then syncs with an online version. This means all your data is available whether you are on- or offline. Files are quick to appear online once you place them in the Dropbox folder on your PC, and you also have the option to make select files available offline on your tablet or smartphone (all are offline by default), with offline editing functionality among the best we've seen.

Folders and files can also be shared with friends, either by sending them links (these work for non-Dropbox users, too), which allow them to view the data, or by sharing the file. An important point to note about sharing is that you can't set permissions, so there
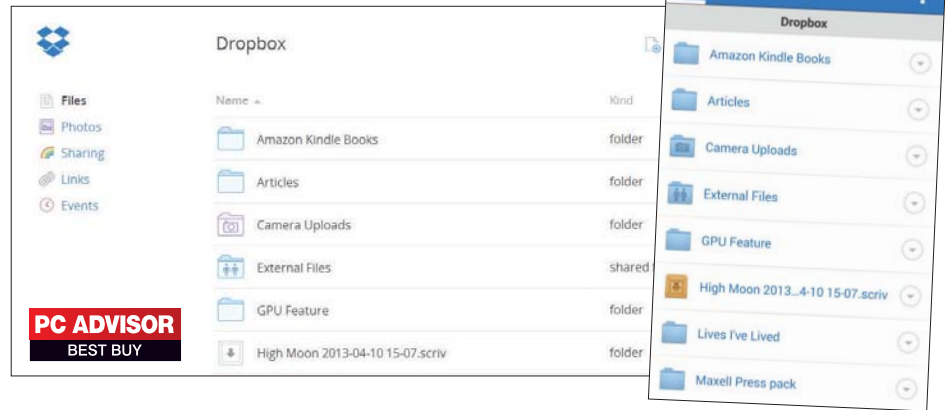
is always the danger that your files can be edited (and even deleted) by other users.

Dropbox explains that this is because getting consistency across multiple operating systems is problematic, although adding a read-only permission is on the roadmap for the future. Sharing isn't a total disaster, though, as Dropbox backs up any changes to files for 30 days. So if you need an older version or want to undelete a file, it's still there. Collaboration is also possible but, if two people work on the document at the same time, Dropbox will save two separate versions rather than combine them.

Security features include two-step authentication (always worth turning on), and all files held on the Dropbox servers are encrypted by AES 256-bit encryption, albeit employed from Dropbox's side rather than the user, with SSL for the data being uploaded and downloaded.

VERDICT: Dropbox is an excellent, cross-platform solution that form the benchmark against which others must compete. It may lack a few of the bells and whistles of its rivals, but it's rock-solid and compatible with so many applications.

Microsoft OneDrive
★★★★☆

Much of the functionality in OneDrive (previously SkyDrive) is similar to Dropbox, with apps available to Windows, Mac, Android, iOS and, of course, Windows Phone users.

Microsoft has also introduced a referral incentive whereby users gain 500MB of storage for every friend that signs up to an account through them.

There is also an additional 3GB offered if you link OneDrive to your mobile phone's camera roll (are you spotting the theme here?), enabling it to automatically back up your photos online.

One deviation from the Dropbox model is that OneDrive offers more than three times as much free storage at 7GB, although the referral system is limited to 5GB – it will top out at 12GB in comparison to Dropbox's 18GB.

The OneDrive interface is in keeping with Windows 8's Modern UI design, with clean lines and the ability to select between the boxy style or a more traditional file tree. Folders and files can be created on the web, including Office and OneNote formats thanks to tight Office Online integration.

There's also a social element to the web version, and various popular messaging services can be linked to your OneDrive account. This might not improve productivity, but it will make it easy to share files with colleagues. In doing this you can set permissions for each user ranging from read-only to complete editing ability.

If you use Office 2013 then OneDrive supports saving directly to its folder and working collaboratively with others online, even when using the full Office suite. You can also continue to work on a file if you're away from the PC on which Office is installed by choosing to open it in Office Online, all of which is controlled from the OneDrive app.

One nice feature is that you can remotely access files on another PC via the OneDrive website. The target machine needs to be turned on and running OneDrive with the Fetch Files feature enabled, but once you've configured this it could be a handy way to control all your data on the move.

If privacy is a major concern then it should be noted that Microsoft reserves the right to scan your files to look for what it would deem objectionable content. This could be copyrighted material or things of an explicit nature. Apple has a similar policy, making
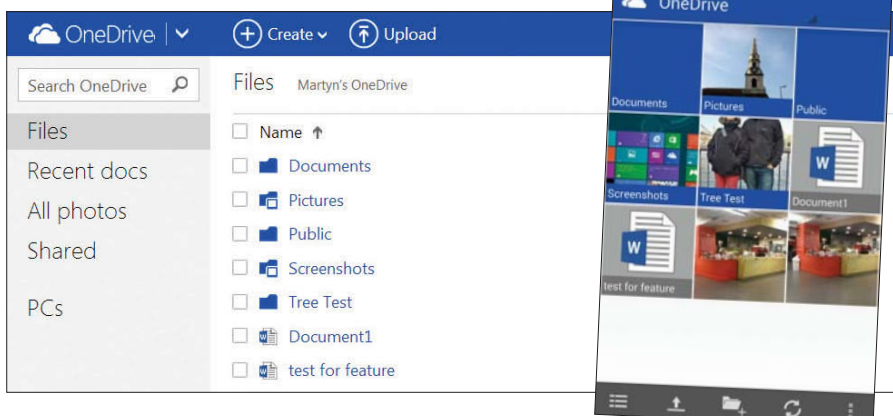
the two potentially more intrusive than their competitors in this group.

VERDICT: The recent updates to OneDrive help make it a competitive option, especially now that additional free space can be earned. Office integration is extremely useful and the Fetch File feature could become a key component once it matures.

Box
★★★☆☆

Sometimes mistaken for the similarly named Dropbox, Box has been around longer than its more famous counterpart, starting life in 2005. One possible reason for its less well-known stature is that for most of that time the company has focused on the business side of the market, building up an impressive enterprise reputation.

Box still offers solid personal storage options, however, with a generous 10GB of space with a new account. This isn't as good as it sounds, though, due to the fact that Box limits individual file sizes to 250MB.

This is markedly lower than the 10GB limits of both Google Drive and Dropbox, but OneDrive's 2GB limit will be adequate for most people. Of course, 250MB is more than adequate for most documents and spreadsheets, but large media files – particularly videos – could be problematic.

Uploading a photo library won't be a problem for the vast majority of users, with the average top-resolution image from a smartphone typically around 2- to 5MB.

The free account doesn't support versioning (the ability to restore previous versions of a file). Upgrading the Personal plan will cost you £7 per month, gleaning you 100GB of storage and a file-size limit of 5GB; or you could switch to the Starter plan for £3.50 per month, which also offers 100GB, a slightly lower 2GB individual file size limit, but crucially 25 previous versions of any file.

Functionally, Box is very good. The mobile app interface (available for iOS, Android,
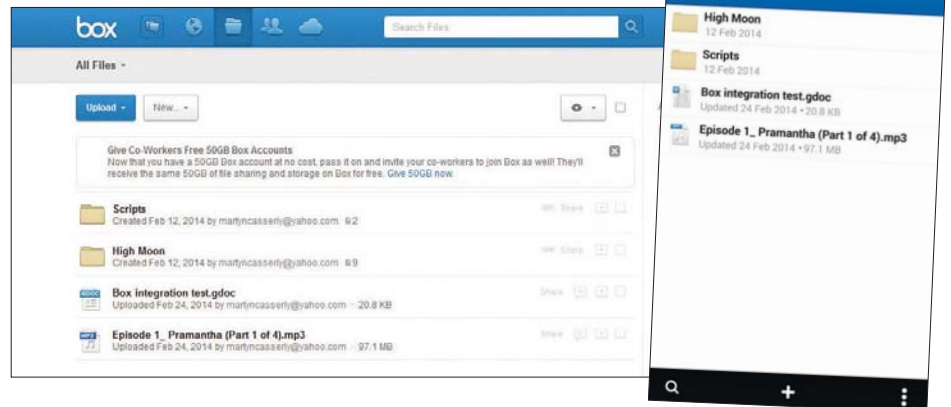
Windows and BlackBerry) is slick and well designed. There are plenty of options for creating, uploading and sorting files.

The web portal gives you the ability to create new documents in either Microsoft Office, Google Docs or web-based formats, which you can then edit in Box via a free, downloadable plug-in.

All your files can easily be assigned tasks and comments from the main page, which could be very useful when you start collaborating with colleagues – another thing Box does very well.

Sharing- and linking features are standard, but again you'll have to upgrade if you want to allocate granular permissions. General security is the standard 256-bit encryption on the servers, with SSL for data in transit.

One of the real benefits of its enterprise background is the excellent range of apps that exist to increase Box's versatility. There are programs that allow you to link Office directly to Box, an FTP app that lets you migrate older data on to the site, and a whole host of others that are listed on the website.

VERDICT: There's a lot to like about Box. The service is fast, solid, and offering 10GB of storage space certainly catches the eye. It's just a shame that many of the best features – such as versioning – are available only to paying customers.

Apple iCloud
★★☆☆☆

iCloud approaches cloud storage with a distinctly Apple-centric view. Unlike the other services here, iCloud isn't really a drag-and-drop-style folder for anything you need to back up. Instead, it is linked to various aspects of the company's devices.

iPhones and iPads have a tightly integrated relationship with the service, which automatically stores data about purchased apps, Keychain settings, plus calendar, contact and email information.

Photo taken on iOS devices are backed up to iCloud, but it isn't possible to do this from Android or Windows handsets. You can access files from a Windows PC if you download the Control Panel software (tinyurl.com/655kkeh) or log on to the iCloud.com website.

iCloud also allows you to have any purchases made on the iTunes store automatically download to your library, no matter which device you used to buy it. Photos – but not videos – are synched across all devices logged into your iCloud account. A neat feature is that, in addition to synching your Safari bookmarks across devices, you can also see a list of open web pages on other iOS devices.

A recent addition to iCloud is iWork – Apple's Office suite – now available for free via the website. The three apps it comprises – Pages, Numbers and Keynote – have clean interfaces, work well to a point, and sync with the equivalent Mac and iOS apps.

This means you can start work on your iPad, then continue on your PC (files can be downloaded from iCloud.com in Microsoft Office formats). The functionality is a little basic, most likely so that it ties in with the iOS versions, but synching between devices and the cloud is fast and reliable.

Services such as Dropbox are designed to cater for whatever you need on whichever platform you prefer, but iCloud feels like primarily a mobile solution. Sure, files and
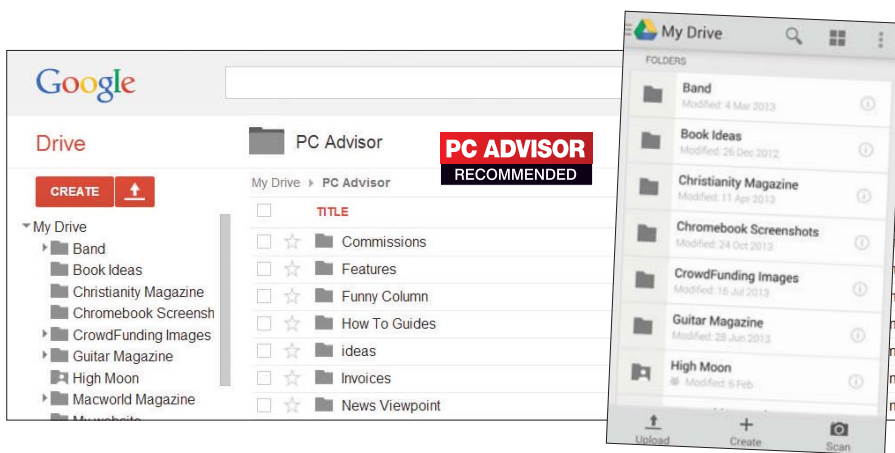
photos sync to your Mac or PC instantly, but the real benefits are linked to apps (such as Messages) and settings, which back up their data to the cloud and allow you to restore everything to a new iPhone or iPad should your old one be stolen, damaged or fail.

The 5GB of free storage offered seems generous, as purchases and photos don't count against it. But when you start turning on all the options that make the service useful, such as backing up your device, that space is immediately insufficient.

While iCloud is secure, much of the data is encrypted at 128-bit AES, with the more standard 256-bit reserved for Keychain passwords. Apple also reserves the right to explore the contents of your files if it believes they may contain illegal or harmful material.

VERDICT: iCloud is something of an outlier in cloud-storage terms. Unlike its rivals the service doesn't offer drag-and-drop functionality, and not synching videos in your Photo Stream is an omission. Apple users will find it handy, but would be wise to also use one of the other services listed here.

Google Drive
★★★★☆

In much the same way as OneDrive links into Microsoft products and iCloud to Apple, Google Drive is at the heart of the various online services offered by Google.

Free storage space is generous, with 15GB available when you set up your Google account or link to an existing one. In fact, as Google recently unified its services under one login ID, the chances are you already have a Drive account if you use Gmail, Google Calendar or even YouTube.

This 15GB of storage space is shared across all these services, so if you have large attachments on emails then they will count against it, and enabling the automatic photo backup to Google+ from a smartphone acts the same way.

Google exempts any photos below 2048x2048 resolution, and videos shorter than 15 minutes, so you could always adjust the settings on your smartphone accordingly and gain unlimited storage for them.

Unlike OneDrive and Dropbox, Google Drive doesn't have any way of adding storage through referrals or linking your account to social media. There have been plenty of promotions, such as 10GB for free when users downloaded Quickoffice, plus various mobile phone deals, and the search giant does offer 100GB free for two years if you buy a Chromebook. Google Music – a separate service – allows you to keep 20,000 songs in the cloud for free, which don't count against your Drive storage.

Drive works in the same fashion as most cloud-storage solutions, with a local folder on your PC linked to a duplicate cloud version. Versioning is supported, as is real-time collaboration on documents via the Google Docs app. Clients are available on PC and Mac, with mobile versions for Android and iOS, but Google and Microsoft's supposed ongoing feud looks to keep the service off Windows Phone for a while to come.

On the whole, the interface across the apps is smart and simple to navigate, with a basic file tree showing where your data is kept. You can choose specific files to be

available offline on the mobile versions, and these can be edited – if they were created in Google Docs – then synched when you return online. For other formats (such as Word), you'll need to open them in another app, thus creating a duplicate copy.

Data stored on Drive is, similarly to Apple, encrypted in 128- rather than the 256-bit AES employed by Box, OneDrive and Dropbox. Google asserts that it won't pry into the content of your Drive folder unless compelled by law-enforcement agencies, and you can set up two-step verification to add another layer of security.

VERDICT: With 15GB of free storage, Google Drive is the most generous of all the services in this group. If you live in the Google universe then it is an excellent storage option, particularly if you use Google Docs.

SpiderOak
★★★☆☆

If privacy is a major concern then SpiderOak might be the cloud-storage service for you. Most of the mainstream offerings, including Dropbox, Google Drive, OneDrive and Box, encrypt your data on their servers, but SpiderOak has a different approach.

Once you've set up your account and downloaded the desktop client (Windows, Mac and Linux are available) you can transfer files to your local folder, which will then encrypt them before synching them to SpiderOak. This might not sound that different, but it means that your data is readable only by you, as the key is local to your machine. SpiderOak calls this 'Zero-knowledge privacy' as the employees at the company can't access your data and, by extension, it should also mean any interested government parties would also find it extremely difficult.

Traditionally this would make accessing files from numerous machines more problematic, not to mention sharing with others, but the team has worked out ways
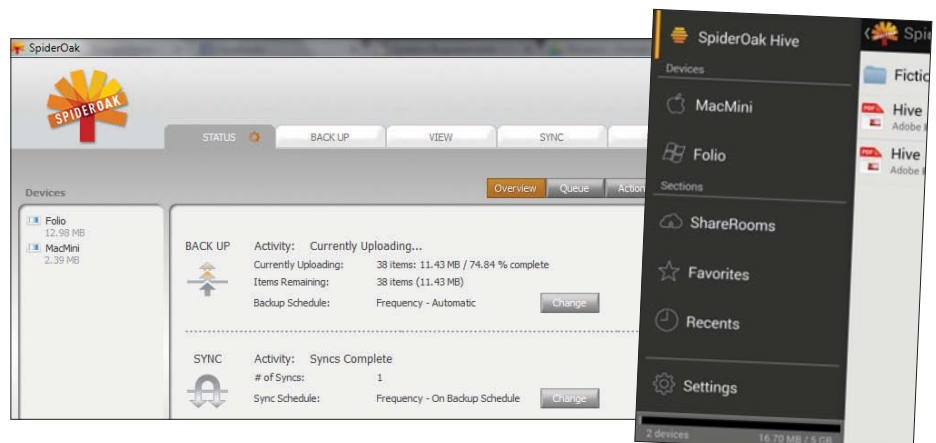
around that. SpiderOak Hive is the control centre of your storage. This app, which runs locally, is very similar to the Dropbox-style of folder on your desktop, although the interface has a little more detail.

This includes any of your other devices on which the desktop app is installed, and gives you access to the file tree within their SpiderOak Hive folders. You can also choose local files to back up via a menu, and there are helpful stats to keep you up to date with the activity on your account.

Whereas rivals such as Google Drive and OneDrive are tightly integrated into wider productivity suites, SpiderOak simply securely stores your files. This means there are no Office-style apps, nor the possibility of online collaboration with colleagues. You can easily share items and send secure links to files from the SpiderOak Hive, although this involves setting up a Share ID (free and simple) as another way to protect your data. This obsession with security runs throughout the system, with strong warning messages appearing if you decide to let the app keep you logged in all the time.

Some may find this annoying, but you can override any of the warnings and it's never a bad thing to be reminded that convenience isn't always the bedfellow of safety (for more on this, see page XX).

A basic free account comes with 2GB of storage, which is among the lowest of all the services here. But this can be increased by a referral system that gains you and a friend 1GB when they sign up to the service (up to a maximum of 10GB).

VERDICT: SpiderOak nails its colours very clearly to the mast with its focus on security and privacy. If these are the most important elements to you then it is clearly the best choice. It may lack the sophistication and integration of some of its rivals, but what it does it does very well.

Amazon Cloud Drive
★★☆☆☆

Not to be left out in the battle of the big players, Amazon has its own cloud-storage solution to take on the likes of Google and Microsoft. The focus of Cloud Drive is simpler than its counterparts, in that there are no fancy plug-ins or web-based Office suites to add productivity to your data.

Instead, it's very much focused on being simply a place to store your documents,
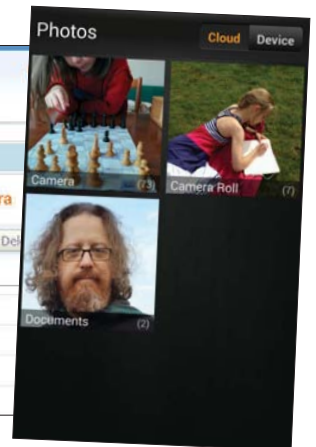
photos and videos. The desktop app is available on PC and Mac and, once downloaded, it will take the form of a folder that sits quietly in the background waiting for you to drag files into it.

The free account offers 5GB of storage, which Amazon assures us will store 2,000 photos, but if this isn't enough you can pay a very reasonable £6 per year to add 20GB, with more space available up to a limit of 1TB for an annual payment of £320.

In addition to the basic package, Amazon also includes a music-storage service, Cloud Player, which entitles you to keep 250 songs online for free. These files can be accessed on your mobile device (Android and iOS) via the Amazon MP3 app, with the option to stream or download them.

The mobile experience with Cloud Drive is very basic, and is centred around photo and video synching. iOS- and Android users can download the Cloud Drive Photos app (this acts as the generic Cloud Drive app) and have their camera roll automatically sync to Amazon's servers when a Wi-Fi connection is available. The transfer time is reasonable, but if you use your smartphone camera often, especially for videos, then the 5GB of storage will need to be monitored and managed lest you run out of space.

A very curious choice is to not make documents available in the mobile apps. If you add Word, PDF or XLS files to the Cloud Drive folder on your PC they will sync with the Cloud server, but won't appear on your smartphone or tablet.

Amazon words its description of the app's capabilities carefully, but you could easily miss this and then wonder why documents aren't available in the app. Of course, you can navigate to the web portal via a browser, but when you consider the other options

available that keep everything in one place, the document omission is a large black mark against the service.

VERDICT: Cloud Drive is a confusing beast. On one hand, it's a useful way to back up your photos and videos online – which it does well – with additional storage being very cheap. But the lack of support for standard documents means we can't recommend it.

Conclusion
If you were to set up the most basic accounts with each of the services we've reviewed here you'd have just shy of 50GB of free online storage, and even more if you included camera uploads and friend referrals.

All are not created equal, though. Amazon's Cloud Drive is fine for storing your photos, but not much else, while Apple's iCloud feels constrained by its iOS-only nature and the storage limit is quickly consumed if you turn on the backup feature. Using the free service is a no-brainer if you have an iPhone or iPad, though.

SpiderOak is an obvious choice for security and privacy, which might be useful if you need to store sensitive data as part of your work. OneDrive and Google Drive are both excellent solutions if you want an added dimension of productivity, thanks to their associated web-based office suites.

Microsoft Office users will love the way OneDrive is deeply integrated, while Google Drive's collaboration feature is particularly impressive. Box is a good, solid service, although its best features are available only to paid-up users.

Which leaves Dropbox, one of the first online storage services and still one of the best. It's useful, reliable, and works across multiple platforms. Highly recommended. ☒

Best free email services

Which email service should you use? Roland Waddilove examines the latest offerings from some of the biggest providers

Most email services have been around for years, but if you think you've seen it all before, you should take another look.

Hotmail is a distant memory: Microsoft has moved its users to Outlook.com, and worked hard to steal Gmail users with its Scroogled campaign (scroogled.com).

Mail is probably Yahoo's most successful division. Google frequently tweaks Gmail, Outlook.com is integrated into Windows 8, Apple has given iCloud Mail an iOS 7 makeover, and there are smaller players including GMX and AOL with solid services.

This isn't just a five-minute look at popular services: I've been using Outlook (Hotmail) for 15 years, Yahoo for 10 years and Gmail for seven years. I have 10,000+ emails stored in these services and use them all daily.

The question for which we all want the answer is which is best? Are alternative email service providers such GMX, iCloud and AOL Mail better than the big-name clients? You'll find the answers right here.

Gmail
★★★★★

Gmail has a lightweight, minimalist design for speed and most of the screen is taken up by the inbox. At one time you couldn't view the inbox and an email at the same time, but a new 'labs' feature splits the view horizontally or vertically with the inbox in one half and the current email in the other.

Folders for organising messages aren't supported; instead you attach labels, such as work, personal and family. Clicking a label lists all the messages tagged with it. It's merely a different way of organising email, and arguably more effective.

Labels take some time getting used to, but if you know the right commands to enter into the search box, you can do some clever filtering that isn't possible with rival services.

There are many ways to view email; the default view shows messages in date order. Priority inbox puts at the top messages Gmail thinks are important, and this works well.

Gmail can automatically sort messages by content into primary, social, promotions, updates and forums, too.

There are more interface themes these days, and an option to use any image you like for the background. Gmail has never been pretty, but it's improving with age.

Some people don't like the way Google matches ads with message content, but the flood of spam predicted when Google+ was integrated never materialised.

Email from POP accounts can be collected and contacts imported, so switching to Gmail is painless. There are more configuration options than most services, too.

Microsoft Outlook.com
★★★★½

Microsoft should stop attacking its rivals and simply tell people how good is Outlook.com. It really does have some great features.

The interface is similar to that of traditional email clients, with a folder list on
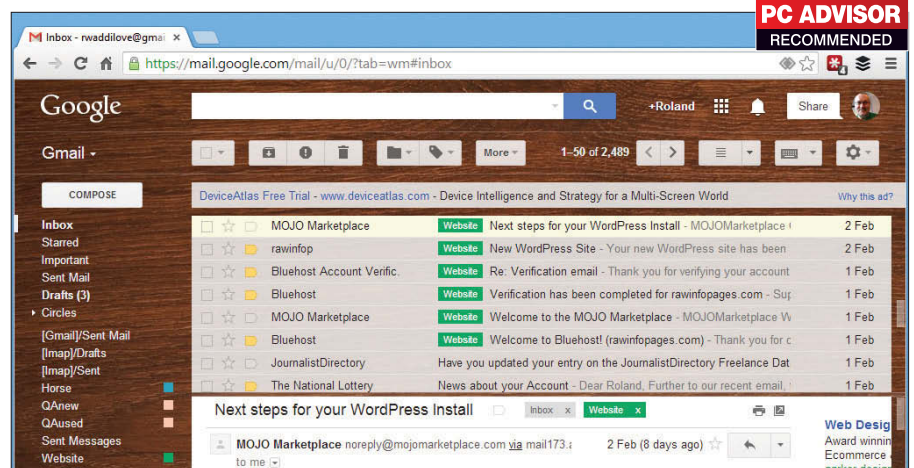
the left including inbox, drafts and sent. Most of the screen lists the contents of the current folder, with the option to show a vertical or horizontal reading pane that lets you browse the inbox and read emails at the same time.

Folders are used to organise messages, and adding new folders is straightforward. Messages can be dragged to folders and rules created to automatically sort incoming mail.

A Quick view section automatically categorises messages to a degree, like Gmail's tabs, but there are more categories. You can also create rules to assign incoming messages to categories.

Click a Quick view category and you can see all unread emails, ones with picture- or document attachments, flagged messages, bills, social-networking updates and so on.

Messages can be archived, which moves them to a folder, or flagged so they appear in Quick views rather than the inbox. Sweep moves or deletes all messages from a sender, or all messages received before a certain date. If you get junk mail, Outlook can try to unsubscribe you from the sender.

You can add other POP3 mail accounts, import contacts from Facebook and elsewhere, access it in a browser, Outlook, Windows Live Mail and Windows 8's Mail app.
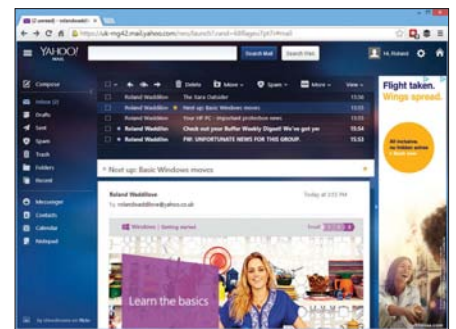
Yahoo Mail
★★★★☆

Yahoo has a modern look, and themes are available with plain- or photographic backgrounds. The design is ruined by ads, but you can remove these for £30 a year.

There's a panel with the inbox-, sent-, spam-, trash- and other system folders, and a list of email on the right from the selected folder. A preview pane can be added to enable you to browse folders and read messages at the same time.

Tabs are optional and, when turned on, they enable multiple messages to be opened on different tabs, and new messages to be created on a tab. It makes it easy to switch from reading to writing to browsing the inbox, without losing the current view. Options under the tabs let you reply, move, delete and flag messages.

Clicking Folders on the left enables you to create extra folders to organise messages. These can be dragged-and-dropped into folders, and there are facilities for creating filters that automatically sort incoming mail into folders. Messages can be starred and filters created to deal with similar ones.

Other email accounts can be added to Yahoo so you can see all your messages in one place, holiday responses are available, extra email addresses can be linked to the account and disposable addresses can be created. You can import contacts from Facebook and Google, and a calendar is available. Yahoo is very good, but Outlook and Gmail are preferable.
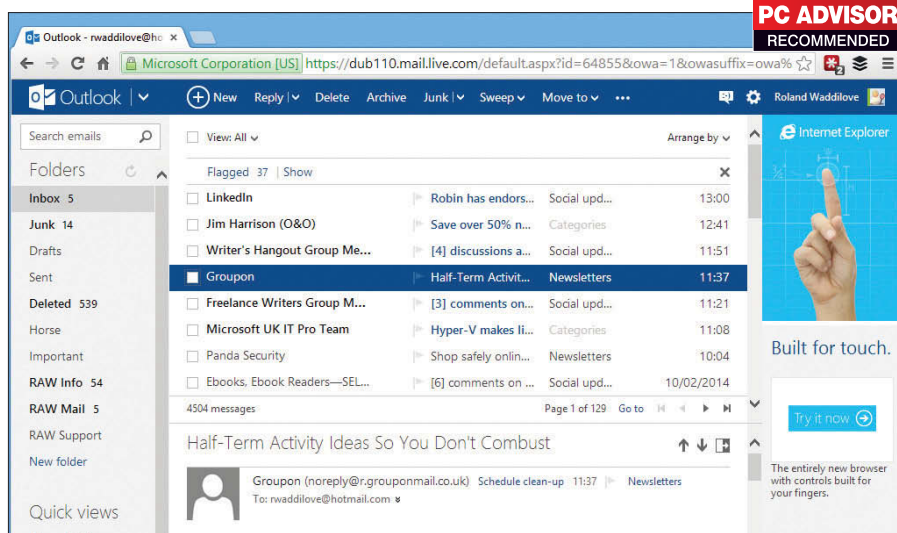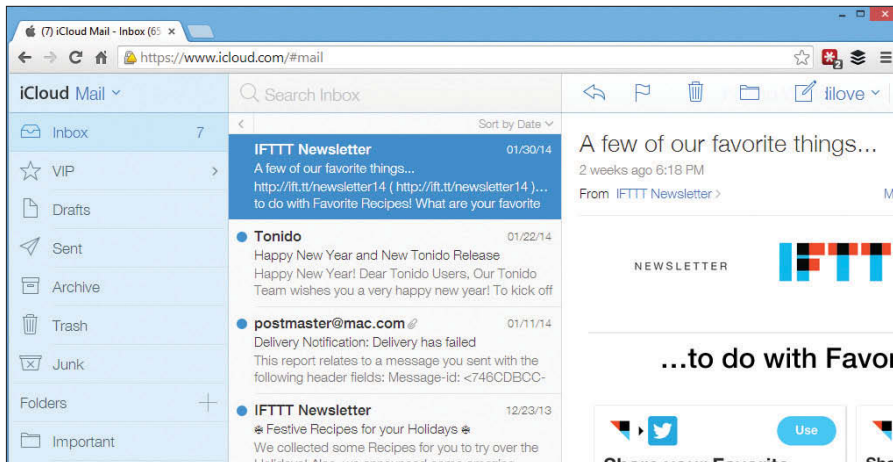
Apple iCloud

★★★☆☆

If you have an Apple device, you will have an iCloud account; email is a component of that service. The web-based version is less functional than the mobile versions.

On the iPhone and iPad, Mail can be set up to access other email accounts, such as Gmail, Outlook and Yahoo, but online you can access only iCloud email.

In typical Apple fashion, the service is designed with simplicity and ease of use in mind. It adopts a standard three-pane view, with email and folders on the left, the inbox listing all the messages in the middle, and the currently selected email on the right. It's straightforward, easy to understand and looks very nice, but customisation isn't possible.

Folders can be created and emails dragged-and-dropped into them. Rules can also be created to automatically sort messages into folders. Making a sender a VIP adds their messages to the VIP mailbox, which is useful for ensuring you don't miss important emails, but iCloud doesn't have the custom views that Gmail and Outlook have.

iCloud is a simple email service with an attractive, easy-to-use interface. Advanced users will find it too limiting, though.

GMX Mail

★★★★☆

GMX Mail is less well known than Google, Outlook and Yahoo, but that's down to marketing and not because it lacks features.

A nice feature is the way it can be configured to import Facebook contacts. GMX can also import from Outlook, CSV files and other sources. It can be configured to fetch email from other accounts, including Outlook, Gmail and general POP3 accounts. This makes it easy to switch from your current email service.

GMX has a good interface that makes using webmail very similar to a local email client. It can be customised with themes and the positioning of the reading pane. There are ads, but they aren't distracting.

There is a folder panel on the left for the inbox, sent, drafts and so on, and you can create additional folders. Messages can be dragged from the inbox and dropped into folders to manually organise them, and filters can be created that automatically sort incoming mail. Below the folders list is a Contacts panel. Most of the screen is occupied by an inbox or folder list and a preview pane. You can quickly view emails and messages can be opened in tabs.

An unusual feature is the ability to insert a photo captured live from the webcam and overlay cartoon shapes.

AOL Mail

★★★☆☆

AOL continues to provide a free email service but, unlike its rivals, most of the interface is taken up by a news feed showing the latest headlines. This is a throwback to the days when it was a content provider, too.

The news feed is distracting, and you'll find yourself clicking links and reading stories when you should be dealing with your mail. Also distracting are the themes, nearly all of which contain cartoon-like artwork.

You get the usual folder list on the left that includes inbox, drafts, sent and more,

and additional folders can be created for organising and storing messages. These can be dragged from the inbox, moved from the menu, or rules can be created to place incoming mail in the appropriate folders.

All the basic features are present, such as spam settings, a holiday message and filters, but you can't collect email from other accounts. It's useful only for light work by home users.

Conclusion

If you use Windows 8, Office, Surface and a Windows Phone, Outlook.com makes sense because everything works well together. In a similar way, people with an Android phone or tablet using Google services such as Docs, Calendar and Music are better off with Gmail. Although Yahoo and GMX offer good email, they aren't part of a broader range of internet services in the same way. The two least attractive are iCloud and AOL Mail, due to their limited range of features.

Microsoft and Google offer so many services that it is almost impossible not to have accounts with both of them; the only question is which should you use as your main email account? The reality is that both are equally good, with millions of people using them everyday. Which service you choose will largely come down to your personal preferences. Both Outlook and Gmail are deserving winners of our *PC Advisor* Recommended awards. ⊠
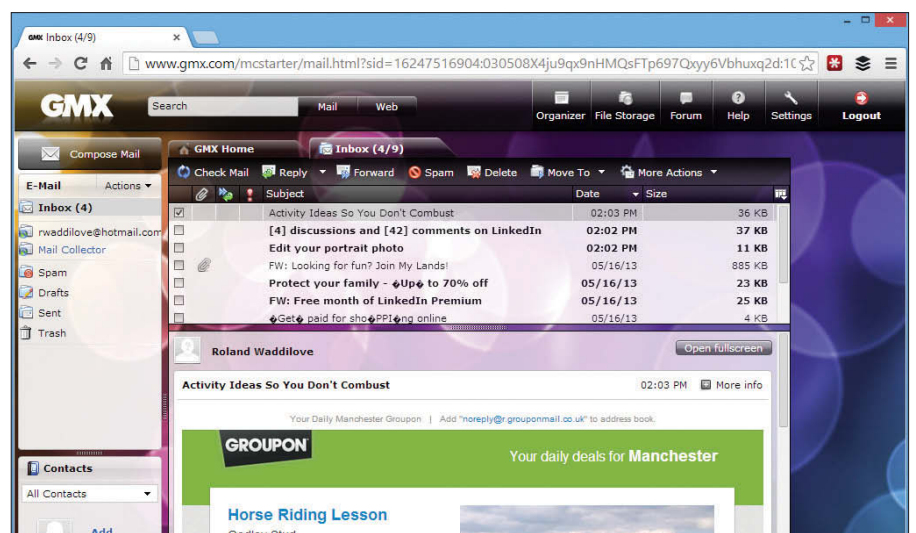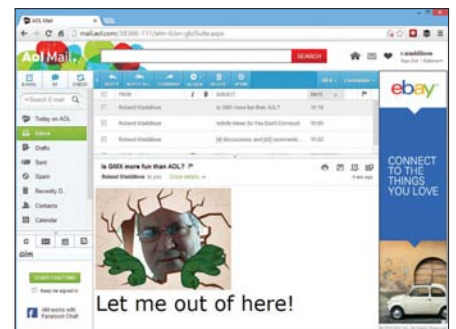
Run Android on W and vice versa

Windows:

Mike Bedford looks at ways of running Windows applications on your mobile device and Android apps on your PC

Although smartphones are now available running Windows, many more of us use Android. This means we have to juggle two operating systems – Windows on our desktop or laptop, and Android on our phone or tablet. Many of us are used to sharing data between these devices, either by synchronising in the cloud or transferring documents locally via Bluetooth or USB.

But what about software? If you have apps you like on your phone, why can't you use them on your PC? And if you have a package that's useful on your PC, why shouldn't you use it on your Android tablet? The good news is that you can.

Monofilar Mode

In monofilar mode, a single conductor runs the length of the tunnel. This permits a nearby hand-held radio to transmit along that conductor with the tunnel walls providing the return path. Monofilar modes operates below the cut-off frequency of the natural waveguide mode, indeed it has a zero cut-off so will operate down to audio frequencies. If the conductor is positioned at the cross-sectional centre of the tunnel, the arrangement can be thought of as equivalent to a large diameter coaxial cable, albeit one with a highly resistive outer conductor. In practice, of course, this is not a feasible arrangement so the conductor will usually run close to a wall.

If the conductor was in the cross-sectional centre of the tunnel, the electromagnetic field would occupy the entire space between the conductor and the walls. Unfortunately, with the more practical position for the cable, i.e. close to a wall, the field is largely constrained to the area between the cable and the closest wall as shown in the diagrams below, which is adapted from (Delogne, 1975).

QUICKOFFICE is free for all Android devices, and comes as standard with those running version 4.4 KitKat

Lookalike apps

Our main emphasis here is on how to use exactly the same applications on our mobile devices as we use on our Windows PC, and vice versa. However, for some purposes, it's possible to manage with lookalike apps while you're out and about. In essence, we make do with apps on our Android devices that provide some of the same functionality as Windows applications.

PDF files: In some cases PDF files work in a way that's indistinguishable from that on Windows. We can find no faults with Android's reader for Adobe PDF files, for example. However, apps that provide compatibility with Microsoft Office documents (namely Word, Excel and PowerPoint files), while very desirable, are something of a mixed bag.

Microsoft Office: A quick search in Google Play shows that plenty of Microsoft Office-type apps are available for Android. Many of them are free, so you don't stand to waste any money by making the wrong choice. However, it would save a lot of time if you take a good look at some reviews before deciding which app will best meet your needs.

In many cases, the more sophisticated features are not fully supported but, since many people use only the basic features, that might not be an issue. Perhaps the most well-known Office app is Google's Quickoffice, which comes as standard with new devices running Android 4.4 KitKat, but is also freely available from Google Play if your device runs an earlier version of Android.

Office Mobile: As we went to press, Microsoft launched Office Mobile for Android. It's free from the Google Play store and lets you view and edit Word, Excel and PowerPoint documents on your smartphone or tablet. Unlike lookalike apps, Office Mobile means your documents look no different from the originals.

Jpeg and other image files: You may also need a means of editing photos and other graphics files in standard formats such as Jpeg or Png. Here, we're not concerned with compatibility with particular Windows

software, but with the ability to import and export in the necessary formats and the provision of adequate functionality. As with Windows, a wide range of Android apps is available for photo editing.

Running Windows on Android

Solutions for using Windows applications on an Android device tend to involve accessing a Windows PC or a virtual PC via the cloud, rather than running the software directly on your smartphone or tablet. While this is undoubtedly a reflection on the more limited resources available on most Android devices, it's a perfectly workable solution.

The first method is to connect to your home PC using the Microsoft Remote Desktop app on your Android device. This will appeal to some users, and it has the advantage of giving you access to all the software you use on your PC, but there are some serious drawbacks that limit its usefulness.

For a start, although you don't have to install any software on your PC, it will work only if that PC is running a certain edition of Windows. In particular, for Windows 8 you need Enterprise or Pro, while in Windows 7 the feature is restricted to Professional, Enterprise and Ultimate. Given that most home users have Basic or Home editions, it's not an option.

Second, for this to work your home PC has to be left switched on while you're away from home. Needless to say, this will increase your electricity bill and doesn't do much for the environment.

Finally, although you can run the Remote Desktop app on any Android device, if you're going to be using it to a great extent, doing so on a tablet would make a lot more sense than a smartphone. After all, trying to navigate a Windows desktop on a small

REMOTE DESKTOP is useful only if you're prepared to leave switched on your PC whenever you leave the house

smartphone screen is going to involve a lot of zooming and panning.

A more practical solution for most people – but, again, only those with a tablet – is the virtual PC service offered by OnLive. Although you can chose to pay for additional features, the free service offers an excellent way to get started, giving you access to Word, Excel and PowerPoint documents, while providing you with 2GB of cloud storage.

We recommend that you try the free service before considering the more fully featured offering. First of all you should sign up at desktop.onlive.com and, optionally, upload to OnLive any Office documents from your PC that you subsequently want to access on your Android device. Then, on your Android tablet (the app isn't supported on smartphones), install the OnLive Desktop app from Google Play. Be sure not to accidentally install the app called OnLive, from the same company, which is for online gaming and quite different. Now, when you run the app, your virtual PC, complete with Microsoft Office, will appear onscreen and those applications will work in just the same way as on your PC.

Running Android on Windows

As we now turn our attention to the opposite issue of running your favourite Android apps on your Windows PC, we find means of doing exactly that, as opposed to effectively driving a remote PC – as is the case with accessing Windows applications on Android.

First up is the BlueStacks App Player, which is free from bluestacks.com. As its name suggests, this package allows you to run Android apps on your Windows machine, but it's not a full Android emulator so you won't get the full Android experience.

It's currently a beta release, and it might ask your permission to upgrade your graphics driver, but in practice we found the installation to be straightforward. Note that if you don't already have a Google account you will need to sign up for one, however.

A key emphasis is on playing Android games under Windows, so when you run BlueStacks most of the screen will be taken up with game suggestions.

However, unlike some similar packages, BlueStacks includes access to the Google Play store, so you can search for and install apps in just the same way as you would on a true Android smartphone or tablet.

As a beta release it's unreasonable to expect BlueStacks to be perfect, and we did experience a few teething problems.

With some apps we found the screen looked very pixelated, although this is inevitable on a large PC screen when you're using an app that has been written for a small, low-resolution screen.

And on a non-touchscreen PC, zooming with apps that expect you to use pinch- and reverse-pinch gestures can be problematic. BlueStacks' support pages suggest that Crtl, + and Ctrl, – should work, but we didn't find that to be the case and it seems that this is probably app-dependent.

A solution that claims to provide you with a full Android emulation on your PC is
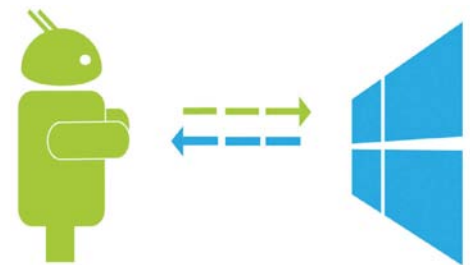
YOUWAVE uses Oracle VM VirtualBox to provide a full Android experience on your Windows PC
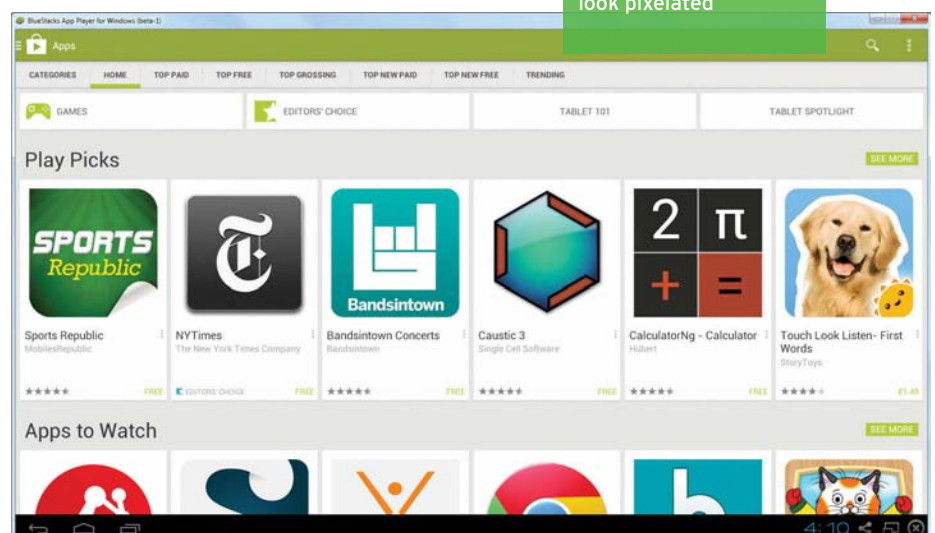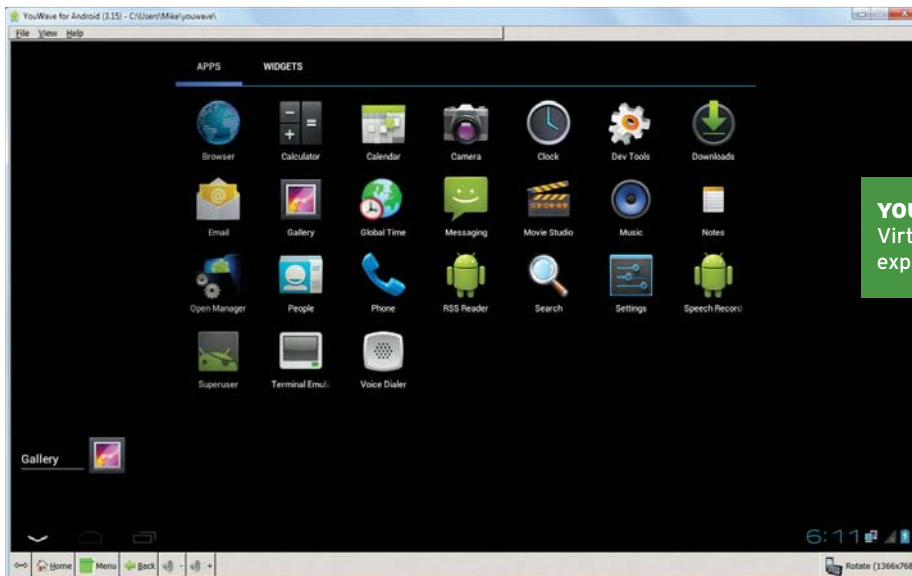
YouWave. Whether the issue of full Android compatibility is an asset compared to the app player approach of BlueStacks, we're not so sure. YouWave uses Oracle VM VirtualBox as the emulation engine but, paradoxically, if you already have VirtualBox installed you have to uninstall it before installing YouWave.

It isn't free software, although you can download a fully functioning copy and try it for 10 days. After this trial period you must pay $14.99 (£9) or $19.99 (£12) for the Basic (Android 2.3 Gingerbread) or Home (Android 4.0 ICS) versions respectively.

We found it very similar to BlueStacks, even down to the issues of pixelation and zooming. The developer confirmed that zooming isn't currently supported, but indicated that it is considering it for a future version, perhaps using onscreen buttons.

These are still early days for Android-on-Windows solutions, and we trust that the type of problems we encountered with both BlueStacks and YouWave will prove to be short-lived. For many uses both will provide acceptable service, but if you're tempted to take the YouWave route we suggest you make good use of your 10-day trial before deciding whether to buy it.

The all-in-one solution

While all the solutions we've seen so far are either free or low-cost, most represent something of a compromise. Although not free, if you're in the market for a new PC you might like to consider one of the small but growing number of devices that have been designed to natively run both Windows and Android. Industry experts are divided on whether these all-in-one machines will take off, but it's a potentially interesting solution to the Windows-Android dichotomy.

While a few such products have been announced, one of the few you can buy today is the Asus Transformer Trio.

Like other products in the Asus Transformer range, the Trio takes the form of a laptop with a removable keyboard that, when detached, turns the laptop into a tablet. But whereas other Transformers run the same operating system – either Windows 8 or Android – regardless of the form factor, the Trio allows you to switch operating system at the touch of a button. In fact, it can do more than this, which is the key to the Trio designation. Because both the screen and the keyboard contain their own processor, by adding a keyboard and monitor to the keyboard it can also be used as a desktop PC.

Not only that, but the screen section can then be used as a tablet by someone else, at the same time. Needless to say, buying two computers in one doesn't come cheap and, even then, without some of the solutions we've seen elsewhere in this article, it doesn't allow you to run Android apps under Windows and Windows software under Android.

With a street price of £899, we think you'd be better off buying a separate Android device and a Windows laptop than the Transformer Trio or a similar device. However, if this type of computer takes off, expect prices to tumble. If these devices can provide a means of the Android and Windows elements interacting with each other, with the ability to share software between the two platforms, we think manufacturers will be on to a winner. ⊠

ASUS' TRANSFORMER TRIO natively runs both Android and Windows 8.1

Windows

8.1 Tips and Tricks

Microsoft's update has easy-to-miss features. Here's how to squeeze more power out of the latest OS

BY BRAD CHACOS AND IAN PAUL

ILLUSTRATION BY JOHN-PATRICK THOMAS

Windows 8, with its overhauled interface and rainbow landscape of glittering Live Tiles, turned traditional computing on its head – and the redesign ushered in a new batch of tips and tricks designed to make the most of the operating system's touch-based user interface. But Microsoft's UI moves were a bit too bold, and less than a year after the launch of Windows 8, the Windows 8.1 update landed, bringing a ton of new features and a slew of subtle revamps.

Yes, the old Windows 8 tips and tricks still work, but Windows 8.1 has a profusion of handy new tools of its own. Roll up your sleeves and prepare to become a Windows 8.1 Jedi, young Padawan.

The hottest hotkeys we know

Let's start with the basics. Microsoft offers a seemingly endless parade of built-in keyboard shortcuts, but mastering the 10 shortcuts listed right will speed your system surfing.

Boot to desktop

Windows 8.1 lets you effectively banish the Start screen and boot directly to your desktop, but the option to do so is hidden in an arcane location.

Right-click the desktop taskbar and select Properties. In the window that opens select the Navigation tab. The option you want to select is 'When I sign in or close all applications on a screen, go to the desktop instead of Start', but take the time to thoroughly explore this 'Desktop power menu'. It has a ton of desktop-friendly tools, such as the ability to disable Windows 8.1's upper 'hot corners' or to launch the All Apps screen rather than the Start screen when you click the Start button.

All Apps filtering powers

Windows 8.1 seriously levelled-up the All App screen's usefulness – and changed the way you access it. To find the All Apps screen in

Switch between the desktop and the Modern Start screen	<Windows>
Search your PC	<Windows>-S
Open the Charms bar	<Windows>-C
Snap a desktop program to the left or right side of screen	<Windows>-Left Arrow/Right Arrow
Open the Quick Access menu (like right-clicking the Start button)	<Windows>-X
Open File Explorer	<Windows>-E
Open the Settings charm	<Windows>-I
Cycle through open programs	<Alt>-<Tab>
Cycle through Modern-UI apps (the entire desktop functions as a single app here)	<Windows>-<Tab>
Minimise all open windows and show the desktop	<Windows>-D

Windows 8, you had to wend your way to an obscure right-click menu, but in Windows 8.1 you can find it either by clicking the small downward-pointing arrow at the bottom of the Modern Start screen or by launching it from the desktop's Start button (if you configured the button to do so using the aforementioned Desktop power menu).

Once you're there, you'll see that the All Apps screen has new filtering options to help you find your chosen apps in no time. Click the By name field next to the word Apps in the top-left corner of the All Apps screen to reveal a drop-down menu of sorting options. Additionally, the Desktop power menu lets you configure the All Apps screen to display desktop programs first, so that it behaves more like a quasi Start menu.

The All Apps screen is also where you go to stock the Windows 8.1 Start screen with apps. Unlike Windows 8, Windows 8.1 will

not automatically dump Live Tiles for newly installed apps on the Start screen. You need to manually do so by going to the All Apps screen, right-clicking on an app, and selecting 'Pin to Start'.

Shut down/restart from Quick Access

Hate digging through the Charms bar to shut down your PC? Then use a new option in Windows 8.1's Quick Access power menu. Right-click the Start button in the lower-right corner of your screen, then hover over Shut down or sign out and choose whether you want to sign out of your user account, put the PC to sleep, shut it down or restart it.

Bing Smart Search

The Bing Smart Search capability baked into Windows 8.1 scours through your local files, the Modern UI apps on your PC, and a Bing web search, and then collates all the results into a single, easy-to-read interface. Bing Smart Search will even drudge up streaming videos and songs via Windows 8.1's Music and Video apps. It's a seriously useful tool.

But along with all the new and improved search capabilities comes one big downer for the privacy-conscious: Bing's web results come with ads, and your local searches can be anonymised and sent back to Microsoft.

To avoid this, open the Settings charm (in the Charms bar) and head to 'Change PC settings', 'Search and apps', Search. In the right-hand pane, click the slider that says 'Get search suggestions and web results from Bing' to turn off the web and Modern app search components. If you don't want to remove those completely, you could also consider modifying the personalisation options under 'Your search experience'.

BOOT TO THE DESKTOP, skipping the Start screen

The **QUICK ACCESS** menu lets you shut down fast

Managing apps en masse

Speaking of Modern apps, Windows 8's app management was a bear. Resizing or deleting apps was a tortuous, one-at-a-time process, and you could never see just how much space a Modern app consumed – a major problem on space-constrained devices. Windows 8.1 fixes both those problems.

Here's how it works. Right-click on the Start screen, then select the Customise button at the bottom right of the screen to enter editing mode. While the button is active, you can move, resize, unpin or uninstall Live Tiles in bulk, or kill their 'live' aspect to leave them as static app launchers.

Alternatively, open the Charms bar on the right side of your screen and select Settings, 'Change PC Settings', 'Search and apps', App Sizes to see just how much space each of your Modern apps is gobbling up. Clicking an individual app on this screen gives you the option to uninstall it.

Restart an app

In Windows 8, grabbing a Modern app at the top of the screen and dragging it off the bottom closed it completely. In Windows 8.1, doing so leaves the app in its current state – the same as if you minimised a window on the desktop. If you want to restart an app, you'll need to drag it to the bottom of the screen and hold it there until the picture of the app rotates to reveal its Live Tile icon. Or you can use the <Alt>-<F4> shortcut to close an app with your keyboard alone.

Get the most out of Libraries

Windows Libraries are a tremendous tool for turning the chaos of far-flung folders into

sweet organisation – but by default they're hidden in Windows 8.1. To drag them back into the light, open File Explorer and click View, Navigation Pane, 'Show Libraries in the Ribbon menu'.

Note that Windows 8.1 parts company with its forebears by not including Public folders

in its libraries. To add those (or any other folder location) to a central library, open File Explorer and right-click the library to which you'd like to add the folder. Click Properties, then click the Add button in the window that appears. From there, just browse to the folder you want to add.

Windows 8.1's libraries pack a new-to-Windows hidden feature as well: the ability to add removable media, such as USB drives and SD cards. This addition makes sense in an age when Windows often resides on storage-squeezed tablets and hybrids.

Snap improvements

Microsoft still doesn't let you open Modern apps in desktop windows as does Stardock's ModernMix (tinyurl.com/nmkqxk5), although

rumour has it that the feature could show up in Windows 8.2. You can use Windows 8.1's Snap multitasking feature to run Modern apps alongside the desktop 'app', however.

To use Snap to run an app, click and 'grab' the app at the top of the screen, and pull it down until the image shrinks to take up only a portion of the screen. Then drag it to the left- or right edge of the screen, depending on which side of your display you'd like the app snapped.

In Windows 8, Modern apps could snap to occupy only 30 percent of the screen, but Windows 8.1 lets you dynamically allocate screen size to 'snapped' apps by dragging the black bar separating them to the left or right. Yes, you can now have two apps each take up 50 percent of the screen, a useful improvement indeed. Computers with a high screen resolution can even 'snap' three or more apps simultaneously.

Minimise Ribbon menu in Explorer

If you hate the gargantuan Ribbon menu splashed across the top of Windows 8.1's File Explorer, just dump it. Open File Explorer, right-click anywhere on the Ribbon menu, and select 'Minimise the Ribbon'.

The Ribbon isn't truly gone, just banished from your sight. You can temporarily recall the Ribbon by selecting any of the text menu items, such as File, Share or View.

Make the most out of new apps

Windows 8.1 is jam-packed with a profusion of new apps. Some of them, such as Calculator, Alarms and the Help+Tips tutorial app, are straightforward and do exactly what you'd expect. But others include some deceptively powerful tools.

Take the Food & Drink app: beyond being simply a vessel for recipes, it can also help you manage shopping lists and meal plans, and it includes a helpful hands-free mode that lets you wave your hands in front of your device's webcam to 'swipe' through recipe steps in the kitchen without smudging your tablet or keyboard.
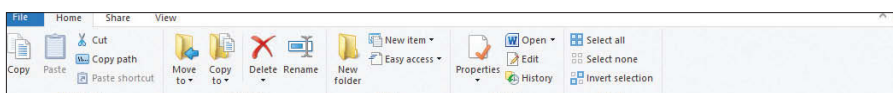
HTC One M8 vs Google Nexus 5 comparison review: which is the best Android smartphone?

Jim Martin

PC Advisor | 2014-03-27

You're spoiled for choice when it comes to quality Android smartphones. Here we compare the new HTC One M8 with the Google Nexus 5 and tell you which one to buy.

The new HTC One M8 is, like its predecessor last year, a great smartphone. Yes, it has its weaknesses, but as flagship Android phones go, there's a lot to like. Since it's already on sale, and since we've run our fine-toothed comb over it, we thought it was about time we found out which is best in our HTC One M8 vs Google Nexus 5 comparison review.

HTC One M8 vs Google Nexus 5: Design and build

It's an easy win for the HTC One M8 on this score. It's a premium smartphone with a one-piece aluminium body that looks and feels great. Build quality is excellent and only badge snobs might have a problem with the big HTC logo on the back.

Of course, we're not saying the Nexus 5 isn't a well-built or good-looking phone. On the contrary, it's a nice piece of kit: it's simply built to a lower cost. That means you get a plastic body instead of metal, and less of a premium feel.

It does mean the Nexus 5 is lighter: 134g vs 160g, but both handsets are roughly the same size overall, and almost the same thickness at around 9mm.

HTC One M8 vs Google Nexus 5: Display

There's not much to choose between two when it comes to their screens. They both have Full HD resolutions and are roughly the same size, with 5in for the HTC and 4.95in for the Nexus.

Both screens use IPS panels, which means great viewing angles and contrast. Whether you're checking email or watching a video, both phones have impressive displays. Colours are vibrant and both are bright.

HTC One M8 vs Google Nexus 5: Hardware and performance

Even though the Nexus 5 is an older smartphone, both are decent performers. The Nexus 5 has a quad-core Snapdragon 800 processor with 2GB of RAM. The newer HTC One M8 has the Snapdragon 801 (the same as the Samsung Galaxy S5).

It's a bit faster in every way, including the speed of the integrated Adreno 330 GPU which is responsible for graphics. The One M8 also has a co-processor, though, which does set it apart from the Nexus 5.

For one thing, it means HTC can do things with its cameras that the Nexus 5 can't. The One M8's twin rear cameras allow you to refocus photos after taking them. It also means you can do more when the One M8 is in sleep mode, such as displaying the time and notifications by double-tapping the screen (this works well with the new DotView case), and swiping on the blank screen to launch apps.

The One M8 can also monitor movements using the co-processor, much as the iPhone 5S does, allowing you to use it as a Fitbit activity tracker without burning through the available battery power. HTC pre-loads the Fitbit app as well.

If you want to see benchmark results, visit our individual HTC One M8 and Nexus 5 reviews, but suffice to say that you won't be disappointed with the performance of either smartphone.

IE 11 READING VIEW bans ads to make browsing more pleasant

http://www.pcadvisor.co.uk/reviews/mobile-phone/3508925/htc-one-m8-vs-google-nexus-5-comparison-review/

The Health & Fitness app provides detailed workout schedules for all levels of fitness and has a variety of useful tracking capabilities. Want to keep tabs on your daily food intake, your exercise results, or even your weight, cholesterol, blood pressure or vaccinations? Health & Fitness does it all.

Dive into Internet Explorer 11

Windows 8.1 includes the latest and greatest version of the Modern-style Internet Explorer, and while Internet Explorer 11 looks an awful lot like Internet Explorer 10 on the surface, it has some nifty new features if you look deep enough.

By default, Internet Explorer 11 now leans on OneDrive to let you sync your open tabs across multiple Windows 8.1 devices (assuming you're signed into your Microsoft account, of course). The browser also now lets you open links in a new window if you right-click on them – automatically opening another instance of the browser in Snap view.

Perhaps even more handy is Internet Explorer 11's new Reading View, which strips out ads and website formatting to display pages in a far more reader-friendly fashion. It's seriously great. To enable Reading View on any web page, just click the open-book icon to the right of the address bar.

Speaking of reading, the Modern version of Internet Explorer 11 has a symbiotic relationship with the new Reading List app, which allows you to save web pages for perusing at a later date. To send a page you're looking at in Internet Explorer 11 to

Reading List, open the Charms bar, select Share, then click the Reading List icon.

Save files to OneDrive by default

Want your documents to be available to you by default everywhere you go? No problem. Microsoft's OneDrive cloud-storage service is more deeply integrated into Windows 8.1, so automatically saving all your files to it is easy.

Open the Charms bar and go to Settings, 'Change PC Settings', OneDrive (this may still show as SkyDrive), File storage. In the right panel, set the 'Save documents to OneDrive by default' slider to On to start synching. You can find OneDrive mobile apps in Google Play (tinyurl.com/8fwzs3y) or iTunes (tinyurl.com/ovy2etn).

OneDrive tricks

But Windows 8.1's cloud-friendliness doesn't end there. OneDrive's cloud-storage- and synching abilities take a more prominent role in Windows 8.1, providing the backbone for Microsoft's multi-device vision of the future.

Beyond merely synching your documents and Internet Explorer tabs, OneDrive can now sync detailed app- and in-app purchase information across devices, along with your Start screen tiles and layout, so that every new PC or tablet you use feels familiar. The service can also automatically save all pictures you've taken with your Camera app. Just open the Charms bar and head to Settings, 'Change PC Settings', OneDrive, Sync Settings to view your options.

ONEDRIVE offers tablet-friendly file search
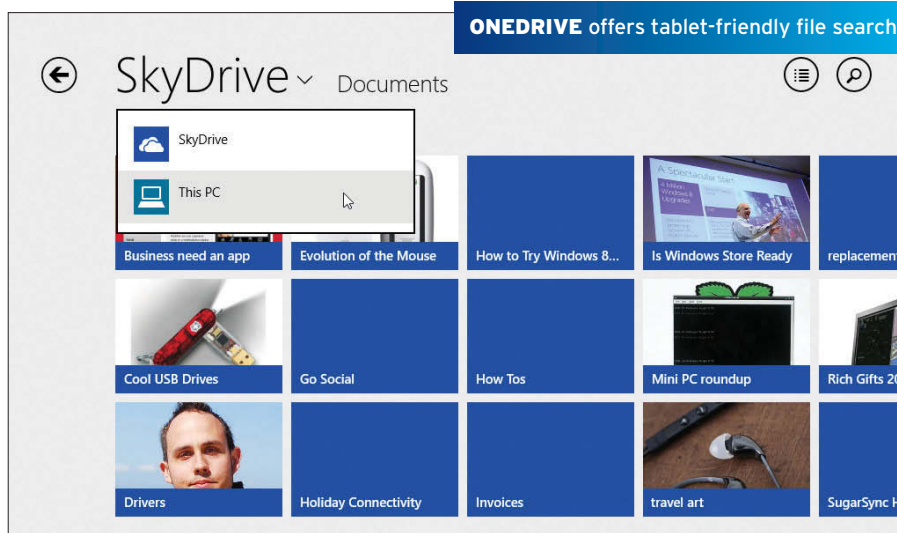
OneDrive is also integrated into Windows 8.1's File Explorer, removing the need for a discrete OneDrive desktop program. One problem, though: while it looks as if all your cloud-saved files are also stored locally in the OneDrive desktop folder, your files are actually stored in the cloud, with only small symbolic link 'hooks' saved directly on your machine. While that arrangement is great for devices with space constraints, PC users probably want to keep a local backup, too.

To do so, just right-click on the OneDrive icon in the left pane of the desktop File Explorer, then select the 'Make available offline' option. Your precious data will start downloading to your hard drive immediately. You can also right-click individual files and folders and choose to make them online-only or available offline if you want to granularly select files to store locally.

OneDrive as a Modern File Explorer

If you're on a PC, navigating your files is a breeze – just open File Explorer on the desktop. But while Windows tablets also feature the legacy Windows desktop, its small menus weren't designed to be navigated with fat fingers, which can make local browsing a pain. The lack of a Modern-style File Explorer in Windows 8 only exacerbated the issue.

Windows 8.1 still lacks a discrete File Explorer app, but never fear: new capabilities introduced to the baked-in OneDrive app offer finger-friendly file browsing. Just launch the OneDrive Modern app, choose the OneDrive name in the upper-left corner, and select This PC from the resulting drop-down menu to see your device's files in a touch-ready tiled format.

Startup tools in Task Manager

Newly installed programs have a nasty tendency to intertwine themselves in your PC's startup process, launching to life as your computer does. Over time, this can severely bog down your boot time. Now you can combat the software-loading slog without resorting to third-party software.

Press <Control>-<Shift>-<Esc> to bring up the Task Manager, then open the Startup tab. Windows will tell you the performance impact of each program installed on your PC, explain whether they launch at boot and, if you click on a program, give you the option to enable or disable it from launching at startup.

Lock-screen slideshow

Windows 8.1 also adds an option to turn your lock screen into a personal slideshow. To show off your pics, open the Charms bar and head to Settings, 'Change PC Settings', 'PC and devices', Lock screen. Under the selection of lock-screen pictures is a slider

Speed up boot times in **TASK MANAGER**
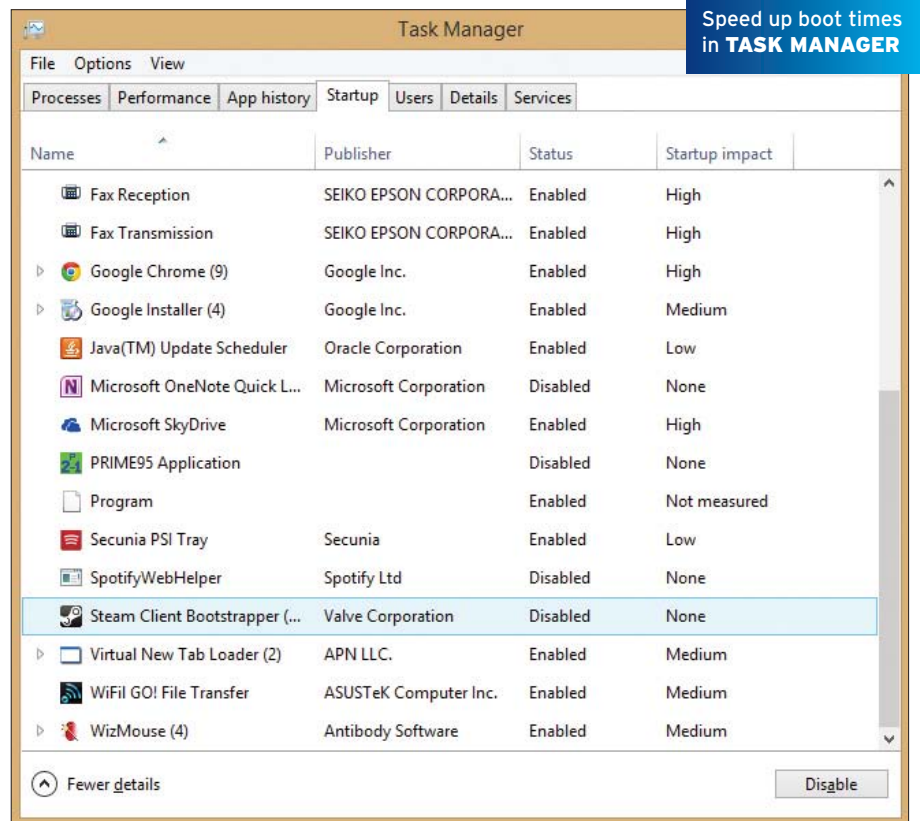
labelled 'Play a slide show on the lock screen'. Slide it to On and use the options to choose where it will grab pictures from and more.

Disable automatic app updates

Windows 8.1 now automatically updates your Modern UI apps. It's even smart enough to know not to update over a mobile-broadband connection. But if the idea of non-sanctioned updates drives you bonkers, you can switch off auto-updates. Open the Charms bar within the Windows Store and go to Settings, App Updates. Move the 'Automatically update my apps' slider to No.

Broadband tethering

If your laptop or tablet packs a cellular connection, a new tethering feature can

The **LOCK SCREEN** can display slideshows

help your share your mobile data signal with other devices by turning your device into an ad hoc Wi-Fi hotspot.

Open the Charms bar, then head to Settings, PC Settings, Network, Connections. If a mobile connection is available, select it and set the 'Share this connection' slider to On to start sharing that bandwidth. You can also customise the name and password for your temporary network.

System image backup

Microsoft made it easy to find the system image backup tool in Windows 8 – then dubbed 'Windows 7 file recovery' – by simply doing a system search for 'recovery'. In Windows 8.1 Microsoft has buried it deeper, hiding the feature within the Control Panel's File History options and changing the feature's name to System Image Backup.

Open the Modern Start screen and type 'File History'. Click on the File History entry in the search results on the right of your screen to open a Control Panel window. Then, simply click the System Image Backup option in the lower-left corner of the window. From there, the wizard will walk you through the system image creation and backup process.

First step of enlightenment

You'll find more useful Windows 8.1 tips and tricks on our website. Head to our Windows 8 Advisor at tinyurl.com/9h79xxr, or get help in the forums (tinyurl.com/cognj4o). ⊠
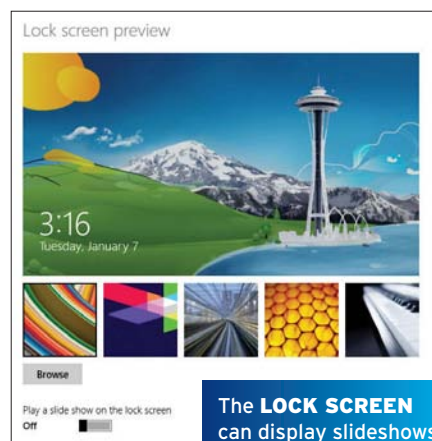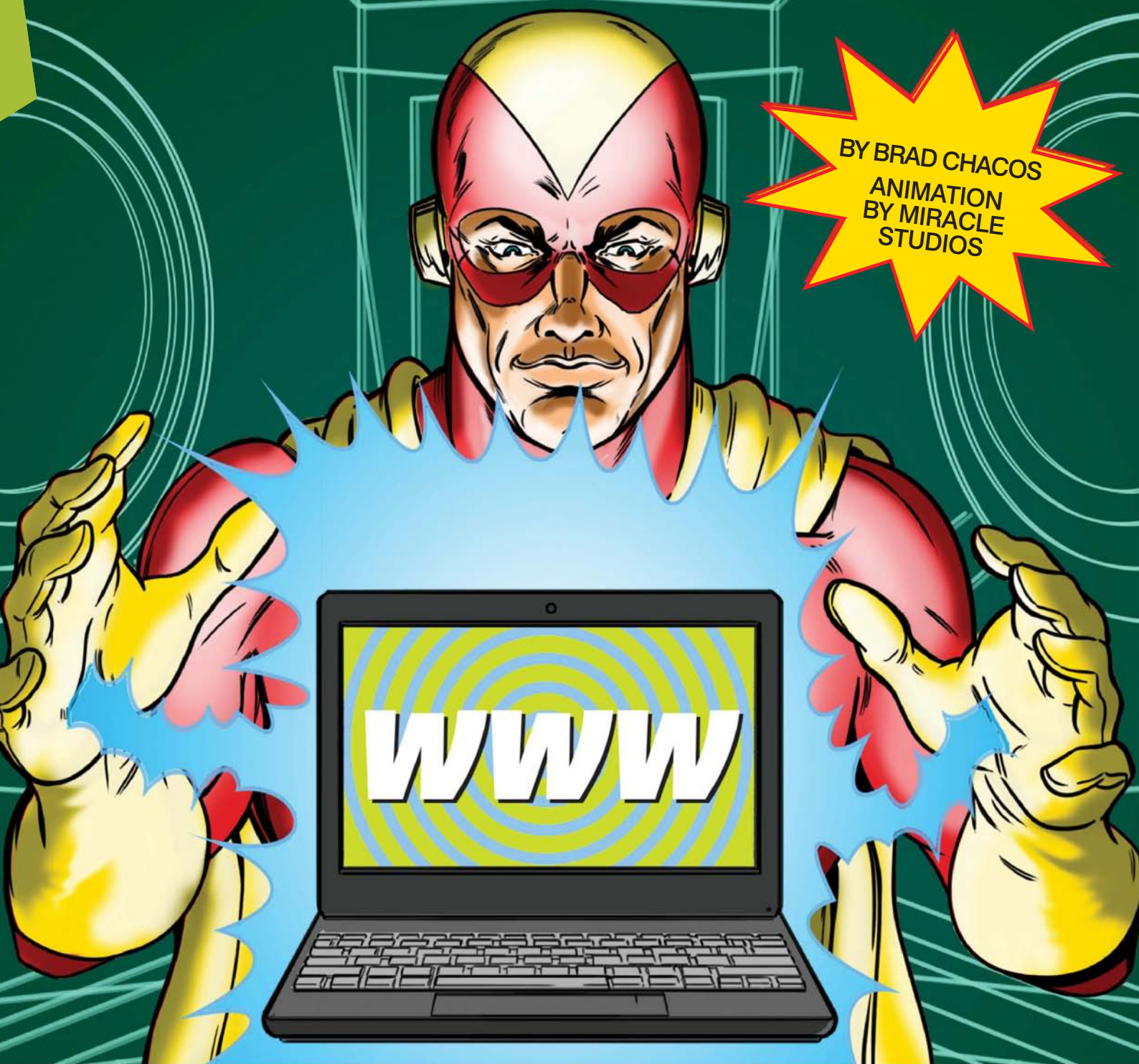
BY BRAD CHACOS
ANIMATION BY MIRACLE STUDIOS

SUPERPOWERS
HIDDEN INSIDE BROWSER
YOUR

ONLINE OR OFFLINE, YOUR BROWSER CAN PERFORM SOME AMAZING FEATS
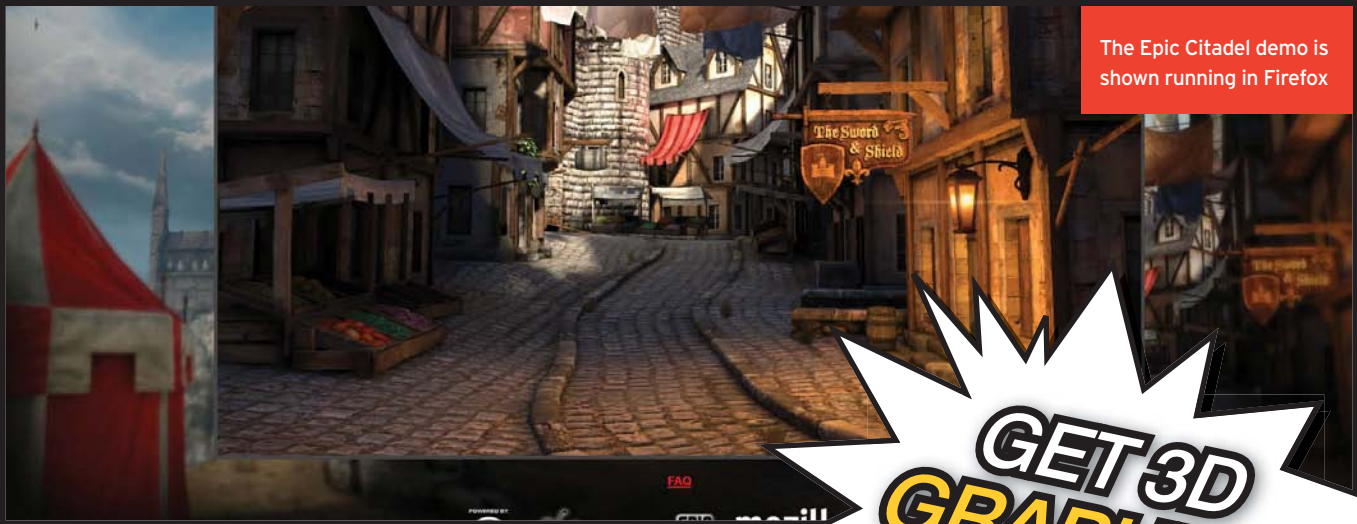
LIVE LIFE IN THE CLOUD

As our digital lives shift more and more to the cloud, more of the web merges into the desktop. Consider the humble web browser: once a mere renderer of static HTML, today's browsers come chock-full of capabilities that can transform web pages into something downright desktopian.

Check out these eight killer features found in modern browsers and see for yourself. When you're done, any preconceptions you have about the impossibility of living life in a browser may well be shattered.

The Epic Citadel demo is shown running in Firefox

GET 3D GRAPHICS

Today's browsers take full advantage of hardware acceleration and the powers of WebGL – a JavaScript API (application programming interface) that lets your browser tap your graphics processor – to deliver robust 3D graphics with minimal hiccups. Check out the Internet Explorer test drive page (tinyurl.com/yktwps4), Google's Chrome Experiments (tinyurl.com/4mjLrrg), or an in-browser demo of the classic Quake 3 (tinyurl.com/2vgeL6w). And a JavaScript subset dubbed asm.js is turbocharging Firefox graphics.
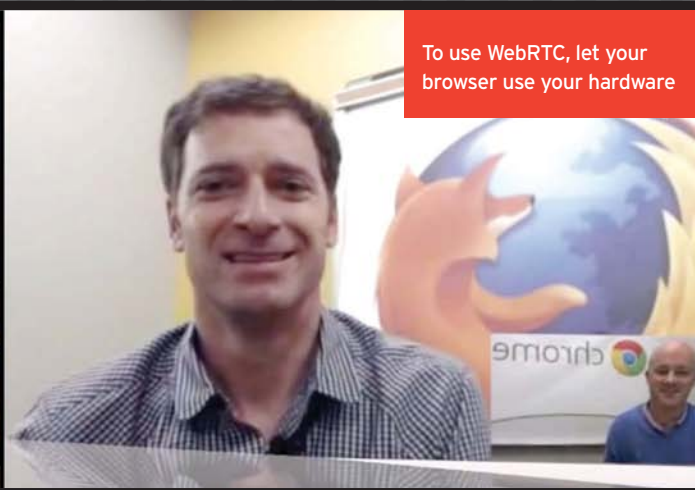
To use WebRTC, let your browser use your hardware

COMMUNICATE FACE-TO-FACE

Forget the Skype app, too. Chrome, Firefox and Opera all support the WebRTC API, which can deliver real-time voice- and video chats and peer-to-peer file sharing in-browser via everyday HTML5, without the need for plug-ins or desktop programs.

A lot of people are excited to see WebRTC become commonplace, but its widespread support among browsers is still fairly new. If you want to try out the tech for yourself, head over to talky.io for a free demonstration. (You'll need a friend – or at least another PC – to play along.) Webmasters can head to WebRTC (webrtc.org) for info on how to add the cutting-edge protocol to their sites.

You can default to HTML5 to watch YouTube videos

PLAY VIDEO NATIVELY

Websites can now natively play video using HTML5, which could one day render Windows Media Player and Flash superfluous. YouTube offers an optional HTML5 mode (youtube.com/htmL5); Netflix leans on the language in Windows 8.1's Internet Explorer (IE) 11 browser – and that browser alone (tinyurl.com/kw39uvj).

Its reason is simple: HTML5 has no official media-protection support. The World Wide Web Consortium is working to change that, but internet activists don't want to see DRM in an open standard. IE 11 got the Netflix nod when Microsoft included an unofficial version of the WWWC's extension in its PlayReady DRM.

You can drag-and-drop desktop files into Gmail

DRAG AND DROP

Dragging-and-dropping files – what's more desktop than that? Compiling source code, maybe. But while your browser may not be able to roll its own binaries just yet, it can let you drag local files into online web pages, thanks to some behind-the-scenes HTML5 magic. Watch the lines between on- and offline blur as you drag-and-drop files into Google Drive, Imgur, your Facebook status or email messages that you've composed in Gmail or Outlook.com.

USE PUSH NOTIFICATIONS

HipChat and Gmail notifications pop up as activity occurs

For websites that want to get really fancy, Chrome and Firefox support the ability to push desktop notifications to users, popping up little windows in the lower-left corner of the screen. Users must grant explicit permission for the feature, and few websites take advantage of it, but it's a handy way to stay on top of things when you have multiple tabs open.

I've let Gmail (tinyurl.com/mdgdtcr) and the HipChat website push notifications to my desktop – it makes my workdays much easier.

It's spelled Pixlr, but I call it 'Photoshop who?'
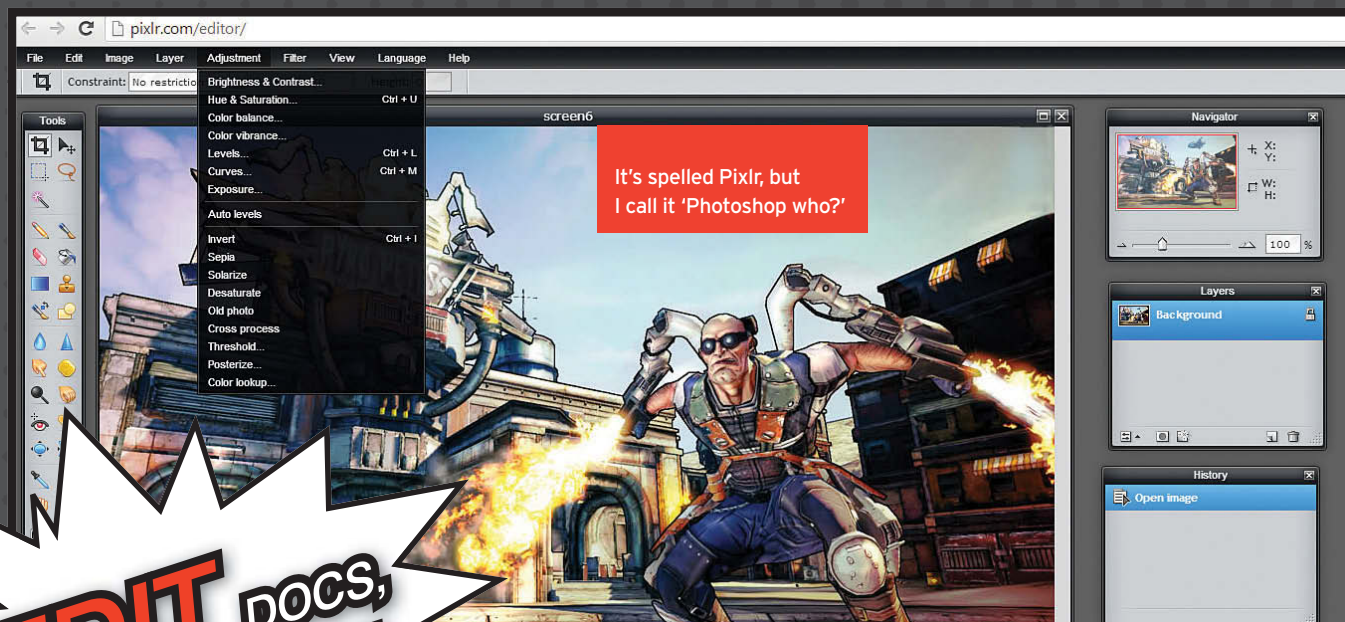
EDIT DOCS, IMAGES & MORE

Need a robust photo editor? Try the amazing Pixlr (pixlr.com/editor). Tune-twiddlers can do basic tweaks with a website such as Soundation (soundation.com) or TwistedWave (twistedwave.com/online). You can also get docs, spreadsheets and more done in Google Drive or Microsoft's Office Web apps – both offer real-time collaboration, too. And Prezi (prezi.com) has some great presentation-making capabilities. The growing power of the web makes all but the most demanding tasks do-able in-browser.
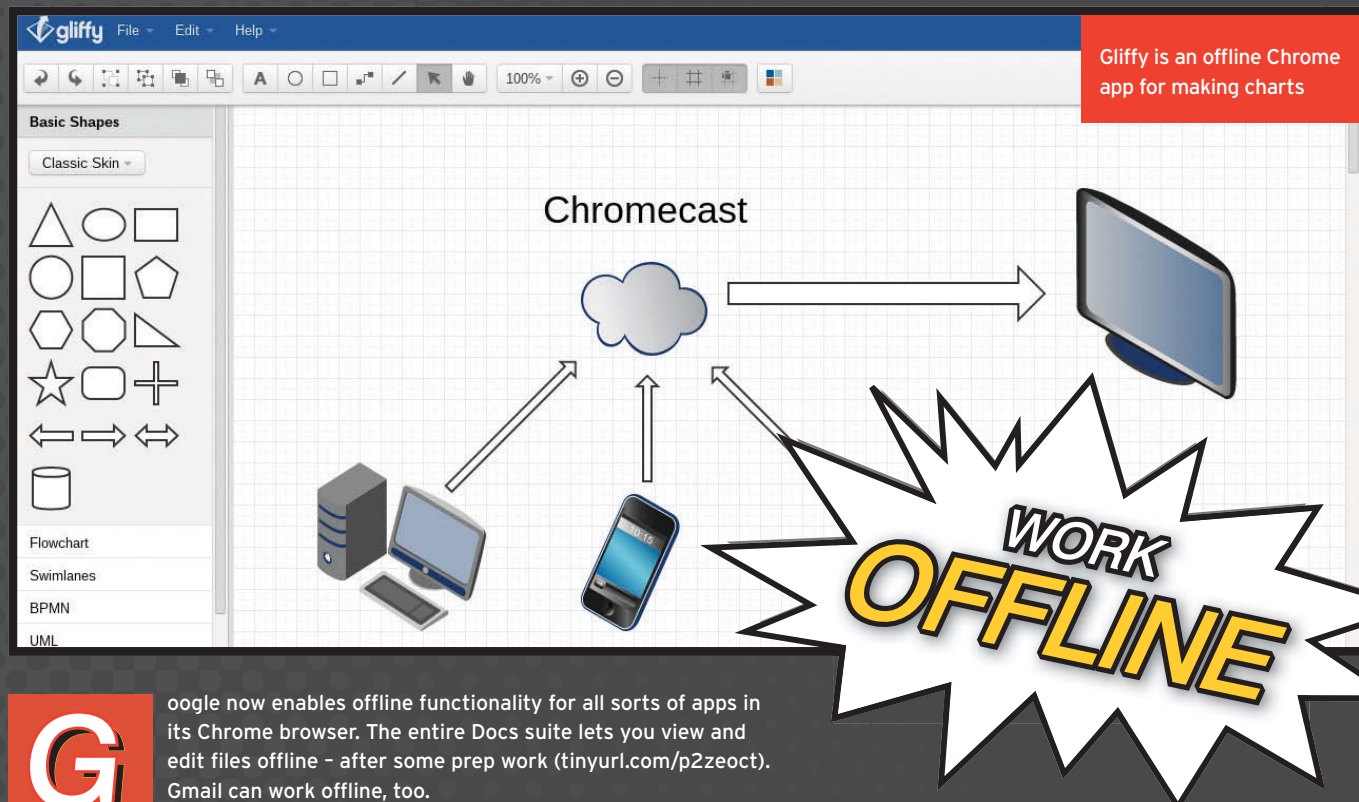
Gliffy is an offline Chrome app for making charts

WORK OFFLINE

Google now enables offline functionality for all sorts of apps in its Chrome browser. The entire Docs suite lets you view and edit files offline – after some prep work (tinyurl.com/p2zeoct). Gmail can work offline, too.

But any developer can create an offline-capable Chrome App. Google even released a Start Menu-esque App Launcher to let you launch Chrome Apps right from your taskbar.

The HP Chromebook 11 runs Google's ChromeOS

TRY THE POTENT CHROMEOS

And now, the pinnacle of the web-browsing mountain: ChromeOS. Google's operating system is in essence a glorified Chrome browser, and it powers a legion of low-cost laptops.

ChromeOS loses some functionality when you're away from the web, and it won't run traditional Windows desktop programs. But glancing over the potent browser features highlighted in this article, you have to ask: how much longer will that matter?

Over time, fewer and fewer browser tricks mentioned here will involve relatively young technology that is far from widely adopted. As time marches on and web browsers become even more potent, Chromebooks will become all the more viable – and the line between the browser and the desktop will become increasingly blurry. Online? Offline? Before long, the distinction might be moot. ⊠

PAUL
MONCKTON

YOUR QUESTIONS ANSWERED
Expert computing advice
We tackle readers' hardware and software conundrums

MISSING TIME STAMPS

Q I have a large collection of photos on my Windows 8.1 PC, which has grown to the point where the drive is now nearly full. The pictures are organised into many folders, which I like to keep sorted by date. To cope with the growing collection, I bought a larger drive and copied over all the images. This seemed to work fine, but when I looked more closely I noticed that the files all had the same time and date. This means I'm no longer able to sort my collection by date. Can you help me?

If you still have the original drive and are able to copy the files again, then you can use the Windows built-in command 'Robocopy' to copy your files instead. Standing for 'Robust File Copy', Robocopy offers many advanced bulk copying options including the ability to maintain the original timestamps on your files and folders.

To use it, open up a command prompt by right-clicking on the Windows 8.1 start button and selecting 'Command Prompt (Admin)'. Next, type the following command:

ROBOCOPY "C:\photos" "D:\photos" /E /COPYALL /DCOPY: T

Substitute "C:\photos" and "D:\photos" for your source and destination folders respectively. The /COPYALL and /DCOPY:DAT options ensure that your original 'date modified' attributes are preserved during the copy. The /E option ensures that subfolders are also copied, including any empty folders you may have in the original location. Robocopy has a great number of additional functions and options, which you can discover by typing **robocopy /?** at the command prompt.

If you're put off by the idea of using the Windows Command Prompt, you can download a utility called RichCopy, written by Ken Tamaru of Microsoft. It provides a graphical interface to set of functions similar to those of Robocopy and is available from tinyurl.com/c2sxyn.

To access the options required to manage your file attributes, select 'Advanced' from the View menu. Next, choose your source and destination paths, by clicking on the source and destination buttons in the main
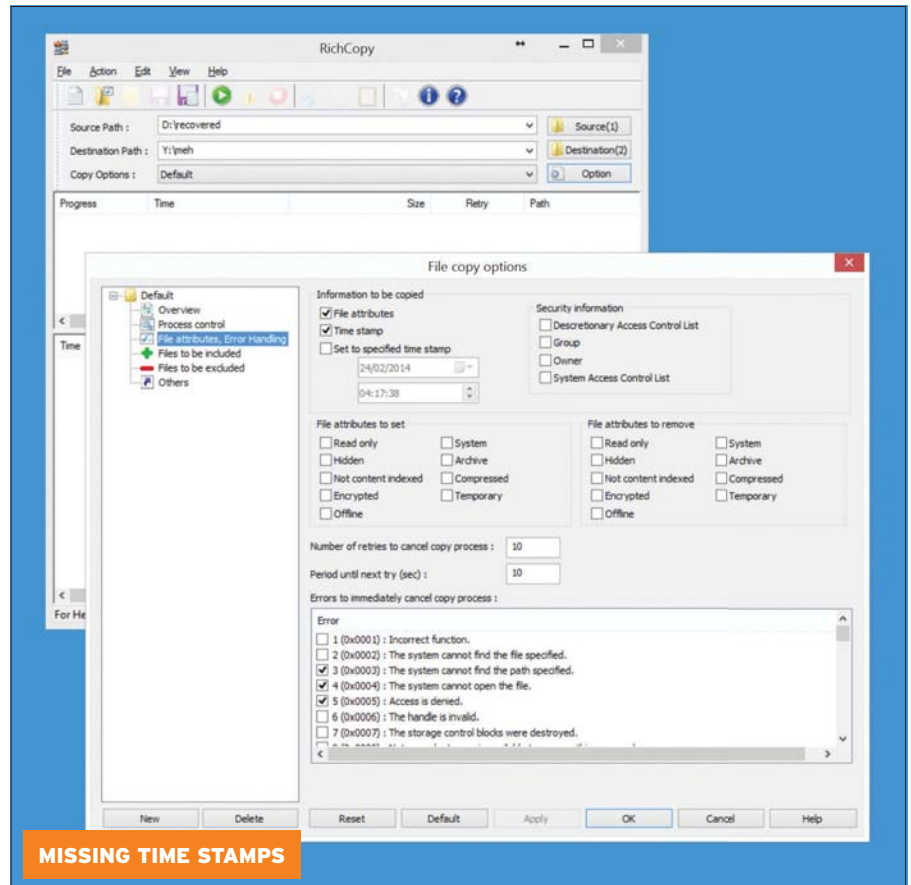
MISSING TIME STAMPS

window. Click the Option button and select 'File attributes, Error handling' from the left-hand pane. In the right-hand pane, ensure that the Time Stamp box is ticked, select any other options you want and click OK. Select Start from the Action menu to start your copy.

If you don't have your original disk and have lost the time stamps, then all is not lost. Your image files will probably contain EXIF data, storing within them the time and date when the photos were originally taken, so you can sort them by this if you wish.

Open up a File Explorer window in a folder containing your images, then click on the Sort By button in the ribbon at the top and select 'Date Taken'.

RETRIEVE A C: DRIVE

Q I recently purchased a new SSD to replace my old, failing drive. Eager to protect my files immediately, I removed the old drive and connected it to my laptop using a USB drive caddy, and then backed it up using Macrium Reflect. I then returned the drive to my original PC and plugged it in alongside my new SSD.

The image file is intact and my files have been saved, but when I mounted the drive in the caddy it showed up on my laptop as drive E. This drive letter seems now to be 'baked in' to my image file and when I restore it to my new SSD it's coming back as drive E with the original faulty drive as drive C.

Windows 8 boots with the drives set up like this, but I realised that all references to drive C are still pointing to the old drive. If I remove the old drive, Windows won't boot at all.

I've gone into the Disk Management plug-in and attempted to swap over the drive letters, but Windows won't let me

Tech Help

do this as C and E are both currently in use. Is there any way I can turn my new drive into drive C now, so I can remove the old drive entirely?

Windows does its best to prevent you from messing up your computer by changing the drive letter of your system volume, but this doesn't allow for a situation like yours where it's already messed up and you need to put it right. Thankfully, you can dig yourself out of this situation with a little bit of Registry tweaking. Be warned: don't attempt this unless you're in a situation where your drive letters are wrong to start with. You can really mess things up and render your PC non-bootable. Because this procedure involves changing system-level configuration, you will need to have Administrator level access to your PC.

So, assuming you have everything important backed up before you start, press Win-R to bring up the Run dialog box and type: **Regedt32.exe** (note the missing i in 'edt'), to bring up the Registry Editor. Navigate to the key HKEY_LOCAL_MACHINE\SYSTEM\MountedDevices.

Right-click on MountedDevices and select 'Permissions' from the context menu. Click on Administrators in the upper pane and note the permissions set in the lower pane. If Full Control is ticked, leave everything as it is and exit Regedt32. Otherwise enable the Full Control permission and come back later to return it to its original setting once you've completed this whole procedure. Now exit Regedt32 and run Regedit.exe from the Run dialog box using the Win-R key combo.

Navigate once again to HKEY_LOCAL_MACHINE\SYSTEM\MountedDevices. In the right-hand pane look for an entry called \Dos\Devices\C:. Right-click this entry and select 'Rename'. Change the name to an unused drive letter such as \Dos\

RETRIEVE A C: DRIVE
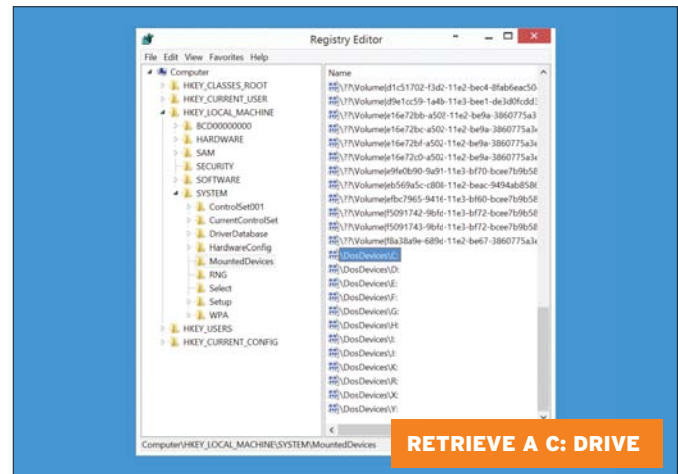
Devices\U: (just pick any drive letter not already listed). Next, find the entry for the drive you want to become drive C. In your case, this would be \Dos\Devices\E:. Rename this entry to \Dos\Devices\C: Rename \Dos\Devices\U: to \Dos\Devices\E: to complete the swap.

If you need to, go back to Regedt32 and reset the permissions changed in the first step above. Now restart the PC and you

BACK UP EXACT COPIES OF YOUR USB FLASH DRIVES

If you have a lot of USB flash drives, it can sometimes become difficult to keep track of what you have on each one. Also, some USB flash drive setups can take some time and effort to create, such as bootable ones for installing operating systems or running live distributions such as Ubuntu. With ImageUSB from PassMark Software, you can easily create exact image copies of any USB flash drives and store them on your PC. Furthermore, if you want to create multiple copies of a USB flash drive, perhaps to hand out at an event, you can create multiple copies quickly and easily in one go.

First, download ImageUSB from tinyurl.com/32b54ge and run it – it doesn't require installation. Plug in the USB drive you want to back up and click on 'Refresh Drives'. You should see your USB flash drive, referred to as a UFD by the program, at the top of the application window. Select it and then 'Create from UFD' below. For security, you can also select Post Image Verification to ensure that your backup matches the original UFD. This will create an image file of your UFD with the extension .bin. You can now copy this image onto another UFD, or multiple UFDs simultaneously by selecting them all before clicking the Write to UFD button. In our example, we have plugged in four flash drives at the same time for duplication.
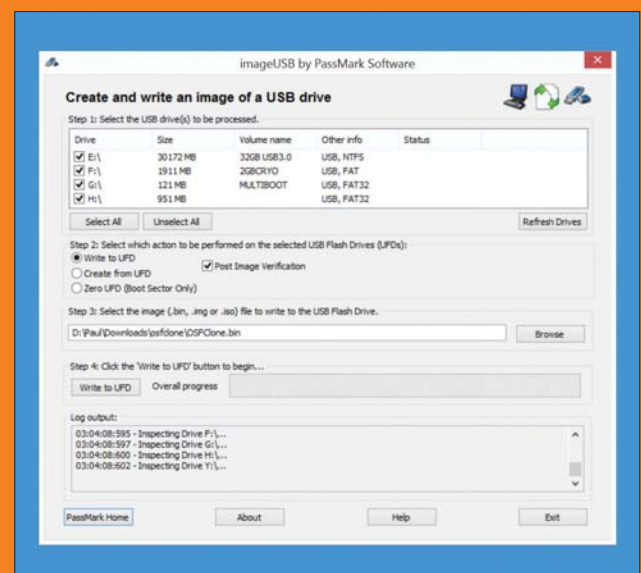
should find your drives now have the correct letter assignments.

UNINSTALL OFFICE 2013

Q My installation of Microsoft Office 2013 has become corrupted and I want to re-install it. However, the uninstaller program refuses to work. How can I remove Office and start again without having to reinstall Windows?

Microsoft has a 'Fix it' that you can download to solve this problem. Go to support.microsoft.com/kb/2739501 and then click the Fix it button to download a small utility which will hopefully uninstall Office 2013 for you. Run the utility and wait. It will take a little time.

If this doesn't work for you, you may have to remove Office manually. The steps required are also provided on the same page from Microsoft.

BROKEN PASSWORD

Q I own a Samsung laptop computer, which I've had for two years. I've always used the same password to start the computer, but now it's telling me that it's wrong, so I'm locked out of the PC. What do you suggest?

There are a few things which could be happening here. First, make sure that you don't have Caps Lock or Num Lock enabled when typing your password – unless, of course, you had either in effect when you originally typed your password.

It's also possible there's a physical problem with your keyboard, so the password you are trying to type may not be what's actually being entered into Windows.

UNINSTALL OFFICE 2013
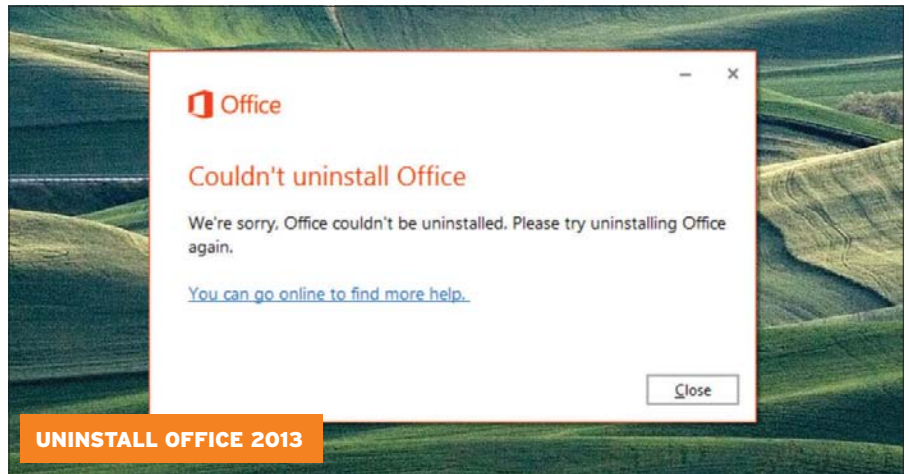
Try booting up the laptop with an external keyboard plugged in to see whether you can type in your password on that keyboard.

From the age of your laptop, we're guessing that you have Windows 7 installed, but if you're running Windows 8 or 8.1, you can click on the little 'eye' symbol that appears next to the row of dots as you're typing in your password as the sign in page. This will reveal your password, so you can verify that it's showing what you intended to type.

If you're signing in to Windows 8 or 8.1 with a Microsoft account – so you're using your email address and password to sign in – you can reset your Microsoft password online from a browser on another PC or from your phone. Go to tinyurl.com/2e8rq3h and follow the instructions to reset your Microsoft account password. This will then apply everywhere you sign in with your Microsoft Account, for example Skype.

If you have a password reset disk, you can use it to reset your password and regain access to the laptop. However, you'll need to have created this yourself before you were locked out of the computer.

If there are any other users set up on the laptop who might have Administrator access, they can log in and reset your password for you from the User Accounts section of the control panel. Selecting the 'Manage another account' option and clicking on 'Change the password'. If none of these methods work, you can follow our instructions on resetting your password here: tinyurl.com/m68ejnw.

Note that if you have protected any files using the built-in Windows encryption, you must NOT use the methods above to change your password via an administrator account as this will prevent you from accessing and files protected under the old password. The same goes for any stored passwords to network drives and websites.

In this case, you'll need to use a password cracking program to recover your original password. One such utility is Ophcrack – free from tinyurl.com/yovyz6. Use the bootable live CD option to create a disc you can boot and crack your existing Windows password. If you don't have a CD drive available, you can use a tool such as UNetbootin (tinyurl.com/64oper) to create a bootable Ophcrack USB flash drive instead.

SAVE COMPLETED PDF FORM

Q I've opened a PDF form online that I want to fill in and save, however it won't allow me to do this and says the following:

"You cannot save data typed into this form. Please print your completed form if you would like a copy for your records."

How can I get around this? I have Adobe Reader 9 and Windows 7.

A simple solution would be to print the completed form, as they say, but instead of printing it out on your printer, print it directly to a new PDF file. This will create a new PDF file containing the original

BROKEN PASSWORD

SAVE COMPLETED PDF FORM
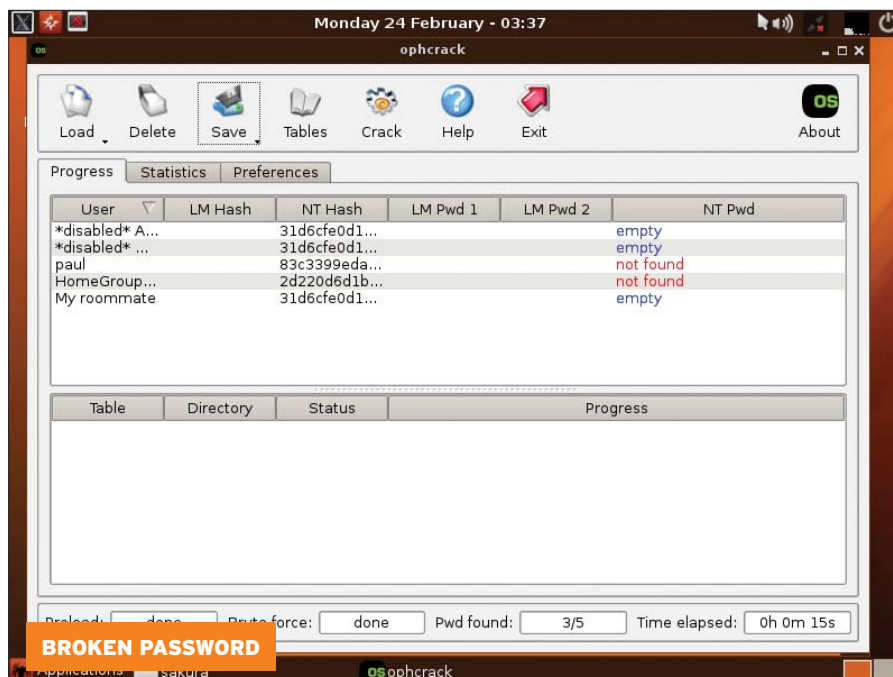
form, complete with all the details you added. If you don't have a PDF writer installed, you can use a free one, such as CutePDF Writer (cutepdf.com), or you can use Adobe's own Acrobat XI which comes with a free 30-day trial.

Once you've installed your chosen PDF writer, complete the form and then go to print in the normal way. Select the PDF writer as your printer and click print to create the PDF.

OLD DRIVE, NEW PC

Q I have a new PC that has only SATA connectors for the drives. Is it possible to use my old IDE drives on this PC. Is there a cable or connecting device to make this conversion possible?

Buying new SATA drives will probably cost you less than you think, and will also be noticeably faster than an old IDE drive, while offering much larger capacities. If you're talking about an optical drive, such as a DVD writer, a new internal SATA example will cost in the region of £10 to £15. With a new 1TB hard drive costing around £45, it's well worth considering one of these as a replacement for an IDE drive.

If you simply want to copy files over from your old drive, you can do so with an external USB caddy or drive enclosure. You can then keep this as an external drive for backups.

If you really must install the IDE drive inside your PC, you'll have to buy a plug-in IDE adaptor card. These are available around the £10 to £15 mark and will plug into a space PCI socket inside your PC. We'd advise against doing this, though, as adding extra drive controllers to your PC adds another layer of complexity to your system and is another thing which can go wrong.

If you want to keep this drive separate from another drive in your PC, we recommend buying a new SATA drive of the same or larger capacity and cloning your

IDE drive onto your new drive and using your external caddy or enclosure with a product such as Macrium Reflect (macrium.com). You can then dispose of the IDE drive or keep it as a backup.

LAPTOP ACCESS

Q Can you advise how I can password-protect particular files on my laptop so I can share it with a roommate for internet access only?

It's possible to encrypt individual files and folders in Windows, but these are automatically decrypted as required, without the need for a password, once you have logged in. You could use third-party encryption software or store files within password protected ZIP files, but this requires you to decompress the files as you need them, and is far from practical.

The best way to allow another user on your laptop while keeping files private is to set up another user account for them on your laptop. For occasional use by different people, the Guest account is available to provide this function. Once your roommate is signed in under their own account, they won't be able to view files you have encrypted or kept private under your own account. You can also deny them access to specific drives, folders or files using the built-in Windows security features.

It's simple to set up a new account in Windows. Go to the control panel and click on 'User Accounts', then 'Manage another Account'. Here you'll see an icon for each user account set up on your PC. You'll also see an icon for 'Guest', which will probably be turned off.

TECH JARGON BUSTER

INTERNET OF THINGS: Sometimes abbreviated to the 'IoT', the Internet of Things describes an ecosystem of interconnected objects and devices, which are able to communicate and interact without human intervention often using built-in sensors and wireless networks.

IP ADDRESS: Rather like a phone number for networks, an IP address is a number used to identify a particular computer or device on a network that uses the Internet Protocol (IP). This network could be within your home or organisation, or part of a much wider network, such as the internet. The most commonly-used version of IP is version 4 (IPv4) which uses 32-bit numbers for addresses, allowing for around four billion unique addresses.

This will eventually be superseded by version 6 (IPv6), which uses 128-bit numbers, allowing for up to 2128 unique addresses and expansion of the internet beyond the four billion address limit.

POWERLINE ADAPTOR: This is a device that allows you to run a network connection over the existing electric mains wiring in your building. It offers the advantages of a wired connection without the need to run new cables and is a good way to extend the range of your network when a Wi-Fi signal won't reach.

ROOTING (ANDROID): Rooting a phone provides the user with full, unrestricted control over all aspects of the operating system. Prior to rooting, many

configuration options are deliberately unavailable to the user in order to prevent possible damage to the operating system or even the hardware. Sometimes functions are disabled to ensure that certain preinstalled apps or settings are not tampered with by the user. This is similar to the concept of 'Jailbreaking' on iOS, although Android imposes far fewer restrictions on the user by default and therefore rooting is usually required only for very specific tasks.

SAILFISH OS: This is a mobile-optimised operating system based on the open source MeeGo OS previously owned by Nokia. Based on Linux, it has the advantage of being able to run Android apps, although not via the Google Play store.

LAPTOP ACCESS
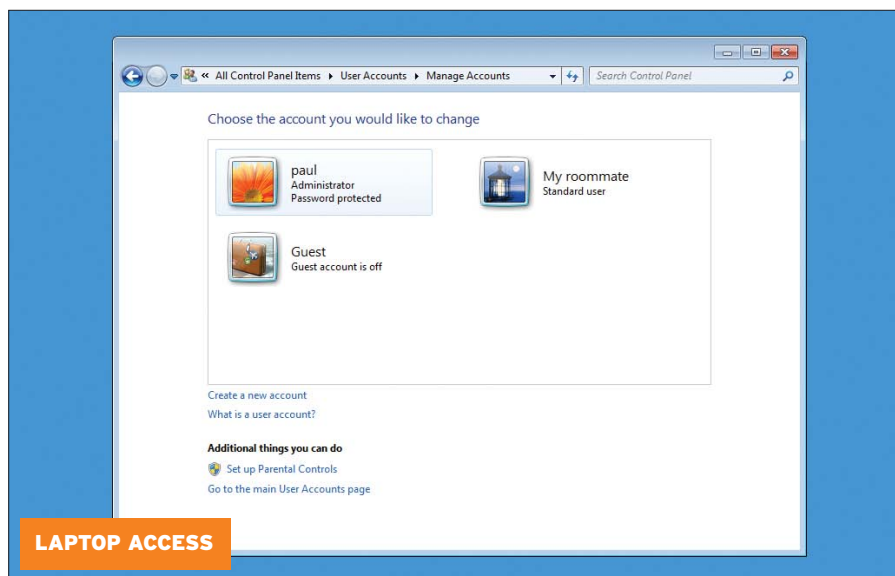
To create a new account on Windows 7, click on 'Create New Account' and assign them a user name. On Windows 8, click 'Add a new user in PC settings'.

Set them up as a standard user and not an administrator. Click the Create Account button. They should now appear in the list of users and will be able to sign in and set their own password and user settings.

If you want to allow different people to use your laptop when they visit, or you'd rather not have other users permanently set up on your laptop, you may prefer to use the Guest account. Click on the Guest account icon in the list of accounts and then click the 'Turn On' button to activate it.

Guest users don't have access to password-protected files, folder or settings, so any of your own files you protect in this way won't be visible to the Guest user. Furthermore, files residing in your personal folders such as 'Documents' won't be visible to other standard or guest users by default.

To protect resources elsewhere on your system, you can right-click and select properties. Then go to the Security tab. Here you can change the access permissions for individual groups or users. This works on individual files, folders or entire drives.

To lock things down further, Windows 8 lets you set up an account for 'assigned access'. In this mode, the user will have access only to a single Windows Store app of your choosing. If you select a web browser app for this purpose, they'll be able to use your laptop only for internet access. ⊠

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

Edit a home movie

Don't let all that great iPhone and iPad video go to waste. Jim Martin explains how you can get stunning results by spending a few minutes in iMovie

Top-quality video-editing software is expensive, so shelling out a couple of pounds on iMovie is a no-brainer (£2.99, tinyurl.com/ap9l8ku from the App Store). And if you have an iPad Air or iPad mini with Retina display, it's free.

While the application is basic, it's easy to use and can produce great results that will wow friends and family. It's easy to share the finished movie, too, as you can upload to YouTube, iTunes Theater, Facebook, Vimeo and share it via iMessage.

In this tutorial, we'll explain how to use the app, plus reveal tips and tricks to give your film a professional look. We're using the latest version of iMovie running on an iPad with iOS 7.

START This is optional, but much of your video will probably be on your iPhone rather than iPad. You can run iMovie on an iPhone, but it's much nicer on an iPad's bigger screen. To transfer videos between devices, use AirDrop. Alternatively, you can do so via iTunes.
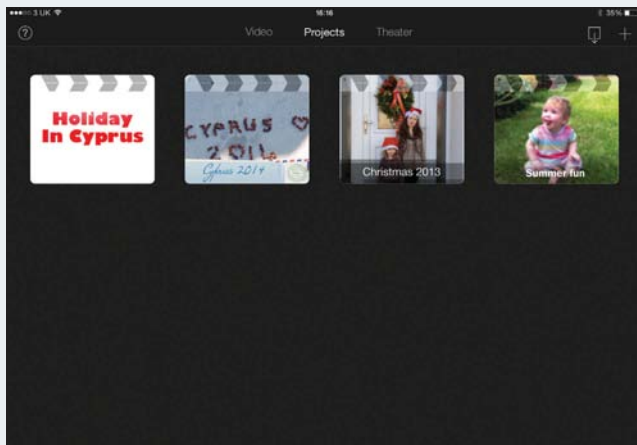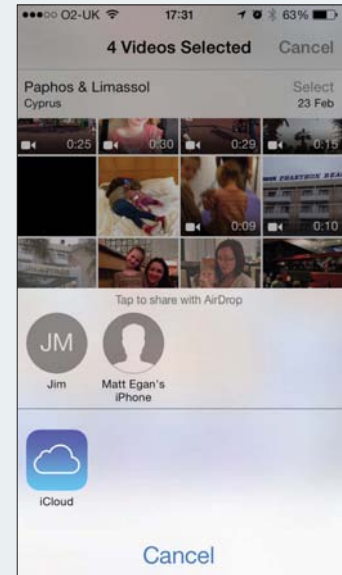
2 Launch iMovie and tap the '+' button to create a new project. You can choose between a Movie and a Trailer. We'll focus on Movie mode here. Tap Movie and then choose a theme. Tap the play button to watch a preview of each style.
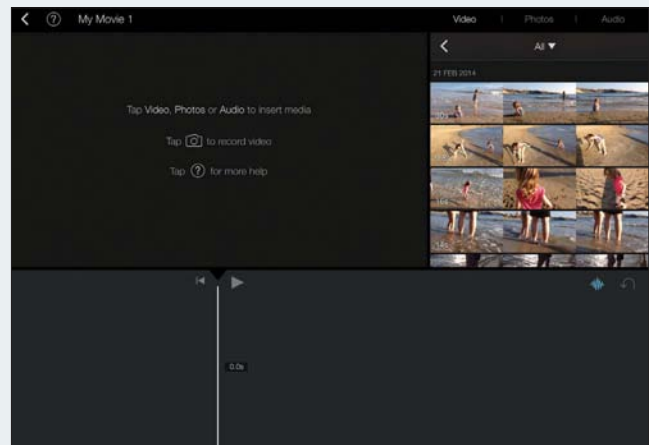
3 Select a theme and then tap Create Movie in the top-right corner. You'll see the editing screen, with your videos to the right, a preview monitor on the left and, running across the bottom, the timeline, which is currently blank.
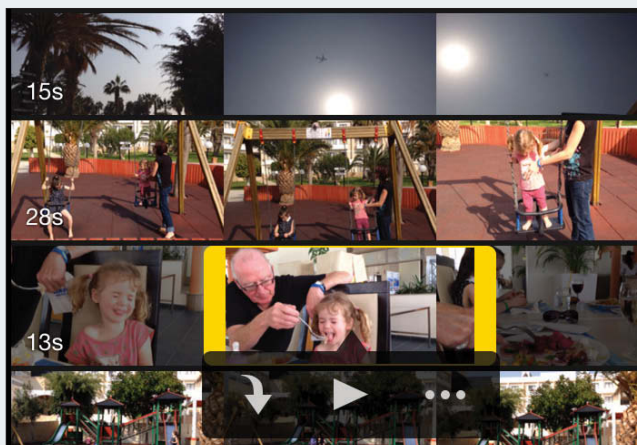
4 Tap on a video and it'll be highlighted in yellow. You can drag the left- and right-hand edges to trim the clip before you add it to the timeline, or you can add the whole clip (by tapping the downward arrow) and trim it later.
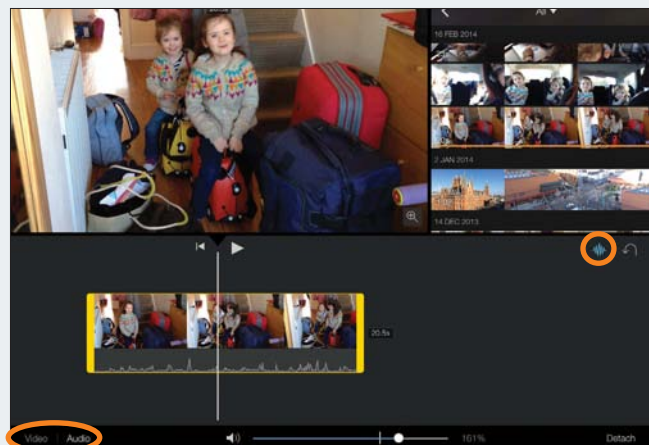
5 Tap on a video clip to select it, and you'll see some options at the bottom. Tap audio to adjust the volume. It's useful to see the audio track, so make sure this is visible by tapping the squiggly line next to the undo arrow at the top-right of the timeline.
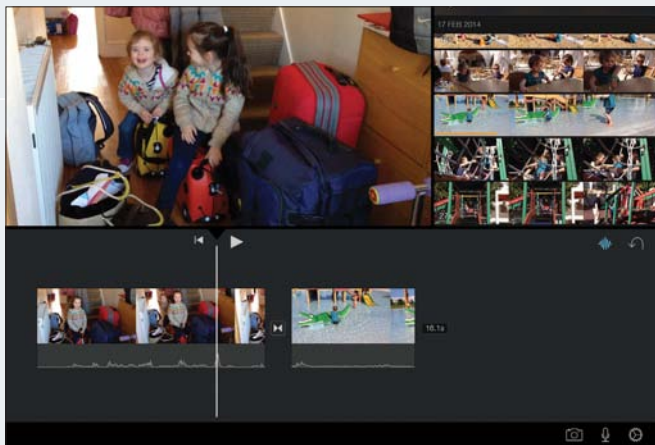
6 Tap the play button at the top of the timeline to play your movie. You can scrub through the clip by swiping left or right. The white vertical line is the playback marker. Make sure it's in the right-hand half of the clip before adding another video.
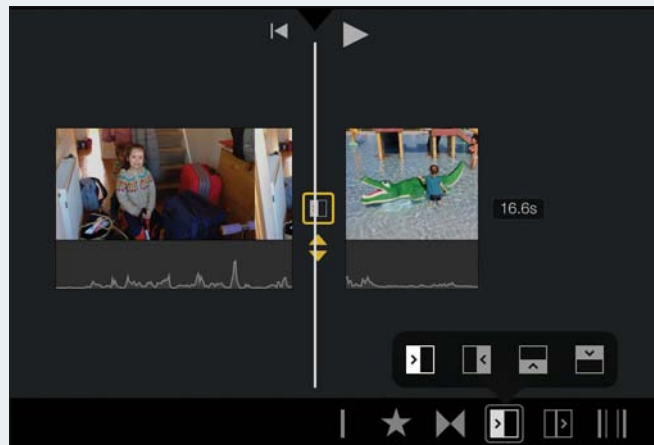
7 Add another video and you'll see the transition icon between the clips. Tap it and the options will appear at the bottom. The default is dissolve, but the others, left to right, are straight cut, theme special, slide, wipe and dip-to-black (or white).
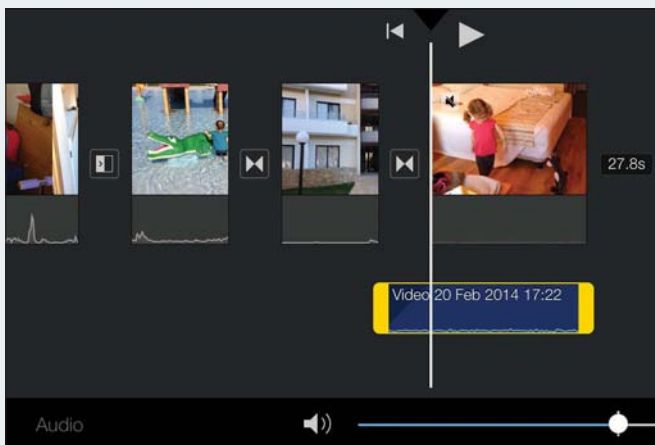
10 We've added an establishing shot of the hotel, followed by a clip showing inside the room. You can make the audio from the second clip play over the establishing shot. Tap on the shot inside the room, then on Audio, then Detach. The clip's audio is shown in blue.
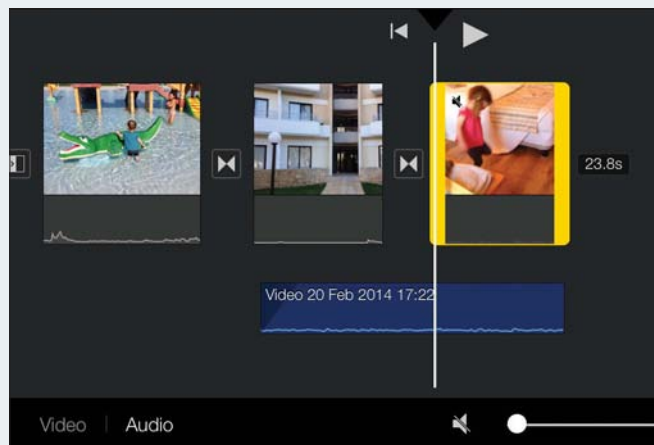
11 Tap and hold on an audio clip to move it on the timeline. To keep it in sync with your video, select the video it belongs to and trim it by dragging the left-hand yellow bar to the right. The audio won't be trimmed, and will extend beneath the previous clip.
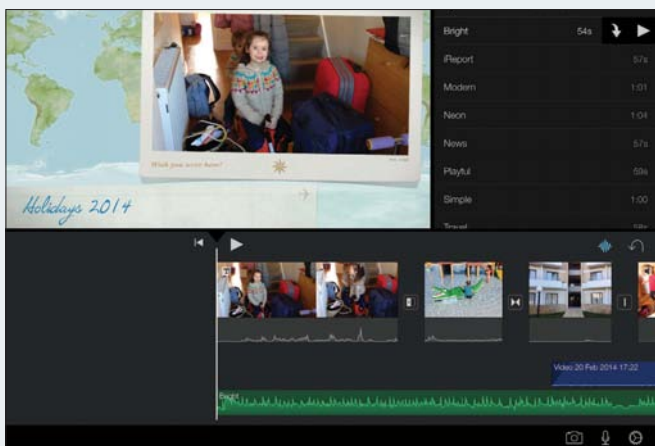
14 You'll want some background music, so tap the Audio button at the top-right corner of the screen. You can choose iMovie's own music, or any music on your iPad that isn't DRM-restricted. Select a song and tap the downward arrow to add it to the timeline.

15 iMovie doesn't allow gaps, so it will insert the song at the start of your movie. If you don't want that, or want to have a gap between songs, trim the clip to the point where you want music to start, and use the slider at the bottom to reduce the volume to 0%.
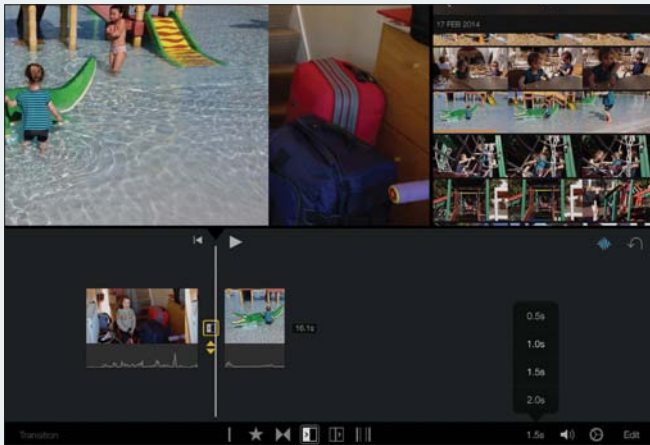
8 You can change a transition's duration by tapping the '1.0s' option at the bottom right, and then choosing either 0.5s, 1.5s or 2.0s. Some transitions have a sound effect, which is muted by default. Tap the speaker icon to toggle the sound on and off.
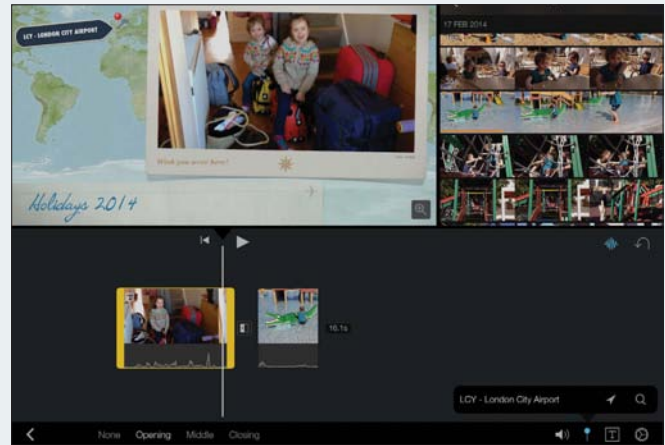
9 Tap the first video on the timeline and then the Title option at the bottom right. Tap Opening on the left and the theme's title will be added to the clip. Next, tap on the text in the preview window to edit it. With this Travel theme, a marker points to a destination.
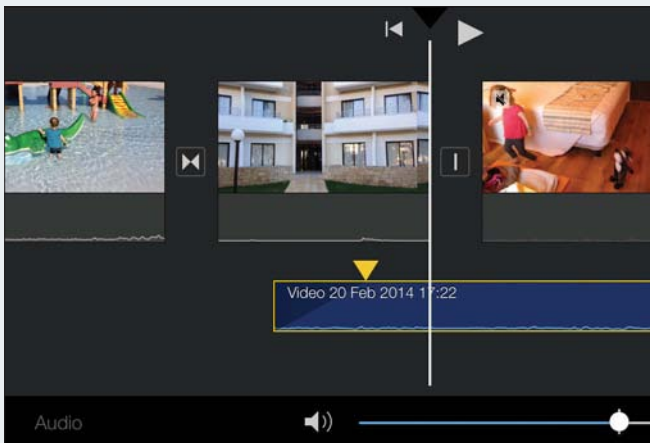
12 By default, detached audio clips fade in, and you can change this by tapping the clip to select it. Now tap Fade at the bottom right and two yellow arrows will appear on the clip. Drag these left or right as you like to fade the start or end of the clip in or out.
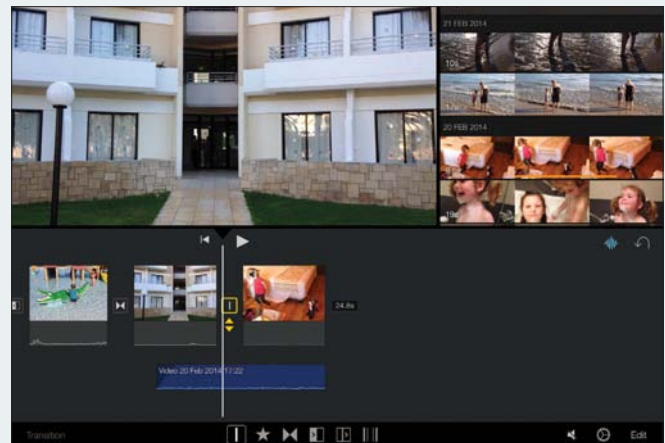
13 To complete the edit, tap on the transition between the two clips and change it from dissolve to a straight cut. Play the two clips and you'll see a seamless transition between them, with the continuous audio making it a lot less jarring.

16 Repeat Step 14, adding the song again (or a different song). There's the same Fade option to fade the song in and out, and you can adjust the volume. Continue to add clips, and perhaps a closing title similar to the opening title in Step 9.
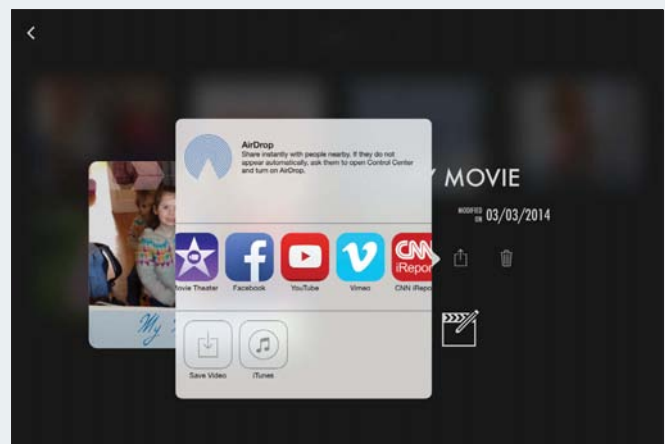
17 When you're finished editing, tap the back-pointing arrow in the top-left corner and you can tap on the title to edit it. Tap the Share button to upload your movie to YouTube or Facebook, save it to your camera roll, or send it to a new device via AirDrop. ⊠

Manage cloud storage

Bring all of your online storage services together in a single interface using the MultCloud website. Martyn Casserly walks you through the basics

Many of us have multiple cloud storage accounts, but managing them all separately can be a chore. Now MultCloud offers a one-stop shop where you can control your different services from a single interface. It's an online service that lets users link their various cloud services to a single site. Here you can transfer files between the different providers, preview documents, and generally make better use of the storage facilities available to you. It's not a complete solution, though, as you can't edit files, but if you want a detailed overview of your online accounts, and the ability to control them from a single login, then MultCloud can be extremely useful.

START Go to multcloud.com (remember there isn't an 'i' in the name MultCloud), and you'll find the option to create a new account via the orange button on the front page. Click this to begin.
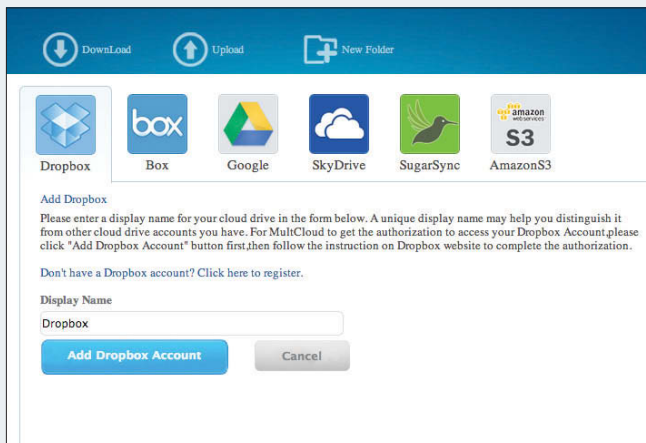
4 The screen now shows the various online storage services that work with MultCloud. If you don't have accounts with any of them, you can follow the links above Display Name, which will take you to the relevant site to create one.
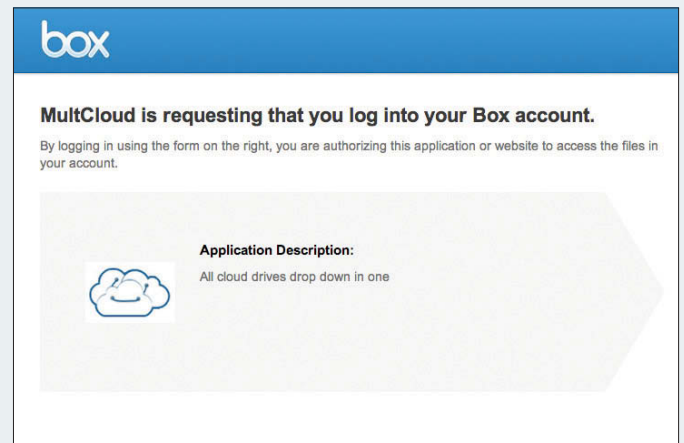
5 To link an account, select the service by clicking on its icon, then click the blue Add Account button. This will redirect you to the service's website where you need to log in and then give permission for the MultCloud app to access your data.
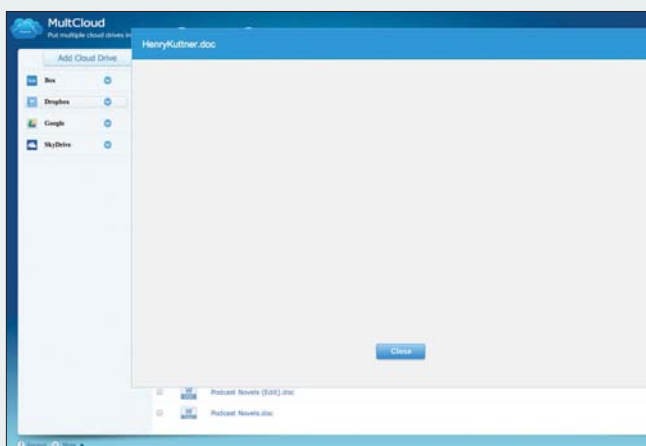
8 One problem we did encounter was that for some reason documents don't seem to preview at the moment. Clicking on one results in a blank box where the words should appear. Hopefully this will be fixed in the near future. Images files were fine.

9 To transfer files between different services, go to the drive that holds the data you want to move, find the folder or file, then right-click on it. Now select copy, navigate to the destination drive and paste it there.

2 Fill in the form to create a new account. Remember that it's always a good idea to use a different password to the one you use for your other cloud storage accounts, and make it a mixture of letters, numbers, and symbols for increased security.

3 Once you've filled in the details, you'll be sent a confirmation email. You'll need to click on the included link to complete setting up the account. Log in again, then you can begin work on linking your various online storage options to MultCloud.
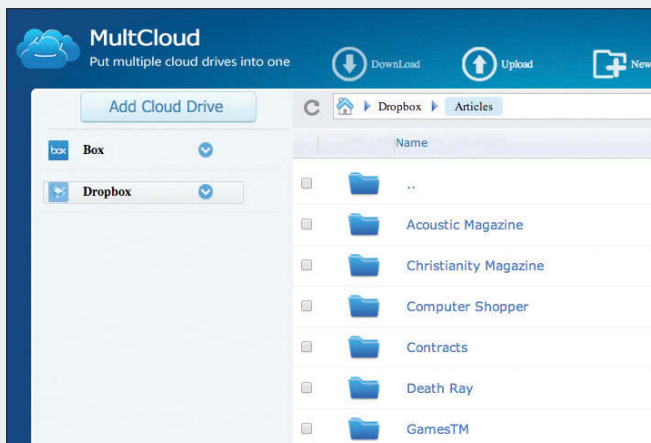
6 One you've added an account or two, you'll see that the MultCloud page changes to show a list of the files available. The left-hand column displays the names of the accounts you've already linked. To add more, click Add Cloud Drive.

7 You navigate the files just as you would on any other library on your computer. Select the storage drive you want from the list in the left column, choose whichever folder holds the data you require, then double-click on the file to see it previewed.
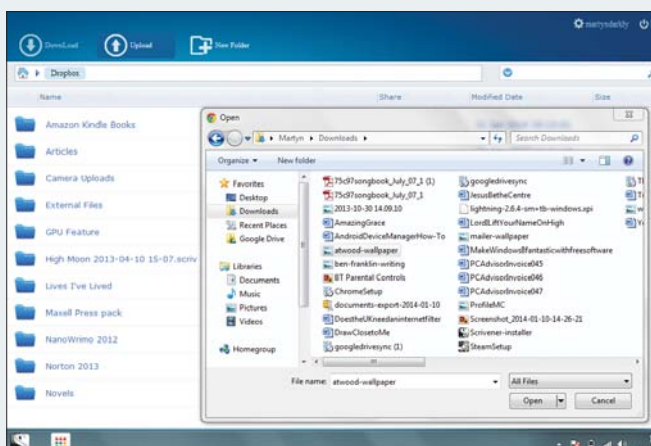
10 To upload files from your PC (the download feature will be enabled soon), select which destination folder you want, then click Upload from the top of the screen. You'll be presented with a pop-up box in which you select the file/folder, then it's uploaded.
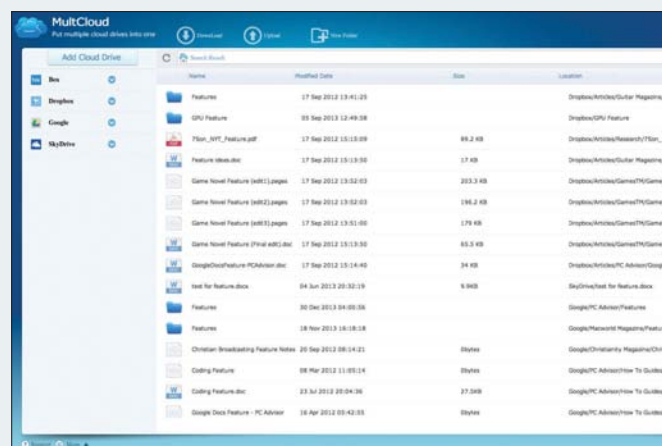
11 The search feature is very useful for tracking down particular files across all your drives. Click on the Home icon in the long bar at the top of the main pane, then enter the filename in the search bar on the right. ⊠

Record phone calls

Sometimes, it can be useful to keep a permanent record of your phone calls. Mike Bedford looks at several solutions and explains how to get the job done

If you're planning an important telephone conversation, recording what's said could prove invaluable. First, it provides you with a reminder and, secondly, if the other party disputes what they'd said, you have the necessary evidence to counter their claim. This is perfectly legal in the UK, although it would be courteous to inform your contacts if you're going to be recording them. Indeed, if the third party knows they're being recorded, that fact alone might have a beneficial outcome. There are several ways you can record your calls and you could probably make a start with no additional hardware or paid-for services at all. Here we'll look at your different options.
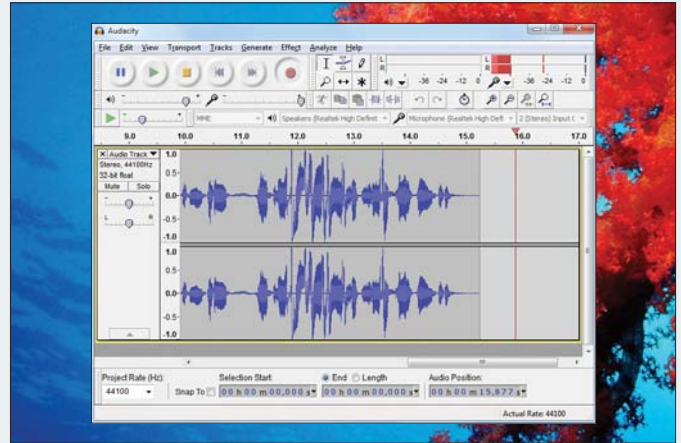
START If your phone has a hand-free capability, use its speakerphone and record through your PC's mic. Needless to say, background noise will be recorded too. Either use Windows' Sound Recorder or the more advanced but free Audacity (tinyurl.com/4gx3j).

4 Also for landlines are standalone recorders that plug into the phone line. Some also act as voice recorders and MP4 players. They have a USB connection for uploading recordings to your PC. Take a look at the £34 4GB recorder from ultradisk.co.uk.
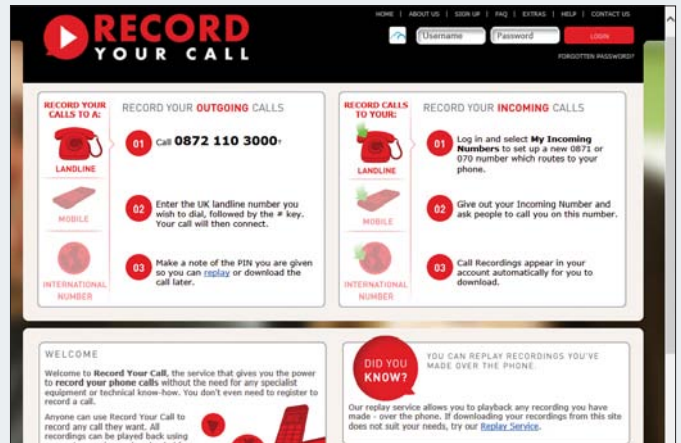
5 Record Your Call (recordyourcall.co.uk) lets you record calls. For an outgoing call, ring 0872 100 3000 (10p per minute, plus network charges) and, when prompted, dial the number followed by hash. Make a note of the PIN and hang up when you're done.
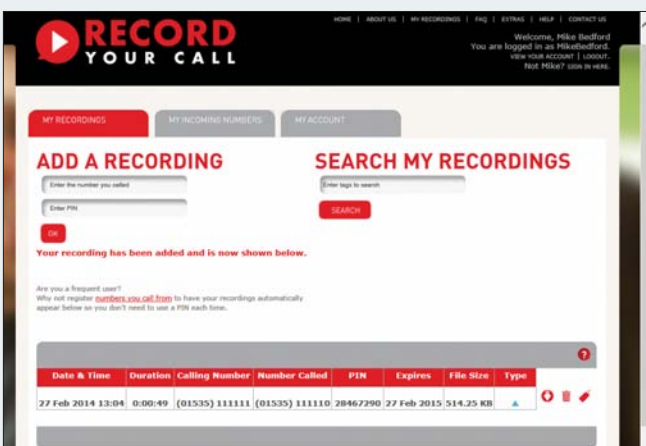
8 To retrieve a recorded call, log in and ensure the 'My Recordings' tab is selected. Enter the number you called and the PIN you were given and click on OK. You'll be shown details of the recordings available. Click the down arrow icon to download it.

9 A method that will work with landline or mobile phones is to use an ear microphone with the Windows Sound Recorder or Audacity. It'll pick up your voice and sound from your phone, and inevitably some background noise, too. The Olympus TP8 costs £19.

2 A similar approach, but without the background noise, is to use a suction pick-up that attaches to the handset (but not a cordless or mobile). They don't stick too well to some phones but with prices starting from a couple of pounds it's worthwhile trying.

3 Again, similar, but without the disadvantages of the previous methods is to use a device that connects between the hand piece and base unit of a landline phone. Some only work with audio recorders but a £35 unit from retellrecorders.co.uk works with a PC.

6 You can retrieve your recording by calling 0872 110 3001, but if you want to download it from the site you'll have to register. Registration is also needed for recording incoming calls. For a free account, click on 'Sign up Today', on the home page.

7 If you want to be able to recording incoming calls, login and select the 'My Incoming Numbers' tab. Click on 'Get New Number' and then select a number that people should call you on if you want to record their call.

10 There are lots of Android apps available, but we found the free Automatic Call Recorder from Appstar Solutions to be very effective. Download if from the Play Store and, by default, all your calls will be recorded. Use the app to play them back.
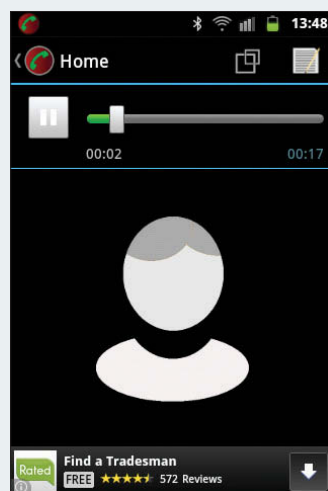
11 If you save a recording (there are options for the location) you can then download it to your PC. The default file format is .AMR, which Windows Media Player won't play, but free players are available. Alternatively, select the WAV option but the files will be huge. ⊠
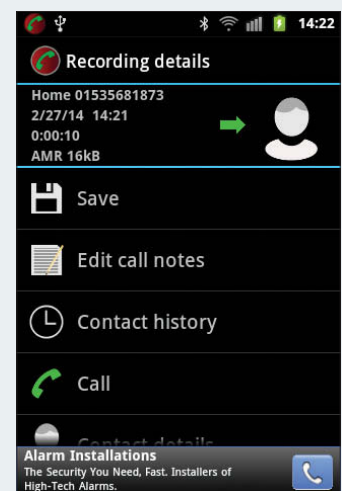
Fix a corrupt user profile in Windows 7 and Vista

Corrupt user profiles are a frustratingly common problem with Windows. Marc Norris explains how to recover by either fixing the problem or creating a new profile

Discovering that your user profile has become corrupted is a frustratingly common experience. After all, you'll have spent time making sure that your computer looks and works exactly the way you want it to. So what do you do if you are no longer able to log into your PC? (Typically, you'll see the error message, 'The User Profile Service failed the logon' and 'The user profile cannot be loaded'. You'll be returned to the logon screen.) Here we show you how to recover from a corrupt user profile by either fixing the problem or creating a new account and transferring your user data across to the new profile.

WARNING: Some people have lost files using Method 1 below, so it's important that you create a backup of your hard disk, or just the files you can't afford to lose before trying anything that involves editing the Windows Registry. There are various programs that will allow you to make a copy of your entire disk, but you'll need a second disk with sufficient capacity, and may even need a second PC or laptop in order to copy the disk (if you can't boot into Windows). You should also make a backup of the Registry itself from Safe Mode before you start. These instructions are provided as a last resort, and we recommend that you try Method 2 before trying Method 1.

METHOD 1: FIX A CORRUPT PROFILE

Microsoft says that a user profile can become corrupted if your antivirus software is scanning your PC while you try to log on, but it could also be caused by other things.

A quick fix can be to restart your PC, but if this doesn't work you'll need to restart again and boot into Safe mode. Do this by pressing F8 before you see the Windows loading screen and choosing Safe Mode from the menu that appears.

Safe Mode logs you into the built-in Windows administrator account, but you might find that some options don't work.
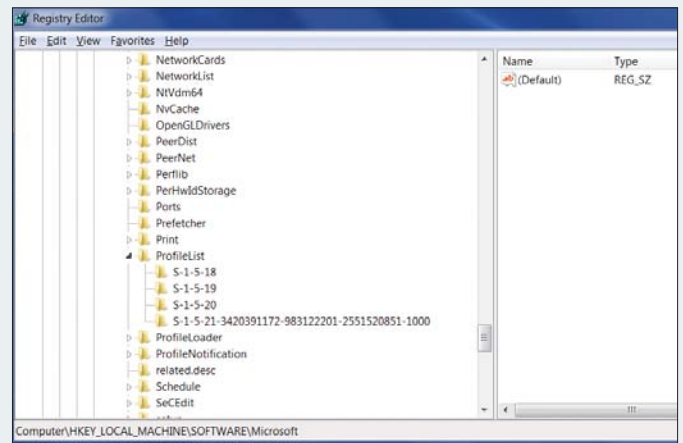
START To fix the user profile, click Start, type **regedit** into the search box and press Enter. Registry Editor will launch and you need to navigate to the following key: HKEY_LOCAL_MACHINE\ SOFTWARE\Microsoft\Windows NT\CurrentVersion\ProfileList.
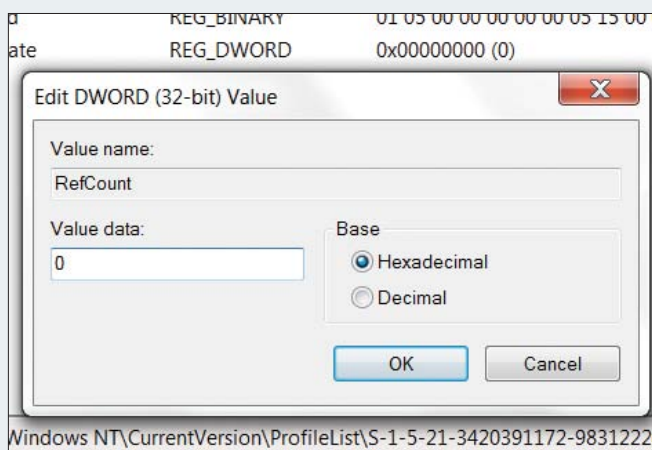
2 Click each S-1-5 folder and double-click the ProfileImagePath entry to find out which user account it relates to. Once you've located the folder for the corrupt profile), double-click RefCount and change the Value data to 0 and click OK.
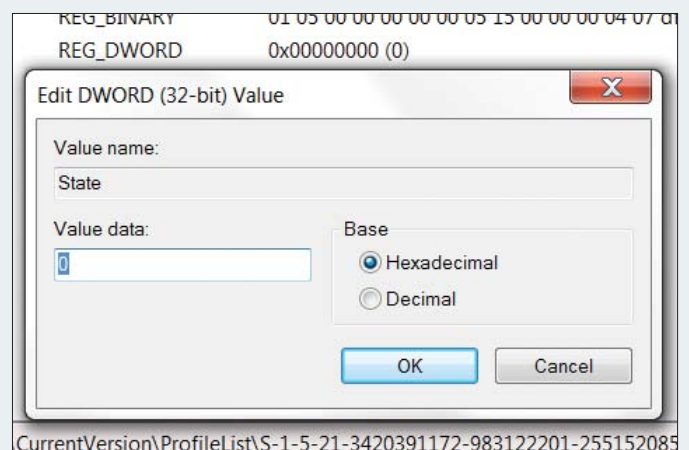
3 Now double-click on State and make sure that the Value data is again 0 and click OK. Close regedit and restart your PC. You should now be able to log into your account.

METHOD 2. CREATE A NEW USER PROFILE

If you have a second account on your PC that you can log in to, you may be able to use this to follow the steps below to create a new user account. However, if you don't have another account, boot into Safe Mode (as described above) and try to follow the steps. If that still doesn't work, you need to enable the hidden admin account. To do this, type **cmd** in the search box and then right-click on Command Prompt in the list of results and choose 'Run as administrator'. Now type the following at the prompt:

net user administrator /active:yes

The response should be: 'The command completed successfully'. Now reboot your PC and you'll see an Administrator account as well as your corrupt account. Log into the admin account (there's no password) and follow the steps below.
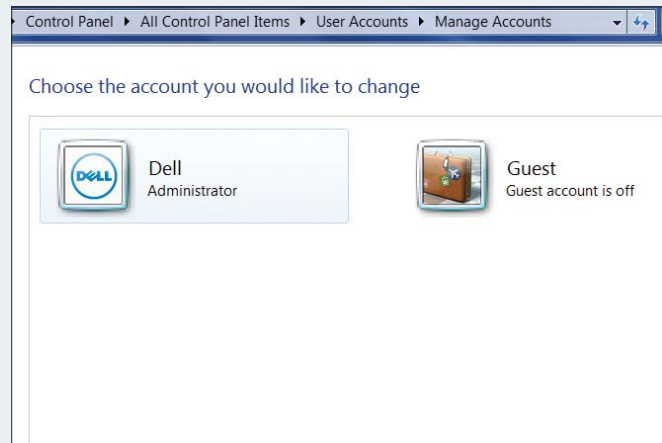
START Open Control Panel and click User Accounts and Family Safety (or similar). Click on User Accounts. Click Manage another account and type in the password (if prompted).
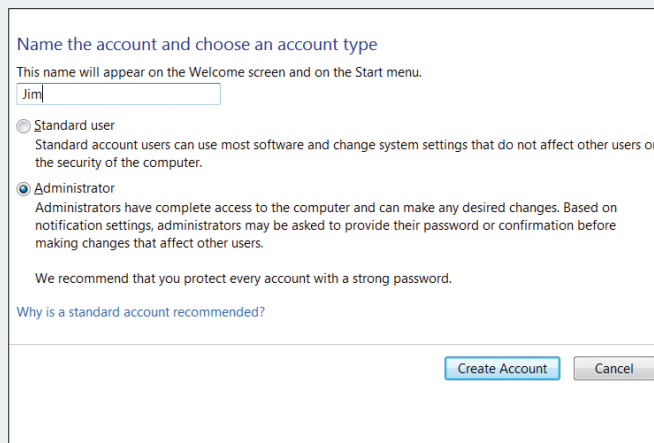
2 Click Create a new account and type the name. This must be different from the corrupt account, but you can rename the account later on if you want to have the same name as before. Restart your PC and log into your new profile, then log out.
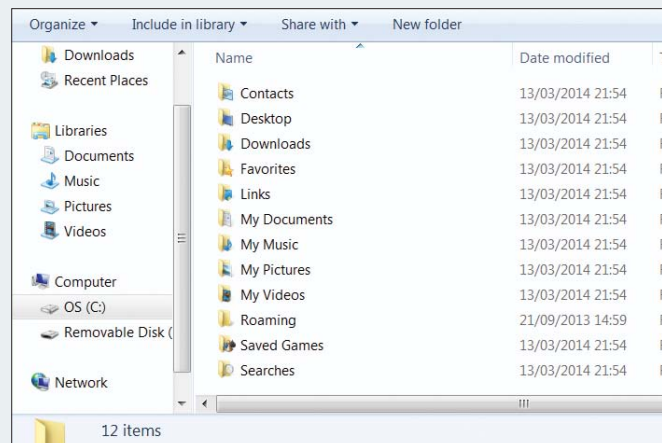
3 Log in as Administrator or Guest. Click Start, Computer, then double-click on the hard drive on which Windows is installed. Double-click the Users folder. Find your old user account and double-click it to see all the files in your account.
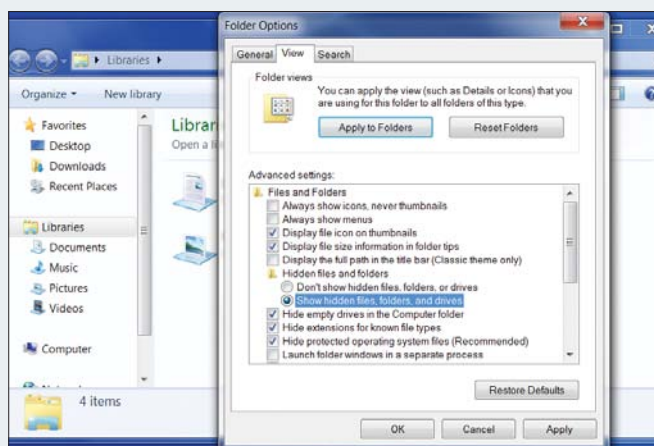
4 It's best to copy across the contents of subfolders separately. If you want to copy the entire contents in one go, enable hidden files and folders and then make sure you DON'T copy across the following files: Ntuser.dat, Ntuser.dat.log and Ntuser.ini.
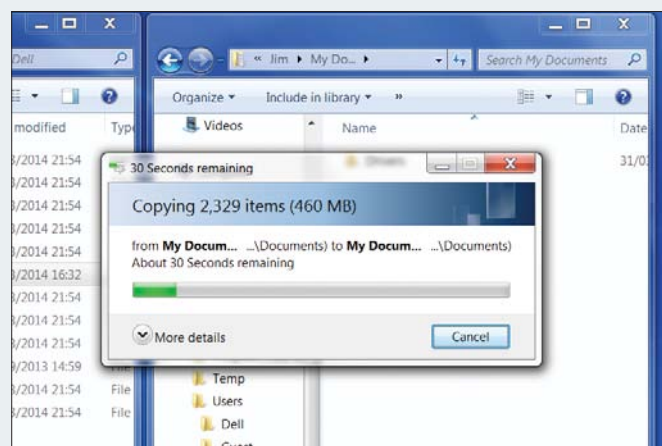
5 When all the files are copied across to the newly created user profile (you'll find it in the same c:\Users folder as the corrupt profile), restart your computer and log on to the new profile. ⊠

Clean up your PC

Is your computer slowing you down? Matt Egan's five tips will ensure that your PC or laptop runs faster and more efficiently. We've explained the tips in detail for Windows machines, but the principles apply to any system, including Apple MacBooks
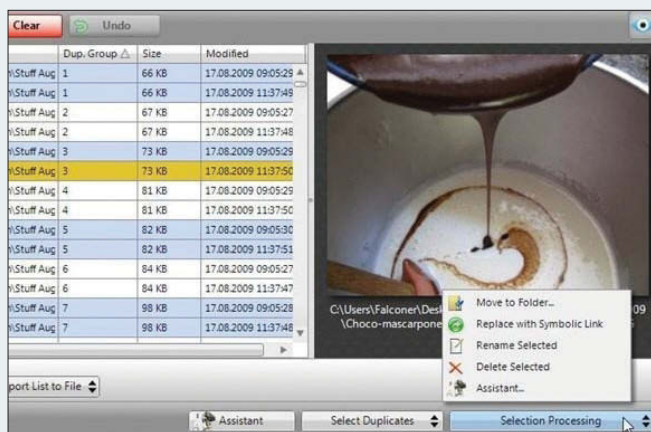
START — Clean out duplicate and junk files

As any PC or laptop ages, data will fill up the hard drive. This in turn slows performance, as your PC has to go further and work harder to find the files and applications it needs to access. Removing as much junk as possible will help to restore your PC- or laptop's zip. We'll start with duplicate files. Typically these will be music or photo files. There's no downside to removing such junk, and the free Easy Duplicate Finder (available from easyduplicatefinder.com) will speed up this process. Install it and follow the simple instructions.

Now you can use Windows' built-in cleanup functions to create more space: they do so by emptying the Recycle Bin, and removing temporary and other files you don't need. In Windows 8, go to the Search Charm and type **Disk Clean-up**. Click on the result for 'Clear Disk Space by deleting unnecessary files'. In Windows 7, Go to Start, All Programs, Accessories, then choose System Tools, Disk Cleanup.

The wizard will identify the files it thinks you can delete, also telling you how much hard-drive space it will free up. Click 'View files' if you aren't sure which files it's pointing to. If it offers to delete a file you want to keep, simply remove the tick in the box beside it before clicking 'Clean up system files'.
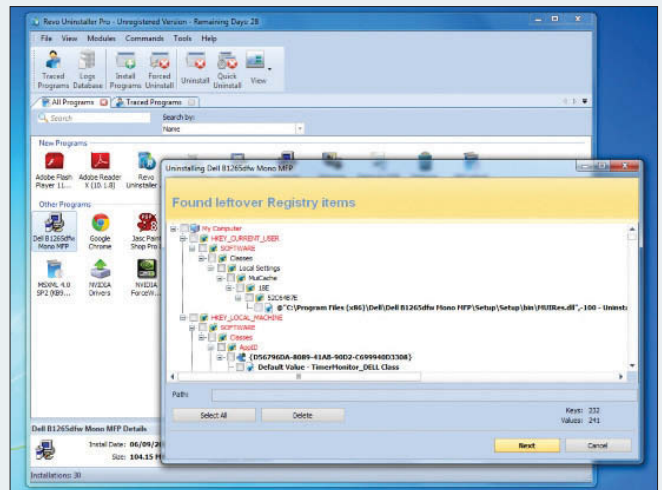
2 Delete programs you don't need

Next, remove any programs you don't use – again Windows has its own tool for this. In Windows 8 head to the Search Charm and search 'Uninstall'. You'll see an entry for 'Uninstall programs to free up Disk Space' (also see page 118). In Windows 7, head to Start, Control Panel, Programs and choose 'Uninstall a program'.

In each case, you can see a list of programs and the space they take up. Scroll down the list and select the program you want to remove, then click the Uninstall button at the top of the window. Remember you want to delete only programs you don't use.

It isn't always possible to completely remove all traces of a program using Windows' utility. For this, you need a third-party tool such as Revo Uninstaller (revouninstaller.com). In Revo's interface, double-click a program's icon to remove it. You can then scan for and remove leftover files or Registry entries.

App sizes

You have 225 GB of space available on your PC. If you want to uninstall an application, select it from the list, then tap or click Uninstall.

Mail, Calendar, and People	55.2 MB
Video	34.2 MB
Music	30.0 MB
Win8 Player	6.83 MB

3 Defrag your PC

Once you've removed unnecessary files and programs from your PC, a good next step is to compact the remaining data, so that your computer can access data in as efficient manner as possible.

Defragging or defragmenting your hard drive is a way of speeding up your PC or laptop in Windows – in principle, at least. The idea is that as data is saved and resaved to the spinning disc in your hard drive, small packets of information are deposited in random places all over the platter. This then takes longer to read, when Windows calls upon your hard drive to find out information.

By defragmenting or compacting that data, the OS removes the gaps between packets of data, moving it all closer to the centre of the disc. This in turn makes each access of the hard drive quicker, by a tiny amount. It should improve the speed of your PC or laptop, even if it does so by only an imperceptible amount. The only exception to this is if your computer has an SSD. Defragmenting an SSD will only wear it out more quickly – don't do it.

To defrag the drive in Windows 7, click the Start button. Select All Programs, then Accessories. Choose System Tools, and then select Disk Defragmenter. You'll probably have to put in your administrator password. Then hit Defragment Now.

In Windows 8, your PC, laptop or tablet will defrag itself by default every week, thanks to the scheduled task: Optimize Drives. So if you haven't changed any settings, you shouldn't need to defrag. But if you aren't sure and you want to check the status of- or manually defrag your drive open Search and type in **Defragment**. One of the results will be Defragment and optimize your drives. Select this. You'll see a dialog featuring a list of the hard drives in your PC or laptop, their media type, when they were last defragged, and how fragmented they are. You really need to defrag only if the drive is more than 10 percent fragmented. If you can't see a figure in Current status, to find out if a particular drive needs to be optimised highlight it and hit Analyze. Then confirm your choice. This will update the Current status column.

If any of your drives is fragmented by 10 percent or more, highlight it and hit Optimize. Confirm your choice.
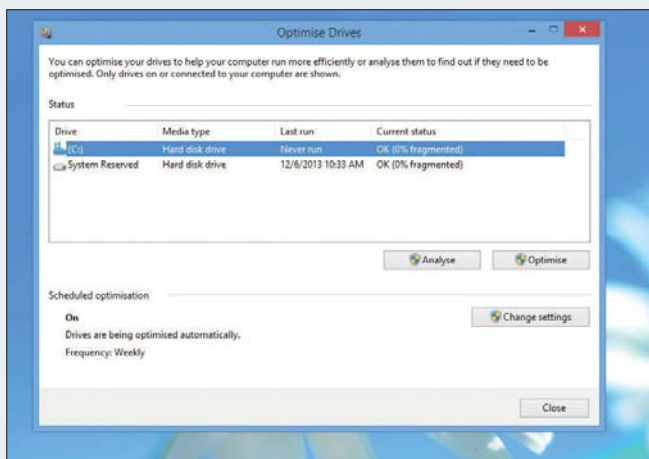
4 Remove programs from launch

You don't even have to completely remove a program from your PC to speed things up. You could just remove them from the startup process. Many programs autoload at startup, so you don't need to wait around when you later want to use them – but you don't always want to use them. You know how your older Windows PC takes an age to boot up? Removing startup programs will help.

In Windows 7 enter **msconfig** in the Start menu Search bar. Click the Startup tab in the System Configuration window and deselect any programs you don't want to launch at startup. Press Apply, then OK. Free boot-analysis tool Soluto (soluto.com) offers advice on which applications can be safely removed from the startup process. This handy utility improves on the System Configuration tool's functionality by also letting you defer certain items to load just after the desktop becomes responsive.

Services can also be prevented from running at startup, but be careful: Windows will require some of these to function properly. Enter **services.msc** into the Start menu Search bar to display a list of startup services, then head to Black Viper to identify which of those services can be delayed or disabled.

It's easier to stop programs launching when Windows 8 boots, though, you'll need to launch the revamped Task Manager. There are several ways to do this.

Hit the Windows Key and Q, or bring up the Charms bar and click the search icon, then type **Task Manager** and hit Enter. Select the Task Manager icon that appears. Alternatively, within the desktop you can right-click on the taskbar, or hit Windows Key and X to bring

up the secret Start Menu, and select Task Manager. Finally, you can use Ctrl+Alt+Delete and select Task Manager.

Once you've opened Task Manager, you need to select the Start-up tab. This lists all the programs that launch when you boot your Windows 8 PC, laptop or tablet. It also tells you each app's publisher, and the impact on startup performance listed as either 'low', 'high' or 'medium'. Now click on the programs you don't want to start with your PC, right-click, and select 'Disable'. Or highlight a program and click 'Disable' in the bottom right-hand corner of the window. You can reverse this process at any time by clicking on the item and right-clicking, then selecting 'Enable', or hitting 'Enable' in the bottom right-hand corner.
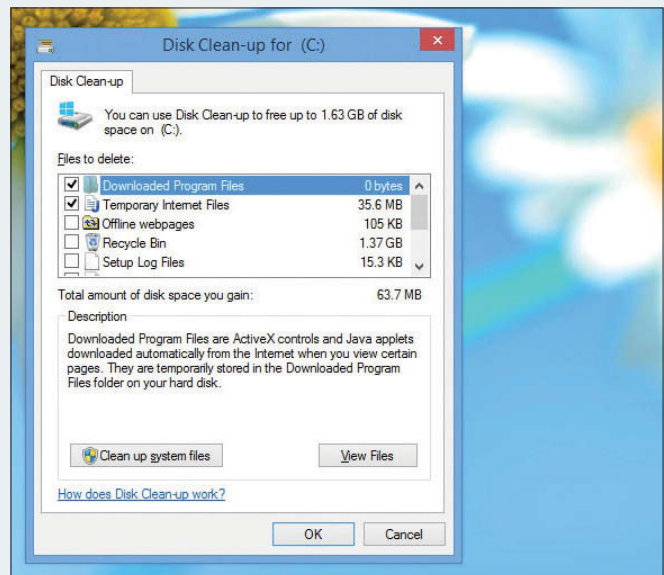
5 Clean up and organise your desktop

Finally, here are some tips that everyone can do. They'll help you find files and folders quicker, regardless of the state of your PC- or laptop's hard drive.

If you need to find a file in a hurry, enter its name into the Start menu Search box or, in Windows 8, the Search Charm. Windows 8 search is great, and in Windows 7 the Windows Search Assistant is useful. But the latter is no match for a desktop-search engine such as Copernic (copernic.com). This free program indexes your entire hard drive to make finding the file you're looking for much faster. Install and use it in Windows.

Digital documents should be stored in relevant folders, not on the desktop. Create a folder by right-clicking the desktop and choosing New, then Folder. Named 'New Folder' by default, you can rename your archive simply by typing over the highlighted text. Drag-and-drop relevant files into your folder.

Remove unused shortcuts from the desktop – this won't uninstall the programs they link to, but it will help to keep things tidy and organised. Next, right-click the desktop and choose View, 'Auto arrange icons'. This will force your remaining shortcuts into a neat grid on the left side of the screen.

You should be able to identify a file's content from its name, without needing to open it. Adding the location to holiday photo filenames is a good example. It can also be useful to include the date. If you've got lots of similar files to rename, copy and paste the common information into each file being renamed.

To get a better view of what's in your folders: click the 'Change your view' icon at the top-right corner of a folder and select Details. File size, creation date and other information will now appear next to a list of your documents. Reorder the list by date, file size, and so on by clicking the various tabs at the top of the window. ⊠

Reinstall Windows 8

Microsoft has made it much easier to reinstall Windows 8. In fact there are two options – refresh and reset. Edward Jones explains how each of these works

Historically, reinstalling your Windows operating system has been a complex and lengthy process. Windows 8 eradicates this issue with 'Refresh & Reset'. Here's how it works:

Refresh: This option allows you to keep all your personal files and purchased Apps from the Windows Store, while removing all downloaded and installed programs such as Java, Adobe and Games. Your PC settings will also revert to default.

Reset: Think factory reset. No personal files, programs, Windows Store Purchases will be kept and your PC settings will be returned to default. Your Windows 8 OS will be fresh an exactly as you found it on day one.

It's important you don't mix the two up or you could lose all your family photos, personal files and those 1000s of MP3s and movies you purchased legally. Don't worry too much, though, Windows 8 makes the options clear at every step and there's an added layer of protection as you must be logged in with Administrative privileges to implement 'Refresh and Reset'.

REFRESH

You've packed your PC with every application you can think of including Skype, Adobe Reader, Photoshop and the past 20 versions of Call of Duty. It's taking forever to start up and is nowhere near as responsive as it used to be. It's time for a spring clean.
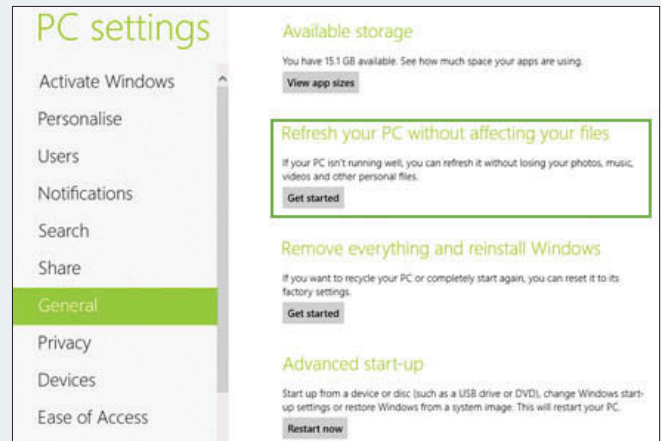
START Hit Win-C, or point your mouse to the top right or bottom-right corner of your screen for the Charms Bar to appear. Then click Settings > Change PC Settings > General. Scroll until you see the option 'Refresh your PC without affecting your Files'.
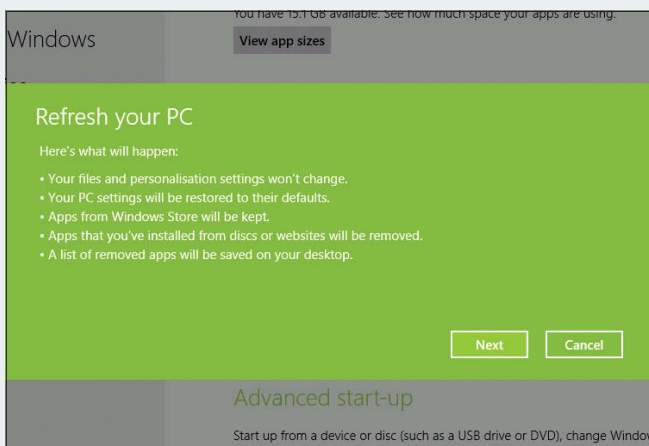
2 Click Get Started. The above options screen should appear. Click Next. The process will take around 15 minutes, so you'll have enough time for a quick game of Call of Duty.
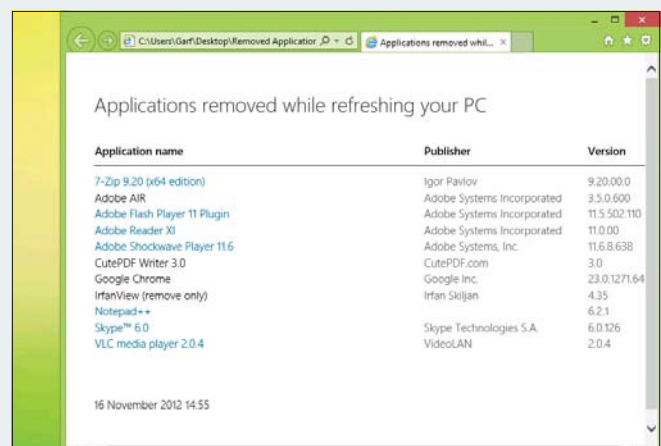
3 Once that's finished, your PC will have 'refreshed' with all your documents and purchases intact. You'll even get a fancy document informing you of all the programs removed.

REINSTALL

On the previous page we showed you how to refresh Windows 8. If that doesn't give you the performance boost you wanted, you might need to use the Reset function.
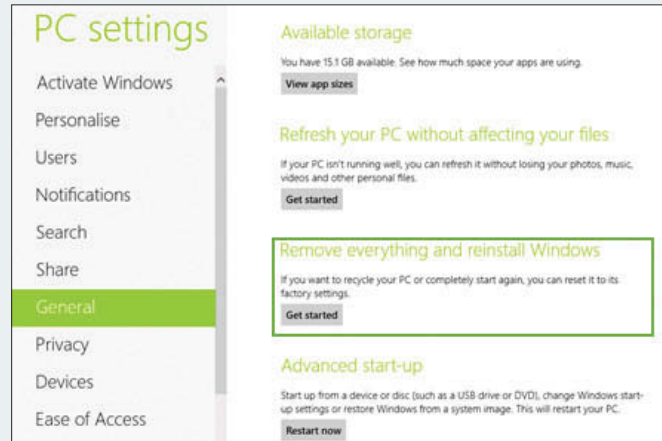
START Hit Win-C, or use your mouse to make the Charms Bar to appear. Click Settings > Change PC Settings > General. Scroll down till you see 'Remove everything and reinstall Windows'.
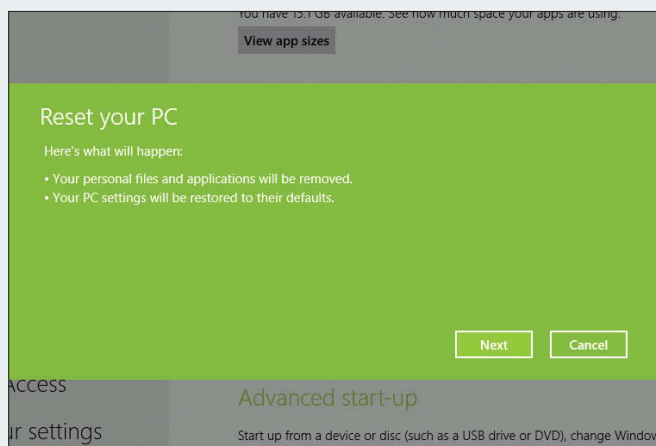
2 Select Get Started and you'll see this screen.
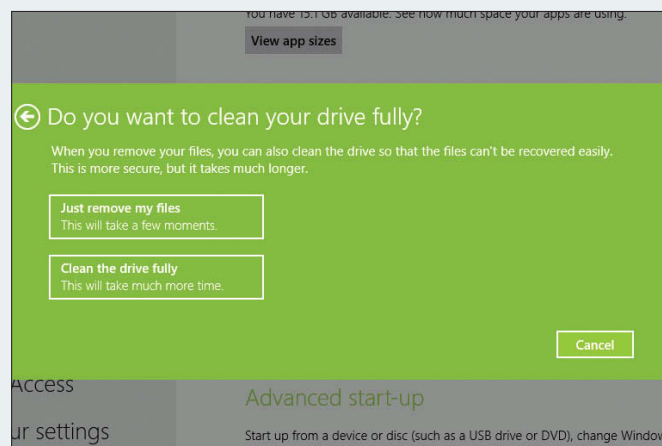
3 Click Next and you'll be shown by these two options. The first of these – 'Just remove my files' – ensures that Windows 8 is as good as new. The other option – 'Clean the drive fully' – wipes the drive and reinstalls Windows 8.
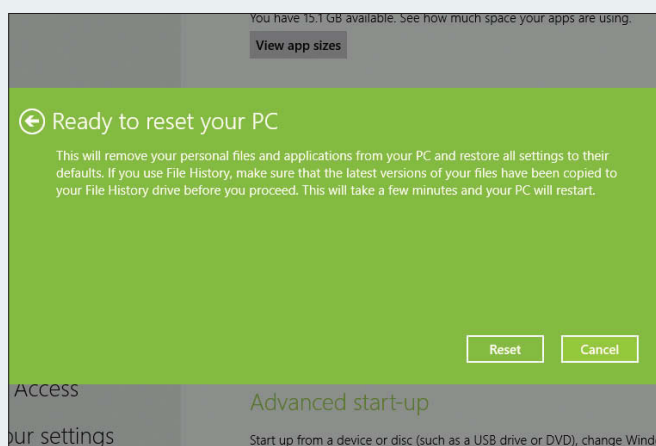
4 This is the point of no return, so make sure you want to do this.
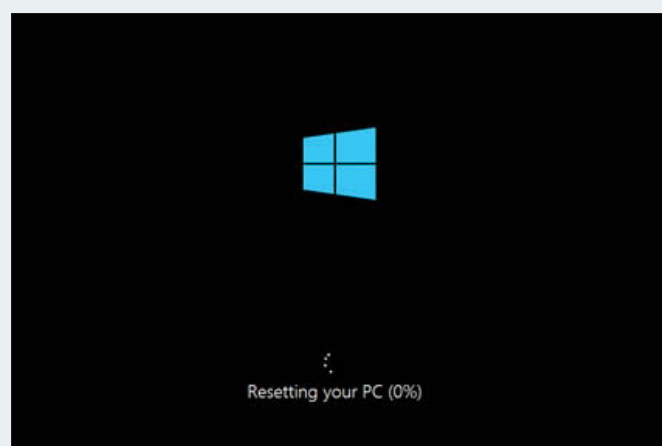
5 Click Reset and your PC will return to its default settings. The process will take from several minutes to several hours. ⊠

LETITIA AUSTIN

ONLINE REGISTRATION REQUIRED

Ashampoo WinOptimizer 2014
FULL PROGRAM AVAILABLE ONLY ON THE DISC+

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 227\Ashampoo WinOptimizer 2014 and open the file

Online registration required: follow the links during installation before 18 June 2014

System requirements

Windows XP (32-bit)/Vista/7/8; 512MB RAM; 100MB hard disk space; 1024x600 resolution

Ashampoo WinOptimizer 2014 stands for modern technology, efficiency, security and intuitive handling. It was designed and developed to:

- Make your PC faster and more responsive

- Protect your privacy and safeguard or remove sensitive data

- Clean and declutter your system

- Fix and repair common Windows errors and improve system stability

- Achieve and maintain peak performance ⊠

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SAVE £24 ON WINOPTIMIZER 10 – NOW JUST £6!
TINYURL.COM/7S5YB4Q

Serif PagePlus X2
FULL PROGRAM AVAILABLE ONLY ON THE DISC+

ONLINE REGISTRATION REQUIRED

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 227\ Serif PagePlus X2 and open the file

Online registration required: Follow the instructions within the program to register the software by phone before 18 June 2014. Call: Freephone UK: 0800 376 5467; toll-free US: 800 376 1989; iInternational: +44 115 914 5479. Quote the registration code and installation number displayed in the Serif Registration Wizard

System requirements
Windows 2000/ XP/Vista; 256MB RAM; 496MB hard disk space; SVGA (800x600 resolution, 16-bit colour) display

PagePlus X2 is here to help your business, charity or personal venture stand out from the crowd. Create posters, flyers, business cards, save and edit PDF files, and much more. It's a versatile and easy-to-use desktop publisher suite.

Features

• Stunning stationery is so simple

• Easy drag-and-drop designing

• Layouts in a couple of clicks

• Precise and easy design tools

• Versatile desktop publishing

• Help is always on hand ⊠

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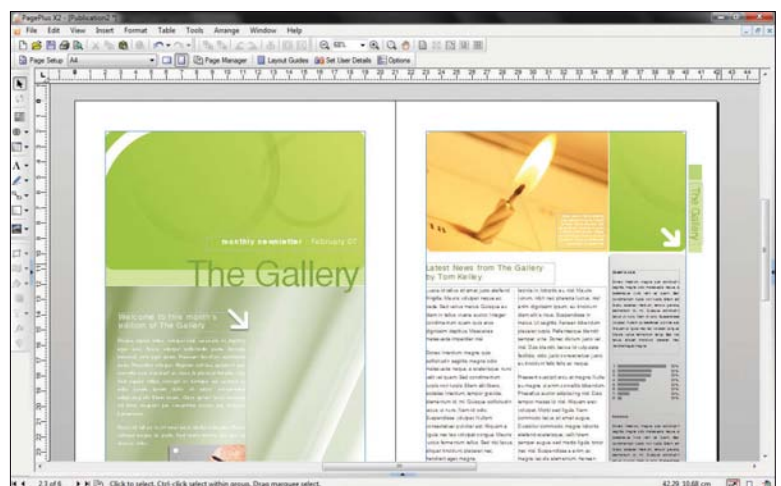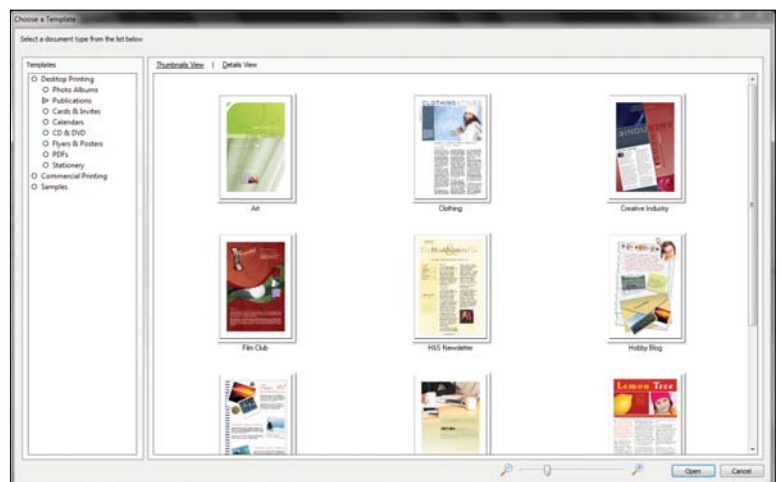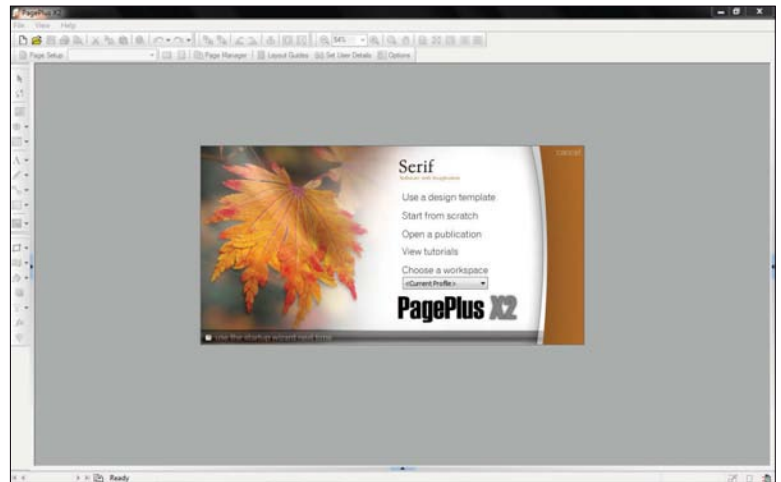
Abelssoft CleverPrint 2014
FULL PROGRAM

Installation details
Go to My Computer. Right-click the disc icon and open the disc. Select Files 227\ Abelssoft CleverPrint 2014 and open the file

Online registration required: follow the links during installation before 18 June 2014

System requirements
Windows XP/Vista/7/8

CleverPrint allows you to print more effectively. It lets you combine multiple pages on a single sheet, and exclude pages from the print job after checking the output in a preview window. You can also print to PNG, JPEG and PDF, and automatically add a watermark or company letterhead.

Features
Saves money: Printing up to eight pages on a single sheet, and exclude certain pages from the print job.

Cleans up: Order documents in the print job. You can also combine a print job from different programs, for example Word and Excel.

Optimises print jobs: CleverPrint can remove graphics within a print job to reduce printing costs.

Saves time: CleverPrint saves and manages letterheads and can print them on any document you want.

Watermarks: Watermarks, text or pictures can be inserted in foreground or background.

PDF printer: CleverPrint is able to convert print jobs to PDF, PNG, JPEG and so on. ⊠

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Verdict

The Galaxy Gear is a mixed bag. We love the styli
design and nice screen. It's packed with handy
features, but performance and potentially poor
battery life are concerns. You can use it with only
a handful of Galaxy smartphones, and it's pricey.

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Ultraportable laptops	**1** Apple MacBook Pro 13in Retina	**2** Apple MacBook Air 13in	**3** Apple MacBook Air 11in	**4** HP EliteBook 840 G1	**5** Dell XPS 12
Price	£1,499 inc VAT	£949 inc VAT	£849 inc VAT	£1,344 inc VAT	£1,234 inc VAT
Website	Apple.com/uk	Apple.com/uk	Apple.com/uk	Hp.com/uk	Dell.co.uk
Launch date	Feb 14	Sep 13	Nov 13	Apr 14	Jan 14
Build rating	★★★★★	★★★★½	★★★★½	★★★★★	★★★★½
Features rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★½☆	★★★★☆
Value rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★½☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Processor	2.6GHz Intel Core i5	1.3GHz Intel Core i5-4250U	1.3GHz Intel Core i3-5250U	2.1GHz Intel Core i7-4600U	1.8GHz Intel Core i7-4500U
RAM	8GB DDR3L	4GB DDR3L	4GB LPDDR3	8GB DDR3	8GB DDR3L
Storage	512GB SSD	128GB SSD	128GB SSD	500GB HDD	256GB SSD
Screen size	13.3in glossy (anti-glare)	13.3in glossy (anti-glare)	11.6in glossy (anti-glare)	14in matt	12.5in glossy touchscreen
Screen resolution	2560x1600	1440x900	1366x768	1920x1080	1920x1080
Graphics	Intel Iris Graphics	Intel HD Graphics 5000	Intel HD Graphics 5000	AMD Radeon HD 8750M	Intel HD Graphics 4400
Video memory	N/A	N/A	N/A	1GB	N/A
Wireless	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11b/g/n	802.11b/g/n
Ethernet	Optional	Optional	Optional	Gigabit	None
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0	2x USB 3.0	4x USB 3.0	2x USB 3.0
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	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	720p webcam	None
Operating system	Mac OS X 10.9 Mavericks	Mac OS X 10.9 Mavericks	Mac OS X 10.9 Mavericks	Windows 7 Pro 64bit	Windows 8 64-bit
Bundled software	iLife 11	iLife 11	iLife 11	None	None
Fear (Max detail)	Not tested	Not tested	Not tested	38fps (1080p)	27fps
Battery	71.8Wh lithium-polymer	54Wh lithium-polymer	38Wh lithium-polymer	50Wh lithium-ion	Not stated
Battery life	9 hrs 55 mins	12 hrs 57 mins	8 hrs 56 mins	6 hrs 25 mins	6 hrs 45 mins
PC Mark 7 score	Not tested	4602	4080	3100	5205
Dimensions	314x219x18mm	325x227x4-17.5mm	300x192x17mm	339x237x21mm	317x215x20mm
Weight	1.57kg	1.35kg	1.08kg	1.58kg	1.52kg
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	3-year return-to-base	1-year enhanced
FULL REVIEW	TINYURL.COM/M3TNC29	TINYURL.COM/KNXWZW3	TINYURL.COM/K64ZPKB	TINYURL.COM/L8HP79T	TINYURL.COM/QBAWKLC

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Price	£449 inc VAT	£240 inc VAT	£299 inc VAT	£400 inc VAT	£300 inc VAT
Website	Toshiba.co.uk	Saveonlaptops.co.uk	Asus.com/uk	Lenovo.com/uk	Acer.co.uk
Launch date	Feb 14	Nov 13	May 14	Nov 13	Apr 14
Build rating	★★★★☆	★★★☆☆	★★★☆☆	★★★½☆	★★★★☆
Features rating	★★★★☆	★★★½☆	★★★½☆	★★★★☆	★★★☆☆
Performance rating	★★☆☆☆	★★☆☆☆	★★☆☆☆	★★★☆☆	★★☆☆☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★½☆	★★★★☆
Overall rating	★★★★☆	★★★½☆	★★★★☆	★★★½☆	★★★½☆
Processor	1.7GHz Intel Core i3-4005U	1.4GHz AMD E1-1200	1GHz AMD A4-1200	2.8GHz AMD A8-4500M	1GHz AMD A6-1450
RAM	8GB DDR3	2GB DDR3	4GB DDR3L	4GB DDR3	4GB DDR3
Storage	1TB HDD	320GB HDD	500GB HDD	1TB	500GB HDD
Screen size	15.6in glossy	15.6in glossy	10.1in glossy touchscreen	15.6in glossy	11.6in glossy touchcreen
Screen resolution	1366x768	1366x768	1366x768	1366x768	1366x768
Graphics	N/A	AMD Radeon HD 7310	AMD Radeon HD 8180	N/A	AMD Radeon HD 8250
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	10/100	10/100	Gigabit	None
Bluetooth	✓	✓	✓	✓	✗
USB	2x USB 3.0, 1x USB 2.0	3x USB 3.0	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 1x 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	None	8x DVD±RW	None	8x DVD±RW	None
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit
Bundled software	None	None	MS Office Home & Student	CyberLink PowerDVD	none
Battery	4400mAh lithium-ion	47Wh lithium-ion	33Wh lithium-ion	41Wh lithium-ion	2640mAh lithium-ion
Battery life	7 hrs	4 hrs 45 mins	4 hrs 20 mins	3 hrs	3 hrs 35 mins
PC Mark 7 score	2511	1094	1100	2700	1300
Stalker (Low/High)	30fps (720p)	9fps (720p)	N/A	N/A	14fps (720p)
Dimensions	378x250x21mm	376x247x33mm	266x185x29mm	380x260x26mm	289x206x20mm
Weight	2.2kg	2.3kg	1.1kg	2.4kg	1.4kg
Warranty	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year return-to-base
FULL REVIEW	TINYURL.COM/OTK6UZD	TINYURL.COM/MT67W8X	TINYURL.COM/PLAUQCG	TINYURL.COM/QBAWKLC	TINYURL.COM/NKD2TAJ

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£501-£1,000 laptops	1 PC ADVISOR RECOMMENDED Chillblast Defiant Mini 13	2 HP Pavilion TouchSmart 15	3 PC ADVISOR RECOMMENDED Dell Latitude 3440	4 PC Specialist Optimus V	5 Asus V550CA
Price	£899 inc VAT	£699 inc VAT	£576 inc VAT	£879 inc VAT	£570 inc VAT
Website	Chillblast.com	Hp.com/uk	Dell.co.uk	Pcspecialist.co.uk	Asus.com/uk
Launch date	Feb 14	May 14	Mar 14	Dec 13	Mar 14
Build rating	★★★★☆	★★★★☆	★★★★½	★★★☆☆	★★★★☆
Features rating	★★★★½	★★★½☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★½☆	★★★½☆	★★★★☆	★★½☆☆
Value rating	★★★★½	★★★★☆	★★★★½	★★★★☆	★★★½☆
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★½☆	★★★½☆
Processor	3.4GHz Intel Core i7-4700MQ	1.6GHz Intel Core i5-4200U	1.6GHz Intel Core i5-4200U	2.4GHz Intel Core i7-4700MQ	1.8GHz Intel Core i5-3337U
RAM	8GB DDR3	8GB DDR3	4GB DDR3	8GB DDR3	6GB DDR3
Storage	1TB HDD	750GB HDD	500GB HDD	1TB hard drive + 120GB SSD	1TB HDD
Screen size	13.3in matt	15.6in glossy touchscreen	14in matt	17.3in	15.6in glossy touchscreen
Screen resolution	1920x1080	1366x768	1366x768	1920x1080	1366x768
Graphics	GTX 765M/Intel HD 4600	GT 740M/Intel HD 4400	Intel HD 4400	GTX 765M/Intel HD 4600	Intel HD 4000
Video memory	2GB	N/A	N/A	2GB	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	10/100	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	3x USB 3.0, 1x USB 2.0	2x USB 3.0, 1x USB 2.0	2x USB 3.0, 1x USB 2.0	3x USB 3.0, 1x 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	None	8x DVD±RW	8x DVD±RW	6x BD-ROM	8x DVD±RW
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit
Bundled software	None	None	None	None	Asus utilities
Stalker (720p/1080p)	150/90fps	60fps (720)	24fps	Not tested	22fps
Battery	62Wh lithium-ion	41Wh lithium-ion	40Wh lithium-ion	76.9Wh lithium-ion	44Wh lithium-ion
Battery life	4 hrs	5 hrs 45 mins	5 hrs 50 mins	3 hrs 29 mins	3 hrs 25 mins
PCMark 7 score	4720	2860	2699	6099	2463
Dimensions	330x227x35mm	386x258x25mm	346x245x25mm	413x278x44mm	380x266x22mm
Weight	2.1kg	2.6kg	2kg	3.2kg	2.6kg
Warranty	1-year return-to-base	1-year return-to-base	1-year business	3-year return-to-base	1-year return-to-base
FULL REVIEW	TINYURL.COM/PBZPA65	TINYURL.COM/L2JAXH7	TINYURL.COM/KQGO23P	TINYURL.COM/Q5QRFJ2	TINYURL.COM/NQALWLF

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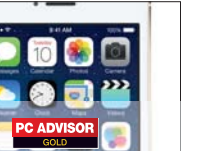
£1,001+ laptops	1 Apple 15in MacBook Pro Retina	2 Toshiba Qosmio X70-A	3 Dell Precision M3800	4 Chillblast Messiah 17 GTX780M	5 Schenker XMG C703
Price	£1,699 inc VAT	£1,600 inc VAT	£1,926 inc VAT	£1,799 inc VAT	£1,253 inc VAT
Website	Apple.com/uk	Toshiba.co.uk	Dell.co.uk	Chillblast.com	Mysn.co.uk
Launch date	Mar 14	Mar 14	May 14	Dec 13	Apr 14
Build rating	★★★★★	★★★★☆	★★★★½	★★★★☆	★★★★☆
Features rating	★★★★½	★★★★★	★★★★☆	★★★★½	★★★★☆
Performance rating	★★★★½	★★★★★	★★★★½	★★★★½	★★★★½
Value rating	★★★★☆	★★★★☆	★★★☆☆	★★★★★	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★½	★★★★☆
Processor	2GHz Intel Core i7-4750HQ	2.4GHz Intel Core i7-4700MQ	2.2GHz Intel Core i7-4702HQ	2.7GHz Intel Core i7-4800MQ	2.4GHz Intel Core i7-4700MQ
RAM	8GB DDR3	16GB DDR3	16GB DDR3	16GB DDR3	8GB DDR3
Storage	256GB SSD	1TB/256GB SSD hybrid	500GB + 256GB SSD	1TB + 250GB SSD	250GB SSD
Screen size	15.4in glossy (anti-glare)	17.3in glossy	15.6in glossy touchscreen	17.3in matt	17.3in matt
Screen resolution	2880x1800	1920x1080	3200x1880	1920x1080	1920x1080
Graphics	Intel Iris Pro	nVidia GeForce GTX 770M	nVidia Quadro K1100M	nVidia GeForce GTX 780M	nVidia GeForce GTX 765M
Video memory	128MB	3GB	2GB	4GB	2GB
Wireless	802.11a/b/n/ac, MIMO	802.11b/g/n, WiDi	802.11ac, MIMO	802.11b/g/n, WiDi	802.11b/g/n
Ethernet	Gigabit	Gigabit	None	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0, 2x USB 2.0	3x USB 3.0, 1x USB 2.0	3x USB 3.0, 1x USB 2.0	4x USB 3.0
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	N/A	N/A	N/A	BD-RE	N/A
Extras	Webcam	2Mp webcam	Webcam	2.1Mp webcam	2Mp webcam
Operating system	OS X Mavericks	Windows 8 64bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit
Bundled software	Apple iLife	None	None	None	None
Stalker (720p/1080p)	62/57fps (Batman)	50/43fps (Batman)	Not tested	64fps	96fps (1080p)
Battery	958Wh lithium-polymer	47Wh lithium-ion	61- or 91Wh lithium-ion	77Wh lithium-ion	58.8Wh lithium-ion
Battery life	8 hrs 14 mins	3 hrs 5 mins	2 hrs 58 mins	4 hrs 15 mins	3 hrs 35 mins
PCMark7 score	N/A	6164	Not tested	6316	6181
Dimensions	359x247x18mm	418x273x44mm	372x254x18mm	412x276x55mm	419x287x22mm
Weight	2.02kg	3.4kg	1.9kg	3.9kg	2.68kg
Warranty	1-year return-to-base	1-year European	1-year next business day	2-year collect-and-return	2-year collect-and-return
FULL REVIEW	TINYURL.COM/K3QSD9Y	TINYURL.COM/P5BD3GB	TINYURL.COM/NTHYU44	TINYURL.COM/PCJP94Q	TINYURL.COM/LZ9ZXVB

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PC ADVISOR TEST CENTRE

Tablets	1 **PC ADVISOR GOLD**	2 **PC ADVISOR RECOMMENDED**	3 **PC ADVISOR GOLD**	4 **PC ADVISOR RECOMMENDED**	5 **PC ADVISOR RECOMMENDED**
	Google Nexus 7 (2013)	Apple iPad Air	Apple iPad mini (1st gen)	Google Nexus 10 by Samsung	Sony Xperia Tablet Z
Price	£199 inc VAT	£399 inc VAT	£249 inc VAT	£319 inc VAT	£339 inc VAT
Website	Play.google.com	Apple.com/uk	Apple.com/uk	Play.google.com	Sony.co.uk
Launch date	Jul 13	Oct 13	Nov 12	Nov 12	May 13
Overall rating	★★★★½	★★★★☆	★★★★½	★★★★½	★★★★☆
Platform	Android 4.3 Jelly Bean	Apple iOS 7	Apple iOS 7	Android 4.4 KitKat	Android 4.1 Jelly Bean
Screen size/resolution	7in/1280x800	9.7in/2048x1536	7.9in/1024x768	10.1in/2560x1600	10.1in/1920x1200
Storage/media card slot	16GB/none	16GB/none	16GB/none	16GB/none	16GB/microSDXC
Connectivity	802.11b/g/n, Bluetooth 4	802.11a/b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4, NFC	802.11a/b/g/n, Bluetooth 4, NFC
Processor	1.5GHz Snapdragon S4 Pro	Apple A7	1GHz Apple A5	1.7GHz Cortex A-15	1.5GHz SnapDragon S4 Pro
RAM	2GB	1GB	512MB	2GB	2GB
Claimed battery life	9 hrs	10 hrs	10 hrs	9 hrs	10 hrs
Cameras (front/rear)	1.2/5Mp	1.2/5Mp	1.2/5Mp	1.9/5Mp	2.2/8.1Mp
Dimensions	114x200x8.7mm	169x240x7.5mm	135x200x7.2mm	178x264x8.9mm	172x266x6.9mm
Weight	299g	469g	308g	603g	495g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/QYUDY5C	TINYURL.COM/LSB84EE	TINYURL.COM/CLJWUVS	TINYURL.COM/ARL2KDG	TINYURL.COM/ODTP6B8

Tablets	6 **PC ADVISOR RECOMMENDED**	7 **PC ADVISOR RECOMMENDED**	8 **PC ADVISOR RECOMMENDED**	9 **PC ADVISOR RECOMMENDED**	10 **PC ADVISOR RECOMMENDED**
	Advent Vega Tegra Note 7	LG G Pad 8.3	Lenovo Yoga Tablet 10	Tesco Hudl	Samsung Galaxy Note 10.1
Price	£129 inc VAT	£199 inc VAT	£249 inc VAT	£119 inc VAT	£450 inc VAT
Website	Currys.co.uk	Lg.com/uk	Lenovo.com/uk	Tesco.com	Samsung.com/uk
Launch date	Nov 13	Feb 14	Jan 14	Sep 13	Jan 14
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Platform	Android 4.3 Jelly Bean	Android 4.2 Jelly Bean	Android 4.2 Jelly Bean	Android 4.2 Jelly Bean	Android 4.3 Jelly Bean
Screen size/resolution	7in/1280x800	8.3in/1920x1200	10.1in/1280x800	7in/1440x900	10.1in/2560x1600
Storage/media card slot	16GB/microSDHC	16GB/microSDHC	16GB/microSDXC	16GB/microSDHC	16GB/microSDXC
Connectivity	802.11b/g/n, Bluetooth 4	802.11a/b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4	802.11a/b/g/n, Bluetooth 4	802.11a/b/g/n/ac, Bluetooth 4
Processor	1.9GHz nVidia Tegra 4	1.5GHz Snapdragon 600	1.2GHz ARM Cortex-A7	1.5GHz quad-core A9	1.9GHz Octo-core Exynos 5
RAM	1GB	2GB	1GB	1GB	3GB
Claimed battery life	10 hrs	8.5 hrs (actual)	18 hrs	9 hrs	9.5 hrs (actual)
Cameras (front/rear)	0.3/5Mp	1.3/5Mp	1.6/5Mp	2/3Mp	2/8Mp
Dimensions	120x190x10mm	127x217x8.3mm	261x181x8.1mm	129x193x9.9mm	243x171x7.9mm
Weight	320g	338g	605g	370g	540g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PMCO4H4	TINYURL.COM/N8OBC7N	TINYURL.COM/KLV5SDM	TINYURL.COM/MXHXVUK	TINYURL.COM/L7YTA35

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Smartphones	**1** PC ADVISOR GOLD	**2** PC ADVISOR RECOMMENDED	**3** PC ADVISOR RECOMMENDED	**4** PC ADVISOR RECOMMENDED	**5** PC ADVISOR GOLD
	LG G2	**Google Nexus 5**	**Sony Xperia Z1 Compact**	**Sony Xperia Z1**	**Apple iPhone 5s**
Price	£329 inc VAT	£299 inc VAT	£401 inc VAT	£430 inc VAT	£549 inc VAT
Website	Lg.com/uk	Play.google.com	Sonymobile.com	Sonymobile.com	Apple.com/uk
Launch date	Sep 13	Oct 13	Jan 14	Jul 13	Sep 13
Overall rating	★★★★½	★★★★☆	★★★★½	★★★★½	★★★★½
Platform	Android 4.2 Jelly Bean	Android 4.4 KitKat	Android 4.3 Jelly Bean	Android 4.2 Jelly Bean	Apple iOS 7
Processor	2.26GHz Snapdragon 800	2.3GHz Snapdragon 800	2.2GHz Snapdragon 800	2.26GHz Snapdragon 800	1.3GHz Apple A7
Storage/media card slot	16GB/none	16GB/none	16GB/microSDXC	16GB/microSDXC	16GB/none
Screen size/resolution	5.2in/1920x1080	4.95in/1920x1080	4.3in/1280x720	5in/1920x1080	4in/640x1136
Screen type	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch
Connectivity	4G, HSPA+, Bluetooth, Wi-Fi	HSPA+, Bluetooth, Wi-Fi ac	4G, HSPA+, Bluetooth, Wi-Fi	4G, HSPA+, Bluetooth, Wi-Fi	4G, HSPA+, Bluetooth, Wi-Fi
Claimed battery life	Not specified	17 hrs/300 hrs	18 hrs/670 hrs	14 hrs/880 hrs	10 hrs/250 hrs
Cameras (front/rear)	13Mp, 1080p video	8Mp, 1080p video	20.7Mp, 1080p video	20.7Mp, 1080p video	8Mp, 1080p video
GPS	A-GPS	A-GPS	A-GPS	A-GPS	A-GPS, Glonass
Dimensions, weight	71x139x9.4mm, 143g	69x138x8.9mm, 130g	127x64.9x9.5mm, 137g	144x74x8.5mm, 169g	59x124x7.6mm, 112g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/PAFK4SZ	TINYURL.COM/PAFK4SZ	TINYURL.COM/KAU7DYR	TINYURL.COM/NJPM4DE	TINYURL.COM/MZ8JHLF

Smartphones	**6** PC ADVISOR RECOMMENDED	**7** PC ADVISOR GOLD	**8** PC ADVISOR GOLD	**9** PC ADVISOR GOLD	**10** PC ADVISOR RECOMMENDED
	Motorola Moto G	**HTC One**	**Samsung Galaxy Note 3**	**Sony Xperia Z**	**Samsung Galaxy S4**
Price	£129 inc VAT	£430 inc VAT	£445 inc VAT	£320 inc VAT	£427 inc VAT
Website	Motorola.co.uk	Htc.com/uk	Samsung.com/uk	Sonymobile.com	Samsung.com/uk
Launch date	Nov 13	Feb 13	Sep 13	Jan 13	Mar 13
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★☆
Platform	Android 4.3 Jelly Bean	Android 4.2 Jelly Bean	Android 4.3 Jelly Bean	Android 4.1 Jelly Bean	Android 4.3 Jelly Bean
Processor	1.2GHz Snapdragon 400	1.7GHz Snapdragon 600	2.3GHz Snapdragon	1.5GHz Snapdragon S4 Pro	1.9GHz Snapdragon 600
Storage/media card slot	8GB/none	32GB/none	32GB/microSDXC	16GB/microSDHC	16GB/microSDXC
Screen size/resolution	4.5in/720x1280	4.7in/1920x1080	5.7in/1920x1080	5in/1920x1080	5in/1920x1080
Screen type	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch
Connectivity	HSDP+, GSM, Bluetooth, Wi-Fi	4G, HSPA+, Bluetooth, Wi-Fi	4G, HSPA+, Bluetooth, Wi-Fi	4G, Bluetooth, Wi-Fi	4G, Bluetooth, Wi-Fi
Claimed battery life	Not specified	Not specified	21 hrs/420 hrs	11 hrs/550 hrs	Not specified
Cameras (front/rear)	5Mp, 720p video	4Mp, 1080p video	13Mp, 1080p video	13Mp, 1080p video	13Mp, 1080p video
GPS	A-GPS	GPS, Glonass	A-GPS, Glonass	GPS, Glonass	GPS, Glonass
Dimensions, weight	66x130x11.6mm, 143g	68x9.3x137mm, 143g	151x79x8.3mm, 168g	71x7.9x139mm, 146g	136.6x69.8x7.9mm, 130g
Warranty	1 year	2 years	1 year	2 years	2 years
FULL REVIEW	TINYURL.COM/NBUTSET	TINYURL.COM/CE76X3T	TINYURL.COM/QAKOLZY	TINYURL.COM/CXDR829	TINYURL.COM/CA5P7LF

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PC ADVISOR TEST CENTRE

Gaming PCs	1 Chillblast Fusion Probe	2 CyberPower Infinity Perseus XT	3 Yoyotech Warbird RS2	4 Quiet PC Serenity Mini Gamer	5 Aria FX-Viper 8320
Price	£1,299 inc VAT	£1,499 inc VAT	£1,370 inc VAT	£1,213 inc VAT	£895 inc VAT
Website	Chillblast.com	Cyberpowersystem.co.uk	Yoyotech.co.uk	Quietpc.co.uk	Aria.co.uk
Launch date	Feb 14	Feb 14	Feb 14	Feb 14	Feb 14
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★½☆
Features rating	★★★★½	★★★★★	★★★★½	★★★½☆	★★★☆☆
Performance rating	★★★★½	★★★★½	★★★★½	★★★☆☆	★★★☆☆
Value rating	★★★★☆	★★★½☆	★★★☆☆	★★★½☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★½☆	★★★½☆
Processor	3.4GHz Intel Core i5-4670K (OC 4.4GHz)	3.4GHz Intel Core i5-4670K (OC 4.4GHz)	3.5GHz Intel Core i7-4770K (OC 4.3GHz)	3.5GHz Intel Core i7-4770K	3.5GHz AMD FX8320 (OC 4.4GHz)
CPU cooler	Corsair H55 Liquid Cooler	Cooler Master Seldon 120mm	Corsair H80 cooler	Reeven Kelveros RC-1202	Scythe Ashura Performance CPU cooler
Memory	16GB DDR3	16GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3
Storage	120GB SSD + 2TB HDD	256GB SSD + 2TB HDD	128GB SSD + 1TB HDD	1TB SSHD	120GB SSD + 2TB HDD
Power supply	750W Corsair	750W Corsair	600W Cooler Master	650W FSP	600W Corsair
Motherboard	Gigabyte GA-Z87N-Wi-Fi	Gigabyte GA-Z87-HD3	MSI Z87M-G43	Gigabyte GA-Z87MX-D3H	Gigabyte GA-990FXA-UD5
Operating system	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit
Screen	23.6in Iiyama X2377HDS	23in AOC i2367fh	23in AOC i2369vm	Not supplied	Not supplied
Graphics	Palit Jetstream GeForce GTX 780, 3GB VRAM	Powercolor AMD R9 290, 4GB VRAM	Asus GTX 760 DirectCU II OC, 2GB VRAM	Gigabyte GTX 650 Ti OC Windforce, 2GB VRAM	Sapphire Radeon R9 280X Vapor-X OC, 3GB VRAM
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Connectivity	Gigabit ethernet, 802.11n	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet
Ports	6x USB 3.0, 4x USB 2.0	6x USB 3.0, 4x USB 2.0	4x USB 3.0, 6x USB 2.0	6x USB 3.0, 2x USB 2.0	4x USB 3.0, 14x USB 2.0
Optical drive	DVD±RW (Blu-ray optional)	DVD±RW, BD-ROM	DVD±RW	DVD±RW	DVD±RW
Case	Aerocool Dead Silence Gaming Cube	Cooler Master Dominator 690 III	AerocoolDS Cube Red with window	Nanoxia Deep Silence 4	Sharkoon Bulldozer
Keyboard & mouse	Gigabyte M6800 mouse, Force K3 keyboard	Gigabyte M6900 mouse, Force K3 keyboard	Powercool JM-9032U mouse, KB-768 keyboard	Zalman ZM-M300 mouse, ZM-K500 keyboard	Not supplied
Other	Optional family pack	None	None	Artisan Medium Hayabusa XtraSoft Mouse Pad	None
PC Mark 7 score	6965	6731	6424	5098	5219
Alien vs Predator score (720p/1080p)	169/93fps	172/96fps	161/88fps	54/27fps	141/79fps
Final Fantasy XIV (720p/1080p)	218/96fps	167/87fps	228/95fps	130/36fps	122/67fps
Sniper Elite V2 (Low/High/Ultra)	308/187/49fps	352/155/39fps	349/180/46fps	156/66/6fps	236/134/134fps
Power Consumption	52/407W	68/484W	81/370W	40/190W	147/657W
Warranty	2-year collect-and-return	3-year RTB (2 years parts, 3 years labour)	3-year Silver (1 year parts, 3 years labour)	2-year collect-and-return	2-year collect-and-return
FULL REVIEW	TINYURL.COM/OWQ24QQ	TINYURL.COM/NKWN7V4	TINYURL.COM/PMWPELY	TINYURL.COM/NUHFM3U	TINYURL.COM/OGAO57M

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Mini PCs	1 Intel NUC D54250WYK	2 Fujitsu Esprimo Q520	3 Chillblast Fusion Brix	4 Zotac Zbox nano ID65 PLUS	5 Lenovo IdeaCentre Q190
Price	£525 inc VAT	£389 inc VAT	£549 inc VAT	£530 inc VAT	£380 inc VAT
Website	Intel.co.uk	Fujitsu.com/uk	Chillblast.com	Zotac.com	Lenovo.com/uk
Launch date	Dec 13	Dec 13	Dec 13	Dec 13	Dec 13
Build rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★½
Features rating	★★★★½	★★★½☆	★★★★☆	★★★★½	★★★★☆
Performance rating	★★★★★	★★★½☆	★★★★½	★★★☆☆	★★☆☆☆
Value rating	★★★★☆	★★★★½	★★★★☆	★★★½☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★½☆
Processor	1.36GHz Intel Core i5-4250U (Turbo boost 2.6GHz)	2.9GHz Intel Core i3-4130T	1.9GHz Intel Core i3-3227U	2GHz Intel Core i7-3537U (Turbo boost 3.1GHz)	1.4GHz Intel Core i3-2365M
CPU cooler	Fan cooler	Passive cooler	Custom semi-active cooler	Smart fan	Fan
RAM	8GB DDR3	4GB DDR3	8GB DDR3	4GB DDR3	4GB DDR3
Storage	180GB Intel 530 Series mSATA SSD	320GB HDD	120GB Intel 525 mSATA SSD	500GB HDD	1TB HDD
Power supply	65W internal	65W internal	65W external	19V 3.42a external	19V 1.7A external
Motherboard	Intel Wilson Canyon D54250WYB	Fujitsu motherboard (Intel H81)	Intel HM77	HM77 Express	Lenovo custom
Operating system	Not supplied	Windows 8 Standard or Pro	Windows 8 64-bit	Not supplied	Windows 8
Graphics	Intel HD Graphics 5000	Intel HD Graphics 4000	Intel HD Graphics 4000	Intel HD Graphics 4000	Intel HD Graphics 3000
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Connectivity	802.11b/g/n/ac, gigabit ethernet, Bluetooth	Gigabit ethernet	802.11b/g/n, gigabit ethernet, Bluetooth	802.11b/g/n, gigabit ethernet, Bluetooth	802.11b/g/n, gigabit ethernet
Ports	4x USB 3.0, HDMI, Mini DisplayPort	2x USB 3.0, 4x USB 2.0, DVI, DisplayPort	2x USB 3.0, HDMI, Mini DisplayPort	4x USB 3.0, 2x USB 2.0, HDMI, DP, S/PDIF, eSATA	2x USB 3.0, 4x USB 2.0, HDMI, VGA, S/PDIF
Media card slot	None	None	None	MMC/SDXC/MS/MS Pro/xD	SDXC/MS Pro
Other	Integrated VESA mount, MS Office, PowerDVD	Integrated VESA mount, MS Office, PowerDVD	VESA mounting bracket	Webcam, VESA mounting bracket, PowerDVD	VESA mounting bracket, desktop stand
Dimensions	117x112x35mm	185x188x54mm	29.9x107.9x114.6mm	127x127x45mm	192x155x22mm
Weight	1kg	1.6kg	400g	1kg	1.2kg
PCMark 7 score	4681	2988	4094	2882	1905
Alien vs Predator score (720p/1080p)	7fps/5fps	6fps/Low	7fps/5fps	6fps/Low	N/A
Sniper V2 Elite score (Low/High/Ultra)	21fps/7fps/Low	21fps/7fps/Low	21fps/6fps/Low	18fps/6fps/Low	9fps/5fps/Low
Power consumption (idle/max)	7W/27W	10W/46W	10W/42W	11W/36W	11W/34W
Warranty	Varies	1-year onsite	2-year collect-and-return	2-year return-to-base	1-year return-to-base
FULL REVIEW	TINYURL.COM/KDBLVND	TINYURL.COM/KS56DVT	TINYURL.COM/PWX38WW	TINYURL.COM/PRSOKRD	TINYURL.COM/KT4MNQ8

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>> See page 62 for our compact gaming PCs group test

PC ADVISOR TEST CENTRE

All-in-one PCs

	1 Dell XPS 2720	2 Apple iMac 27in (Late 2012)	3 Medion Akoya P2002	4 Chillblast Fusion AIO Ultima	5 MSI Wind Top AE2712G
	PC ADVISOR BEST BUY	PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED		
Price	£1,749 inc VAT	£1,699 inc VAT	£449 inc VAT	£1,199 inc VAT	£1199 inc VAT
Website	Dell.co.uk	Apple.com/uk	Medion.com/gb	Chillblast.com	Uk.msi.com
Launch date	Sep 13	Sep 13	Sep 13	Sep 13	Sep 13
Build rating	★★★★½	★★★★★	★★★★☆	★★★½☆	★★★★☆
Features rating	★★★★½	★★★★½	★★★½☆	★★★★☆	★★★★☆
Performance rating	★★★★½	★★★★☆	★★½☆☆	★★★½☆	★★½☆☆
Value rating	★★★½☆	★★★★☆	★★★★★	★★★½☆	★★★½☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★½☆	★★★½☆
Processor	3.1GHz Intel Core i7-4770S	3.2GHz Intel Core i5-3470	3.3GHz Intel Core i3-3220	3.1GHz Intel Core i7-3770S	2.9GHz Intel Core i5-3470S
RAM	16GB DDR3	8GB DDR3	4GB DDR3	16GB DDR3	4GB DDR3
Storage	2TB HDD + 32GB SSD	1TB HDD	1TB HDD	1TB HDD + 120GB SSD	1TB HDD
Screen	27in IPS touchscreen	27in IPS	23.6in TN	21.5in IPS touchscreen	27in TN touchscreen
Screen resolution	2560x1440	2560x1440	1920x1080	1920x1080	1920x1080
Graphics card	nVidia GeForce GT 750M	nVidia GeForce GTX 675MX	Intel HD Graphics 2500	Intel HD Graphics 4000	nVidia GeForce GT 630M
Video memory	2GB	1GB	N/A	N/A	2GB
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	✗	✓	✓
USB	6x USB 3.0	4x USB 3.0	2x USB 3.0, 4x USB 2.0	4x USB 3.0, 2x USB 2.0	2x USB 3.0, 4x USB 2.0
FireWire	✗	✗	✗	✗	✗
Thunderbolt	✓	✓	✗	✗	✗
HDMI	✓	✗	✓	✓	✓
Media card slot	✓	✓	✓	✓	✓
Optical drive	Blu-ray combo drive	None	DVD drive	Blu-ray combo drive	Blu-ray combo drive
Other	2.1Mp webcam, wireless keyboard and mouse, dual digital microphone array	1.3Mp webcam, wireless keyboard and mouse	Wireless keyboard and mouse, CyberLink software, Kaspersky Internet Security	Webcam, Microsoft Wireless Desktop 3000	2Mp webcam, DVB-T TV tuner, wireless keyboard and mouse, CyberLink software
Operating system	Windows 8	Mac OS X 10.9 Mavericks	Windows 8	Windows 8	Windows 8
Power consumption (idle/max)	54/84/220W	53/84/243W	34/42/92W	32/40/119W	44/53/110W
Sniper V2 Elite (Low/High/Ultra)	6/25/94fps	12/54/197fps	5/5/16fps	5/7/28fps	5/6/17fps
PCMark 7 score	6091	4141	3298	5195	3138
Dimensions	492x664x72mm	650x203x516mm	580x196x430-460mm	338x541x61mm	672x483x66mm
Weight	16kg	9.5kg	10.3kg	9kg	13kg
Warranty	1-year next-day in-home	1-year return-to-base	1-year return-to-base	2-year collect-and-return	2-year collect-and-return
FULL REVIEW	TINYURL.COM/KWZ4KLL	TINYURL.COM/A95Q9VY	TINYURL.COM/MEVSJ9D	TINYURL.COM/LQ4U8FW	TINYURL.COM/MUGFKQ7

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Business PCs	1 Aria Gladiator Logic N200-3220M	2 Chillblast Fusion Opal	3 Wired2Fire Business Accelerate	4 Dino PC Synergy 4430	5 Eclipse Precision A856F85
Price	£509 inc VAT	£549 inc VAT	£689 inc VAT	£569 inc VAT	£519 inc VAT
Website	Aria.co.uk	Chillblast.com	Wired2fire.co.uk	Dinopc.com	Eclipsecomputers.com
Launch date	Aug 13	Aug 13	Aug 13	Aug 13	Aug 13
Build rating	★★★★½	★★★★☆	★★★½☆	★★★★☆	★★★☆☆
Features rating	★★★½☆	★★★½☆	★★★★½	★★★½☆	★★★½☆
Performance rating	★★★½☆	★★★★☆	★★★★½	★★★½☆	★★½☆☆
Value rating	★★★★☆	★★★½☆	★★★☆☆	★★★½☆	★★★½☆
Overall rating	★★★★☆	★★★½☆	★★★½☆	★★★½☆	★★★½☆
Processor	3.3GHz Intel Core i3-3220 (dual-core)	3.2GHz Intel Core i5-4570 (quad-core)	3.4GHz Intel Core i5-4670 (quad-core)	3GHz Intel Core i5-4430 (quad-core)	3.6GHz AMD Trinity A8-5600K (quad-core)
RAM	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3
Storage	500GB HDD + 80GB SSD	1TB HDD	120GB SSD	1TB HDD	1TB HDD
Motherboard	Gigabyte GA-B75M-D3H	Asus B85M-G	ASRock B85M-HDS	Gigabyte GA-H87M-HD3	Asus F2A85-M LE
CPU cooler	Arctic Cooling Alpine 11 GT Quiet	Standard Intel cooler	Standard Intel cooler	Standard Intel cooler	Standard AMD cooler
Power supply	Corsair 430W	CiT 500W	Xigmatek 400W	CiT 500W	Alpine 600W
Screen	21.5in AOC E2260SWDA	23.6in Iiyama X2377	2x 21.5in AOC E2260SWDA	23in Iiyama XB2380HS-B1	23in AOC i2369Vm
Screen resolution	1920x1080	1920x1080	1920x1080	1920x1080	1920x1080
Graphics	Intel HD Graphics 2500	Intel HD Graphics 4600	Intel HD Graphics 4600	Intel HD Graphics 4600	Integrated
Video memory	N/A	N/A	N/A	N/A	N/A
USB	2x USB 3.0, 4x USB 2.0	3x USB 3.0, 6x USB 2.0	2x USB 3.0, 8x USB 2.0	4x USB 3.0, 4x USB 2.0	4x USB 3.0, 4x USB 2.0
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	Not specified	Not specified	Not specified	Not specified	Not specified
Case	Cooler Master N200	CiT Fortress	In-Win Em040	CiT Templar	K2 Gamer
Keyboard	Microsoft Desktop 400 keyboard and mouse (wired)	Cherry J82-16001 keyboard, M-5450 mouse (wired)	Gigabyte K6800 keyboard, M6800 mouse (wired)	Logitech K120 keyboard, B110 mouse (wired)	Microsoft Optical Desktop 800 (wired)
Optical drive	24x DVD±RW	24x DVD±RW	DVD±RW	Samsung DVD±RW	Samsung DVD±RW
Operating system	Windows 7 Home Premium 64-bit	Windows 8 Professional	Windows 7 Professional 64-bit	Windows 7 Home Premium 64-bit	Windows 8 Professional
Bundled software	None	None	None	None	None
PCMark 7 overall score	3524	4257	5667	3458	2349
PCMark 7 Productivity score	4056	2685	5929	2529	1883
PCMark 7 Computational score	3321	21490	13651	9377	3899
Power consumption (idle/max)	27/69W	47/124W	37/135W	37/115W	34/145W
Warranty	1-year return-to-base, phone support	2-year collect-and-return, phone support	2-year return-to-base, phone support	3-year return-to-base, phone support	1-year return-to-base, phone support
FULL REVIEW	TINYURL.COM/OSW55A8	TINYURL.COM/KGGE98T	TINYURL.COM/PCSKWVS	TINYURL.COM/PF8LUXD	TINYURL.COM/MQFWJ3R

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PC ADVISOR TEST CENTRE

Family PCs	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3	4	5
	Chillblast Fusion Commando	Quiet PC Serenity Home Value	Dino PC Raging Lizard	CyberPower Ultra Scylla SE III	Computer Planet F2000
Price	£799 inc VAT	£696 inc VAT	£899 inc VAT	£699 inc VAT	£930 inc VAT
Website	Chillblast.com	Quietpc.com	Dinopc.com	Cyberpowersystem.co.uk	Computerplanet.co.uk
Launch date	Jul 13	Jul 13	Jul 13	Jul 13	Jul 13
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★½	★★★★☆
Features rating	★★★★☆	★★★☆☆	★★★½☆	★★★½☆	★★★☆☆
Performance rating	★★★★½	★★★☆☆	★★★★★	★★★☆☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★½☆	★★★★☆	★★★☆☆
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	3.2GHz Intel Core i5-4570	2.9GHz Intel Core i5-3475S	3.2GHz Intel Core i5-4570	4.2GHz AMD FX 4350	3.4GHz Intel Core i5-3570
RAM	16GB DDR3	16GB DDR3	16GB DDR3	8GB DDR3	8GB DDR3
Storage	1TB HDD + 120GB SSD	500GB HDD hybrid SSD	1TB HDD + 128GB SSD	2TB HDD	2TB HDD + 120GB SSD
Motherboard	Asus B85M-G	Gigabyte GA-H61M-USB3V	Gigabyte GA-Z87M-HD3	Asus M5A78L-M/USB3	Gigabyte B75M-D3H
CPU cooler	Arctic Cooling Freezer 7 Pro	Standard Intel cooler	Standard Intel cooler	Standard AMD cooler	Arctic Cooling Freezer 7 Pro
Power supply	600W CiT	Zalman ZM450-GS 450W	Corsair VS450 450W	Cooler Master 500W	Cooler Master GX 600W
Screen	23in Iiyama X2377	Not supplied	23in AOC i2369Vm	24in BenQ GL2450E	23.6in Iiyama X2377
Screen resolution	1920x1080	N/A	1920x1080	1920x1080	1920x1080
Graphics	Zotac nVidia GeForce GTX 650 Ti	Intel HD Graphics 4000	Gigabyte nVidia GeForce GTX 650 Ti	MSI AMD Radeon HD 7770	Gainward nVidia GeForce GTX 660
Video memory	N/A	N/A	N/A	1GB	2GB
Connectivity	802.11b/g/n, gigabit ethernet	802.11b/g/n, gigabit ethernet	802.11b/g/n, gigabit ethernet	802.11b/g/n, gigabit ethernet	802.11b/g/n, gigabit ethernet
USB	3x USB 3.0, 6x USB 2.0	2x USB 3.0, 6x USB 2.0	6x USB 3.0, 2x USB 2.0	2x USB 3.0, 6x USB 2.0	2x USB 3.0, 7x USB 2.0
Media card slot	None	None	Yes	Yes	Yes
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	2x Logitech LS220	None	None	None	None
Case	Cooler Master Force 500	Zalman ZM-T1	Xigmatek Asgard 382	Cooler Master Elite 430	Cooler Master Elite 335U
Keyboard	Logitech MK260	Gigabyte GK-KM7580	Logitech MK260	Logitech MK330	Logitech MK260
Optical drive	LG BD-ROM/DVD±RW	Sony DVD±RW	BD-ROM, DVD±RW	Lite-On BD-ROM/DVD±RW	TSSTcorp 24x DVD±RW
Operating system	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit
Bundled software	None	None	None	None	None
Sniper V2 Elite score (Low/High/Ultra)	147/59/14fps	26/7/5fps	154/62/14fps	130/43/9fps	205/59/15fps
Alien vs Predator score (720p/1080p)	52/27fps	8/5fps	53/27fps	47/24fps	77/41fps
PCMark 7 score	6177	4464	6282	2957	6134
Warranty	2-year collect-and-return	2-year collect-and-return	3-year return-to-base	3-year return-to-base (1 year parts)	2-year return-to-base, 1-year collect-and-return
FULL REVIEW	TINYURL.COM/KF6G3T7	TINYURL.COM/KPE3BAD	TINYURL.COM/RAGLIZ	TINYURL.COM/QHT5X2H	TINYURL.COM/NEVWQ4U

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Internet security software

	Bitdefender Total Security	Qihoo 360 IS 4.3	Symantec Norton 360 2014	Kaspersky Pure 3.0 TS	GData TotalProtection 2014
	1 PC ADVISOR BEST BUY	**2** PC ADVISOR RECOMMENDED	**3**	**4**	**5**
Price	**£55 inc VAT**	**Free**	**£60 inc VAT**	**£60 inc VAT**	**£50 inc VAT**
Website	Bitdefender.co.uk	360safe.com	Norton.com/uk	Kaspersky.co.uk/pure	Gdatasoftware.com
Launch date	Jul 13	Not specified	Oct 13	Mar 13	Not specified
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Number of devices	3	Unlimited	3	3	3
Portable support	Android	Android	Android	Android	Android
Anti-malware	✓	✓	✓	✓	✓
Anti-spam	✓	✗	✓	✓	✓
Firewall	✓	✗	✓	✓	✓
Parental control	✓	✗	✓	✓	✓
Online storage	2GB	N/A	2GB	2GB	N/A
50GB AV scan time	140 mins (1.39M files)	39 mins (68,100 files)	20 mins (176,000 files)	81 mins (334,000 files)	32 mins (8,800 files)
Scan rate (files/sec)	166	29	148	69	5
1GB copy with/without AV	41/48 secs	45/55 secs	43/69 secs	44/71 secs	52/54 secs
FULL REVIEW	TINYURL.COM/L9KNK29	TINYURL.COM/LY557M7	TINYURL.COM/LEZ8AHC	TINYURL.COM/N4ER2X2	TINYURL.COM/LZBQKEM

Antivirus

	Norton AntiVirus	Bitdefender Antivirus Pro	G Data AntiVirus	Kaspersky Anti-Virus	Trend Micro Titanium AV+
	1 PC ADVISOR BEST BUY	**2** PC ADVISOR RECOMMENDED	**3** PC ADVISOR RECOMMENDED	**4** PC ADVISOR RECOMMENDED	**5**
Price	**£39 inc VAT**	**£24 inc VAT**	**£34 inc VAT**	**£39 inc VAT**	**£39 inc VAT**
Website	Norton.com	Bitdefender.co.uk	Gdatasoftware.com	Kaspersky.co.uk	Uk.trendmicro.com
Launch date	Not specified	Jul 13	Not specified	Oct 13	Not specified
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★½☆
Licence terms	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year
Signature-based detection	98.7%	97.5%	99.4%	95.7%	98.4%
Malware blocking (full)	96%	68%	84%	88%	88%
Malware blocking (partial)	0%	20%	4%	4%	8%
Clean-up of active malware	80%	80%	80%	80%	80%
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
FULL REVIEW	TINYURL.COM/4P5YCXP	TINYURL.COM/66SK77U	TINYURL.COM/6BFXWCS	TINYURL.COM/6HQA2WB	TINYURL.COM/4HUORV3

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Sub-£150 printers

	Samsung Xpress M2070W	Canon Pixma MG5550	Brother HL-3140CW	Canon Pixma MX525	HP Photosmart 7520
	1	**2** PC ADVISOR RECOMMENDED	**3**	**4**	**5** PC ADVISOR RECOMMENDED
Price	£130 inc VAT	£80 inc VAT	£140 inc VAT	£83 inc VAT	£130 inc VAT
Website	Samsung.com/uk	Canon.co.uk	Brother.co.uk	Canon.co.uk	Hp.com/uk
Launch date	Mar 14	Apr 14	Jan 14	Dec 13	Jan 13
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★½☆	★★★★☆
Technology	Mono laser	Colour inkjet	Colour laser	Colour inkjet	Colour inkjet
Max print resolution	1200x1200	4800x1200dpi	2400x600dpi	4800x1200	9600x2400
Actual print speed	B=17.1ppm	B=11.8ppm C=8.7ppm	B=15.9ppm C=8.6ppm	B=11ppm C=5.5ppm	B=17.6ppm C=7.9ppm
Scan/fax facilities	1200x1200 scans	1200x2400 scans	None	1200x2400 scans, fax	1200x2400 scans
Supported interfaces	USB 2.0, 802.11b/g/n, NFC	USB 2.0, 802.11b/g/n	USB 2.0, 802.11b/g/n	USB 2.0, 802.11b/g/n, ethernet	USB 2.0, 802.11b/g/n, HP ePrint
Cost per page	B=3.8p	B=2.4p C=4.8p	B=2.3p C=11.1p	B=3.5p C=5.5p	B=2.4p C=4.8p
Media card/auto duplex	✗✗	✗✓	✗✗	✓✓	✓✓
Input capacity	150 sheets	100 sheets	250 + 1 sheet	100 sheets + 30 ADF	125 sheets + 20 tray + 25 ADF
Dimensions	406x360x253mm	455x369x148mm	410x465x240mm	458x385x200mm	454x551x220mm
Weight	7.4kg	6.3kg	17.4kg	8.7kg	8.6kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/OYZKJKE	TINYURL.COM/LKWLJDE	TINYURL.COM/P2P27TA	TINYURL.COM/ON28THH	TINYURL.COM/98G9XTE

£151+ printers

	Kyocera Mita FS-1320D	HP OfficeJet Pro X551dw	Kyocera Ecosys M2030dn	Canon i-Sensys LBP7780Cx	Samsung Xpress M2875FW
	1 PC ADVISOR BEST BUY	**2** PC ADVISOR GOLD	**3**	**4** PC ADVISOR RECOMMENDED	**5**
Price	£176 inc VAT	£415 inc VAT	£340 inc VAT	£440 inc VAT	£210 inc VAT
Website	Kyoceradocumentsolutions.co.uk	Hp.com/uk	Kyoceradocumentsolutions.co.uk	Canon.co.uk	Samsung.com/uk
Launch date	Apr 11	Aug 13	May 14	Jun 13	Mar 14
Overall rating	★★★★½	★★★★½	★★★½☆	★★★★½	★★★★☆
Technology	Mono laser	Colour inkjet	Mono laser	Colour laser	Mono laser
Max print resolution	1200x1200	2400x2400	1800x600dpi	9600x600	4800x600dpi
Actual print speed	B=26.1ppm	B=42.9ppm C=15.8ppm	B=28ppm	B=23.2pp C=16.7ppm	B=21.4ppm
Scan/fax facilities	None	None	600dpi scans	None	1200dpi scanner, fax
Supported interfaces	USB 2.0	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, Gigabit	USB 2.0, ethernet	USB 2.0, ethernet, 802.11b/g/n
Cost per page	B=1.4p	B=1p C=4.3p	B=2.2p	B=1.3p C=7.5p	B=1.7p
Media card/auto duplex	✓✓	✗✓	✓✓	✗✓	✗✓
Input capacity	250 sheets	500 + 50 sheet	250 sheets + 50 sheet	500 + 100 sheets	250 sheets + 1 sheet + 40 ADF
Dimensions	375x393x250mm	517x399x414mm	494x430x448mm	517x530x401mm	401x362x367mm
Weight	12kg	17.1kg	18kg	31kg	11.3kg
Warranty	2 years	1 year	2 years	1 year	3 years
FULL REVIEW	TINYURL.COM/6GG9UKV	TINYURL.COM/CZO5P65	TINYURL.COM/NRLNSZW	TINYURL.COM/CCAPAJF	TINYURL.COM/QD5V3NF

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Blu-ray drives

	1 Pioneer BDR-209EBK Retail	2 Pioneer BDR-209DBK OEM	3 LG BH16NS40	4 LG BP40NS20	5 Lite-On IHES112-115
Price	£61 inc VAT	£57 inc VAT	£70 inc VAT	£90 inc VAT	£54 inc VAT
Website	Pioneer.eu/uk	Pioneer.eu/uk	Uk.lge.com	Uk.lge.com	Liteonit.eu
Launch date	Nov 13	Nov 13	May 12	Jan 13	Oct 12
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★½☆
Blu-ray speeds	16x -R, 14x -R DL, 2x -RE, 12x -ROM	16x -R, 14x -R DL, 2x -RE, 12x -ROM	16x -R, 12x -R DL, 12x -RE, 12x -ROM	6x -R, 6x -R DL, 2x -RE, 6x -ROM	12x -ROM
DVD speeds	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 16x -ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 16x -ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 12x -RAM, 16x -ROM	8x ±R, 6x ±R DL, 6x -RW, 8x +RW, 5x -RAM, 8x -ROM	8x ±R, 8x ±R DL, 6x -RW, 8x +RW, 8x -ROM
Max storage	128GB	50GB	50GB	100GB	8.5GB
Interface type	SATA (internal)	SATA (internal)	SATA (internal)	USB 2.0 (external)	SATA (internal)
Label technology	None	None	LightScribe	None	None
Software	ArcSoft TotalMedia Extreme	None	CyberLink Blu-ray Suite	PowerDVD, PowerProducer	None
Dimensions	148x180x42mm	148x180x42mm	146x170x41mm	160x153x22mm	158x145x22mm
Weight	740g	740g	749g	380g	700g
Warranty	1 year	1 year	1 year	1 year	2 years
FULL REVIEW	TINYURL.COM/LD47X7K	TINYURL.COM/LD47X7K	TINYURL.COM/8YTUJEF	TINYURL.COM/BS8UAFF	TINYURL.COM/8SYECMW

Wireless routers

	1 Apple AirPort Extreme	2 TP-Link Archer C7	3 D-Link N600	4 Asus RT-AC68U AC1900	5 TP-Link TL-WDR4900
Price	£169 inc VAT	£99 inc VAT	£50 inc VAT	£175 inc VAT	£80 inc VAT
Website	Apple.com/uk	Tp-link.com	Dlink.com	Uk.asus.com	Tp-link.com
Launch date	Jan 14	Jan 14	Jan 13	Jan 14	Dec 13
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Standards supported	802.11b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n	802.11a/b/g/n/ac	802.11a/b/g/n
Frequency modes	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)
Antennae	6x internal	3x external, 3x internal	2x internal	3x external, 3x internal	3x external, 3x internal
128bit/256bit WEP	✓✗	✓✗	✓✗	✓✗	✓✗
Modem/Parental Control	✗✓	✗✓	✗✓	✗✓	✗✓
Firewall	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI	NAT/SPI
Ports	Gigabit WAN, 3x gigabit LAN, USB	Gigabit WAN, 4x gigabit LAN, 2x USB	Gigabit WAN, 4x gigabit LAN, USB	Gigabit WAN, 4x gigabit LAN, 2x USB	10/100 WAN, 4x 10/100 LAN, 2x USB
Average power use	Not tested	Not tested	Not tested	Not tested	Not tested
Throughput (near, far, ac)	124, 105, 578/540Mbps	110, 89, 505/468Mbps	142, 115Mbps, N/A	98, 69, 610/570Mbps	127, 111Mbps, N/A
Dimensions, weight	98x168x98mm, 945g	32.5x243x160mm, 508g	111x93x145mm, 330g	160x83x220mm, 640g	243x161x33mm, 1.1kg
Warranty	1 year	3 years	1 year	2 years	1 year
FULL REVIEW	TINYURL.COM/MFDLLSC	TINYURL.COM/KKJMPCE	TINYURL.COM/9LGFF8Y	TINYURL.COM/K4ZATKV	TINYURL.COM/MUXCBNM

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NAS drives

	1	2	3	4	5
		PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED		PC ADVISOR RECOMMENDED
	Synology DS413j	Qnap TS-421	Synology DS1813+	Asustor AS-604T	Zyxel NSA325
Price	£270 inc VAT (diskless)	£387 inc VAT (diskless)	£775 inc VAT (diskless)	£430 inc VAT (diskless)	£95 inc VAT
Website	Synology.com	Qnap.com	Synology.com	Asustor.com	Zyxel.co.uk
Launch date	Oct 13	Mar 14	Jan 14	May 14	Jun 12
Overall rating	★★★★☆	★★★★☆	★★★★½	★★★★☆	★★★★½
Drive bays	4	4	8	4	2
Processor	1.6GHz Marvell mv6282	2GHz Marvell single-core ARM	2.13GHz Intel Atom D2700 dc	2.13GHz Intel Atom	1.6GHz processor
Memory	512MB DDR3	1GB DDR3	2GB DDR3	1GB DDR3	512MB DDR2
Remote access	✓	✓	✓	✓	✓
eSATA	✗	✓	✓	✓	✗
USB port	2x USB 2.0	2x USB 3.0, 2x USB 2.0	2x USB 3.0, 4x USB 2.0	2x USB 3.0, 4x USB 2.0	2x USB 2.0
Raid options	0/1/5/6/10/JBOD	0/1/5/6/10/JBOD	0/1/5/6/10/JBOD	0/1/5/6/10/JBOD	0/1/JBOD
Software	DSM 4.1	Backup Station	DSM 4.3	Asustor utilities, App Central	zPilot
Dimensions	184x168x230mm	177x180x235mm	175x340x233mm	230x170x185mm	108x205x147mm
Weight	2kg	3kg	5.2kg	3.5kg	1.8kg
Warranty	2 years	2 years	3 years	2 years	1 year
FULL REVIEW	TINYURL.COM/PL8XM8S	TINYURL.COM/MCYWUB8	TINYURL.COM/PWO4M6J	TINYURL.COM/NX5QO8M	TINYURL.COM/7B9EPW8

USB drives

	1	2	3	4	5
	PC ADVISOR RECOMMENDED				
	WD My Passport Edge for Mac	G-Technology Professional	LaCie Little Big Disk TB	Toshiba Stor.E Basics	LaCie Fuel
Price	£55 inc VAT	£250 inc VAT	£750 inc VAT	£92 inc VAT	£170 inc VAT
Website	Wdc.com/en	G-technology.com	Lacie.com/uk	Toshiba.co.uk	Lacie.com/uk
Launch date	Feb 13	Sep 13	Feb 14	Nov 13	May 14
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★½☆
Capacity tested	500GB	4TB	1TB	2TB	3.5
Capacity range	500GB	2TB to 4TB	512GB to 2TB	320GB to 2TB	1TB
Disk size	2.5in	3.5in	2.5in	2.5in	2.5in
Spin speed	5400rpm	7200rpm	5400rpm	5400rpm	5400rpm
Transfer speed	94MB/s (USB 3.0)	N/A	635MB/s	94Mb/s (USB 3.0)	94Mb/s (USB 3.0)
Encryption	Password protection	None	None	None	Password protection
Other interfaces	None	FireWire 800	None	None	Wi-Fi 802.11b/g/n
Software	WD utilities	None	LaCie Backup Assistant	None	LaCie utilities
Dimensions	112x83x11mm	235x130x46mm	40x140x85mm	119x79x21mm	115x115x23mm
Weight	164g	1.35kg	650g	215g	300g
Warranty	3 years	3 years	1 year	1 year	2 years
FULL REVIEW	TINYURL.COM/BMG7SW9	TINYURL.COM/NV7F32F	TINYURL.COM//KRCL3VZ	TINYURL.COM/LBHC8EL	TINYURL.COM/LK3398C

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SSDs	Samsung 840 EVO	Crucial M500	Plextor M5 Pro	Samsung 840 EVO mSATA	Samsung 840 Pro
	1 PC ADVISOR GOLD	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4	5 PC ADVISOR RECOMMENDED
Price	£310 inc VAT	£185 inc VAT	£150 inc VAT	£276 inc VAT	£350 inc VAT
Website	Samsung.com/uk	Crucial.com/uk	Plextor.com	Samsung.com/uk	Samsung.com/uk
Launch date	Nov 13	Aug 13	Aug 13	Apr 14	Aug 13
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★☆
Capacity tested	750GB	480GB	256GB	500GB	512GB
Price per GB	41p	39p	59p	55p	68p
Memory cache	1GB LPDDR2	512MB DDR3	512MB DDR3	512MB LPDDR2	512MB LPDDR2
Controller	Samsung MEX (3-core ARM)	Marvell 88SS9187	Marvell 88SS9187	Samsung MEX (3-core ARM)	Samsung MDX (3-core ARM)
Encryption	AES 256-bit	AES 256-bit	AES 256-bit	AES 256-bit	AES 256-bit
Flash	Samsung 19nm Toggle NAND	Micron 20nm MLC NAND	Toshiba Toggle NAND	Samsung 19nm Toggle NAND	Samsung 21nm Toggle NAND
Firmware updated via	SSD Magician for Windows	ISO boot disc	ISO boot disc	SSD Magician for Windows	SSD Magician for Windows
ATTO peak sequential	R: 554MB/s; W: 537MB/s	R: 539MB/s; W: 433MB/s	R: 547MB/s; W: 457MB/s	R: 554MB/s; W: 536MB/s	R: 562MB/s; W: 519MB/s
CDM peak IOPS	104k (read)	89.8k (read)	103.3k (read)	102k (read)	103.8k (read)
AS SSD (points)	1141	1038	1124	1147	1094
Warranty	5 years	3 years	5 years	3 years	5 years
FULL REVIEW	TINYURL.COM/L5EDQOY	TINYURL.COM/M2NCSMJ	TINYURL.COM/PTYGG27	TINYURL.COM/MNKPM2Q	TINYURL.COM/OU4LEJG

Projectors	Epson EB-1945W	BenQ W1070	ViewSonic PJD7820HD	Asus P2B	Dell M900HD
	1	2	3 PC ADVISOR RECOMMENDED	4	5
Price	£1,334 inc VAT	£630 inc VAT	£550 inc VAT	£450 inc VAT	£754 inc VAT
Website	Epson.co.uk	Benq.co.uk	Viewsoniceurope.com/uk	Asus.com/uk	Dell.co.uk
Launch date	Mar 13	Nov 13	Jun 13	Feb 14	Nov 13
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Projection technology	3LCD	DLP	DLP	DLP	DLP
Resolution (pixels)	1280x800	1920x1080	1920x1080	1280x800	1280x800
Brightness[1], Contrast	4200, 3000:1	2000, 10000:1	3000, 15000:1	350, 3500:1	900, 700:1
Image size	280in	235in	300in	20-120in	80in
Supported aspect ratios	16:10, 16:9, 4:3	16:9	16:9, 4:3	16:10, 16:9, 4:3	16:10, 16:9, 4:3
Noise levels (dB)	37 (29 eco)	33 (30 eco)	35 (29 eco)	32 (24 eco)	38 (34 eco)
Connections	VGA, HDMI, DP, CM, USB, ET	VGA, HDMI, CM, USB	VGA, HDMI, CM, USB	HDMI, USB, microSD	HDMI, USB, WiDi
Lamp/lamp life	Not supplied/2500 hrs	240W/6000 hrs	Not supplied/5000 hrs	LED/30000 hrs	LED/30000 hrs
Dimensions	377x271x108mm	312x244x109mm	268x221x84mm	143x130x35mm	232x164x43mm
Weight	3.9kg	2.65kg	2.1kg	1.4kg	1.59kg
Warranty	5 years	2 years	3 years	1 year	1 year
FULL REVIEW	TINYURL.COM/CP95P7G	TINYURL.COM/LXADR7Q	TINYURL.COM/D2HO4CV	TINYURL.COM/JWV6PD6	TINYURL.COM/MAXQRG3

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Sub-£150 graphics cards

	1 MSI HD 7770	2 MSI R7 260X OC	3 Gigabyte GTX 650 Ti	4 MSI GeForce GTX 650	5 Sapphire Radeon HD 7750
Price	£70 inc VAT	£100 inc VAT	£105 inc VAT	£75 inc VAT	£80 inc VAT
Website	Uk.msi.com	Uk.msi.com	Uk.gigabyte.com	Uk.msi.com	Sapphiretech.com
Launch date	Sep 12	May 14	Aug 13	May 13	Jun 12
Overall rating	★★★★☆	★★★☆☆	★★★★☆	★★★★☆	★★★☆☆
Graphics processor	AMD Radeon HD 7770	AMD Radeon R7 260X	nVidia GTX 650 Ti Boost	nVidia GeForce GTX 650	AMD Radeon HD 7750
Installed RAM	1GB GDDR5	2GB GDDR5	1GB GDDR5	1GB GDDR5	1GB GDDR5
Memory interface	128-bit	128-bit	192-bit	128-bit	128-bit
Core clock/Boost	1GHz/none	1175MHz/none	966MHz/none	1071MHz/none	800MHz/none
Memory clock/Effective	1125MHz/4.5GHz	1625MHz/6.5GHz	1350MHz/5.4GHz	1250MHz/5GHz	1125MHz/4.5GHz
Stream processors	640	896	768	384	512
Texture units	40	56	64	32	32
Power connectors	1x 6-pin	1x 6-pin	1x 6-pin	1x 6-pin	None
DirectX	11.1	11.1	11	11	11
Digital interface	DVI, HDMI, Mini-DP	2x DVI, HDMI, MiniDisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, Mini-HDMI	DVI, HDMI, DisplayPort
Warranty	3 years	3 years	3 years	3 years	2 years
FULL REVIEW	TINYURL.COM/BWJ7BL9	TINYURL.COM/OZ6WUYT	TINYURL.COM/DYE3OW8	TINYURL.COM/AKT2XOM	TINYURL.COM/7ZB5OE3

£151+ graphics cards

	1 Asus GeForce GTX 770 2GB	2 Gigabyte Radeon R9 280X	3 MSI Radeon R9 270X	4 MSI Radeon R9 290X Boost	5 Gigabyte GeForce GTX 780Ti
Price	£260 inc VAT	£275 inc VAT	£160 inc VAT	£400 inc VAT	£530 inc VAT
Website	Uk.asus.com	Uk.gigabyte.com	Uk.msi.com	Uk.msi.com	Uk.gigabyte.com
Launch date	Aug 13	Mar 14	Dec 13	Apr 14	May 14
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Graphics processor	nVidia GeForce GTX 770	AMD Radeon R9 280X	AMD Radeon R9 270X	AMD Radeon R9 290X	nVidia GeForce GTX 780 Ti
Installed RAM	2GB GDDR5	3GB GDDR5	2GB GDDR5	4GB GDDR5	3GB GDDR5
Memory interface	256-bit	384-bit	256-bit	512-bit	384-bit
Core clock/boost	1058MHz/1110MHz	1GHz/1.1GHz	1030MHz/1120MHz	1GHz/1GHz	1020MHz/1080MHz
Memory clock/Effective	1752MHz/7008MHz	1.5GHz/6GHz	1.4GHz/5.6GHz	1.25GHz/5GHz	1750MHz/7GHz
Stream processors	1536	2048	1280	2816	2880
Texture units	128	128	80	176	240
Power connectors	1x 6-pin, 1x 8-pin	2x 8-pin	2x 6-pin	8-pin, 6-pin	1x 6-pin, 1x 8-pin
DirectX	11	11	11	11	11
Digital interface	2x DVI, HDMI, DisplayPort	DVI, HDMI, 2x Mini-DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort
Warranty	3 years	3 years	2 years	3 years	3 years
FULL REVIEW	TINYURL.COM/OAG6277	TINYURL.COM/OWVAP37	TINYURL.COM/OYA2DFJ	TINYURL.COM/NPET8ER	TINYURL.COM/O29JMT3

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Sub-£200 flat-panel displays

	BenQ GW2760HS	AOC i2769Vm	Samsung S24C650PL	Dell S2440L	Dell 20 Touch Monitor E2014T
	1 PC ADVISOR RECOMMENDED	2	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5
Price	£194 inc VAT	£195 inc VAT	£175 inc VAT	£195 inc VAT	£178 inc VAT
Website	Benq.co.uk	Benq.co.uk	Samsung.co.uk	Dell.co.uk	Dell.co.uk
Launch date	Not specified	May 14	Mar 14	Mar 13	May 14
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★½☆
Screen size	27in	27in	23.6in	24in	19.5in
Panel type	A-MCA	AH-IPS	Plane-to-line switching	Vertical alignment	Twisted nematic
Native resolution	1920x1080 (82ppi)	1920x1080 (82ppi)	1920x1080 (93ppi)	1920x1080 (92ppi)	1600x900 (94ppi)
Pixel pitch	0.31mm	0.31mm	0.27mm	0.28mm	0.27mm
Brightness	300cd/m²	250cd/m²	250cd/m²	239cd/m²	225cd/m²
Static contrast ratio	950:1	720:1	760:1	1200:1	820:1
Response time	4ms	5ms	5ms	6ms	2ms
Ports	HDMI, DVI, VGA	2x HDMI (1 MHL), DP, VGA	HDMI, DP, VGA, USB	HDMI, VGA	2x HDMI (1 MHL), DP, VGA, USB
Dimensions	472x191x623mm	622x213x449mm	555x487x224mm	568x191x418mm	506x376x165mm
Weight	4.5kg	5kg	5.5kg	3.6kg	4.9kg
Warranty	2 years	3 years	3 years	3 years	3 years
FULL REVIEW	TINYURL.COM/NF3WVFY	TINYURL.COM/LDTANWC	TINYURL.COM/K969YMH	TINYURL.COM/CXWJJLM	TINYURL.COM/PO6GA8J

£201+ flat-panel displays

	BenQ BL2411	NEC MultiSync P242W	AOC Q2963PM	LG 29EA93	LG 23ET83V
	1 PC ADVISOR RECOMMENDED	2	3	4 PC ADVISOR RECOMMENDED	5
Price	£237 inc VAT	£570 inc VAT	£323 inc VAT	£395 inc VAT	£230 inc VAT
Website	Benq.co.uk	Uk.nec.com	Aoc-europe.com/en	Uk.lge.com	Lg.com/uk
Launch date	Apr 14	May 14	Mar 14	Aug 13	Mar 14
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★½	★★★½☆
Screen size	24in	24.1in	29in	29in	23in
Panel type	IPS	IPS	AH-IPS	In-plane switching	IPS touchscreen
Native resolution	1920x1200 (94ppi)	1920x1200 (93ppi)	2560x1080 (96ppi)	2560x1080 (96ppi)	1920x1080 (96ppi)
Pixel pitch	0.27mm	0.27mm	0.27mm	0.26mm	0.27mm
Brightness	300cd/m²	367cd/m²	240cd/m²	300cd/m²	144cd/m²
Static contrast ratio	650:1	680:1	530:1	560:1	420:1
Response time	5ms	8ms	5ms	5ms	5ms
Ports	DVI, DP, VGA	HDMI, DVI, DP, VGA, USB	HDMI, DVI, DP, VGA	3x USB 3.0, 2x HDMI, DVI, DP	2x HDMI, VGA, USB
Dimensions	366x555x236mm	557x378-528x228mm	714x214x388mm	700x209x387mm	554x208x399mm
Weight	6.7kg	10.2kg	6.9kg	5.2kg	5.1kg
Warranty	3 years	3 years	3 years	2 years	3 years
FULL REVIEW	TINYURL.COM/PMV5L5V	TINYURL.COM/NE9HGBZ	TINYURL.COM/NXDAGMK	TINYURL.COM/CTR7AAW	TINYURL.COM/K8WBR7R

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Five reasons why Facebook is just like any other 10-year-old

Facebook has just turned 10 years old, a fact you can't help but have noticed due to the domination of your News Feed by videos it has made to celebrate each user's history.

It's a company that has gone from a tiny, university-only bulletin board with ambition to the biggest social-media portal the western world has ever seen. Facebook's not that different to your typical 10-year-old, so here we'll explore how this new decade will affect your relationship with the site as it moves through its awkward phase.

1. It's beginning to assert its independence

There was a time when Facebook was a docile and respectful creature. It did as it was told, when it was told. But recently our young charge has begun to show signs of an independent streak. Whereas once you could view your News Feed in the sensible, mature order in which people post things, now anarchy reigns as Facebook decides to show you only the Top Stories whenever it feels like it.

And it feels like it a lot. There you are, happily keeping in touch with your social circles, then suddenly an item from two years ago pops up to confuse you. I didn't know Charlie was pregnant again! Led Zeppelin is reforming? England crash out of the World Cup in embarrassing fashion? Oh, wait, that's not old news.

2. It's going through changes

Entering double digits has profound effects upon young folk. Things get confusing, awkward and, inevitably, there are some physical developments. Facebook has, for most of its existence, been cute and carefree, with a clean, fresh-faced appearance. Now it's peppered with ad-spots. Where once there was a simple white and blue expanse, now we are confronted by colourful blemishes that implore us to sign up to various games that will steal our money through the evil that is micro-transactions. Oddly enough, this is also similar to the way young children behave.

3. It's getting ready to go to big school

The end of the homework-light days of primary education can be a shock to the system. For years the comfortable surroundings and constancy of friends has been a rock under those diminutive feet. Time, though, is a cruel mistress and all must pass through the crucible of secondary school.

Facebook has enjoyed years of being the little startup that most certainly could. But when it floated on the stock exchange just over a year and a half ago those days were firmly behind it. Now there is an expectation to make money, and shareholders to answer to. Excuse me a moment while I weep for the loss of Facebook's innocence.

4. Your secrets are no longer safe

There's a certain charm about the straight-talking nature of children. After all, we bring them up to be honest and forthright. Yet this can have calamitous results if you happen to mention what you really thought of the birthday present from your partner, or how their latest haircut wasn't the success you pretended it was. Careless whispers such as these are guaranteed to reappear in a conversation at a moment of maximum embarrassment.

Facebook is no shirker in the land of revelations. Time after time the overly truthful site has changed various settings that expose your details to the world, usually without telling you. Its Android app can even read your text messages. Who needs the NSA or GCHQ spying on us when Facebook can do a much better job?
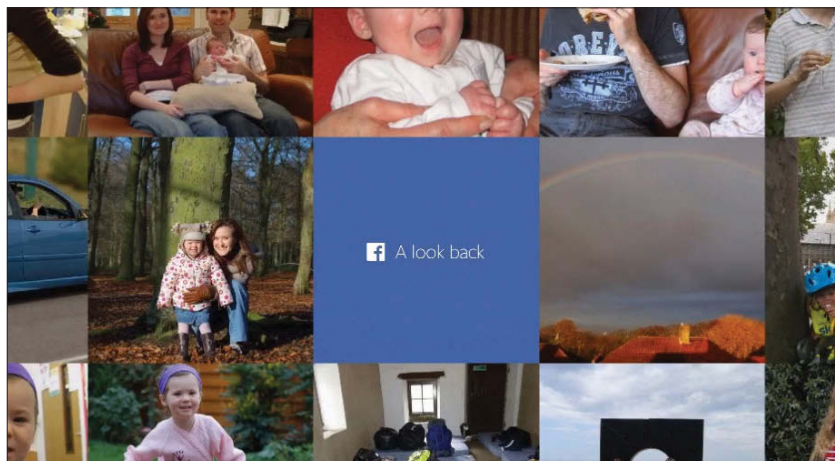
5. Despite everything, it's still great fun

Parenting is a hard job. The hours are long, the pay is poor, and it's a long time before you see a finished result – if ever. But it's also a lot of fun. Facebook has many faults and personality quirks, and it can be downright stupid at times, but in the end we keep coming back for more because it is a great place to chat with friends, find links to the best videos and articles the web has to offer, and look at our friend's pictures without them knowing. I guess it does keep some secrets after all... ⊠

> **There was a time when Facebook was a docile and respectful creature. It did as it was told, when it was told**

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