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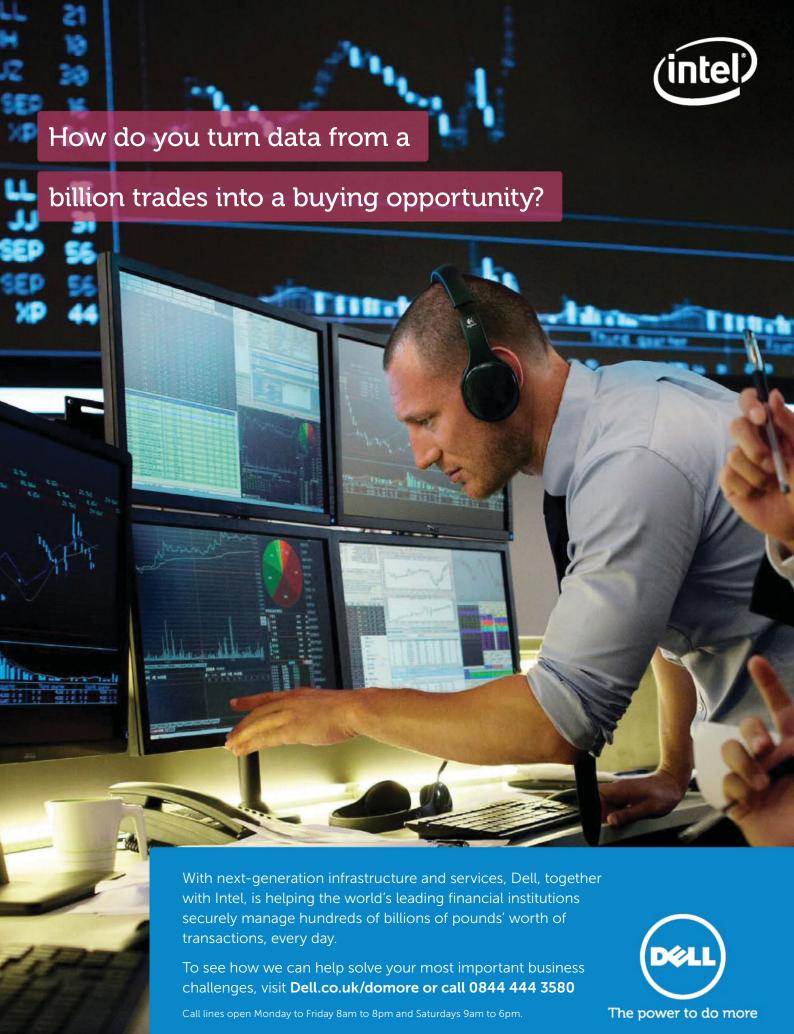
+ £135 Motorola Moto G reviewed



Public Wi-Fi hotspots tested

We find out if you can live without a 3G connection





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Too good to be true?

The £600 smartphone is here to stay, but you no longer need to spend that amount to get a great deal

hen mobile phones first became affordable to consumers, the average Joe had no desire to buy his handset outright and look for a cheap SIM-only deal for his calls, texts and WAP data. Back then everything was about contract prices, and the handsets themselves had very little value in Joe's eyes.

Of course, the free or cheap handset price was subsidised by Joe's monthly payments. He paid handsomely for the handset (see page 146) over the course of a couple of years, before getting an upgrade to the latest and greatest feature phone. He then continued to pay monthly.

Many Joes still do that today, but smart Joes realise that buying their smartphone outright and choosing a SIM-only package works out cheaper in the long run. Prices have tumbled, and Google's brand-new Nexus 5 (reviewed on page 77) seems too good to be true at £299.

Now, there's Motorola's Moto G (reviewed on page 44), which offers a respectable specification that would make some £400 smartphones blush. Yet you can buy one for just £135.

Motorola says it's making a profit on every Moto G sold, and when you look closely at the specs you can just about see how the maths works. The screen is big and bright, but it doesn't have the full-HD resolution of the flagship models we test from page 74.

There's no card slot to add more storage and no support for near-field communication (explained on page 99). Rather than an über-megapixel camera, the Moto G offers a 5Mp snapper that shoots 720p footage. And its processor isn't the fastest available.

Each one of those components saves money, yet is unlikely to be detrimental to Joe's overall experience with the phone. If local storage fills up, Joe can store and access his files from the cloud (a deal with parent company Google means 65GB is included).

Photos and videos look pretty good, so Joe isn't likely to complain. The same goes for the screen resolution and performance.

Plus, since Motorola hasn't changed Android much, the associated development costs are minimal.

The final trick, which is by no means unique or particularly clever, is to offer replaceable rear covers. Since there are 15 colours to choose from, Joe can personalise his Moto G so it doesn't look like every other Joe's.

The price might seem too good to be true, but the Moto G is a genuine bargain. Could the days of the £600 smartphone be over? Don't bank on it, but rejoice that you no longer have to spend that amount to bag yourself a great smartphone. \boxtimes





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Cloud crime

I received an email from a friend who was reportedly stuck in the Philippines with no cash and needed my help. Knowing this was unlikely I phoned my friend and, not only was he at home, he didn't even have a passport. His account had been hacked.

He discovered that his email account, including his contacts list, was stored in the cloud and not on his computer. He also discovered that the contacts list had been emptied and he had no local backup. He contacted the provider within seven days (the timeframe within which you can usually recover deleted files), and it was able to recover his contacts list. But what if he had been on a two-week holiday?

We are sold the cloud as a futuristic solution for always having up-to-date software and security for our data but, for now, I will keep everything local and under my control. lan Rutter

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Closing apps in iOS 7

In its latest update to iOS Apple has changed the way in which you close running apps. (Now you simply double-tap the Home button and swipe the relevant app off the screen.) It's a tiny change, but one that's got right on some users' nerves. "This new system sucks! Where's the manual? I'd never have downloaded iOS 7 if I knew I'd have to re-learn how to use my iPad. Having to look online to find out how to do stuff I could easily do before is a waste of time, and time is money," wrote Texas.

Chrome OS

Chrome OS has already found plenty of fans, and not everyone is against the idea of a laptop that needs to be connected to the internet to be of any use.

"Chromebooks have advantages of security and reliability, making them a compelling alternative to a tablet for people who are more keyboard-driven. And that's the important point: they need to be compared with tablets or very cheap PCs rather than PCs in general," wrote dourscot.

"I am totally sold on Chrome OS," added Anthony Pirtle. "I don't use any offline



applications other than for music-, podcastand audiobook playback, which is what the 7in tablet in my pocket is used for. What that tablet can't do is run the full Chrome browser. Lots of things are better in the full browser, such as having all your extensions available, getting a more enjoyable and useful Gmail experience, and much better multitasking abilities, such as being able to run Netflix in a tab rather than using an app that occupies the entire device. It's also just nicer to have a bigger screen and full keyboard and touchpad, since the internet really isn't a touchscreen environment."

Flagged: Star letter

Beautiful screens, but you can't read them outdoors

With the advent of tablets and smartphones more and more emphasis is being placed on using computers on the move. The overriding limitation is no longer battery life, size or weight of the device, but readability of the display while outdoors.

No devices are readable in bright sunlight and, even with the usual cloudy UK conditions, using a handheld device outdoors can be a less than ideal experience.

Perhaps it is time reviewers should place more emphasis on display readability in high ambient light conditions. Even just listing the light output in the specs would help.

It may be that manufacturers shy away from high-output displays due to their detrimental effect on battery life, but high brightness levels need to be used only in outdoor light conditions. Leaving the decision of battery usage versus readability to the user has got to be a reasonable compromise. Nigel Charles

Marie Brewis, managing editor, replies: Thanks for your letter, Nigel. We completely agree: a beautiful HD screen is worthless if you can't enjoy it. We think more work can still be done on battery life, however.



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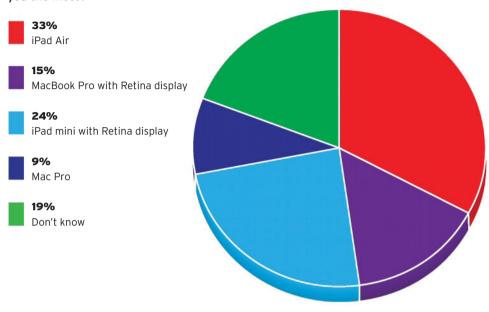


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Apple's had a busy few months with several product launches, but which interests you the most?



Based on 7,024 votes, tinyurl.com/qajtu2g

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Phone for a fiver

As smartphone manufacturers launch ever more expensive £500 to £600 handsets, supermarket chain Asda is bucking the trend by putting on its shelves a £5 SIM-free mobile phone (read more at tinyurl.com/ndcwawa). Would you buy one?

Matthew Webber wrote: "As a spare or temporary phone you can't go wrong for a fiver. And I can see this phone appealing to the elderly."

Mary Ridley was also in favour of a super-budget smartphone. "I would buy one for my other half who is still resisting becoming a mobile phone user. It's better to just spend a fiver and for him not use it than get him a more expensive brand and him still not use it." she wrote.

But Matthew Darlington wasn't taken with Asda's offering. "No way would I buy a phone for a fiver," he wrote.

Curved screens

Following the unveiling of the curved-screen Samsung Galaxy Round and LG G Flex (see pages 18 and 30), rumour has it Apple will also launch a curved-screen iPhone.

"I can't see the point in having a curved screen," wrote Boon Dave, "its only use is that it would fit better against your leg in your pocket. Surely it would also be a rip-off of the Samsung Galaxy Round."

"It would also fit nicely in your palm," added Aidan Andrew Lovegrove.

"I'm not too sure about the curved screen," wrote Jasic Choudry, "but a larger screen would be a definite yes!"

Cartoon chaos

We received a telling off from Jay Scales when we told readers how to remove Bitstrips cartoons from their Facebook news feed (see tinyurl.com/q6cwnp8). "I like them," he wrote. "Don't be so grumpy." (We have to admit we have a soft spot for them, too, as you'll see in our review at tinyurl.com/p96qLjq.)

The story got more love on our website: "Best article EVER," wrote David Tesch. Jonathan Boshoff added: "Even though this was once an obvious feature of Facebook, along with many other things, this is a good article for the less fortunate/ knowledgeable readers."

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Microsoft's biggest mistake

In the January issue of PC Advisor, editor Jim Martin wrote that forcing the Modern UI on users entrenched in the old ways of the Windows desktop was Microsoft's biggest mistake (see page 3). Not all our forum members agree (see tinyurl.com/mnehtj8).

wee eddie Microsoft's biggest mistake with Windows 8 was not making the home page attractive. The colours it used are those you would not wear, put on your car on paint on your walls. As it is, Windows 8 has a screen that resembles regurgitated puke.

mbc Microsoft's biggest mistake was issuing Windows 8 at all. It had cast envious eyes on the success of Apple and Google in selling apps and tried to emulate them.

chub_tor The mistake in my opinion was in not advising Windows 7 users with non-touchscreen PCs that the OS would not give them any advantage other than speeding up bootup.

Just.me Microsoft's mistake was in trying to foist a phone system on to the PC. Just imagine the reaction if a car manufacturer decided to move into the bicycle market and produced a car with pedals and handlebars, just so it could use the same system on both. The PC and mobile phone are separate products and should be developed as such.

Aitchbee The sales of new computers will dwindle due to the universally bad reviews of Windows 8, which is preinstalled on most home PCs.

Woolwell My grandchildren naturally take to the touchscreen of a tablet or laptop. A mouse is much more difficult for them to control. We grew up with mice and standalone keyboards. But, in my opinion, touch is the future. 🗵

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BLACKBERRY OFF THE MARKET

Troubled smartphone firm accepts Fairfax loan • CEO Thorsten Heins resigns from company

BlackBerry will change its CEO and accept a \$1bn loan from a consortium including shareholder Fairfax Financial Holdings as it struggles with inventory- and strategy problems. The firm has abandoned plans to sell up after it failed to find a buyer.

CEO Thorsten Heins will resign when the deal is complete, with former Sybase CEO John Chen joining the company as chairman and interim CEO.

The \$1bn loan takes the form of convertible debentures, exchangeable for shares at a price of \$10. Fairfax has agreed to acquire \$250m of the debentures, with other institutional investors taking the rest.

In September Fairfax made a conditional offer of \$9 per share, valuing BlackBerry at around \$4.7bn, although it had not obtained financing for the deal at that time. The new arrangement puts a higher value on the company, but means Fairfax has to find less money to finance the deal.

BlackBerry thanked Heins for establishing a more efficient cost structure and overseeing delivery and adoption of BlackBerry 10 and Enterprise Server 10. However, it failed to indicate whether Chen plans to stick with the company's current strategy of reducing the number of devices it launches and focusing on the enterprise.

The firm said the deal is a "significant vote of confidence in BlackBerry and its future", but not everyone sees it that way. "I think it's more a leap of faith than a vote of confidence," said Ben Wood, director of research at CCS Insight.

The main problem is that it doesn't fundamentally change anything, according to Wood. It gives the firm some more cash and new leadership, but BlackBerry is still a company that is finding it hard to compete with Apple and Android.

The decision to borrow money and stay independent is in contrast to Nokia's deal to be acquired by Microsoft.

"Right now there are no real answers for Blackberry, and that is a very uncomfortable place to be for investors. customers, workers and partners," said technology analyst Jeff Kagan.

New products in turbulent times

Although BlackBerry is on rocky ground, it has marched on with the launch of new products and expansion of services.

The firm launched the Z30 smartphone (reviewed on page 76), which ushered in a new version of the BlackBerry OS. BlackBerry OS 10.2 has been rolling out to the Z10, Q10 and Q5 smartphones.

"BlackBerry OS 10.2 introduces new features that will help you be more productive and stay better connected. It includes hundreds of refinements that make the things you do every day faster and easier," said the firm.

New features in 10.2 include BBM Video with natural sound, lock screen notifications, calendar enhancements and improvements to the BlackBerry Keyboard.

The Priority Hub learns what conversations are most important to you and puts those messages at the top of your inbox. You can also preview BBM, texts and email from any app, and Reply Now means you can respond to an incoming call with one of those three methods.

After some delays BBM finally launched on Android and iPhone and has been greeting with a warm reception. BlackBerry said the IM app was downloaded 10 million times in the space of 24 hours.

"While we're excited to bring BBM to iPhone and Android, we aren't stopping there. We committed to delivering a BBM experience on iPhone and Android that was equal to that on BlackBerry 10. That means bringing BBM Video, BBM Voice and BBM Channels to Android and iPhone customers, too," said BlackBerry.

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AMD HOPES FOR TABLET TURNAROUND WITH 2W PROCESSOR

Low-power Mullins and Beema chips offer improved performance - but is that enough to take on Intel?

AMD will release a tablet chip codenamed 'Mullins' that draws about half as much power as its predecessor, 'Temash', as the company struggles to compete with Intel.

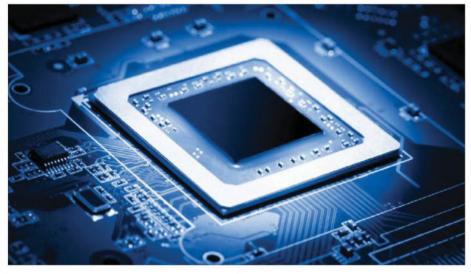
Mullins will have two- to four CPU cores codenamed Puma and draw around 2W of power in certain usage scenarios. Variants of the chip, based on the x86 architecture, will also be used in low-power laptops. It will appear in tablets in the first half of 2014.

"It's going to be a very exciting product for us in 2014," said AMD's chief technology officer, Mark Papermaster.

AMD claims the Mullins chip will provide 139 percent better productivity performance per watt compared to Temash. The chip will also include graphics cores based on AMD's latest Radeon technology, and a security processor based on ARM's Cortex-A5 CPU core.

The Temash chips, which started shipping earlier this year, have been a failure, appearing in only a handful of tablets and low-power PCs.

AMD also announced a laptop chip codenamed Beema, which will draw between 10- and 25W of power. It will



have up to four Puma CPU cores, a security processor and integrated graphics.

Beema chips will be made using the 28-nanometre process, and products will appear in the first half of 2014.

These chips will be key to AMD's survival in the tablet-, laptop- and PC markets. During the third quarter of 2013, AMD lost market share to Intel as it tried

to expand into non-PC markets such as game consoles.

AMD's x86 PC processor market share was 15.8 percent during the third quarter, declining from 16.1 percent in the same quarter of 2012, according to a study from Mercury Research. Intel's PC processor market share was 83.8 percent, up slightly from 83.3 percent.

Microsoft's next-gen Surface 2 tablet sales look promising

Microsoft breathes a sigh of relief as its Surface 2 line-up records positive first-quarter earnings

Microsoft has reported positive first-quarter earnings, despite a declining PC market, with sales of its Surface tablets on the up.

Although the company's revenue dropped to \$18.5bn compared to the previous quarter, its net profit climbed to \$5.2bn, up 17 percent year on year. Surface revenue grew to \$400m, with sequential growth in revenue and units sold over the prior quarter.

The boost is likely due to the price cut on the original Surface models as it launched the Surface 2 and Surface Pro 2.

Although it didn't reveal how many Surface tablets were sold, the news is in stark contrast to Microsoft's announcement in which it admitted it had taken a \$900m hit on Surface tablets.

Steve Ballmer, retiring CEO at Microsoft, said: "Our devices and services transformation is progressing, and we are launching a wide range of compelling products and experiences for both businesses and consumers.



"Our new commercial services will help us continue to outgrow the enterprise market, and we are seeing lots of consumer excitement for Xbox One, Surface 2 and Surface Pro 2, and the full spectrum of

Windows 8.1 and Windows Phone."

The results include the deferral of Windows 8.1 pre-sales revenue, which totals \$113m. It was Microsoft's OEM division that seemed to struggle the most with a decline of 7 percent in revenue. The software giant's Devices and Consumer revenue grew four percent to \$7.46bn.

While we haven't yet reviewed the Surface 2, the Pro 2's IPS panel looks gorgeous, with strong viewing angles, colour saturation and contrast. The main down side is its glossy finish, which makes the Pro 2 difficult to use in bright lighting and outdoors. Read our thoughts on page 26.



Tesco Mobile offers 4G for £2.50/month

The supermarket has announced that its mobile phone customers can add 4G to any existing tariff for £2.50 per month. Tesco Mobile is the first virtual operator (it uses 02's network) to offer 4G. Users who are unsure how much data they will use on 4G can opt for a 'Capped Tariff' to avoid unexpectedly large bills. They can also ditch 4G or adjust the data limit to suit their needs. MORE: tinyurl.com/Lkpkxnn



Giffgaff to sell SIMfree smartphones

Virtual mobile operator Giffgaff announced that it will begin selling SIM-free smartphones. Customers will be able to choose how much they pay upfront for the device and can also opt to pay in monthly instalments thereafter.

MORE: tinyurl.com/mpp9xpq

Google introduces Helpouts service

Google has launched an online service that connects people with experts over live interactive video, while adding a revenue stream in the form of transaction fees. The Helpouts service rates its advisors on their qualifications, availability, price, ratings and reviews. MORE: tinyurl.com/ksv8wwd

OFCOM DEMANDS GET-OUT CLAUSE ON PRICE HIKES

Jump ship without penalty if your provider raises your tariff mid-contract



Ofcom has announced that consumers hit with mid-contract price increases will be able to leave without a penalty fee.

The regulator said consumers should be allowed to exit a landline-, broadband- or mobile subscription for free if the provider increases the price before the contract term is over.

Claudio Pollack, Ofcom's Consumer Group director, said: "Ofcom is making clear that consumers entering into fixed-term telecoms contracts must get a fairer deal. We think the sector rules were operating unfairly in the provider's favour, with consumers having little choice but to accept price increases or pay to exit their contract.

"Any increase to the monthly subscription price should trigger a consumer's right to leave their contract - without penalty."

Ofcom said any increase to a monthly charge is 'materially detrimental' to consumers, and providers should give at least 30 days' notice of a price rise.

The rules will come into effect in early 2014 and will apply to any new landline-, broadband and mobile contracts starting after this time. They apply only to changes in price, but Ofcom will also consider a reduction in the contract's allowance of calls and texts, for example, a price increase.

It's all about giving consumers a fairer deal and avoiding unjust price hikes during a contract. However, users won't be able to escape charges incurred outside the main contract, such as when roaming or breaking allowance limits.

UK's fastest broadband cities announced

Telford tops uSwitch broadband speed table, followed by Belfast and Portsmouth

Research conducted by uSwitch has shown that not a single town or city in the UK achieves an average 'super-fast' broadband speed.

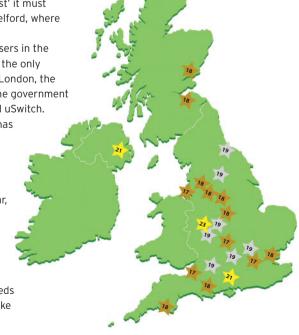
For a broadband speed to be regarded as 'super-fast' it must reach 24Mbps or above. The closest the UK got is in Telford, where the average broadband speed is 23Mbps.

"The speed test data - collected from broadband users in the 50 biggest UK cities and towns - shows that Belfast is the only capital city with average speeds above 20Mbps. Even London, the financial capital of the world, is trailing behind what the government classes as super-fast, with an average of 17Mbps," said uSwitch.

Although the average download speed for the UK has risen to 14.5Mbps, more than a quarter (27 percent) of homes receive less than 3Mbps on average. The award for slowest city goes to Hull, at 10.5Mbps.

Norwich gets a special mention in the report for boosting speeds by 75 percent in the space of one year, but at only 11.6Mbps making it still one of the slowest cities in the UK. More than a third (35 percent) of its residents are yet to see their average speeds break 3Mbps. The same is true for broadband users in Huddersfield and York.

In London one in five broadband users receive speeds lower than 3Mbps. uSwitch said at this rate it would take almost six hours to download a Blu-ray film. ⊠





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Windows 8

Acer recommends Windows 8.



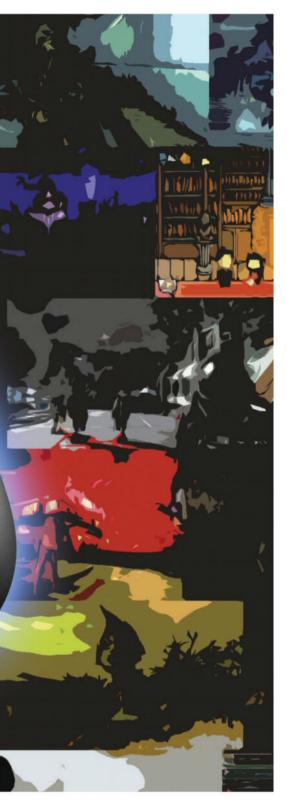
Martyn Casserly investigates SteamOS, which could change Windows gaming forever ith Sony and Microsoft having finally released their long-awaited consoles to the world, the battle for the living room has begun.

It came as a surprise when, on the eve of hostilities, game manufacturer Valve threw down a pretty hefty gauntlet: SteamOS. The company, which is responsible for Portal, Half-Life and Defenders of the Ancients, announced it had developed a Linux-based OS that it saw as the future of gaming.

This was accompanied by the promise of dedicated hardware from multiple manufacturers, plus a brand-new controller with a plethora of buttons and no joysticks. This sort of announcement is usually met with the slow nodding-head of certainty that, within a couple of years, all this will be forgotten. Valve, though, is a big deal. And its biggest victim might be Windows.

Valve has recently celebrated the 10-year anniversary of its Steam online gaming





platform. Launched exclusively on Windows in September 2003, Steam has since gone on to become the dominant force in PC gaming, with some estimates giving it 70 percent of the online market.

The service, which is famed for its price-slashing sales, has nearly 60 million members and offers around 3,000 games. With a huge user base already heavily invested in the platform, Valve is in a unique position for selling a new hardware approach.

STEAMOS VS (ANGOLES

Valve's biggest challenge will be supplanting the already ensconced consoles that offer years of service, without the need to upgrade components, install software or read system requirements to work out whether or not your PC can run a game.

These inconveniences were some of the main reasons that PC gaming found itself taking a backseat as the consoles strode forward to assume centre-stage. Although far from perfect, consoles also had the advantage of being relatively small and guiet compared to a large, noisy PC tower, so PCs tend to be relegated to the study or bedroom rather than used in the lounge.

Valve is conscious of these factors and has outlined reasons why gamers should look to SteamOS instead. It's designed specifically for use as a gaming platform and pretty much nothing else. This means everything is optimised for that one task, freeing system resources from the other considerations that burden a Windows machine. In essence, SteamOS allows you to have a small PC 'games console'.

Valve has also been working on another feature within SteamOS that allow your game to run on your existing PC, then be streamed to your TV via a 'Steam Machine'. This is clever because it allows those who have already invested money in a gaming PC or laptop to bring their games out of the spare room and on to the living-room large-screen TV at little cost.

MPROVED CONTROL

To tempt the classic PC player away from their more advanced control systems Valve has also developed the Steam Controller. This unconventional unit features two curved trackpads rather than joysticks, a touchscreen and several additional buttons to those usually found on Xbox and PlayStation controllers. This gives PC gamers the finer level of control that they expect from a mouse and keyboard. How it works remains to be seen, but if Valve can pull this off then it could provide a roadmap for the controllers of the future.

Although the Steam Machine hardware has yet to be revealed, Valve has said that it is working with several different partners who will release machines in 2014. There will be various options optimised for size, price, quietness and other factors, but one of the real strengths of the system is that users will be able to build their own PCs, then install the SteamOS for free.

The existing online Steam service will continue to operate on Windows, Mac and Linux. In many ways this compares to Google's attitude to its Android mobile operating system, which is now the most widely used platform in the mobile space.

WINDONG TO BLAME?

The biggest hurdle of all will be the games themselves. Developers are already set up to write for Windows, and they have a marketplace, so why jump ship?

How this plays out will be the deciding factor in the SteamOS story, but Valve is bullish on this aspect, saying that hundreds of games already run natively on the OS and that big-name titles will be announced soon.

It also points to the streaming functionality that makes all games compatible in the short-term. Of course, if Valve was to announce Half Life 3 as a SteamOS exclusive, it would be very interesting to see how gamers react.

So why has Valve switched to Linux? The existing system has worked very well for years, there didn't seem to be a groundswell of voices demanding the switch, and game developers are hardly desperate to learn a whole new programming environment.

The answer seems to rest very much with Windows 8. Gabe Newell, Valve's managing director, has been very public in his criticism of Microsoft's troubled release. At a conference last year he said "Windows 8 is a catastrophe for everyone in the PC space," and in his recent Linuxcon 2013 address he intimated that the OS had caused problems for the PC manufacturing industry and that 'we'll see either significant restructuring or market exits by top five PC players. It's looking pretty grim."

Some analysts point to the fact that the Windows 8 store would pose direct competition for Steam, and that This may be a defensive measure to protect its business model. This would make sense, as Apple's App Store is proving a very successful portal for software sales on the OS X platform and Microsoft will have taken careful note of the way it has performed.

But there is another, more troubling possibility. With more and more services heading online (such as Microsoft's own Office365 suite), declining desktop PC sales, and the continued rise of tablets, is it possible that industry figures are beginning to plan for life after Windows? Gaming has always been a strong feature of Windows computing, but even that is now dwindling against consoles, with PC revenues projected at only a fifth of their living-room rivals in 2013.

Whether SteamOS and its proposed hardware makes a dent in the gaming market remains to be seen, with plenty of obstacles looming large for the fledgling system. User loyalty and a few key titles will get you only so far if it means a considerable upheaval for customers. One thing's certain, though: 2014 is going to offer a fascinating glimpse at where the future of home computing is headed. ⊠



Curved-screen smartphones

Michael Kan spends some time with a stylish and surprisingly non-ridiculous smartphone with a curved screen

he Galaxy Round's designers have given it a slightly curved screen that clearly set off the 'Designed by clowns' klaxon on Twitter. It was abused and ridiculed in a manner akin to red-tops going after a 'British Bake Off' contestant who said something sensible and nuanced about gender politics in The Guardian.

Hyperbole aside, we wanted to know what advantages a curved screen can bring to a smartphone. Not a lot, it turns out. Nevertheless, Samsung's Galaxy Round may be the company's best-looking handset yet.

When Samsung unveiled the Galaxy Round it claimed it to be the world's first smartphone to feature a curved touchscreen. It has a top-end spec and includes software features that leverage the curved design.

Most of the world won't see this phone any time soon. Samsung, for now, plans to release the handset only in its home market of South Korea, priced at around £600. However, the company did make it available for hands-on use at one of its Seoul offices.

In a way, you could describe the Round as a curved version of Samsung's Galaxy Note 3 (reviewed on page 79). The two handsets share nearly identical features and the same design style. Both have a full-HD 5.7in screen, a fast processor, a 13Mp rear camera and even the same leather-like synthetic fibre covering the back.

Despite hardware similarities with the Note 3, the Galaxy Round feels and looks different. The phone is slightly lighter (154g versus 168g) and is easier to grip

with its curved back. This is one benefit of using Samsung's flexible displays, which the company says weigh less than traditional displays. At the same time, the phone feels sturdy and its curves are more pleasing to the eye, when compared to the flat exterior of the Galaxy Note 3.

Users don't have to worry about the phone rolling off a table or even wobbling. The device's display is not as round as its name suggests. The arch is subtle, and contours more at the edges. When placed on a table the Round remains stationary. But due to its curved backing, Samsung included a few software features that activate when a user tilts the phone on its spine.

One of these, called the 'Roll Effect', automatically turns on the screen and





may have a future



displays the time and date, when the phone tilts toward the user. A similar feature allows the user to cycle through songs played on the device. A tilt toward the right side will forward to the next track, while a tilt toward the left will restart the current song.

When put into practice the two functions are easily activated, but we found it sometimes took a harder tilt to cycle through music tracks. Both features, however, can activate only if the phone is laid on a table.

A third function works when viewing the phone's image gallery. A soft touch to the screen's centre and a flick of the wrist will display a sidebar showing the other photo albums stored on the phone.

These so-called tilt functions offer nice shortcuts, but they could also easily be

incorporated into any Samsung phone. Perhaps the company will do so in the future, but it's likely that most users will look at the features as novelties, much like how the Samsung Galaxy S4 will track facial- and eye movements to help the user scroll through websites. Getting them to work on the Round can also take several tries at first.

When looking at the phone's screen the curvature can be easy to miss. When you're directly facing at the display the arch blends in and seems flat.

It brings to mind how the electronics industry is also moving to televisions with curved screens. These TVs can arguably offer a wider field of view over traditional flatscreens. But in the case of the Galaxy Round, it's difficult to notice any difference, given that the phone already has a superb screen with its AMOLED display technology.

Save for the Galaxy Round's screen, nothing else inside the phone is curved, according to the company.

Despite that only the phone's aesthetics really set it apart from the Note 3, we like it as it's a really stylish piece of product design that subtly stands out from the crowd. And if you don't like its dark 'luxury brown' colouring, a white version will be available in December (in South Korea).

Samsung hasn't given any concrete details on the future of its curved displays for smartphones, and we can't necessarily see this becoming widespread - but that's kind of the point of a distinctive device such as the Galaxy Round.





Why OS X Mavericks is free

Neil Bennett asks whether Apple's decision to let users download the latest version of Mac OS X for free is stupid or wise

o-one was expecting Apple to give away Mavericks for free. The online rumour mill goes into overdrive at the prospect of a new iPad or MacBook Pro - but this, not a whisper.

At first glance it just seems like a way for Apple to lose money. While Mountain Lion cost only £13.99, Apple sold three million copies in the first four days – netting it a tidy sum of almost £42m. So, why would Apple ditch this revenue stream?

Firstly, because it will make more money in the long term, through upgrades and enhancing its brand by following the principles of what those at the cutting edge of business call 'experience design'

The price of Mac OS X upgrades has been dropping steadily over the years: the first Mac OS X cost around £100; OS X 10.5 Leopard cost £85; and OS X 10.8 Mountain Lion cost just £13.99. The churlish could say that this has reflected the dwindling number of high-profile features that have been added with each new release (and they'd be right), but Apple's strategy is more complex and subtle than that.

A free upgrade could be seen as a natural successor to this, and in line with the company's iOS strategy - where upgrades from iOS x to iOS 7 have been free. And this is where we find the real principles behind Apple's decision for its desktop OS.

The real reasons Mavericks is free

Free iOS upgrades are a bonus to the latest iPhone and iPad users. Those with elderly models don't get the upgrade, so are enticed into upgrading their hardware. In the middle are those who get the upgrade, but may see their current device become less useful because of the performance lag caused by the demands of the OS.

For example, iOS 7 was well received by the majority of iPhone 4S and 5 owners. iPhone 3 and 3S were out of the loop, but felt an extra pull to upgrade. iPhone 4 users were caught in the middle - able to upgrade, but then saw their hardware slow down. Some saw a small lag that's a gentle nudge to upgrade; others saw a more noticeable slowdown that was probably a key reason why *Macworld*'s recent article on how to downgrade to iOS 6 was so popular (although Apple soon blocked this method).

I suspect Mavericks will be an equally powerful driver for hardware upgrades. While we're still in the initial testing phase of the OS, I'm expecting that it will have a noticeable, but not too painful, negative impact on the performance of older Macs. If this helps to convince enough users it's time to upgrade their machine, Apple may find it more profitable than charging those who would pay to upgrade (who are most likely to have newer hardware).

The free upgrade is also a way for Apple to maintain and enhance its brand. The understanding customers have of a brand isn't only based on what they experience in the run up to making a purchase (think ads, expert reviews, social-media posts and so on). The experience we have when using the product - and the value we derive from using it - has just as much influence on whether we'd buy from that brand again, and what we tell our friends, colleagues and peers.

Apple's all about the brand

This may sound obvious, but it's something many big brands have only recently woken up to - in reaction to the understanding that things have changed.

In the past they controlled their brand image through advertising and marketing, and in what the press that writes about them. Now they must realise that their customers have a massive influence on it, too - through Twitter, Facebook and other social-media channels, blogs, user reviews on Amazon and a whole load of other ways they can influence people they both know and don't know.

Giving away Mavericks for free makes current Mac hardware owners feel that they're getting more value out of their iMacs and MacBooks, improving their experience of the products and bolstering Apple's already high brand image.

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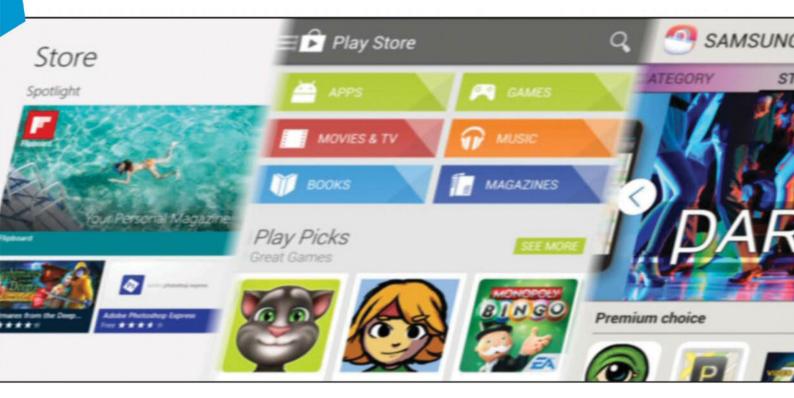
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After the PC: phones and

With PC sales continuing to decline, Martyn Casserly examines the trade-off in widespread adoption of highly portable, but ultimately difficult-to-upgrade, locked-down devices

ast issue we revealed that desktop computer sales had continued their downward trend for the sixth quarter in a row (January issue, page 12). And the projected future doesn't look any better for PC makers. In the same period last year Gartner reported that worldwide sales of PCs amounted to 87.8 million; this year those figures dropped to 80.2 million. This is still a huge number, but the steady decrease in sales is a concern.

Reasons for the slump are complex and varied, but analysts believe one of the most significant causes is that PCs and laptops are now sufficiently powerful that they don't need to be so frequently updated. Plus Windows 8 hasn't been Microsoft's most popular OS release, with its preference for touch-enabled hardware potentially causing some people to hold off upgrading from Windows 7. Online services are also adding value to older machines, as they expand their capabilities in the cloud.

The prolonged financial recession is a strong factor, as customers try to make their money, and old hardware, stretch further.

But the sudden and meteoric rise of tablets, allied to the ever-more powerful smartphones that accompany us at all times (see our group test on page 74), has probably had the most tangible impact of all.

In the same period that PCs stumbled to sales of around 80 million units, the smartphone market grew by an impressive 39 percent, selling three times as many devices - 258.4 million, according to IDC. Tablet sales also grew to 47.6 million, and this upward trend looks set to continue. With Apple recently releasing two new iPads and more affordable tablets being offered by Tesco, Google and Amazon, we could see record numbers of tablets appearing under Christmas trees in 2013.

Too many choices?

Perhaps a more obvious sign of how the PC market is in a state of confusion is best represented by the barrage of designs that has emerged since the introduction of Windows 8. Now there are laptops that transform into large, cumbersome tablets, devices whose screens flip over or detach to transform into a separate tablet, and desktop machines that can be leaned back at mystifying angles. Microsoft itself has added to the miasma by building its own vision of the PC's future with the Surface (see page 26).

So far this has been a mixed bag, with the hybrid nature of the Windows 8 interface still proving difficult to fully realise on a single device. And Microsoft's entry to the hardware space has ruffled a few feathers: we're now seeing companies such as HP, Lenovo, Dell and Acer releasing machines that don't run Windows at all, instead dipping their toes in the waters of Android, ChromeOS and Linux.

By its very nature, technology is a constantly evolving medium, but its current path presents some uncomfortable possibilities. With computers ubiquitous in the workplace, there isn't a tremendous need for many people to have a powerful system at home. If all you want to do is check your email, spend some time browsing online, and keep up to date with your social networks, the iPad and its ilk make a lot of sense.

The cloud effect

Traditionally you'd also want a decentcapacity hard drive on to which you could store your photos and music, but now you might instead use any one of the plethora of cloud services, such as Dropbox or Google+, iTunes Match, Google Music or Spotify.

This is all good, as it saves the user from needing to think about how a device works



tablets are not a panacea

or remembering to plug it into their PC to update the media content. Now we're free to live the lives promised by the sun-drenched worlds of Samsung and Apple ads.

Ease of upgrades

Only that's not entirely true. Up until now computers have been pretty much open to use as we pleased. If you were handy with a screwdriver you could also prolong a machine's lifespan by upgrading its hard drive or system memory, while incurring relatively little expense.

True, you might not have personally upgraded your PC but, as all of us here at PC Advisor can attest, friends and family members will always turn to the resident techie for help. Whereas in the past these requests would generally be met with a successful result (and hopefully the offering of babysitting or a cake in return), the only assistance offered in the case of a dropped iPad will be "take it to the Apple store".

It's a subtle turn of events, but with the glued-shut, irreparable devices that are beginning to replace our trusty old laptops and desktops, we are faced with an increased reliance on manufacturers. This is also becoming a reality on the software side.

Locked in

Unless you jailbreak your iOS device the only place from which you can get software is Apple's App Store, which is tightly regulated. Microsoft has implemented a similar strategy with the RT version of Windows 8, which runs software only from Windows Store. This has the enviable benefit of security, but also gives the companies power over the applications you can access.

Google's Play store is more open, but concerns about Android becoming an increasing target for malware has seen the Google pressured into ramping up security.

Amazon has taken Android and turned it into a portal to its online services with the Kindle range, and Samsung recently showed its hand by staging its first developers conference in San Francisco, focusing on making its devices more interoperable. The Korean giant has also built its own app store into its devices and filled the storage with bespoke versions of its own software, presumably to increase your reliance on its products. All this alludes to the main concern: customer lock-in.

The ideal landscape for manufacturers is that you use only their products, buy software only through their stores, and

regularly update your hardware. This is evident than when you see how some devices work best when paired with other products from the same stable. Want to use AirPlay to watch something on your Apple TV? You'll need an Apple product to send the signal. Want the Samsung Smartwatch? You'll also need the Galaxy Note 3 (page 79).

This makes sense from a technology perspective, as the manufacturer can optimise its hardware, but there are too many instances when you feel this restrictive practice has the shareholders' rather than customers' best interests at heart.

The sad truth as we move into this new era of personal computing is that it's becoming more difficult to resist the convenience these offerings present. Once you've paid for the apps you like and grown used to how they work, you won't want to repeat the cycle - or investment - on a new platform. In a few years from now customers will be even more entrenched, held in place by media purchases or services that work only on a particular platform.

Mobile devices have ushered in an age in which you need to choose your platform wisely: you'll be dependent on that company for a long time to come.

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Gaming tech used to aid communication



A Kinect-based sign-language translator could help deaf and hearing people communicate, write Neil Bennett and Michael Kan

icrosoft's research arm recently showed a project in Asia that will have a positive impact on the lives of those who have complete or partial hearing loss and use sign language to communicate. The project uses data captured using the Kinect motion-control camera usually attached to Microsoft's Xbox 360 console, which it then translates this into words. These can be read or spoken to assist communication with others. It could even be used to let sign-language practitioners issue commands to computers.

The reverse is also possible, as words spoken by a hearing person can be translated into sign using a digital avatar on a screen (or holographic projection).

We asked Kevin Taylor, technology development manager at disability charity Action on Hearing Loss if the technology developed by the project would be useful to people who use sign language.

"Action on Hearing Loss welcomes the development of any new technology that can improve communication between deaf- and hearing people," he said.

"The Kinect-based sign-language translation, which enables sign language to be translated into spoken text, has the potential to succeed. We are delighted that there is investment in new technologies to help bridge the communications gap between the hearing- and deaf world.

Taylor also said he could see signlanguage-translation technology helping with information kiosks, reception areas and meetings in the near future. Looking beyond this, he it could provide automated live-signing for TV and events. "It is also another fine example of how technology used in one application, in this case gaming, can be developed for other uses," said Taylor.

Microsoft Research began collaboration on the project with the Chinese Academy of Sciences and Beijing Union University in February 2012. Microsoft Research program manager Wu Guobin had tried using a video camera and digital gloves before trying the Kinect, but they worked out a more expensive solution. After around 18 months of development, the Kinect translator can now recognise 370 of the most popular words in Chinese- and American sign language. British sign language shouldn't prove too challenging either.

The research team hopes to collaborate with more experts in the field and is also surveying the deaf to find the best use cases for the Kinect translator.

It is thought that the system could help deaf users make presentations to non-sign-language speaking crowds. Deaf users working at an information kiosk could also more easily communicate with visitors who need help.

It is not known when the technology will arrive in the market, Wu said. Microsoft is still working on improving the language-recognition technology, and needs to expand the vocabulary of sign language the system is able to recognise.

"I think it's been great. In a year and a half, we have already developed the system prototype," Wu said. "The results have been published in key conferences, and other researchers have said the results are very good."

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Surface Pro is unique and

Microsoft's Surface Pro 2 tablet is the best laptop and desktop PC you'll ever own - provided you are the sort of person who needs a super-powerful portable PC. Matt Egan explains

riting about something you yourself wrote is the last refuge of a scoundrel, I appreciate. But in the last issue I caused what counts for a stir around these parts when I opined that Microsoft's Surface 2 tablet was bound to fail (January issue, page 18). Okay, I said it would suck and is pointless. And I've seen nothing to change my mind on that score.

Nor have I changed my mind on the fifth reason I gave for Surface 2's suckery: 'it's not Surface Pro 2'. Having spent a little time with the Surface Pro 2 I'm now more than ever convinced that this is the case. The Surface

RT is a dog - half a product with half an OS. A pale imitation of the iPads it apes.

On the other hand, Surface Pro tablets are the products Microsoft wanted to make for all those years when it alone was pushing the idea of tablet computing.

Unique and brilliant

Why do I have such regard for the Surface Pro 2? After all, it's a tablet with a starting price of £719 inc VAT. It's heavier and much more expensive than Apple's iPad Air. Its battery life can't compete. And it's running Windows 8. WINDOWS. 8.

But to compare Surface Pro tablets to Apple's iOS devices is a fool's game. iPads are - forgive me, Apple fans - consumption devices. They are amazing entertainment-and educational tools. Desirable objects that allow you to surf, read, watch, play and communicate. And they do so for a long time away from the mains. But, with all due respect to the oddballs who record albums via iPad using GarageBand, consumption and communication is really all that iPads do well. If you are faced with a serious computational task you are unlikely to choose your iPad if there is a desktop PC to hand. The problem



brilliant - for power users

for the Surface RT devices is that they offer only similar functionality to iPads, and iPads are better and have better app support.

The Surface Pro 2, however, is a serious PC in a tablet's body. It is tablet, laptop and desktop all thrown into one. As such it is unlikely to excel in any of those formats. But it doesn't have to: Surface Pro 2 excels at compromise. It is the king of versatility. A power PC in your pocket. And although the combination of price and unique functionality makes it a niche product, that doesn't make it a bad product.

Consider the performance stats. Surface Pro 2 comes with a Haswell processor, a 1.6GHz Core i5-4200U. In PCMark 7 the Surface Pro 2 scored 4886 points, which puts it up there with the latest Ultrabooks and faster than, say, the 2012 iMac. In terms of power it is a fast laptop and a more than acceptable desktop PC. With a Type cover keyboard it makes a very acceptable laptop, and with any keyboard and display it would do great service on your desktop. It does run full Windows, after all.

Indeed, with integrated Intel HD Graphics 4400, the Surface Pro 2 is even a passable Windows gaming rig. In Stalker: Call of Pripyat at our lowest test settings (720p, Medium detail), the Surface Pro 2 managed a playable 33fps. At native 1080p the framerate dropped to 18fps.

And although it can't compete with ARM-based tablets when it comes to battery life, we saw around six hours of runtime in our video-looping tests. So you could watch three films on your Surface Pro 2 if you want to use it as an iPad.

In each case - tablet, laptop, desktop - a dedicated device is marginally better, but the Surface Pro 2 is decent. And if you can buy only one device to do the job of three you will save money. Can you think of another device out there that can do everything Surface Pro 2 does?

Who Surface Pro 2 is for (not you, probably)

But who exactly needs this? The short answer is: not everyone. Even with the 'saving' of buying one product in place of three, Surface Pro 2 is a high-end product for high-end needs. For most people a £350 laptop at home and an iPad mini on the move offers the best of all worlds, for less than the price of the cheapest Surface Pro 2, and before you have to buy accessories.

The iPad is supported by better entertainment apps and is more portable. And a cheap laptop will cover the Windowsrelated needs of the majority of home PC users. Heck, for the price of a high-end Surface Pro 2 you could buy a decent Ultrabook and a mid-range iPad.

For most people the Surface Pro 2 is overkill. And that makes it a compromise too far. But if you require a truly powerful, truly portable device, the Surface Pro 2 is the best game in town. Commentors on *PC Advisor's* Surface Pro 2 review (see tinyurl.com/qx9ezmb) who said the device is ideal for them include creative professionals and CAD operators. People who need to use complex and high-powered software, on the move, all the time. If that's you, this is the product for you. It certainly doesn't suck.







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Tablet

Nokia's first tablet is the Lumia 2520 and it's something of a Surface 2 rival. It's a brightly coloured Windows 8.1 RT tablet with a full-HD 10in screen. Nokia offers the tablet with a Power Keyboard case. It also

has built-in 4G connectivity.

Price TBC

nokia.com/gb-en



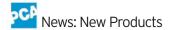


Lenovo Yoga Tablet «



Lenovo's biggest launch of the year is the multi-mode Yoga Tablet, which can be used in three positions thanks to its wedge shape design and kickstand. Available in 8- and 10in versions, both models have a 1280x800 screen resolution, run Android 4.2 Jelly Bean and offer up to 18 hours battery life.

£199 inc VAT (8in) £249 inc VAT (10in) lenovo.com/uk/en



Samsung Galaxy Round vs LG G Flex

Curved screen smartphones

We don't know whether these phones will launch in the UK, but we wanted to show you them anyway. The Samsung Galaxy Round and LG G Flex are the first curved screen smartphones to come to market, offering a glimpse of what's to come. As you can see, the Korean rivals have opted for different approaches with a horizontal and vertical curvature.

Price TBC samsung.com/uk lg.com/uk





Logitech M560

Logitech's latest wireless mouse will be a great addition to the desktop for Windows 8 users. A button behind the scrollwheel, which has a free spinning mode, gives quick access to the Charms Bar. Two side-mounted thumb buttons get you to the desktop or Start screen in a single click. £34 inc VAT

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Pure Evoke D4 «

Digital radio

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This 23in touchscreen monitor offers 10-point multitouch, which is perfectly suited to Windows 8. The LED backlit monitor has a full-HD (1920x1080) resolution and four video modes for various uses. The HannsG also carries VGA and HDMI inputs.

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Asus Transformer Book T100

Tablet/laptop hybrid

Asus is taking on Microsoft's Surface tablets with the Transformer Book T100. Like other Transformer tablets, the T100 has a hinged keyboard dock that converts it into a laptop. The device comes with an Intel 'Bay Trail' Atom chip and Windows 8.1, and promises an 11-hour runtime.

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Ive got an ugly hunch

in't progress a wonderful thing? So perhaps it doesn't take a seer to predict that any given piece of tech will get slimmer and lighter as time drifts by. And with the iPad Air now suiting up to become the world's favourite 10in touchscreen tablet, we have an iPad that is unsurprisingly a bit slimmer and lighter.

But wait, something magical has happened in that downsize. When it comes to thickness, I couldn't give a damn whether a phone or tablet is 12- or 10- or 8- or 6mm thick. Although I do fear for anything too thin as it's all the more likely to snap in two, folding like a wafer in the back pocket as it unexpectedly meets your chair.

As for a smartphone, I can live with 150g or more of its mass. In fact the iPhone 5, at 112g, is too light for comfort; I can't sense through its weight when it's in my jacket pocket, so I need to repeatedly check in case it's been lifted by a pickpocket.

For tablets, though, the iPad Air has made me realise something interesting happens at around 500g. In my testing of the iPad Air, I found I was using it for much longer than any previous iPad, for reading and notetaking and assorted iPaddy uses. And it's all down to the weight, which at 478g is now a comfortable mass to support one-handed for extended reading. For the avoirdupois generation, that's extraordinarily close to 1lb in weight.

That weightlessness can even make me look beyond the ways in which the iPad Air is a step down from previous models. Not just its poorer sound, wrong proportions, propensity to pick up stray finger input from a holding hand, and less-comfortable shape to the touch.



No, not just hardware issues - I'm one of the naysayers who sees iOS 7's interface as a back step, in both its look and usability. In some ways almost pretty (I do like thin typography, but would never use it when legibility is paramount), it is more difficult to read at a quick glance. Whereas the iOS 6 look was beautifully nuanced and detailed, with useful cues such as drop shadows, great contrast and a sense of depth, I find iOS 7 just too flat, angular and ugly - as though its designer Jonathan Ive looked at Windows 8 and tried to give it minimal Applefication. And then there's the girly pastels with which we're now saddled throughout the interface.

The iPad Air will be a hit, I'm sure, and will ensure this device continues as the best tablet money can buy, as well as the cheapest. Why it's the cheapest is a discussion for another day (see page 146), but until then you can read our review of the iPad Air overleaf.

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£739 inc VAT (128GB Wi-Fi and 4G)

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Specification

1.39GHz Apple A7 processor); PowerVR G6430 graphics; 9.7in (2048x1536-pixel) LEDbacklit Multi-Touch IPS display, 264ppi; iOS 7; 16/32/64/128GB flash storage: dual-band 802.11a/b/g/n Wi-Fi with 2x2 MIMO: Bluetooth 4.0: 1.2Mp FaceTime HD front camera, 720p video; 5Mp f2.4 iSight rear camera, 1080p video; dual microphones; stereo speakers; Lightning dock connector; digital compass; 32.4Wh fixed lithium-polymer battery; USB power adaptor; 240x170x7.5mm; 478q



TABLET

Apple iPad Air

Foremost, the iPad Air is about lightness. We tried a 128GB model with 4G modem, and on the scales this - the heaviest option - weighs iust 478a and is only 7.5mm thick. If you've used any previous full-size iPad, you'll immediately notice the transformation from that circa-650a weight. It seems much smaller, too, despite the same-size screen. The styling follows exactly the original iPad mini, with the same thinned bezel side edges with broader borders top and bottom.

The iPad is primarily a portraitmode device in 3:4 aspect ratio. vet one that works well on its side in landscape. Contrast this with successive Google Android copies that take a 16:9 widescreen, a shape that's better for video, but when used for reading web pages or ebooks in portrait you get an overly tall narrow window.

When we first tried the new Air, we thought it widescreen in appearance, not unlike a 16:9 device. The proportions didn't look right any more - by slimming the edges but not the sides, the tablet looked too tall, not so aesthetically 'right'.

The screen is unchanged since the first iPad with Retina display - a 9.7in capacitive touchscreen using IPS technology to deliver rich, faithful colours and clear viewing from any angle.

To slim the frame Apple has shaved fractions of millimetres from the glass, the LCD and touch sensor. The resolution is just as high at 2048x1536, ensuring there are enough pixels tightly packed to become invisible to the eye.

In general handling, the lightness remains the breakthrough. Yet we found the shape and feel much less tactile than the shape of the iPad 2, 3 and 4, with their gently curved radiuses at the rear and smooth snag-free edges around the front. The iPad Air has harder, less well finished edges, which may add more purchase to the fingers but make it less satisfying to handle.



In our benchmark tests. Geekbench 3 showed that the iPad Air's processor clocked at 1.39GHz - a tad higher than the Apple A7 in the iPhone 5s, which reads 1.3GHz - and it returned a score of 2703 points in multi-core mode; and 1487 points for a single core. The 5s returned figures of around half as much: 722 points for single-core and 1296 points multi-core. But does the Air feel twice as fast as the 5s? No.

In the Egypt HD graphics test, the Air could play at an average framerate of 48fps, and we can't imagine anyone being disappointed by its gaming capabilities.

A new 2x2 wireless setup means there are two antennas inside to improve Wi-Fi performance. In our tests we found no perceptible speed difference, though, the range may have increased.

Battery life is still exemplary, with Apple assuring around 10 hours continuous use, while we found that occasional but steady use meant it could last the best part of a week between charges.

We're a little troubled by the sometimes unsmooth interface, though. This is a general criticism of iOS 7 but one we didn't expect to see on the latest iPad with bestyet graphics processor.

Most apparent with app zooming, when you open or close an app and

return to the home screen, we saw jittery animations. It's not always obvious, and we suspect many people will probably not notice, let alone be troubled by it. Elsewhere in text scrolling and pinch-to-zoom actions there were no such issues. and it's as free and fluid as ever.

Sound quality is demonstrably reduced for the iPad Air. It gains stereo speakers and is almost as loud at full volume, but has a quacky colouration to the audio, as well as sounding less clean, more sandpapery. There also seems less treble extension, which reduces clarity.

The front and back cameras are almost the same as before, with the addition of sensor backside illumination to help in low light. And we did find night-time Skype calls were more clearly lit than before.

Verdict

In many respects a triumph, the iPad Air also introduces compromises to hit the low-weight/thin-case targets. Sound quality through the new stereo speakers is reduced compared to the previous mono speaker, and the iOS 7 interface, not popular with every user, can't be avoided on this device and it suffers some stickiness in app zooming.

Ultimately, though, the iPad Air will succeed by simple nature of its new weight - the lose of almost 200g is so significant to its handling, and means it could encroach on E Ink e-book readers; only with the power and versatility, not to mention gorgeous colour screen. of a real iPad. Mandrew Harrison





£1,499 inc VAT (512GB)

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Specification

2.6GHz dual-core Intel Core i5 processor (Turbo Boost up to 3.1GHz) with 3MB shared L3 cache; 13.3in (2560x1600) display; Mac OS X 10.9; 8GB of 1600MHz DDR3L onboard memory; 512GB flash storage: Intel Iris Graphics: 802.11ac Wi-Fi wireless networking. 802.11a/b/g/n compatible; Bluetooth 4.0: 2x Thunderbolt 2; 2x USB 3.0; 1x HDMI; SD Card slot; stereo speakers; 720p FaceTime HD camera; 71.8Wh lithiumpolymer battery: 314x219x18mm; 1.57kg



I APTOP

Apple MacBook Pro with Retina display 13in (late-2013)

When portability is more important than ultimate performance, the 13in MacBook Pro with Retina display is the tool for the job. Weighing less than 1.6kg, it's in true ultraportable territory, with state-of-the-art build quality, performance and battery life.

Prices start at £1,099 for the 13in model, which is a significant reduction over the £1,449 original. The entry-level model combines a 2.4GHz Intel Core i5 dual-core processor with 4GB of memory and a 128GB SSD. The middle version ups the RAM to 8GB and the storage to 256GB, and costs £1,249. The topend MacBook Pro. reviewed here. comes with 8GB of RAM and a 512GB SSD, plus a higher-clocked 2.6GHz Core i5. It costs £1,499. You can specify a 2.8GHz Intel Core i7 chip for an extra £180, 16GB of memory for £160, and a 1TB SSD for £400.

The unibody chassis is a fraction thinner than its predecessor at 18rather than 19mm. It's rigid, toughfeeling and impeccably finished in satin sand-blasted aluminium. Light bleed from the backlit keyboard has been reduced. Despite some short-travel keys, we found typing comfortable and nearly effortless.

The Retina display is an IPS panel with bonded front glass, treated with a reflection-reducing optical coating. Its native resolution is 2560x1600 pixels, although an HiDPI mode in OS X renders the UI at 1280x800 pixels.

At 1.56kg, the MacBook Pro is around 220g lighter than its predecessor. This may be in part due to the reduced battery capacity, from 74- to 71.8Wh.

Last year's MacBook Pro with Retina display ran cool and quiet, and this year's model perhaps even more so. We heard its cooling fan only during graphics testing.

In Geekbench 3, this 13in laptop scored 3113 points in the singlecore test. That's not far off the 3254-point result of last year's



'Best' 15in MacBook Pro with Retina display. And in the full multi-core test it scored 6719 points.

Improved graphics performance is one of the key changes expected from the new Haswell processors. Playing games is possible with its Intel Iris graphics. In Batman: Arkham City we measured an average 31fps at 1280x800, High detail. But in the tougher Unigine Heaven test the Intel graphics struggled to hit a smooth framerate. We saw an average 21fps at 1280x800, Medium detail.

Finding an IPS panel in a laptop is cause for celebration as it offers wide viewing angles and richer, more accurate colours than TN screens. But when a display has twice the resolution in both axes as the familiar 1280x800 size of Apple's 13in portables, we hit a pixel density of 227ppi, which makes individual pixels invisible to the eye at reading distances.

Subjectively we found this IPS panel far superior to most TN designs, but it wasn't markedly better under lab measurement. It could cover 98 percent of the sRGB gamut, and 69- and 75 percent of NTSC and AdobeRGB. The best IPS screens hit 100 percent AdobeRGB.

The contrast ratio was around 550:1 at its comfortable mid-range brightness settings, rising to 610:1

at its brightest (292cd/m²). Colour accuracy was creditable, with an average deviation of 1.44 Delta E.

Apple quotes up to nine hours of wireless web or iTunes film playback. Given that it has changed its test methodology, setting screen brightness to 75- rather than 60 percent, this nine hours is far from the 12 hours we'd hoped for following the MacBook Air refresh in June In our own tests streaming an MPEG-4 HD film from a NAS (802.11ac, 120cd/m²), the MacBook Pro lasted nine hours, 55 minutes.

The MacBook Pro with Retina display now has a PCI Expressconnected SSD, bypassing the usual SATA interface for potential power savings and faster data throughput.

Connected to a traditional SATA 3 bus, the best SSDs can return sequential read speeds up to around 550MB/s. We tested with QuickBench and saw reads of up to 795MB/s, and writes not far behind at 745MB/s. And importantly, small random file transfers were extremely quick: 19- and 67MB/s respectively for 4kB random reads and writes.

New to the 2013 MacBook Pro with Retina display is support for 802.11ac wireless. Copying a 21GB Blu-ray rip from a NAS drive, we recorded a staggering 720Mb/s using the latest Apple Time Capsule over 5GHz wireless.

Verdict

This 13in MacBook Pro is marginally lighter, faster in every important direction and still boasts a gorgeous Retina IPS display. Fast storage, the latest Wi-Fi and fantastic battery life make it a must-have.

Andrew Harrison



£1,539 inc VAT

Contact

- alienware.co.uk Read more
- tinyurl.com/nzopdvu

Specification

2.4GHz Intel Core i7-4700MQ (3.4GHz Turbo Boost); Windows 8 (64bit); 8GB DDR3 memory; 256GB SSD; 1TB HDD (7200rpm); 14in (1920x1080) IPS display; nVidia GeForce GTX 765M graphics; DVD writer; 802.11b/a/n: Bluetooth 4.0: gigabit ethernet: HDMI/mini DisplayPort; 2x USB 3.0: 1x USB 2.0; headphone and microphone sockets; SD card reader (SD/SDHC/ SDXC/MS); 69Wh removable battery: 334.8x261.2x42mm; 2.8kg



LAPTOP

Alienware 14

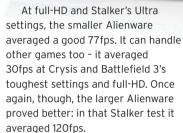
The Alienware brand dominates gaming laptops, but the latest addition to Dell's range isn't the big, brash notebook you'd expect - it's got a 14in screen and looks amazing.

Dell has done sterling work to temper the excesses of older models – the flamboyant styling has been calmed down, and the Alienware 14 looks like it's grown up. The matt aluminium throughout is fantastic, and the slanted lines and angles are subtly stylish. Logos still light up, the keyboard is modestly backlit, and there's a thin band of light around the base, but it's not ostentatious.

Build quality is great: there's no weakness across the wrist-rest, and minimal flex in the screen. The sturdy design comes at a price, though, and that's size: at 42mm thick and 2.8kg, the Alienware is as bulky as three Ultrabooks, and not far off some 17in-screened rivals.

The quad-core i7-4700MQ runs at 2.4GHz and is bolstered by a 3.4GHz Turbo pace. It returned a PCMark 7 score of 6044 points, which places it among the fastest laptops: the 17in MSI GS70 scored 6060 points, and the Alienware 17 - which has a Core i7-4800MQ processor - managed 6332 points.

The nVidia GTX 765M with 2GB VRAM ran through our 1280x720 Medium-quality Crysis benchmark at an average of 121fps: excellent, even if it is 10 frames slower than the Alienware 17 (tinyurl.com/ks5lnfx).



The storage star is the 256GB LiteOn mSATA SSD. Its sequential read and write times of 467MB/s and 399MB/s are good, and the machine booted in less than 10 seconds.

The big heat

Heat and noise are issues. The processor's top temperature of 100°C is the chip's thermal limit, and the fans inside whirred loudly when the machine was stress-tested - the fans even spun up occasionally when the Alienware idled. You'll need to use the 14's audio kit to drown the noise out.



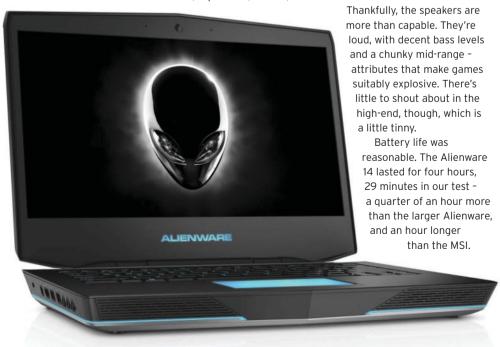
There's plenty to like about the IPS panel. The matt finish banishes reflections that hamper gaming, and it's matched with a high resolution – our model has been upgraded with a full-HD screen. Quality is high: the measured brightness level of 325cd/m² ensures punchy images, and a reasonable black level of 0.29cd/m² lends games and movies real depth. The contrast ratio and viewing angles are both good, although the matt layer adds more grain than we'd like.

Dell eschews chiclet keys for a traditional keyboard, which works well: plenty of travel, a solid base and snappy typing. The trackpad is grippy and large, and lights up when touched - but, as with most gaming laptops, we'd prefer a mouse.

The final touch comes from Alienware's bespoke software. The most interesting program allows the colours of 10 different lights across the machine to be changed, with different options for different power states. Elsewhere, there are tools to update the machine, alter touchpad functionality and establish application routines for different games and monitor performance.

Verdict

Alienware's designers have done a great job tempering the excesses of traditional gaming laptops with good looks and matt aluminium, and the Alienware 14 doesn't just look great - it shifts, too. The quad-core processors puts paid to applications, and the GTX 765M graphics core handles modern games at high settings. It's not thin, light or quiet, but it's a more portable proposition than most of its 17in rivals. Mike Jennings



£950 inc VAT

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Specification

2.4GHz i7-4700HQ (3.4GHz Turboboost): Windows 8 (64-bit); 8GB DDR3 memory; 1TB hard drive (5400rpm); Intel HD Graphics 4600 and nVidia GeForce GT 750M (2GB): 15 6in (1920x1080) alossy IPS touchscreen; 802.11b/a/n: Bluetooth 4.0: HDMI, Mini DisplayPort: 3x USB 3.0; 720p webcam with built-in mic; combo headset jack; SDXC card reader; non-removable lithium-polymer battery; 383x255x27.7mm; 2.7kg



I APTOP

Asus N550JV

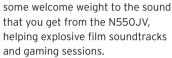
Asus' N-Series laptops are far from the most portable devices you'll find, but their audio and video capabilities could make them a choice for multimedia and entertainment. The new 15in N550JV isn't radically different from previous models in the range, but it's been updated with an Intel Haswell processor and a touchscreen for Windows 8.

The N550JV has a smart silvergrev metallic outer casing and an attractive stencilled design on the inner keyboard panel. There's a full-size keyboard with a separate number pad, and a nice, large trackpad (105x74mm). The kevs stand proud of the main keyboard panel and travel well, making it a comfortable for extended typing.

Multimedia has always been the main focus for the N-Series, so Asus has opted for a 15.6in IPS screen panel with 1920x1080-pixel resolution, along with a built-in Blu-ray drive for watching HD films.

The image quality is excellent - bright and sharp, with viewing angles that approach the claimed 178 degrees. It doesn't, however, live up to its 'non-glare' description, with irritating reflections noticeable on the glossy screen.

The other standout feature of N-Series laptops has always been their impressive audio quality. That's still a strength, and the N550JV has four speakers and separate bass driver. The woofer is external, about the size of a small tin of beans. and plugs into a dedicated audio connector on the left-hand side of the laptop (which also provides it power). A small speaker such as this won't worry the neighbours



You can unplug the woofer when you need to travel, although this does leave the internal speakers sounding rather thin. Remember, though, this isn't a particularly portable machine, and its 2.7kg weight is well above average for a 15in laptop, even with built-in optical drive. Chances are it will spend most of its time stationary with the speaker plugged in.

That's underlined by the limited battery life, too. Last year's lvy Bridge model only lasted for two hours, 30 minutes when streaming video with its integrated graphics processor; the N550JV can now stretch to three hours, 45 minutes. That's a useful 50 percent increase in battery life, but well below what a good portable laptop can now deliver.

Performance is something of a mixed bag, too. Our review unit was one of the more expensive in the range, selling for about £950 with

a guad-core 2.4GHz Intel Core i7. 8GB memory, 1TB hard disk and an nVidia GeForce GT 750M for gaming. That's a pretty powerful-looking combination, but the weak link in the chain is the slow 5400rpm hard disk. This led to a low score of 2550 points running the general-purpose PCMark 7 benchmark.

You'll notice the sluggish disk performance when first starting up. Even with Window 8's 'fast start' option, the N550JV took 30 seconds to boot into the Metro Start screen. and there's a further 30 seconds of thumb-twiddling before you can even launch apps such as Internet Explorer to start web browsing.

Fortunately, things are a lot better once Windows sorts itself out. The touchscreen controls respond quickly and smoothly, and the raw power of the Core i7 processor will allow it to cope with demanding applications such as photo- or video-editing.

While the N550JV isn't a dedicated gaming rig, it can handle some respectable games action. It zipped along at 96.5fps when running Stalker: Call Of Pripyat at 1280x720 resolution with Medium graphics settings. Then maintained a smooth 55fps even when we stepped up to 1920x1080 resolution.

Verdict

The slow hard drive is a weakness in a laptop costing almost £1,000, and leaves it looking expensive in a crowded market. Nonetheless, the N550JV is an attractive multimedia laptop with impressive audio and video capabilities that could make it suitable for presentations at work, or entertainment at home. ☑ Cliff Joseph





£899 inc VAT

Contact

- chillblast.com Read more
- tinyurl.com/pbzpa65

Specification

2.4GHz Intel Core i7-4700MQ (3.4GHz Turbo): Windows 8 (64-bit); 8GB DDR3 SDRAM; 1TB hybrid HDD (7200rpm); 13.3in (1920x1080) LED; Intel HD 4600/GeForce GTX 765M (2GB): 802.11b/a/n: Bluetooth 4.0; 1x HDMI, 1x VGA: gigabit ethernet: 3x USB 3.0. 1x USB 2.0: SD/ SDHC/SDXC/MMC; 2Mp webcam with built-in mic: headphone socket microphone socket; 62Wh lithium-ion battery; 330x227x35mm; 2.1kg

PC ADVISOR



RECOMMENDED



I APTOP

Chillblast Defiant Mini 13

The photos on Chillblast's website make it clear that this compact 13in gaming laptop is named after the USS Defiant - the nippy little battleship from Star Trek: Deep Space Nine. It lives up to its name, too, providing the sort of speed and gaming power that you'd normally expect from larger, more expensive gaming rigs.

There are a variety of buildto-order options available on Chillblast's website, but we reviewed the base version of the Defiant Mini 13. which costs a reasonable £899. with a Haswell i7-4700MQ processor running at 2.4GHz (3.4GHz with Turboboost), 8GB of memory, a 1TB Seagate Momentus hybrid HD/SSD, and nVidia GeForce GTX 765M in addition to Intel's integrated HD 4600 graphics. Our review machine was supplied with Windows 8, but you can opt for Windows 7 for the same price if you prefer.

The Defiant may not have its namesake's armour but it's sturdily built, measuring 35mm thick and weighing in at 2.1kg. That's relatively heavy for a 13in laptop that doesn't include an optical drive, but you should still be able to carry it around in a backpack without slipping a disc.

It gets off to a good start with a bright, colourful 13.3in display that provides full 1920x1080 resolution and wide viewing angles both horizontally and vertically. The screen isn't touch-sensitive, but we doubt that many gamers will worry about that. More useful for gaming is the matt finish that helps to reduce glare and reflection when you're lining up for a sniper shot.





produce an anaemic, tinny sound that's barely adequate for listening to dialogue on television, let alone music or an explosive gaming soundtrack. You'll almost certainly want to plug in some speakers or headphones when you settle down for a long gaming session.

The keyboard's a little cramped, too. It's a standard Qwerty keyboard, but there's an extra row of function keys on the right-hand side of the keyboard. This reduces the space available for the other keys, leaving a key pitch of just 16mm, which some people may find rather fiddly.

Those are our only real complaints, though, and the Defiant provides good performance for a laptop that costs less than £1,000. It produced a score of 4720 when running the general purpose PCMark 7 benchmark, which is solid and respectable rather than spectacular. However, that score reflects the use of a hybrid hard drive rather than a dedicated solid-state drive, and the Defiant can handle heavy-duty desktop applications such as videoediting or audio-recording.

And it doesn't disappoint when it comes to pure gaming performance. It managed 90fps without any trouble when running Stalker: Call Of Pripyat at 1920x1080 resolution with medium graphics settings, and sped right up to 150fps when we turned the resolution down to 1280x720. To take things a bit further we fired up Batman: Arkham City, and even at 1920x1080 with all the DX11 trimmings, high graphics and anti-aliasing, the Defiant still managed a perfectly playable 41fps. Dropping down to 1280x720 and medium settings allowed it to hit 52fps, so it provides good gaming performance for a laptop in this price range.

Battery life isn't bad, either. Switching to the integrated HD 4600 graphics allowed the Defiant to hit 240 minutes (four hours) when streaming video from the BBC iPlayer. That's not exactly Ultrabook battery life, but it's not at all bad for a gaming laptop.

There's a large cooling vent on the left-hand side of the laptop. but the Defiant ran cool and guiet during our games tests. It was only sustained disk use - such as the lengthy installation process for the Batman game - that caused the cooling vents to occasionally kick up a bit of a racket.

Verdict

The Defiant certainly isn't perfect - the speakers are below-par and the keyboard won't suit anyone with chunky digits. However, it's still very good value for money, with gaming performance that's as good as anything we've seen in this price range. Some people might prefer a gaming rig with a larger screen, but if you need portable power at a competitive price, then this is hard to beat. Z Cliff Joseph



£399 inc VAT

Contact

- lenovo.com/uk Read more
- tinyurl.com/mamebc9

Specification

1.8GHz Intel Atom Z2760: Windows 8 (32-bit): 2GB DDR2 RAM; 64GB SSD (31GB available); 10.1in touch-sensitive (1366x768) IPS display; 802.11b/g/n; Bluetooth 4.0; 1x Micro-USB: 1x Micro HDMI: 1x microSD: stereo speakers: headphone/ microphone socket: 1Mp webcam with built-in mic; lithium-polymer battery; 265x173x10.1mm; 580g



TABLET

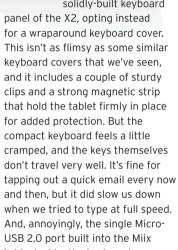
Lenovo Miix

We liked the design of HP's Envy X2 tablet (tinyurl.com/cpxnb3d), which comes with full-size, detachable keyboard so you can use it as a proper laptop when you need to. But, at around £700, the X2 costs as much as a good mid-range laptop while only offering basic, entry-level tablet performance. Lenovo's Miix has a lot in common with the X2 but costs only £399, which seems a more realistic price for a tablet with this specification.

The Miix is a 10in tablet - or 10.1, to be precise - and runs the 32-bit version of Windows 8. It has an attractive IPS display that looks bright and colourful, and works well for watching video or browsing the web. The resolution is only 1366x768, but that's fine for a screen of this size and the brightness of the IPS panel ensured that the image remained clearly visible even when we held the Miix up at all sorts of odd angles. The speakers sound thin and tinny, but they're adequate for listening to streaming video, and a headphone socket is available if you need it.

Tucked away behind that screen is a dual-core Atom Z2760 running at 1.8GHz, along with a modest 2GB of (non-upgradeable) memory and 64GB solid-state storage. Unfortunately, only 31GB of that storage is available for your own files, but there's a microSD slot available for additional storage. That's a modest specification for a device running Windows 8 (32-bit), and it produces an equally modest score of 1477 when running the PCMark 7 benchtest. Even so, it's still more than adequate for web browsing, running Microsoft Office

However, the Miix doesn't have X2. Its plastic casing is pleasantly thin and light - just 10.1mm thick and 580g in weight - but certainly doesn't feel as sturdy as the metallic case of the X2. There are also small details, such as the flimsy plastic flap that covers the microSD slot, that make a poor impression.



Battery life is respectable, but not outstanding. We got just over 6.5 hours (400mins) of streaming video out of the Miix, and you could probably stretch that closer to eight hours for lighter work, but that's not particularly impressive when larger Haswell laptops can now offer 10 or more hours between charges.

from the cover when we wanted to

copy my notes on to a memory stick.

Verdict

Its modest specification means that the Lenovo Miix 10 isn't as powerful as rival tablets such as the Microsoft Surface. However, it's reasonably priced and its attractive IPS screen ensures that it works well as an entertainment tablet, while still having enough power to handle basic email and Microsoft Office documents. **Cliff Joseph**



Start



£630 inc VAT (without operating system)

Contact

- vibox.co.uk Read more
- tinyurl.com/muyyzuu

Specification

4.2GHz AMD FX4350 (OC 4.4GHz); Gigabyte 970A-UD3 motherboard; 8GB DDR3 RAM; no operating system included in price (Windows 8.1 £75); 1TB WD Caviar Blue hard drive (7200rpm): 120GB Kingston SSDNow V300; Vibox Predator Green Gaming case: 550W XFX Pro PSU; Raijintek Aidos CPU cooler: MSI AMD Radeon HD 7850 with 2GB memory; 3x USB 3.0; 10x USB 2.0; DVI; FireWire; flash-memory drive; ethernet: 24x Lite-on iHAS124 DVD writer



GAMING PC

Vibox Envy

Many PC manufacturers merely buy a selection of third-party components, and then build a system around them. Vibox, however, takes a more proactive approach.

For starters, there's the number of different options available to customers. This is the Standard version of the Envy, but you can also buy Extreme/Overclocked and Liquid Cooled models.

The differences in components list and price are small. For instance, the Extreme version adds faster memory, nudges 0.1GHz to the overclocking, 50W-higher rated power supply, twice the hard drive storage, plus a faster SSD and network card. All for an extra £110.

Those differences aren't perhaps large enough to merit a completely different model name, but as a means of adding extra flexibility without going down the potentially bewildering 'fully customisable' route, it works brilliantly. You also know that the overclocking has been handled very carefully, so that any increase in the speed has been justified by the improved hardware.

This PC maintained a consistent temperature of around 33°C, only increasing slightly to 33.5°C during our toughest benchmarks. It also remained pleasingly quiet, adding little to the sound levels in the room – a testament to its immaculately controlled overclocking.

Not that Vibox's attention to detail ends there. The case has been designed by the company, and if you want something a little special, the slashes of glowing green that adorn the front make it one of the more striking machines we've seen.

But there's functionality to the design as well, with the green display keeping you continually informed as to such useful details as system temperature, hard drive performance, and the length of the current session.

The case is a bit of a monster to get into, and you'll need a good screwdriver and plenty of grunt before you can remove the lid - most modern cases are easy-screw, making them a doddle to open up in comparison. Once inside, space is a little lacking, and it's not easy to get to such components as the memory chips. Nonetheless, the system

remains cool, and the range of ports and connectors are ample.

The front has three USB ports (one of those USB 3.0), a memory-card slot, and headphone/mic sockets. You'll find a further 10 USB ports (two of those USB 3.0) on the rear, along with FireWire. Gigabyte's 3x USB Power is implemented, so you can use the USB 2.0 ports at the back to recharge some tablets that need more than the usual 500mA.

The PC itself is modestly priced, although not as modestly as it might seem at first. That's because the £630 tag doesn't include an operating system. However, it's worth remembering that having Windows 8 installed, for instance, will add £75, bringing the real price up to £705. And that only covers the PC unit, so if you want a monitor, keyboard and mouse, those will add more still. Nonetheless, £705 is a low price for a bare gaming rig.

Inside the Envy

Inevitably, the pricing shows in some of the components. The drive options are strong, though, with the 1TB WD Caviar Blue HDD combining impeccably with the 120GB Kingston SSDNow V300 to deliver capacity and high performance. The 24x DVD writer is a smooth performer, too.

The Corsair Vengeance memory gives very serviceable 1600MHz speed, although 8GB isn't a mind-blowing amount. Fervent gamers will prefer the 1833MHz RAM of the Extreme version of this PC. They may also want a bit of extra pace on the AMD FX-4350 processor. Its baseline speed of 4.2GHz has been increased to 4.4GHz here, and the Extreme version of the Envy pushes this up a further notch, to 4.5GHz.

The Envy is aimed at the gaming market, but the FX-4350 processor does leave it a little underpowered in this arena - this chip can't get close even to the Intel Core i5-4670K systems, let alone the Core i7 powerhouses. It's worth considering



the £705 price tag, though, before you look too unkindly upon the middling PCMark 7 score of 4216.

The Envy will be good for general PC work, but its gaming performance is capable rather than outstanding. In fairness, a lot of that is down to the low price tag. For this price, you can't expect more than the AMD processor and an AMD Radeon HD 7850 graphics card. There's nothing specifically wrong with either component, but they aren't going to give you the same capabilities as PCs some £100+ higher in price.

Strangely, that difference is most marked at lower detail levels. In Sniper Elite, for instance, the PC secured a score of 174fps at the lowest setting. This is a long way behind the 7870 and i5-4670K combo of the Arbico Elite 4670 OCX, for instance, which picked up 251fps in the same test. The gap closed at more medium settings (the Vibox scored 69fps to the Arbico's 87fps) and narrowed to 2fps at 1080p.

Verdict

This Vibox Envy is defined by its price. Another £100 or £150 would get you a 4670K processor and a superior graphics card, and those would make all the difference. However, given the price constraints, this is a playable system. It's quiet and low on power (consuming just over 60W for the most part), and will make a great buy for the gamer on a budget. 🗵 Robin Morris



£64 inc VAT

Contact

- www.sapphiretech.com Read more
- tinyurl.com/k6rjqgz

Specification

AMD Radeon HD 7730: 1GB GDDR5: 800MHz Core Clock; 1,125MHz Memory Clock (5GHz DDR effective): 400MHz Ramdac; 128-bit memory interface: 384 Stream Processors; 24 Texture Units: 8 ROP Units: PCI-E Interface: DirectX 11: DVI, HDMI. RGB; 2-year warranty



GRAPHICS CARD

Sapphire HD 7730

The lower end of the graphics cards market may not see the products at their most glamorous, but for those who want to pay a modest sum to improve on their onboard graphics. and get a card that can handle a few games, the likes of the 7730 come as pleasantly-priced appetisers.

A new version of the Cape Verde line that sits behind the 7750 (tinyurl.com/pjplu39) and 7770 (tinyurl.com/nse2y2u) cards, the 7730 has a good deal in common with its more expensive siblings. Indeed, at 1.5 billion transistors. they are all the same size. Cape Verde offers up to 10 Compute Units. In the case of the 7770, all 10 of those are activated, in the case of the 7750, only eight are turned on, while this figure drops to six in the case of the 7730.

This means that in a number of areas, the 7730 has 60 percent of the capabilities of the 7770, while the 7750 offers 80 percent. The 7770's 640 stream processors, for instance, become 384 on the 7730. while the number of texture units falls from 40 to 24. The 7730 also loses out on Raster Operation units - the 7750 and 7770 both have 16 of these, but the 7730 only has half that figure. All three cards have a 128-bit memory interface.

There are two versions of the 7730, both with very different memory configurations. The Sapphire option offers 1GB of RAM, and sticks to the reference card settings, so it has a core clock of 8GHz and a memory clock of 1125MHz (5GHz DDR effective). The memory bandwidth of 80GB/s is identical to that of the more 7750, although the 7730 loses out in terms of texture fill rate - offering 19.2GT/s to the 7750's 25.6GT/s.

We did some fresh benchmark tests for the 7730 and 7750, assessing them at a resolution of 1680x1050 and at lower detail levels. and you won't be using this card for high graphics quality. Typically, the 7750 finished six to eight frames



Crysis 3, for example, the 7750 and 7730 scored 27.4 and 21.2fps respectively. In Bioshock, the figures were 40.9 and 33.5fps, and in Stalker, 45.5fps played 37.3fps. These scores are playable, suggesting that the 7730 isn't a total write-off as a gaming card.

No additional connector is required from the PSU, so the Sapphire's demands are relatively light - its TDP of 47W is some 8W less than that of the 7750. It's thick, though, and requires a dual slot, so those looking for a compact card will be disappointed.

Verdict

Modest in power requirements, quiet and offering capable performance for a card this cheap, this is a viable sub-£65 option. 🗵 Robin Morris

£246 inc VAT

Contact

- hisdigital.com/gb Read more
- tinyurl.com/owvap37

Specification

ATI Radeon R9 280X: 3GB GDDR5; 850MHz Core Clock (1GHz Boost); 1.5GHz Memory Clock (6GHz DDR effective); 384-bit memory interface; 2048 Stream Processors; 128 Texture Units: 32 ROP Units: PCI-E Interface; DirectX 11; 1x DVI, 1x HDMI; 2x Mini-DP; 1x 6-pin. 2x 8-pin PSU connector needed



GRAPHICS CARD

HIS Radeon R9 280X iPower IceQ X2 Boost

More than 18 months after the launch of its 7000 series, AMD has finally unveiled its successor. As it turns out, it's, well, the 7000 series with knobs on

The R9 280X is a lightly clocked 7970. The architecture has remained largely the same, so it's still built around GCN (Graphics Core Next) technology. Having said that, a card that emulates the 7970 for slightly less isn't to be sniffed at.

In terms of raw figures, the 280X struggles slightly against the best versions of its predecessor. That core clock of 850MHz is a significant way behind the standard 7970's 925MHz. However, take into account the sizeable Boost figure of 1GHz and the actual difference (if it exists) becomes small. Both the new and old chips have 128 texture units, so the 280X's resulting texture fill rate of 128GT/s is only 6.4GT/s behind the very best 7970 cards.

The 280X's memory clock is a little higher than most of the 7970s, and the quadrupling capabilities

of GDDR5 RAM bring its 1.5GHz clock rate up to 6GHz. The memory interface is a 384-bit version, which gives a strong memory bandwidth figure of 288GB/s. The amount of memory is a significant factor as well - the 280X comes with 3GB. It also fares well on stream processors, matching the 7970's

figure of 2048. We should, perhaps, mention the size of this card, too. Measuring 295mm across, it's something of a giant for a single-GPU card. The design is nice, if not too colourful, and the twin fans and IceQ X2 system make for a surprisingly quiet and cool card. This is despite some significant power requirements, and the 280X needs two 8-pin power connectors from the PSU. Most PCs will offer two of these, but it's still worth checking your machine before you buy. The 250W TDP is high, however, HIS has done a good job of



a resolution of 2560x1440, using its 3GB of memory well to close the gap. In Crysis 3, for instance, it scores 39.8 and 22.1fps at resolutions of 1920x1080 and 2560x1440 respectively. On the less detailed Stalker, the 280X scored 94.7/70.3fps to the 102/74.3fps.

Verdict

While we were initially disappointed by the lack of innovation in the new range, as an overall deal, the R9 280X is an exceptional deal. If you're in the market for a card at around the £250 mark, then this is a good choice. 🗵 **Robin Morris**

£135 inc VAT (8GB)

Contact

- motorola.co.uk Read more
- tinyurl.com/nbutset

Specification

Android 4.3 Jelly Bean OS: 4.5in (720x1280) display, 326ppi; 1.2GHz Quad-Core Qualcomm Snapdragon 400 CPU; Adreno 305 GPU; 1GB RAM: 8/16GB internal storage; 5Mp rear camera with LED flash: 1.3Mp front camera: video recording at up to 720p; Wi-Fi 802.11b/g/n; Bluetooth 4.0 LE; A-GPS:GSM 850/900/1800/ 1900MHz; HSDPA 850/900/1900/2100MHz; 7.7Wh (2070mAh) nonremovable battery: 66x130x11.6mm; 143g



SMARTPHONE

Motorola Moto G

Motorola is now a Google-owned company and the Moto G comes at an extremely attractive price: just £135. For this you get a smartphone that eclipses every other budget handset. It's not going to trouble the flagship smartphones in our group test on page 74, but it does have a higher specification than you'd expect from a phone that costs this little.

For a start, there's a nicely sized 4.5in display with a 720p resolution. The pixel density of 326ppi is the same as that of the iPhone 5s. meaning it looks nice and sharp.

A quad-core processor coupled with 1GB of RAM makes the Moto G speedy, so there's hardly any waiting around for web pages or apps to load and virtually no lag when scrolling or zooming.

Storage is one area where corners have been cut. Like other budget handsets, it has just 8GB of internal storage, of which 5GB is available. There's a 16GB model for £159 - a hetter choice for most people since there's no microSD card slot. You do. however, aet 50GB of free Google Drive cloud storage. Add that to the 15GB Google gives you as standard and you have 65GB in which to store photos, music and documents.

The Moto G has Wi-Fi, Bluetooth 4.0, GPS and a Micro-USB port for charging and synching. You don't get NFC, infrared or 4G LTE. If you're not planning to pay extra for a 4G data plan, being limited to 3G won't matter.

Pick up the Moto G and it feels reassuringly weighty. The removable back cover lets you accessorise the phone with a different colour 'Moto Shell' or flip cover. This loses some of the 'solid' feel you get with a Lumia or other one-piece smartphone, but build quality is very good.

Silver power- and volume buttons sit on the side and the two ports - headphone and Micro-USB - are located at either end of the handset. A large, central lens on the back covers a 5Mp camera, and there's a 1.3Mp webcam around the front of the device.

Both cameras perform well enough and you can shoot in burst. panorama and HDR modes. Video is captured in 720p rather than full HD, but it's respectable and there's even a slow-motion recording mode.

It doesn't come with Android 4.4 KitKat, but it will be upgraded by January 2014, according to Motorola. Purchase one before then and you'll get version 4.3 Jelly Bean, which is ahead of most Android smartphones.

The interface is largely unchanged from the standard Google version,



but there are a handful of additions. Motorola Migrate, for example, helps transfer your content such as photos, videos and text message history - as long as your old phone ran Android.

Motorola touts 'all day' battery life for the Moto G and this proved to be the case in our testing. If you tend to use your smartphone lightly, then you'll probably get a couple of days' use out of it.

Verdict

Punching well above its weight, the Motorola Moto G is a real smartphone bargain. If you can live with only 5GB of onboard storage buy the cheapest version, but otherwise spend the extra £24 on the 16GB model. Martin

NETWORK CAMERA

D-Link HD Wireless Outdoor Cloud Camera DCS-2332L

■ dlink.com/uk/en

£203 inc VAT

■ tinyurl.com/pnhdmp7

Specification

Focal length 3.45mm, F2.0; H.264/MPEG-4/MJPEG compression: 1280x720 resolution: CMOS sensor 1/4in; 802.11n; 10/100 ethernet; 235g



The DCS-2332L is D-Link's highest specification outdoor camera, and the company says that the weatherproof housing will protect it from rain and dust. The resolution is specified at 720p (1Mp) and there's an extra infrared night mode that's combined with an infrared LED.

The camera itself is solidly built and includes an easy-to-assemble mount. This is adjustable and uses a ball and socket joint that can be secured to point in any direction. Also included are screws to mount the unit on a wall. The ethernet port is sealed with a rubber bung and the entire front of the device is sealed. To test the DCS-2332L's waterproofing, we placed it under

a cold running shower for five minutes and it still worked.

A small Wi-Fi antenna connects via a standard screw-in port, so a larger or directional antenna could be used to boost the signal.

The DCS-2332L is easy to set up and requires that you connect it to your home router via ethernet. During setup, you can give the unit a password and select either Wi-Fi or an ethernet connection. Note, you can only retain the weatherproofing if you use Wi-Fi to connect the device to your home network - if you opt for ethernet, you'll need to remove the rubber sealing bung.

After you've set up the device, D-Link gives you two methods

of connecting to the camera. The first of these is to use the mydlink web portal (mydlink.com), which is accessible from any web browser and provides basic viewing functions. However, the most useful option is to connect to the camera's internal web portal, as this provides access to all of its functions. This can be done from inside the device's network by typing in the camera's IP address or from a web browser outside on the internet.

External access requires a few extra steps, though, including setting up a static IP for the camera, registering with a DDNS service and forwarding the ports in your router settings. Thankfully, D-Link provides a



£184 inc VAT

Contact

- dlink.com/uk/en Read more
- tinyurl.com/nwakfdj

Specification

Focal length: 4.57mm, F1.9, 360-degree pan and tilt, H.264/MPEG-4/MJPEG simultaneous triple format compression; 1280x720 resolution; light sensitivity 1 lux@F1.0; CMOS sensor 1/4in: power consumption 8.2W: 802.11n: 10/100 ethernet: speaker out: microphone



NFTWORK CAMERA

D-Link Pan/Tilt/Zoom Cloud Camera DCS-5222L

The DCS-5222L camera is D-Link's premier network camera. It can pan and tilt, has infrared night capability and 720p (1Mp) resolution for daytime viewing. The unit provides dual connection options, which include both wireless 802.11n with full WPA2 security and 10/100 ethernet.

The device feels solid and well made, and the base is heavy enough to prevent it tipping over when turning and rotating. There's also a small Wi-Fi antenna on the rear that connects via a standard screwin port, which means a larger or directional antenna could be used for slightly greater range.

Setup is easy and requires an initial connection via ethernet to your home router. This process allows you to choose between wireless (802.11n) and wired (ethernet) connections. It also lets you set up a D-Link account to log into your camera over the internet via the company's website. Unfortunately, the picture on the web portal is very low resolution, and to get a full-size image you need to log in directly to the cameras internal website. This requires you set up a DDNS service (which is offered free from D-Link), forward the port from your router and set up a static IP for the camera. The interface for these operations is clear and simple to use.

To move the camera, you are given a selection of arrows, which

must be tapped repeatedly to turn the unit around. This can be tedious to traverse more than a few degrees, so there's also a pan mode that moves swiftly from left to right with the option to stop at any point. There is an additional method of access via an iOS app, which works well, however, the lack of fast pan makes turning the camera a few degrees at a time a little tortuous.

The device's images don't provide the sharpness and clarity we've come to expect from handheld consumer cameras claiming 720p resolution. Even in daylight, the picture is grainy. To find the reason for this, we delved into the technical specifications not listed on the box.

The sensor in this camera is CMOS, but its size is 1/4in. This means its light gathering area is 7.68mm. To put that in context, the current iPhone 5s has a 1/3in sensor that's over twice as large at 17.94mm (low quality compact cameras are 28mm). While the image is less than stunning, it seems 1/4in is generally the standard for security cameras of this type. As is the case with most cameras at this price point, the zoom on the camera is digital, which is useful but again shows up the lack of resolving power of the sensor.

The night mode uses infrared LEDs that D-Link says will light up dark areas up to 5m away. We



tested this claim in total darkness and the LED lights easily light up an entire room, with objects 5m away clearly illuminated.

The unit is also capable of selective motion sensing where you can specify distinct areas of the frame to be sensitive to movement. We tested this by selecting a path 100m away, and each person that passed triggered the recording of a video clip. We also set up an email alert where a frame was emailed to us each time motion was detected

Verdict

The DCS-5222L has a wide range of useful features. It's just a shame that with such a rich feature set, the device is let down by a poor quality image sensor. For a better image without pan and tilt, the DCS-2332L (reviewed below) is worth considering.

John Taylor

free DDNS service that lets you type in a single web address, which will always link to your home IP address. This is most likely dynamic and therefore changes from time to time (unless you pay for a static IP from your broadband provider). The camera itself does seem to live up to its 720p claim, and during testing the picture was crisp and sharp, even in its full-screen mode. Don't expect iPhone 5s video performance,

though, as the sensor in

the unit is 1/4in size - the smallest sensor commercially available. To put this in context, the sensor area is 7.68mm, compared with a low quality compact camera, which has a sensor area of 28mm, or an iPhone 5s at 17.94mm. The 1/4in sensor is standard in security cameras of this type, however, it would be nice to see higher quality sensors appearing in these devices. The image quality in the DCS-2332L is considerably sharper than that found in the DCS-5222L (reviewed above).

D-Link says that the internal infrared LED will light up objects 5m away in the dark, and this claim was confirmed in our tests. The LED light is noticeably dimmer than the

DCS-5222L's, though, which has an additional three LED units. However, we did use an external infrared LED to light up more distant areas which worked well. This could be useful to light up a whole garden or other dark area at a greater distance from the camera.

Verdict

The D-Link DCS-2332L camera is a solid performer and the weather sealing held up well during testing. The local and remote access software provides fine control of the video and recording options. As an added bonus an iOS mydlink app allows monitoring from anywhere. 🗵 John Taylor

£599 inc VAT

Contact

- kef.com/html/gb Read more
- tinyurl.com/promsx6

Specification

Powered speakers with active crossovers: 4.7 litre volume; 130mm Uni-Q magnesium/aluminium mid-bass drivers with 25mm concentric aluminium dome tweeters; 24-bit/96kHz USB DAC: 2x 20W (HF) and 2x 50W (LF) Class AB amplifiers: 49Hz-45kHz (-6dB) specified frequency response; balance and gain controls; 15W consumption per speaker 280x180x215mm (without rear heatsink, 243mm deep with); 7.5kg each



SPEAKERS

KEF X300A

There are desktop speakers and then there are loudspeakers that will also fit on the desk. The difference? It all comes down to the sound quality. In the case of the KEF X300A, we have a pair of active powered loudspeakers that were built for the best sound at a reasonable budget. That's not a KEF marketing guote, but our judgement based on extended listening.

They also happen to fit on the desk, helped by smart and tidy build, and by a custom adjustment switch on the back that optimises the acoustic characteristics for that kind of positioning away from free space.

On first sight, the KEF X300A looks like a regular bookshelf hi-fi speaker, albeit one with an unusual concentric driver arrangement. Instead of the classic tweeter above mid-bass driver lavout. the tweeter is embedded at the centre of the main driver. This KEF UniQ unit should help create a more even tonal balance from different listening positions, and assist stereo imaging - and this is demonstrably the case, as we found an unusually consistent sound from different locations.

Build and design

The KEF X300A may resemble the long-standing brand's typical fare of high-fidelity loudspeakers from the past few decades, but this particular speaker is self-powered, with four separate channels of amplification. It also features active crossovers, working in the analogue domain, for splitting the sound into treble and mid/bass frequency bands before it hits the amplifiers.

This is a crucial step, one used in professional PA and studio monitors, which really optimises the signal that reaches each speaker driver, as well as being a more efficient way to power any speaker.

In this system, the amps live inside the speakers, along with the associated electronics - and that includes D-A convertors (DACs), so you can feed the X300A speakers with a digital signal, up to the



24-bit/96kHz standard, through a single USB input.

It's also notable that the amplifiers used are high-fidelity Class AB designs (50W for mid/bass, 20W for treble), and not the musiccrushing Class D type that's found in cheap mass-market audio products.

Build quality is faultless. These speakers feel incredibly solid and they're weighty, too, at 7.5kg each. The front baffle is devoid of any grille or cover and is finished in matt black, with matching black trim rings. The main carcass of the speaker box resembles coursegrained metal, although it's likely a vinyl wrap over thick-walled MDF. Even so, it feels very tough.

On the back of the left speaker - the control unit of the pair - there's a Mini-USB 2.0 port for the digital audio input from a computer, as well as a 3.5mm mini-jack analogue input. A second USB port sends the signal to the right-hand speaker over an included USB cable. To tailor the sound for Desk or Stand use there's the small slide switch here, while a rotary trim knob lets you adjust overall volume gain.

Performance

These are incredibly revealing loudspeakers, and yet tonally very neutral - sometimes 'revealing' can be a euphemism for overly enthusiastic treble, for example, which gives a false impression of 'detail'. We ran them from a MacBook Pro and various iMacs over USB, playing a variety of 16-bit CD-ripped lossless files, as well high resolution 24/96 material.

Regular CD music had a clarity and sparkle that we've not heard at this price level before - the overall grip and cohesiveness of sound outclassed what you might have expected from, say, a traditional stereo hi-fi amp and loudspeaker combination of £300 each.

Voices were fixed naturally in the space between the speakers, and free of unwanted chestiness from the cabinet or sibilance from the all-metal drivers. Acoustic music played convincingly, capturing the air and space around instruments while showing authentic timbre of guitars or violins, for example. And the Uni-Q helped lock the sound such that the soundfield remained consistent in size and spread.

Steady stereo soundstaging was a creditable strength, which let us enjoy music from a wide range of listening positions.

Given weightier music material, the X300A could also step up and keep up. In fact their tight. focused bass made them great for rock and jazz material, remaining in control even at higher volumes where other speakers start sounding messy. The rear-ported acoustic design allowed them to go relatively low in the bass, and without troubling low-frequency port or box resonances.

Verdict

As a self-contained speaker system, the KEF X300A stands clearly above the style-first speakers that are usually sold to accompany a PC or laptop. These KEFs have a solid sound that adds real weight to music yet keep acoustically neutral with barely any coloration from the box or electronics. A majestic achievement. Andrew Harrison



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www.dinopc.com 0844 999 4123 Or visit our London office

£200 inc VAT

Contact

- asus.com/uk Read more
- tinyurl.com/ophxdlx

Specification

15.6in (1920x1080) WLED TN panel: pixel pitch 0.179mm; brightness 250cd/m²; contrast ratio 600:1; viewing angle 140/120: response rate 11ms; USB 3.0; power consumption under 5W: 379x236x8mm; 800g



USB MONITOR

Asus MB168B+

USB monitors haven't, up to now, had the best of times. Generally saddled with poor resolutions and lacking the hardware required to do iustice to smooth movies and fastchanging games, they've remained niche products. However, with the 15.6in Asus MB168B+ their time may have come - it boasts high performance, and a resolution that can stretch right up to 1920x1080.

It's stunningly light, too. Weighing 800g (2kg when in its case), it can be whipped out in a second. Its sleek looks and lack of bulk make it an item vou'll love to twist and turn around. The Asus comes with a Smart Case, the top of which folds out to provide a soft felt stand for the screen. We were initially sceptical about this arrangement, but it's more stable than you might think, and we had no problems with the panel slipping out of place. You have a choice of positioning it either at an angle, or bolt upright.

One word of warning. The nature of the case/stand means that the whole setup consumes a fair amount of desk space. If the idea is that you want the MB168B+ to take up the minimum amount of space on your desk, then you would have to devise another means of standing it up. It could be leant easily against a stack of books or wall. Assuming you were happy that it wouldn't slip over, then

vou would still be faced with the dilemma of how to get it to stand at the right angle for optimum picture quality. It's only a

TN panel, but the viewing angles are good for a screen of this type. Even so, some ingenuity might be needed if you wish to do away with the case/stand.

Using the screen itself is easy. It operates with DisplayLink. Install the software and then connect the monitor to your computer using the USB cable. You'll need USB 3.0 for the smoothest results, although it can work on USB 2.0 ports as well. You don't get the same level of performance here, but it's still more than enough for office applications.

The controls are simple enough, consisting of an on/off button and the brightness adjustment control. In fact, the screen will automatically adjust its brightness to suit the room conditions, but Asus also gives you the option of changing the settings yourself, just in case.

Ultimately, though, the success of this screen will depend on how good it is as a viewing device. It's only a TN panel, so you don't get a stunning colour palette. Nonetheless, the different shades



certainly no match for the likes of an IPS display, but as a standard TN panel it's more than sufficient. The screen coating is matt, so you won't be driven crazy by reflections.

In USB 3.0, the screen was able to handle full 1080p without any problems at all. The image was clear, and we were able to use the full extent of the panel. More critically, it has the grunt to work with video, and our HD movies were impeccably smooth.

It wasn't as perfect in games. The stated response rate is only 11ms, and there were occasions in our fastest moving arcade games when the graphics didn't change as smoothly as on our standalone 4ms monitor. For the most part. though, it'll be more than adequate. and only the most finicky of gamers will find it a problem.

Verdict

The MB168B+ does have some of the limitations of TN panels, but in other respects, it's stunning and the best USB screen yet. **I** Robin Morris

65in 4K TV

Panasonic TX-L65WT600

Contact ■ panasonic.com/uk

£5,499 inc VAT

■ tinyurl.com/m4jywou

Specification

65in 4K TV; 3840x2160 nixels: 2x 4W speakers with 10W woofer: Freeview HD. Satellite DVB-S2 tuners: 1468x863x56mm, 38kg



TV manufacturers continue to pursue a 4K agenda, even though standards (unlike Ultra High Definition images), aren't clear. Panasonic, though, has stolen a major lead over the competition. with the launch of its first 4K set, the 65in TX-L65WT600. At the time of writing, it's the only UHD screen able to support high frame rate content, thanks to the provision of both HDMI 2.0 and DisplayPort v2.1a.

Cosmetically, it looks much like Panasonic's current Full HD range topper, the TX-L55WT65. It's slim with a narrow chrome bezel and distinctive translucent lip.

There are two Freeview HD tuners onboard, the inclusion of

which opens up novel viewing options. A MultiWindow preview mode allows the main screen to be scaled alongside a vertical TV listing. This fast-zapping programme guide, with live window, can reflect either the DVB tuner, satellite feed or HDMI input. You can swap the channel positions as required.

The WT600 comes with a pair of remotes, a standard IR controller and a dumpy Bluetooth touchpad with integrated microphone, which can be used for voice control.

It has four HDMI sockets, only one of which is 4K HDMI 2.0 enabled, plus SCART and component/composite inputs, three USB ports (one for external hard drive recording), ethernet, an SD card reader and an optical digital output. Wi-Fi is integrated. The surprise is the provision of the aforementioned DisplayPort connection, which supports 4K UHD.

The screen shares the same Smart feature set as its stablemates. Apps include Panasonic's own 4K streaming service, allowing 50/60Hz 3840x2160 clips to be viewed, for which a connection of around 50Mb/s is suggested.

Of course, the set's main claim to fame is its eight-million pixel panel. To this with native 4K, we connected a media server loaded with UHD content from Eurosport, via DisplayPort. Unlike other 4K demo



£450 inc VAT

Contact

- asus.com/uk Read more
- tinyurl.com/jwv6pd6

Specification

DLP technology; 1280x800 native resolution: 16:10/16:9/4:3 aspect ratio; 350 ansi lumens; 3500:1 contrast ratio: 32db/24db (eco) noise; HDMI; USB; stereo mini jack; microSD memory drive; 2GB of built-in storage; display size: 20-120in: distance 3m: lamp life: 30.000 hours; LED lamp; 1.5W speaker; 143x130x35mm; 1.4kg



DLP PROJECTOR

Asus P2B

Gone are the days of 'portable' projectors amounting to multikilogram monsters. These days, people are more likely to opt for a svelte model such as the beautiful and exquisitely-sized Asus P2B.

Weighing 1.45kg, the projector slips comfortably from one hand to the other, and you can even unplug the power supply and rely on its batteries instead. These ran for only a smidge under Asus' stated hour and a half, although you can extract further juice by slightly decreasing the brightness rating.

A microSD drive (along with 2GB of internal memory) allows you to save presentations, pictures and other files to a suitable memory card, so you don't even need to take a laptop or other gadget with you. The Asus connects easily to mobile devices, such as smartphones and tablets. And if your device has MHL (Mobile High-Definition Link) compatibility, the projector will be able to recharge it even while it's being used to display images.

HDMI is the main interface for connecting Blu-ray and other players. You can also use the mini-VGA port to hook up the projector to a D-Sub. Apart from these options, though, there are no other ways of connecting the Asus.

The Asus is easy to use. It powers on almost instantly, and

does a good job of correcting the image automatically. We didn't have to fiddle around with the keystone settings to get a straight picture either. The device can also be powered off almost immediately, and requires next to no cooling down period.

The P2B is also very quiet, and in ecomode can be turned down to a virtually inaudible 24db - even its standard noise levels of 32db are hard to pick up unless the room is almost silent.

The picture is astonishingly large. and the short throw lens creates a 42in image from just 1m away. Given three times that distance, it can project an image approaching 120 inches. In a cramped boardroom, you'll have few problems creating a images that flood the senses.

The brightness rating, though, only stretches to 350 ansi lumens. While this is standard for ultraportable models in this price point, it's still a little disappointing. Even a bit of light can mar the image. If ultra-portable projectors do suffer from a significant drawback, it has got to be the lack of brightness. Even the considerably more expensive Dell M900HD's (tinyurl. com/maxgrg3) rating of 900 ansi lumens suffered from a few issues, despite being almost three times

as bright. If you'll be moving this from one location to another, you need to think about whether you'll be able to guarantee good conditions.

Assuming you have a relatively dark room, the 1280x800 images are smooth and clear. The palette is slightly overcast, and the generous 3500:1 contrast ratio (created by the ever-impressive DLP technology) helps deliver decent colour depth for the price and size. For PC work, presentations and images with a little video added, the Asus is more than adequate.

Sound isn't bad, if a little lacking in power and bass. It's comfortable to listen to for short bursts, though.

Verdict

The stylish Asus P2B has amazing portability. The short throw lens and easy setup are excellent, and sound levels are low. As ultraportables go, this is a very good choice. **Kobin Morris**



material we've seen, this footage was shot at 60Hz.

While UHD clarity always impresses, high frame rate 4K footage of rally car driving and equestrian events is stunning. The set also makes for a totally outrageous gaming monitor, when hooked up to a PC sporting a 4K

graphics card. Playing Project Cars at 60Hz via DisplayPort on a 65in panel is the next best thing to sitting in the passenger seat. A growing number of cards support 4K, including nVidia's Quadro and GeForce series, as well as AMD's Radeon HD 7000 and FirePro models.

The WT600 also does a fine job of upscaling Full HD sources, be they from its own tuner or Blu-ray. The set's 4K Hexa-processing engine references a database of textures and applies them dynamically; alternatively you can scale 1080p inputs to the pixel dense display.

The screen's black level performance is satisfying, and not particularly prone to greyness (an

LCD trait), even in full black out conditions. Colour vibrancy is also high. While edge-lighting uniformity is good, the set does struggle to maintain colour and contrast when viewed off-angle, though.

Audio is the Panasonic's weakest feature. A low level of amplification and downward/rearward firing drivers make for a muddy noise.

Verdict

It may be early days for 4K Ultra HD, but this HDMI 2.0 model hints at what we can expect. In the meantime, thanks to the provision of DisplayPort, you can hook up a PC and enjoy the set's ultra hi-res 2160p talents straight away. 🗵 Steve May

£683 inc VAT

Contact

- samsung.com/uk Read more
- tinyurl.com/m3h55b5

Specification

20.3Mp compact system camera; 23.5x15.7mm; CMOS sensor; ISO 100-25600 equivalent; 3.3lin AMOLED screen; USB 2.0 output; HDMI output; Wi-Fi; 122x63.7x40.7mm; 284q (body only)



COMPACT SYSTEM CAMERA

Samsung NX300

The NX300 is Samsung's latest compact system camera, and while in many ways it's similar to the company's previous offering, the NX210 (tinyurl.com/pp4zu4q), in a number of ways it's an improvement.

Our test NX300 came with a 50-200mm lens and on the whole, the image quality offered is excellent from the 23.5x15.7mm 20.3Mp CMOS sensor. Images are vibrant, colour reproduction is accurate and white balance is exemplary.

Our only quibble is that there's the tiniest amount of softness - not a great deal, just enough that images aren't absolutely sharp and may need tweaking in post-production. However, noise levels are almost undetectable up to reasonably high ISOs.

Video quality is similarly very good, providing smooth videos in Full HD. The position of the record button on the top right on the rear means you're unlikely to inadvertently press it while trying to take still shots. It's a shame there's

no option for plugging in an external mic, though, as noise from the wind can interfere.

Samsung describes the styling as 'retro modern', which it has achieved well and build quality is good. Although the back does feel a little plasticky, the brushed aluminium top makes up for it somewhat. At 122x63.7x40.7mm the size is similar to many other CSCs out there, and at 284g it's not too heavy either.

As is common with CSCs, there's no viewfinder so your shots can only be composed on the live view AMOLED screen. Like its competitor, the Sony NEX-6 (tinyurl.com/kucuwpr), the NX300's articulated screen can be tilted up by 90 degrees and down by 45 degrees to allow for awkward angles.

However, the Samsung camera has a slight edge over Sony's as at 3.31 inches it's fractionally bigger than Sony's 3in, and perhaps most importantly, it's a touchscreen, which the NEX-6's isn't. We found it bright, crisp and easy to view even in direct sunlight.

The NX300 is easy to navigate without too many buttons cluttering up the rear. Unfortunately, there's no wheel for speedy scrolling when you've taken a lot of images. There is a handy button for instantly sending photos and video via Wi-Fi to any smartphone, tablet or TV with the necessary capabilities, though.

Verdict

The NX300 is a great CSC, with decent image quality for both stills and video and good build quality. It's easy to use, too. However, the price tag is a little steeper than similar cameras. Becca Martin

£399 inc VAT (8GB)

Contact

- lytro.com
- Read more
- tinyurl.com/k3xq3a6

Specification

8x optical zoom; constant f/2 lens; 38.55mm back-lit LCD display with glass touchscreen; 4lx4lx112mm; 214g (body only)



CAMERA

Lytro camera

The Lytro camera is an amazing technological achievement: a marvel of design that's like nothing else on the market. So what does the Lytro let you do that other cameras don't?

Despite the Lytro's unusual shape, the process of getting it to take photos is the same as a conventional camera: you point the lens end of the camera at your subject, frame with the large postage-stamp-sized touchscreen at the other end, touch where you would like the camera to sample the shot's exposure and then press the shutter button.

A mix of smooth metal and gridlined rubber, it's oddly reminiscent of the brick towers of industrial factories. There are four colour variants: silver, blue, pink and red. The first three have 8GB of memory built in for £399 - the red one has 16GB and costs £100 more.

Its square tube is about twothirds lens – the metal end – with a few controls on the rubber grip. The only real controls are the round indented shutter button, a set of bumps that control zoom and an on/

off button on the bottom, next to a pop-out rubber cover that hides a USB port for connection to your computer. Everything else is controlled through the touchscreen.

After you've taken a few photos, you can export them to your computer using the supplied Lytro Desktop. Here you can download your photos, check if your shots have come out okay, apply a range of stylistic filters and output images to a gallery page on Lytro's site (or post individual shots to Facebook).

After downloading the images to your computer, you must let Lytro Desktop process the images. Be warned, though, that this can take a while on older computers.

The filters you can apply to images are what you'd expect in the age of Instagram - a mix of retro and silly, although some do

test the Lytro's knowledge of a photo's depth. So you can turn the background of an image into a mosaic or apply circus mirrorstyle warping without affecting the foreground. The best is 'Pop', which emphasises the difference in sharpness between in-and out-of-focus areas for a pleasing effect.

You can also use the app to view your gallery on the Lytro site, post to it, and post to Facebook, too. It's slick and seamless, though, the photos aren't transferred to your iOS device.

Verdict

The Lytro camera lets you change the focus of your photos after you've shot them. Unfortunately, the concept still has some way to go. Neil Bennett







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New milestone in IPS display technology

This 58.4 cm (23") Full HD model sets a new milestone in IPS display technology. It boasts a great design and offers extensive connectivity options, such as D-Sub, two HDMI connectors and a DisplayPort. Its practical MHL interface even allows you to directly hook up your Android mobile devices to the monitor. IPS is known for vivid colours as well as high viewing angle stability. Until recently mainly used by professionals and enthusiasts, the competitively priced i2369Vm proves that this technology and high standard has become affordable to all. The display comes with a 250 cd/m² brightness, a typical contrast of 1000:1 (dynamic contrast: 50,000,000:1) and a 6 milliseconds GTG response time for your ultimate viewing experience.





Multiple inputs for enhanced multimedia capabilities

PRODUCT DETAILS

- D-Sub, 2x HDMI, Display port
- · 6 ms GtG
- 1920 x 1080 @ 60 Hz
- MHL, -3°~+21° Tilt, VESA Wallmount
- 250 cd/m²











5 best apps for shopping

Chris Martin compiles the best e-commerce apps to help you through the Christmas sales frenzy

hristmas is just a few weeks away. If you haven't finished buying all your presents, or you fancy a little treat for yourself, you probably aren't much looking forward to heading out into the cold, damp weather and trudging through a busy shopping centre. Thankfully, it's quite easy to save yourself the bother: just give these free mobile shopping apps a try.

We think shopping is best done when you're sat at home in the warm, with a nice drink and your feet up. You can buy almost anything you like from your smartphone or tablet, and get it delivered to your home or office. This takes out much of the hassle of finding and buying presents.

Here, we've selected five of our favourite mobile apps for online shopping.

eBav

ebay Price: Free

Available on: iOS, Android.

BlackBerry and Windows Phone eBay is both a great place to find a bargain on new- and used products, and a useful marketplace in which to sell off your old stuff and make some extra cash. You can find almost anything with this app, which has an easy-to-use, stylish interface.

Listed items take the form of either fixed-price 'Buy it now' or traditional bidding auctions. You can do all the things you would do on eBay's desktop website, including searching for and adding items to your Watch list. Plus, notifications on your phone or tablet mean you're less likely to

miss the end of an auction, and you can use the device's camera to scan barcodes instore and quickly compare online pricing.

amazon Amazon Mobile

Price: Free

Available on: iOS, Android

and Windows Phone

Amazon is the go-to shopping site for many consumers, and the e-tailer's mobile app offers an ideal way to browse the gigantic catalogue without switching on your PC. Amazon Mobile lets you access your shopping basket, wishlists, payment and shipping options, order history, 1-Click settings and Prime membership account. The app also lets you purchase items from Amazon's Marketplace.

Like the eBay app, Amazon Mobile lets you scan in barcodes with your device's camera, allowing you to quickly and easily compare instore and online pricing.

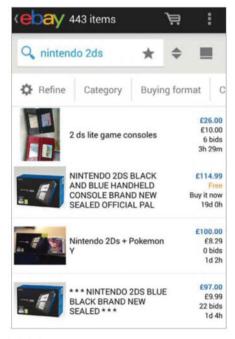


HotUKDeals

Price: Free

Available on: iOS and Android

HotUKDeals is a great way of finding products at the best prices, and you don't even need to sign up. Users post deals found both online and instore, and others vote to determine whether the deal is hot. You can browse the hottest, newest, most discussed, local and specific-category deals. If you're looking for a particular product you can use the search feature. Plus there are sections for freebies, vouchers and competitions.



Quidco

Price: Free

Available on: iOS and Android

If you frequently partake in online shopping, you could earn some cashback with an app such as Quidco. The service is free to use and offers cashback at more than 3,500 top retailers. Quidco lets you view nearby instore (if you're going to head out) and online cashback deals, with the ability to browse by category. As well as cashback. which can be as much as 30 percent, Quidco lists vouchers codes and offers that can be cashed in from your phone.



What Other Customers Are Looking At Right Now









Groupon Price: Free Available on: iOS and Android

We all like a good deal, and Groupon is ideal for putting the best offers on your radar. The app delivers daily offers and savings of up to 90 percent on events, getaways, restaurants and more. Groupon works on both phones and tablets, which is ideal for buying and using vouchers on the go.

Groupon's mobile app lets you browse deals by category, so you can find a deal suited to your interests or use the map view to find ones nearby. The Groupon app also has an Android widget that lets you share a deal with family and friends via social media.

MOBILE PAYMENTS APP

PayPal

Free

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paypal.co.uk

Read more

■ tinyurl.com/mxecn4p

System requirements

iOS 6.0 or later, 24.7MB storage; Android 2.2 or later, 14MB storage

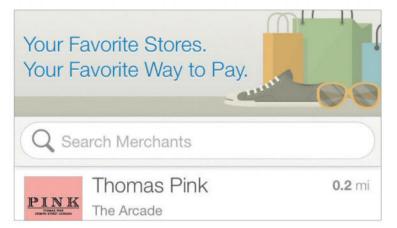
You carry your smartphone everywhere, so wouldn't it be great if you could use it to pay for good and services? That's the idea behind the new PayPal app, which has been completely redesigned.

Like Google Wallet, which isn't yet available in the UK, PayPal's app is all you need to buy lunch or pick up some emergency inner tubes at your local bike shop.

You use the Local section of the app to find nearby shops and restaurants that accept PayPal payment. Choose one and you can 'check in' to the store - maybe even order food ahead of your arrival. Above the list you may see offers, such as a free dish at a restaurant.

The shop will have a device that can see who's checked in and, when it comes time to pay, they scroll through the list and find you by your photo. They can then charge you and your app informs you that the transaction is complete.

Depending on the shop or restaurant you might be able to see



a breakdown of the bill or even be able to split it between fellow diners.

Aside from the privacy issues. the system is clunky and slower than using your credit card or a contactless debit card. It might be useful if you've forgotten your wallet, but the number of shops accepting PayPal is limited.

The other half of the app allows you to manage your PayPal account, and see your current balance and recent transactions. Tapping on a transaction reveals almost no additional information: you can't see what you bought (or sold), nor the seller's (or buyer's) address.

You can send money to friends or family, or pay for goods and services outside of eBay. It's now much clearer who has to pay the fees.

A Wallet tab shows which bank accounts and cards are linked to your account, and you can choose in the settings which one is the default.

Verdict

The redesigned PayPal app has a host of changes, but the new payment system is clunky at best. There's clearly still work to do before this digital wallet becomes your preferred payment method.



HMV Music

Free

Contact

■ hmvdigital.com

Read more

■ tinyurl.com/ozbaeg7

System requirements

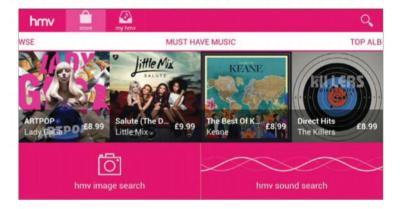
iOS 6.0 or later, 5.3MB storage; Android 2.2 or later, 5.4MB storage

When I was a lad, Saturday afternoons weren't complete without a visit to Our Price or HMV to peruse the latest records. These Goliaths of the high street may be disappearing in physical form, but just as vinyl gave way to CD, which begat the digital download, the HMV name lives on in the form of an online music store that can be accessed via this app: HMV Music.

There are many online music stores, but the HMV app offers something different: like Shazam, you can play music and it will recognise the record and the artist. You can also sing your version of a song. Then you can buy the track.

It's a neat idea, but not one entirely borne out in the usage. HMV Music is an app for Android and iOS, but it's worth considering only for the former. That's because Apple won't allow any music store other than iTunes into its walled garden.

The audio recognition works okay. On neither iPhone nor Android phone could we fool HMV Music



when playing it records from a variety of acts, provided they were in its catalogue, of course. The Beatles' Help! was immediately recognised, but we were then offered the chance to buy a cover version of the song by an unknown hand. No thanks.

We had some fun with singing our own versions of famous songs, and found that it worked on occasions when there was no ambient noise and we were feeling particularly tuneful.

The other way by which you can use HMV Music is to recognise music via album artwork. But we

couldn't get the app to recognise any of the album covers we showed it, even when the app had previously recognised the music.

Music track pricing is fairly standard at around 99p for individual tracks and £8.99 for albums. All music is DRM-free, too.

Verdict

A neat app that looks good and in parts at least works well. We wouldn't bother with HMV Music for use on the iPhone, but the Android app offers an intuitive way to buy that tune you heard on that advert, at a decent price. 🗵 Matt Egan



ENTERTAINMENT APP

Wuaki.tv



Contact

- uk.wuaki.tv
- Read more
- tinyurl.com/mzz5ssd

System requirements

iOS 5.0 or later, 17MB storage; Android 3.2 or later, 2.8MB storage

charge a monthly subscription for unlimited streaming of films and TV programmes, and Blinkbox offers individual rentals and purchases. Wuaki.tv goes one further and brings to the table both options. It's a sort of hybrid streaming service to which you can quickly log in via a Play.com account.

Whereas Netflix and Lovefilm Instant

The service

Like Blinkbox and other such services. Wuaki.tv lets vou buv content outright. It typically offers rentals for £3.49 (more for a new release), and TV series for £10- to £20 depending on their age. These prices are fairly standard, but it's worth installing Wuaki.tv and then shopping around for the best prices.

The advantage of using this method in addition to a subscription service is that you can watch new releases much earlier. Wuaki tv is a good match for Blinkbox and the Google Play store in this regard.

You can't download purchased content, but Wuaki, tv savs it is working on a feature that will allow you to download content to a PC.

This will mean that for the same price, or possibly even less, you can buy the boxset and rip it to your device. Rentals can be watched as many times as you like over the 48-hour period following purchase.

If you prefer the monthly subscription route then Wuaki Selection costs £4.99 per month. which is £1 cheaper than Netflix and Lovefilm Instant. Don't be fooled into



doesn't work like that.

As the name suggests, only a selection of content is available to stream. Wuaki Selection might be cheaper than its rivals, but the choice is more limited. It's likely that, if you pay the monthly subscription, you'll regularly find yourself wanting to watch films and TV shows that are available only to rent or buy.

The apps

Wuaki works fine with an iPad: but while an Android app is available, it might not be supported on your device. The app requires a device running Android 3.2 or later with a 4in-plus screen. Of all the Android phones and tablets we've tested over the past year or so, Google Play allowed us to install Wuaki.tv on only a handful of them.

"You can try installing it on other devices, but we cannot guarantee proper operation," warns the firm. Our advice is to thoroughly test the

> app before parting with any money.

If you can get the Android app to work then it offers a perfectly good experience, but the iPad app looks nicer and runs smoother. It displays content in page form, allowing you to flick through the catalogue like you would the pages of the book; the Android app presents a simple list of content.

Several filters help you find something good to watch, for

example new releases, recently added, genres and recommended. You can also filter titles by publisher in Wuaki Selection. However, the regular TV selection on the Android app has no filtering options.

Wuaki.tv doesn't support any kind of video output, be that HDMI or AirPlay, so your films and TV shows are restricted to the small screen of your phone or tablet.

We like the ability to pin content to a wishlist. There's also a library section in which you can browse purchased content which vou've paid for. Both can be synchronised across multiple devices.

HD or no HD

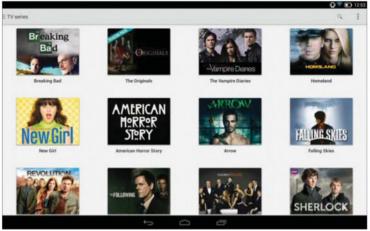
Wuaki.tv has almost the opposite problem to Blinkbox: despite the HD label on a movie's cover art, it can be viewed only in standard definition. HD content is currently reserved for Samsung Smart TVs and the Xbox 360. Only around 25 percent of content is available in HD, so in many cases it's standard definition or nothing.

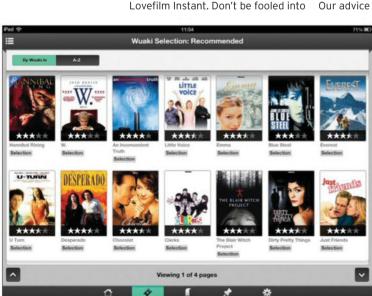
This means you can purchase but not watch HD content on the Android app, while on the iPad app you can view only purchased content stored in your library.

We've also noticed in the small print that 'purchased' content will be available for only three years, which is just plain ridiculous.

Verdict

Wuaki.tv offers cheaper subscriptions than its rivals, and it offers pay-per-view content. However, numerous limitations in both the service and apps, plus a lower-quality catalogue, reduce its value. Wuaki.tv is worth having on your device only to check rental prices. **Chris Martin**





INTERNET SECURITY SUITE

Webroot SecureAnywhere Internet Security Complete 2014

£65 inc VAT (5 PCs)

Contact

- webroot.com/gb/en Read more
- tinyurl.com/lz93qbc

System requirements

Windows XP.SP2/ Vista/7/8: 32- and 64-bit: Celeron/K6 or better: 128MB RAM: 10MB drive space

Protecting your PC from malware is important, but these days it's only part of the task. If you also have a phone, a tablet or a netbook running other operating systems, you need something that's multi-platform.

Webroot SecureAnywhere caters for Windows, OS X, iOS and Android. and the Internet Security Complete package covers five devices, so you can mix and match. We looked at how well it worked on Windows.

When the suite installs, it scans your operating system, making default settings for its main anti-virus, firewall, identity and anti-phishing modules. You can tweak these later if you want.

On opening the program, you'll see that the main screen is mainly text based, with a menu down the right-hand side showing the key elements of the software.

Webroot gives you the option to back up and sync your files online, and provides a generous 25GB of storage on its servers. This can be split between the five devices in the licence, though, it's most efficient to configure it as a common pool and share access between them.

We saw some erratic test times. with the initial scan of our 50GB file basket checking 27,012 files and completing in 59 minutes, 43 seconds, which gives a slow 7.5 files/s. However, a repeat scan took



SECUREANYWHERE is a multi-platform suite that scans for malware

an even slower one hour. 10 minutes to examine 18.094 files.

The test site, av-test.org, rated Webroot 2014 at 12.5/18 in its most recent group test of Windows IS consumer products. This places it sixth from bottom and a long way behind the leaders. It does very well under the Performance heading which measures host performance hit, with a full 6/6. This reflects our own results, where a 1GB file copy took only 12 percent longer to complete with a scan running in the background, than without.

The suite falls off in the other two categories, though. It scored 4/6 in Usability, with a total of 27 false detections over the two

months of the test. Perhaps most worrying, though, was its 2/6 under Protection, which measures its ability to protect against Malware. Although it did pretty well at detecting widespread threats, the software averaged only 81 percent over two months with zero-day attacks, when many rival offerings were well into the 90s.

Verdict

Webroot's utilitarian approach may appeal to those who shun ostentatious software, and it's useful to have a suite that can protect up to five devices at once. The problem is the question mark over its ability to spot malware. M Simon Williams



VIDEO-EDITING SOFTWARE

PC ADVISOR

Adobe Premiere Elements 12 RECOMMENDED

£63 inc VAT (upgrade) Contact adobe.com/uk Read more

£78 inc VAT

■ tinyurl.com/pygte69

System requirements Mac OS X 10.6 or later; dual-core processor; 4GB RAM; 10GB hard disk



Premiere Elements has traditionally been packed with features. Its multi-track timeline allows you to perform complex editing tasks, and it completely outguns Apple's iMovie with its wider range of transitions, filters and animation effects. However, that array of tools also meant it was far more complicated to use than iMovie.

To make the program more appealing to new users, Premiere Elements 11 introduced two separate editing modes. Expert continued to offer access to the program's full array of editing tools, while the new Quick mode provided a simplified editing interface with a single-row editing timeline.

Version 12 continues making the program more accessible by introducing another editing mode called Guided Edits. This provides step-by-step help with a number of common video-editing tasks.

By default, Premiere Elements launches into Quick mode, with a large Add Media button to help get you started. Once you've imported one or more video clips, click the new Guided tab that sits at the top of the screen, and you'll see a list of different editing tasks that the program can help you with.

If you're new to the software, select Getting Started and you'll be given a brief introduction to basic tasks, such as using the playback

controls, trimming clips and adding transitions. Other guided edits look at more complex tasks, including adding titles or creating picture-inpicture effects.

The help provided by these guided edits is comprehensive. A floating window gives step-by-step instructions on how to perform each task, with graphics and icons to identify the tools under discussion. If the guided edit requires you to select a particular menu option, then that menu will open automatically and a big yellow animated arrow will point towards the option you need.

For more experienced users Premiere Elements now has 'adjustment layers', which can be



INTERNET SECURITY SUITE

Bullguard Internet Security Suite 2014

£50 inc VAT (3 PC licence, 1 year)

Contact

■ bullguard.com

Read more

■ tinyurl.com/jwoshyb

System requirements

Windows XP/SP2 32-bit: Vista/7/8 all 32- and 64-bit: 1GB RAM: 850MB drive space



Over the past couple of years Bullguard has gone from being an internet security suite you might find bundled with a new PC, to one you'll want to add yourself. Bullguard Internet Security 2014 continues this tradition and includes all the core modules, with anti-virus, firewall, spam filter, safe browsing and parental control, but adds a vulnerability scanner, tune-up and online backup.

The interface has had a revamp: a clean look that's largely for the better, but with one oddity. Each of the suite's main modules is assigned a control panel within the home screen, but this isn't wide enough to show all nine. There's a slider underneath to move left and right. We can understand this approach for customers with small screen devices, but why isn't the home screen window resizable, for those with bigger screens? It's irritating to use.

Initial setup is largely automatic and key protections are nut in place without a lot of hassle. We like the slide-up alerts Bullquard uses when it grants internet access to programs, but you can turn them off if you want. We also appreciate the automatic run of its tune-up module, which gives a exhaustive report of apps tuned and caches flushed.

Backup facilities are unusually comprehensive, with the ability



Not every control panel fits on the HOME SCREEN, which can't be resized

to set up different schedules for different files, folders ad categories, and also to control how many backup copies are kept and to set different schedules for removing old ones.

Scanning our 50GB test file basket took one hour, 39 minutes and targeted 1,303,933 files, which is pretty comprehensive and gives a scan rate of 219 files/s, the second highest we've seen. Surprisingly, this didn't change much when we reran the scan: this time 855.973 files in one hour, nine minutes, so not a lot of fingerprinting of unchanged files.

We didn't measure much of a resource hit, as the time taken to copy our test 1GB file rose by only 16 percent when there was a scan running in the background, from 43 to 50 seconds.

The test site, av-test.org, rated Bullguard at 14.5/18, which is a good, though not group-leading, result. When you break it down, you see that in the Protection section - it's competence in dealing with widespread and zero-day attacks it scored 5.5/6.0 and did the same in the Usability section, too, which looks at false warnings and blocks when working on typical PC tasks.

The main area where it dropped. to 3.5/6.0. was in Performance, the resource hit that it places on its host while working.

Verdict

We like Bullguard Internet Security 2014 a lot. It's one of the most comprehensive security suites on the market. Simon Williams



Premiere Elements 12's **GUIDED EDIT** mode is great for those who want to learn more advanced editing techniques

used to apply effects to multiple clips within a movie project. To use these, you'll need to work with the multi-track editing timeline, found in Expert mode.

An equally useful new addition is Auto Smart Tone, which adjusts a video's lighting and colour in order to improve visibility or create a more

dramatic effect. You can either allow it to work automatically or click the Custom button, which displays a grid and four automatically generated thumbnail previews. Each of these uses different lighting and tone settings, and these can be modified until you achieve the desired effect.

Premiere Elements also includes a companion program, called the Organizer, that lets you browse and search your photos and video collections, and organise them into albums. It also allows you to create 'mobile albums', so you can share photos and videos across all your devices. In order to use these, you'll need to sign up for Revel - in effect, is Adobe's version of iCloud.

There are Revel apps for the Mac, Windows and iOS devices, so you can share your photos and videos across all your devices. It's also possible to view your files online using a web browser. Unfortunately, the service is only free for the first month. After that you'll have to pay for a subscription.

Verdict

If you're a home movie buff who wants to create more professional results, then this provides all the editing tools you need. The Guided Edit mode also makes it a great option for anyone who wants to learn more advanced editing techniques. **Cliff Joseph**

WINDOWS UTILITY

Greatis Software BootRacer

Free Contact areatis.com Read more ■ tinyurl.com/qyq3994

Specification

Windows 2000/7/8/Server 2003/Vista/XP



There's nothing more frustrating than turning on your computer and watching programs slowly load up. Why are they taking so long? Well, wonder no more: BootRacer can take the mystery out of PC startups.

After a free download and install. the utility will be ready to time your next PC restart. Though you can't see it, it starts timing the moment the PC starts the bootup process.

Once the desktop opens, a small dual timer appears in the bottom right-hand corner of the screen. The top timer counts down the seconds until your PC has finished booting up the necessary files to be responsive. while the bottom one counts the total time it takes to boot.

A summary screen appears when your PC has finished booting up to review your time and score. Digging deeper, you'll see a breakdown of what section of the bootup took the most time and a star rating compared to other PCs that upload their results. You can choose to submit your own results to discover



BOOTRACER'S main menu provides a breakdown of a PC's startup time

your global rank and help improve future versions of the utility.

Options are scarce, though. You can, for example, choose whether you want BootRacer to run every time you boot up and what statistics you want to record. A history page will give you every previous boot result and the change in time from

the previous boot. You can also add notes to each result and upload these to the global rankings.

Verdict

BootRacer is a great tool for monitoring your PC's health, but don't expect it to improve performance. M Alex Cocilova

VIDEO CONVERSION SOFTWARE

Wondershare Video Converter Ultimate 6.5

£37 inc VAT Contact wondershare.com Read more

■ tinyurl.com/pgq7hub

Specification

Windows 7/Vista/XP: 1GHz CPU or above; 128MB RAM (256MB recommended); any VGA card; 26.59MB disk space



If you need more options than those offered by free video conversion applications, then you may want to look at Wondershare's Video Converter Ultimate 6.5

The interface is easy to use drag the file you want to convert to the program's window, select a destination device from the dropdown list on the right and click the convert button. Although there's a decent selection of Apple, Samsung and Motorola devices, that's where the list ends. Owners of other brands will need to know their device's format and resolution, and select this from a separate list.

Although the program no longer rips commercial DVDs, it will still author and burn discs. There's also a good selection of menu templates, and you can change the text and background image, as well as add your own music to the menu.

You can also download and convert video from the web. Wondershare provides an add-on for the major browsers, and you can



After SELECTING A DESTINATION for your file, click the convert button

also cut and paste a URL into the program. During testing, we didn't have a lot of luck with the plug-in/ add-on outside of YouTube, but the program downloaded from a wide variety of URLs employing Flash video, but not Silverlight.

Verdict

Many users will be fine using a free application, but Wondershare Video Converter Ultimate 6.5's feature list makes frequent movie conversion much easier. Jon L Jacobi



GAME

The Stanley Parable

£78 inc VAT £63 inc VAT (upgrade)

Contact

- galactic-cafe.com Read more
- tinyurl.com/pv2x6v5

System requirements

Windows XP/Vista/7/8: 3GHz P4, Dual Core 2.0 (or higher) or AMD 64X2 (or higher) processor: 2GB RAM: DirectX 9-compatible graphics card with support for Pixel Shader 2.0b; 3GB drive space

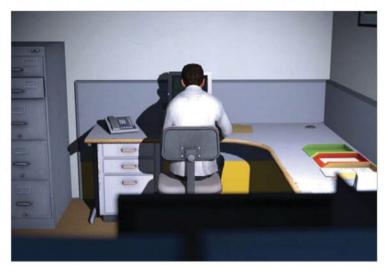


Whether you decide to follow the NARRATOR'S **INSTRUCTIONS** and go down that strange-looking corridor is up to you Ooh, this one's a tricky beggar to describe without giving too much away, or without making it sound desperately dull. For instance, summarising it as 'a comic look at the existential crisis of hapless office drone' might understandably lead to someone to believe it's tedious navel-gazing, like some particularly indulgent mumblecore indie film. Believe us, The Stanley Parable is nothing like that.

The reality is that this game is very funny, packed with surprises and curveballs, and an absolute treat for anyone who's spent a fair amount of time playing videogames. The office drone aspect rapidly fades away in favour of strange, tragicomic spectacle and constant shaking-up of what's required of you.

It's an affectionate satire of the choice and consequence, the moral dilemmas and the dramatically branching plots found in some of the most highly-feted videogames - for instance, Mass Effect 3 or Bioshock. Only rather than potentially universe-destroying decisions or agonising crises of conscience over who lives or who dies, you're choosing whether to obey an unseen, apparently beneficent narrator when he says you should take the left rather than the right door.

The Stanley Parable began life as a mod for Half-Life 2 a couple of years ago, but has now been made over, extended and worked into something extremely slick, strange and sharp. You'll probably recognise the graphics engine behind Portal



Are you ready to prove that you're not a MINDLESS OFFICE DRONE?

and Left 4 Dead, and in the case of the former, the acid-tongued narrator here will remind you of the similarly snarky GlaDOS, but other than that, The Stanley Parable has little in common with Valve's games There's no shooting, no vehicle sections, no action - little more than walking and the occasional optional jump or button push, in fact. Yet the game wrings so much from so little.

The heart and soul of the game lies in the Narrator's outrage and scorn if you disobey him - this is a wonderfully written and performed game, and a very funny one indeed. But more than that, the very situation you're in changes both dramatically and absurdly, depending on what you choose to do or not do. We're on dangerous territory here, but suffice it to

say that the rug will repeatedly be pulled from under you, no two playthroughs will be the same and, if you take the right/wrong turns, you might even encounter cameos from other games. Aargh, we've said too much.

Most of all. The Stanley Parable will get in your head. You'll become determined to prove the Narrator wrong, to prove you are a free being, not a mindless drone who follows orders - a person, not a videogame character.

You'll become determined to uncover every possible permutation, every one of the absurd, comic, bleak, unexpected endings. You'll marvel at sights you could never possibly have predicted. And you'll play again and again, unsure whether you're really starting a new game each time or having your own personal Groundhog day.

Then you'll suggest that a friend plays The Stanley Parable, and you'll find yourself struggling to describe it without giving too much away or making it sound desperately dull. Good luck. You're going to need it.

Verdict

The Stanley Parable is steeped in videogame knowledge, history, affection and contempt. It'll make you laugh, it'll make you wince, it'll make you reflect on just what the hell you're doing with your time, and it'll make you play it again and again and again. 🗵 Alec Meer





GAME

The Wolf Among Us

£18 inc VAT (five-episode season pass)

Contact

- telltalegames.com Read more
- tinyurl.com/oo2gxao

System requirements

PC system requirements: Windows XP Service Pack 3; Core 2 Duo 2GHz or equivalent; 3GB RAM; ATI or nVidia card with 512MB RAM; DirectX 9.0c-compatible graphics card; 2GB drive space. Mac system requirements: OS X Snow Leopard (10.6.X); 2.3GHz Intel processor; 4GB RAM; 512MB nVidia or ATI graphics card; 2GB drive space.



US features fairy tale characters, including Snow White's Magic

THE WOLF AMONG

Snow White's Magic Mirror and Bufkin, a winged monkey from The Wizard of Oz Having been unexpectedly elevated from jobbing studio to superstar status by the much-acclaimed, notoriously heartstring-pulling adaptation of The Walking Dead, expectations for the next release from Telltale Games are high.

To some extent, it's on safe ground with The Wolf Among Us, which like The Walking Dead, is based on a comic (Fables, in this case) and very much story- rather than action-focused. Rather than zombies and bickering survivors, here the game is set in an alternative New York where the denizens of fairy tales and children's fiction are eking out a secret, dangerous life among the unknowing 'Mundies', or mundane humans.

Whimsy is in short supply, though - this is a world where Mr Toad is a foul-mouthed slum landlord, Beauty and the Beast are an arguing couple and Snow White is a disillusioned public official who resolutely refuses to discuss her apparently torrid life with the seven dwarves. You, meanwhile, play as Bigby Wolf - the Big Bad Wolf from Little Red Riding Hood, who's seeking redemption for his violent past by acting as 'Fabletown's' loose cannon sheriff.

It's a silly setup, but an appealing one – it's played straight and film noir-styled. As such, it's not long before Bigby discovers murder on his doorstep, and grudgingly sets about investigating who's killing off Fables and why.

As with The Walking Dead, though, this is nominally a pointand-click adventure game, there's



Getting on the wrong side of SHERIFF BIGBY WOLF is a very bad idea

very little indeed in the way of puzzles or even interactive objects in any given screen. It's primarily a game about dialogue, and selecting responses that both reflect your own character and have major longterm effects on later outcomes

Split personality

Bigby's an appropriate avatar for this, given that his nature is torn between duty and the feral aggression writhing just beneath his hardbitten gumshoe skin. Pick aggressive conversation options and you might well unleash the inner wolf, resulting in epic smackdown scenes; try to keep the peace and you're more likely to make allies of the dangerous, grumpy creatures of Fabletown.

This being just the first of five two-to-three hour episodes, many of

these consequences haven't made themselves known yet, but already the story is moving in fascinating and even harrowing ways: the temptation for an immediate second playthrough to attempt rectification of disastrous events is strong.

At times, the lack of interactivity can be a problem. The game will pat you on the head and tell you that you're a good detective when all you've done is click on the sole available option, for instance, while visually appealing screens and items are often nothing but backdrops. At other times, Wolf Among Us far too brazenly flags up that you're about to make a critical choice, enormous onscreen prompts transforming it from thoughtful character study to a multiple choice test.

The story and the intrigue propel the game along neatly, though, and anyone put off by the mawkish qualities of the central father-child relationship in The Walking Dead will likely find the combo of grit and fantasy here a little more compelling. In a big way, it's Telltale playing things safe, but this is a fascinating, oddball world, and the first episode ends on enough of a shocker that the second one can't arrive soon enough.

Verdict

The Wolf Among Us is a beautiful and offbeat game that's a natural, if perhaps less emotive, successor to The Walking Dead. It's more of a branching story than an action or puzzle game, though.

Alec Meer





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Contact

- fujitsu.com/uk
- Read moi
- tinyurl.com/nna9sta

Specification

600dpi (1200dpi mono); USB 2.0 interface; 285x283dpi optical resolution; recommended maximum thickness 30mm; 210x156x383mm; 3kg; 3-year warranty



Read more ■ tinyurl.com/nwts5mp

2.5in SATA drives, up to

95mm thickness: SATA

Revision 2 interface:

256-bit AES hardware

123x77x14mm; 94g

Build

encryption; USB 3.0 cable;

Specification

OVERHEAD A3 SCANNER

Fujitsu ScanSnap SV600

Scanners come in a multitude of shapes and sizes, from sheetfeds to flatbeds, from large and fat, to small and svelte. Never, though, have we come across one like the SV600.

Tall and thin, it looks more like a piece of gym equipment than a scanner. Indeed, despite Fujitsu's claims of portability, the SV600 isn't a model you'll want to move from place to place. While the scanner itself has a small footprint, it comes with a black 522x415mm mat that takes up a fair amount of room. You don't need to use this, but it does a good job of showing you where to place objects, and the dark colour offers a suitable contrast that makes it easy for the scanner to pick out the source material.

Lay out the mat in front of the SV600, and it can scan anything you place before it - given a rough 432x300mm A3 work area. The scanner head contains a deep depth of field lens that cleverly compensates for extra height or curvature. This means images are clear and undistorted, regardless of shape. For practical purposes, it means the Fujitsu can scan books, magazines, pictures, and so on. You can also place multiple small objects (such as business cards) on the mat, and have the SV600 scan all of them before turning them into separate files.

The Fujitsu's great strength is its versatility. It can even give close 3D approximations of objects, and we were able to scan bottles and glasses of orange juice with a fair amount of success.

Scanning
books will
undoubtedly be a
prime function for this
model, and Fujitsu has added
some handy features for this. For
example, once a book has been
scanned, the software can produce
a 'flat' version of the image that
eliminates the spine. You can also
adjust the contours of the book,
so that it matches the shape and
curvature for optimum results.

It's easy to keep books in place but, if you do have to physically hold them open, the software will delete your fingertips. There are some innovative tricks for handling multiple pages, too – you can either set a timer, allowing you to manually turn the pages at periodic intervals, or get the SV600 to detect when pages have been turned and automatically initiate scanning.

The SV600 is simplicity itself to use, and if you're happy with the (adjustable) automatic settings, press the scan button to start. We found it took around four seconds to scan good quality material at Best.

This was then ready to work with the software within 10 seconds. As a scanner, it's incredibly fast.

You can then hand over the files to the assured software bundle. This includes a full version of Adobe Acrobat Standard, plus ABBYY FineReader 5.0 for optical character recognition (OCR), the document organiser, Rack2-Filer, and CardMinder. The OCR is smooth, and we were able to use the bundle to create a variety of file types, from searchable PDFs to Word, Excel and PowerPoint documents.

Verdict

The Brother SV600 isn't perhaps a mainstream product – it's too pricey for that. However, the sheer range of materials it can scan, and the quality with which it can scan them, makes it an outstanding product in its field.

HARD DRIVE ENCLOSURE

StarTech Encrypted Hard Drive Enclosure

For business users, securing data isn't an option - it's mandatory.

That's never more true than for portable devices that are taken from the four walls of a firm's premises, especially laptops, smartphones and tablets. But portable storage must also be encrypted to comply with company policies or even the Data Protection Act 1998 if personal data is involved.

We've tested keypad-operated portable drives before, notably the Apricorn Aegis series, which is rebranded in the UK by iStorage as the diskAshur drive (tinyurl. com/cx3dnhy). Like those drives, the StarTech Encrypted Hard Drive Enclosure takes a 2.5in SATA drive,

with data scrambled by an onboard encryption engine and unlocked by a PIN code of your choice.

The principle difference is that StarTech supplies this drive as an empty enclosure, so you can use any 2.5in drive - hard disk or solid-state - so long as it's profile is 9.5mm or less. Most drives are this height, with only super-high-capacity models of 1TB-plus sometimes taking up 12mm or more.

Besides its versatility as an empty enclosure, the drive also has a touch-sensitive keypad. It's a capacitive type, too, so doesn't require much pressure.

Overall construction quality is very good, with a tough plastic case

to the front and polished stainless steel on the rear. It's also supplied with a soft stretchy nylon pouch, which will keep it clean when packed in your carry bag.

Besides the configuration with your own PIN code various other options are available, all read out from a tiny OLED display at the top of the front panel. From here you can check HDD temperature (although not available with our choice of drive), as well as HDD usage time; which USB protocol is in use; and enable write protect.

For its security, the StarTech enclosure uses AES-256 encryption and all data is scrambled when copied to a fitted drive. And if



£765 ex VAT **£919** inc VAT (1TB)

tinyurl.com/krcL3vz

Specification

1TB external Thunderbolt drive; also available in 512GB and 2TB; 2x 512GB Crucial C400 SSD: external 12V/5A mains adaptor: removable foot stand: Thunderbolt cable: 39x84x140mm: 633a (without stand)



THUNDERBOLT DRIVE

LaCie Little Big Disk 1TB

We know that Thunderbolt is the fastest desktop bus in the world. but few devices make much use of all that potential performance. LaCie's Little Big Disk 1TB is one of the few, a small external flashbased drive that goes some way to showing what Thunderbolt can do, thanks to its RAIDed pair of SATA 6Gb/s SSDs inside.

The LaCie LBD was one of the first available Thunderbolt devices after the technology launched almost three years ago, and now this modest-sized desktop drive has had a boost in performance.

The build quality and styling remain the same - a solid-feeling but compact extrusion in heavy aluminium, with a stout front fascia and big blue light to indicate drive activity. On the back of the drive are two Thunderbolt ports, so the unit can sit within a chain. That's a great benefit compared to units with only one socket, which terminates the connection to har other devices' use

The downside to being an inline unit is that it must be self-rather than bus-powered. Hence the need for mains power from a supplied mains adaptor, and thereby it loses true on-the-road portability.

To help keep the unit cool when being pushed hard, the case will act as a heatsink, although LaCie must have found this to be insufficient

alone as it also fitted a smalldiameter cooling fan to the rear. This is sadly too audible whenever the unit is powered up, making it far less attractive as a unit you'd want to keep nearby on your desktop.

We saw a lift in speed compared to the original version that was fitted with two 240GB SATA Revision 2 SSDs. With a pair of Crucial C400 SATA 6Gb/s SSDs, there should be a lot more headroom.

In the QuickBench 4.0 speed test, the drive could read at up to 703MB/s, averaged from 20- to 100MB test files. That compares well with the previous version's 542MB/s. Write speed in the same test was

of data potentially writable every two seconds. In the Blackmagic Disk Speed Test, the Little Big Disk ticked almost every box for highvideo formats, such as 12-bit uncompressed video at 2k resolution.

Verdict

For more permanent installations. being tied to the mains shouldn't be an issue, so providing you can stand the noise of an always-on high-speed fan, LaCie's Little Big Disk can provide extremely highspeed storage in a rather small and dinky package. Mandrew Harrison



the drive is removed it can't be read when attached elsewhere. even if installed in another StarTech enclosure, although we couldn't test this.

The unit is USB 3.0 compatible, using a Fujitsu MB86C311 USB 3.0 SATA chipset, and although this should allow USB-attached SCSI protocol (UASP) for decent throughput, it's already limited

to the old SATA Revision 2 standard. During testing, we discovered that UASP mode wasn't available when used with our MacBook, which is surprising as OS X has UASP compatibility baked in with no need for third-party drivers.

We lab tested the StarTech enclosure with different SSDs. including a Samsung 840 Pro to test its very best performance. The unit was found to be capable of sequential transfers up 255MB/s, for both read and writes. That's plenty fast for most applications, if less than half the speed the drive inside can support. As importantly, small files could be read and written quickly, as noted by our random

read/write test, which averaged 123and 152MB/s respectively for files between 4- and 1024kB.

For security, you'd be advised to use the supplied microfibre cloth to wipe the front clean, as tell-tale fingerprints can highlight which numbers comprise a PIN code.

Verdict

StarTech's Encrypted Hard Drive Enclosure is a well-made case to hold your choice of internal drive, with data all locked down with 256bit encryption. The touchscreen control works well, with the added bonus of a small display to make setup and subsequent use even easier. Andrew Harrison



£99 ex VAT £118 inc VAT

- brother.co.uk
- tinyurl.com/mdjk79a

Specification

Mono laser printer; 16MB standard memory; 2400x600dpi max printing resolution; 20ppm specified speed; manual duplex printing; 150 sheet standard input capacity; 800-sheet maximum input capacity: USB 2.0: 385x340x255mm; 7kg



MONO ALL-IN-ONE LASER PRINTER

Brother DCP-1510

Brother has released a trio of low volume mono laser printers at highly affordable prices, so we decided to take a look at the middle unit to gauge how much this range merited its 'great value for money' tag.

The DCP-1510 occupies a compact area of 385x340x255mm, so will fit in even the smallest of offices. In addition, it weighs a mere 7kg, so can be quickly repositioned without causing any back strain.

The focus here is on simplicity and speed. There's no ADF on the top of the machine, nor an extra feeder tray in the middle - just a standard 150-sheet paper trav in the base. The only connection available is via USB 2.0 to a single PC, so if Wi-Fi or ethernet is vital for your home or small business, this all-in-one isn't for you.

While the main body of the DCP-1510 feels sturdy enough, the scanner cover is somewhat flimsy. There's also a design error - the access door has to be raised before you can unfurl or retract

the output tray extender with its paper stop.

The control panel is a narrow strip in front of the cover. You can oversee operations via the two-line, 16-character

LCD using arrow keys to scroll through the menus. Strangely there's a dedicated button for 2-in-1 ID copying - not the most obvious first choice, but maybe this is a deliberate ploy to appeal to the student market.

So far, so ordinary. However, once you start printing you realise that with print and copy speeds approaching 20ppm (we averaged 18ppm), the DCP-1510 might well have a future in your study or business. Document print quality is good without being exceptional, while graphics and images reveal broad contrast tones.



Verdict

Although Brother may target this budget MFP at small businesses, the restricted features might suggest it's more likely to end up in home or student studies, despite its rapid print speed. Martyn Clayden

work out at around 3p per page.

£115 ex VAT £139 inc VAT

Contact

Read more

Specification

Colour inkjet printer; 75mm LCD; 4800x1200dpi print resolution; five individual tanks (PGBK, BK, C, M, Y); borderless printing; auto duplex; 1200x2400dpi scanner resolution; USB, 802.11n Wi-Fi; Apple AirPrint, Google Cloud Print; memory card slot; 455x369x148mm; 6.4kg



INKJET PRINTER

Canon Pixma MG6450

Canon recently updated its Pixma range of photo-printers with three new multifunction models. Prices range from £110 to £180, but we reviewed the mid-range MG6450.

It's a little on the bulky side. measuring 455x369x48mm, so you'll need to find some spare desk space to set it up. Canon squeezes a good range of features into the printer. As well as its 4800x1200dpi printing, the MG6450 also includes a 1200x240dpi scanner and copier. It provides both USB and Wi-Fi connections, and supports Apple's AirPrint, so you can print from iOS devices. The small LCD control panel also includes a number of built-in apps that let you log into Facebook and other services, so you can print photos you've stored online.

The MG6450 uses five coloured ink cartridges, with standard cyan, magenta, yellow and black inks used for colour printing, and a special pigmented black for mono text printing. That system produces very good results, but

the performance and running costs suggest it's mainly suitable for occasional home use rather than frequent use in the office.

Canon quotes speeds of 15 pages per minute for mono printing and 10ppm for colour, but our tests produced results closer to 12.5ppm and 6ppm respectively. Those speeds should be adequate for most home users, though, and the print quality is very good. The pigmented black ink produces very fine, detailed text, while colour graphics and photos produce colours that are rich but not over-saturated.

However, the use of five inks does push the printer's running costs up a bit. A standard size cartridge of the pigmented black ink costs £12 and only produces about 300 pages, which works out at 4p per page. The XL cartridge is better value, costing £15 and printing 500 pages, but this still works out at an above-average 3p per page.



Fortunately, colour printing is a bit more reasonable. You can buy a multipack of all four standard colour cartridges for about £40, which should produce about 345 colour pages at a cost of 11.6p per pages. That price falls to a far more reasonable 6.5p per page if you buy a set of XL cartridges for £60.

Verdict

If you're looking for a generalpurpose office printer, the MG6450 isn't the best choice, as the modest capacity of even its XL size pigmented black ink cartridges means mono printing is expensive. However, the XL colour cartridges offer better value, and the quality of the colour output makes it a good option. I Cliff Joseph



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Mini PCs





Paul Monckton tests six tiny computers that'll slip unobtrusively into any lounge and serve up all the power you need to get work done

esktop PCs with their large, noisy and cumbersome cases surrounded by cables aren't the kind of thing many of us would want to put up with if we didn't have to. But neither is the laptop always an appropriate solution.

Sometimes we want to work on a large desktop monitor, but have limited space available. Using a TV as a display, rather than bringing a monitor into the room, may be a preferable option.

A mini PC can be an ideal solution in such cases. Based on small, low-power components, they take up a fraction of the space of a traditional desktop PC or laptop, and don't require unnecessary parts such as a screen, battery and keyboard.

Many are so small that you can mount them to the back of a monitor and create your own all-in-one PC. This has the advantage that you can upgrade your display without needing to replace the entire system.

Lower power consumption can also mean reduced cooling requirements and quieter operation, so you could use a mini PC as a media-centre PC without the distraction of whirring fans.

There are disadvantages, of course. A mini PC doesn't have enough internal space for a discrete graphics card or a desktop (3.5in) hard drive. You'll have to rely on integrated graphics solutions and, in most cases, a single laptop (2.5in) drive.

All other upgrades will usually be achieved externally. In the case of really small PCs, such as the Chillblast Fusion Brix and Intel NUC, there may be room only for a plug-in mSATA SSD.

With this in mind, you'll need to pay particular attention to the connectivity options supported by a mini PC. If you want to hook up external storage, look for USB 3.0 ports. The Dino PC's Minisaur offers an external SATA connector and the Zotac Zbox ID65Plus offers an eSATA port.

For connecting the PC to a standard LCD monitor you can use HDMI, but if you're thinking of creating a DIY all-in-one PC you'll need a DisplayPort, Thunderbolt, HDMI 1.3 or dual-link DVI port to connect a screen with a higher resolution than 1920x1200.

If you're creating a mini media centre you can pipe audio through your HDMI connector, but if you have an external music system with digital inputs you may also want an S/PDIF connector.

In keeping with the DIY approach, mini PCs typically ship without a keyboard or mouse, and often come without an OS. Remember to factor in the cost of these items.

Performance from a mini PC can be very good - especially when it uses an SSD as the boot drive. A wide range of processors are available, from low-end Intel Celeron chips to quad-core Core i7s with Hyper-Threading. AMD processors are also available, with low-power versions that can help the mini PC run cool and quiet.

Whatever your choice of CPU, this component will also be powering the graphics - and this is where you're most likely to notice performance limitations.

The latest high-end Intel processors come with integrated Intel HD Graphics 4400 or 5000, which is good enough for entry-level Windows gaming, but less expensive models provide poor graphics capabilities.

AMD processors often provide faster graphics, but this is not the case with the E-350D found in the Dino PC, which delivers disappointing graphics compared to the best Intel processors.

CHILLBLAST FUSION BRIX

£549 inc VAT · chillblast.com · tinyurl.com/pwx38ww

At just 115x108x30mm and weighing only 400g, this Chillblast system is the tiniest mini PC in our round-up, yet its speedy CPU and solid-state storage deliver superb performance.

The glossy black and gunmetal-grey casing is beautifully constructed: an illuminated silver power button sits on the top of the case with a single USB 3.0 port at the front for easy access.

At the rear are HDMI and Mini DisplayPort sockets, along with gigabit ethernet and an additional USB 3.0 port. It's a highly pocketable device, so you'll be glad of the Kensington Security slot that sits next to the external power supply connector. The PSU itself is around half the size of the PC itself.

Resting on its four rubber feet, the Chillblast sits inconspicuously on a desk, and could be easily mistaken for a paperweight. Alternatively, you can use the VESA mounting bracket to attach it to the back of your monitor and hide it from sight.

Based on Gigabyte's Brix GB-XM12-3227 barebones Ultra Compact PC kit, the Fusion Brix comes with a 1.9GHz dual-core Intel Core i3-3227U processor with Hyper-Threading support and a 120GB Intel 525 Series mSATA SSD. Its PCMark 7 score of 4094 points was bested here only by the Intel NUC with its faster Haswell processor. The Fusion Brix is at least 50 percent faster than anything else.

The Ivy Bridge chip provides Intel HD 4000 Graphics, which help the PC to achieve some of the best graphics scores of the group, too.

Despite its stellar performance, the Fusion Brix has some drawbacks, mainly as a result of its ultra-compact size. Connectivity is somewhat limited, and there simply isn't room for many more ports. Two USB ports aren't enough unless you want to use an



external hub. We gave the Intel NUC our Recommended award over the Chillblast based on its faster performance and the fact it is only a tiny bit larger but offers twice as many USB ports.

VERDICT: Small enough to fit in a back pocket, the Chillblast Fusion Brix is almost impossibly small and yet one of the fastest mini PCs available. The build quality is excellent and it offers a good set of features, but the modest storage capacity and rather limited connectivity are major drawbacks.

DINO PC MINISAUR E350

£269 inc VAT • dinopc.com • tinyurl.com/o39qvy6

For a mini PC the Dino PC Minisaur E350 is rather big and heavy. Although it's small enough to pick up in one hand and easily portable, it certainly won't fit in your pocket.

The Dino PC is based on a Gigabyte GA-E350N WIN8 motherboard, fitted inside an AVP Black Imp Mini ITX case that can stand either horizontally or vertically. Its steel construction feels much more like a traditional PC case, only considerably smaller. Finished in black with silver details, the front sports just a power button and some LED indicators that glow blue and purple.

The back of the case exposes a standard-sized motherboard blanking plate with separate line-in and -out jacks, a microphone input, VGA, HDMI, ethernet and four USB 2.0 ports. USB 3.0 isn't available; instead you get a pair of legacy PS/2 ports and even older serial and parallel ports. Despite its larger size, the Minisaur E350 still uses an external power supply, which also hooks up at the rear.

A more careful inspection of the front of the PC reveals two removable plastic clip-on covers. One conceals an additional pair of USB 2.0 ports and audio jacks, while the other provides a SATA (not eSATA) connection and Molex power port.

This anachronistic and somewhat unusual selection of ports, combined with its lack of built-in Wi-Fi, makes the Minisaur feel old-hat when pitted against the likes of the Chillblast or Intel PCs.

The PC is powered by a 1.6GHz AMD E-350D APU, which also provides integrated graphics capabilities. Unfortunately, it's slow really slow. PCMark 7 recorded only 1261 points from the Minisaur, and this is noticeable when using the PC in the form of much finger drumming and general waiting around for things to happen. It's also slow in terms of graphics, although fine for general multimedia use.



The Dino PC is, however, by far the least expensive of our mini PCs: around half the price of the most expensive here. If your budget won't stretch any further and performance isn't an issue, the Dino PC Minisaur E350 may be just what you need.

VERDICT: Although tiny compared to a full-sized desktop, the Dino PC Minisaur E350 is large, cumbersome and frustratingly slow when compared to most of the competition here. Its price, however, is considerably lower than anything else and makes the Minisaur a reasonable-value purchase.



FUJITSU ESPRIMO Q250

£389 inc VAT • fujitsu.com/uk • tinyurl.com/ks56dvt

This business-oriented Fujitsu PC is considerably larger than most of the mini PCs reviewed here, but it offers some unique features.

Designed with space-saving and low power consumption in mind, the Esprimo Q520 is fitted with the most powerful processor yet draws only 10W when sitting idle. Its flat, square casing is constructed from brushed aluminium and textured plastic, and finished to a very high standard, with a smart, professional look.

Its relatively large physical dimensions are still minuscule compared to a standard desktop PC, and yet the Fujitsu manages to include a built-in optical drive. It's also the only PC here to feature an internal PSU and bundle a matching keyboard and mouse.

The front of the case provides a pair of convenient USB 3.0 ports and an SD Card reader, while four additional USB 2.0 ports can be found at the back alongside DVI, DisplayPort, ethernet and audio jacks. The underside features an integrated VESA bracket. Snap-on covers provide tool-free access to the inside for easy upgrades.

A low-power 2.9GHz dual-core Intel Core i3-4130T Haswell CPU ensures the Esprimo has ample computing power for demanding business applications, while its integrated Intel HD 4400 graphics ensure seamless multimedia playback.

The reason it doesn't best the performance chart is down to its use of a regular 320GB hard drive rather than a speedy, but lowercapacity, SSD. It's also fitted with just 4GB of RAM, where many come with 8GB. If you need more performance you can specify a faster CPU, and SSD and hybrid drives are available. Wi-Fi is also optional.

A fanless processor cooler ensures that, at least in normal use, the Esprimo Q520 is completely silent. Only under heavy load does





PC ADVISOR RECOMMENDED



the case fan kick in which, due to its small size, can be rather loud. It's only under exceptional circumstances that you'll hear this fan, and it turns off very quickly when CPU load is reduced.

VERDICT: The Fujitsu Esprimo Q520 is a truly powerful business computer, with excellent ergonomics and superb build quality. It's much larger than the smallest PCs reviewed here, but also considerably less expensive and incorporates both a DVD burner and an internal power supply.

INTEL NUC D54250WYK

£525 inc VAT • intel.co.uk • tinyurl.com/kdbLvnd

This latest incarnation of Intel's Next Unit of Computing (NUC) platform is an evolution of the Ivy Bridge-based model we reviewed previously. The D55250WYK updates the processor to a fourth-gen Haswell model, as well as providing notable design improvements.

The new NUC features a 1.3GHz dual-core Intel Core i5-4250U processor, which can Turbo Boost up to 2.6GHz under load. This enables very low power consumption - only 7W at idle - but excellent performance when required.

The NUC is sold as a barebones kit without memory or storage. We configured this PC with Intel storage and wireless components, plus 8GB of DDR3 memory from Crucial.

The tiny form-factor of the standard NUC case won't allow for a 2.5in hard drive, so we've fitted a 180GB Intel 530 series mSATA SSD. However, the board itself includes standard SATA connections, so it would be possible to build a larger version including a full-sized drive. This isn't much room for external connections so, to save space, mini-HDMI and mini-DisplayPort video connectors have been used. However, there's still room for a gigabit ethernet port and four USB 3.0 sockets. It also includes an infrared sensor and combined headphone/microphone jack.

Wi-Fi and Bluetooth connectivity are provided by an internal Intel 802.11b/g/n/ac card, which adds around £20 to the price. In all we've added around £230 worth of components to the £295 price of the barebones kit, reaching a price comparable with the PCs from Chillblast and Zotac.

In this configuration, the NUC simply flies. In our PCMark 7 benchmark it turned in a score of 4681 points, which is considerably faster than any of the competition. The processor also includes



Intel's HD Graphics 5000, the most powerful integrated graphics of any of the mini PCs in this round-up. Unsurprisingly it provided the best framerates in our gaming tests.

VERDICT: The D54250WYK is a big improvement over the previousgeneration Intel NUC. It's much faster and no longer are you forced to choose between wired ethernet or wireless connectivity. With four USB 3.0 ports, the Intel NUC has good connectivity for such a small PC. Note that the price quoted does not include an OS - be sure to factor in this additional cost.

LENOVO IDEACENTRE Q190

£380 inc VAT • lenovo.com/uk • tinyurl.com/kt4mnq8

The IdeaCentre Q190 from Lenovo is a very smart-looking mini PC with a long, slim design that can lay flat on your desk or upright in its supplied stand. It also comes with a VESA bracket for fixing to the back of your monitor.

The Lenovo comes in a pleasing glossy black and silver finish, with all front-facing ports concealed behind a plastic door. These include a pair of USB 3.0 ports, audio jacks and a multiformat card reader. The back panel includes four USB 2.0, ethernet, HDMI and VGA, as well as an optical S/PDIF port.

The flat design of the Q190 allows it to be clipped together with an optional matching DVD burner or Blu-ray drive, making this a great system for use as a home-theatre PC, although the continuous soft whirring of the cooling fan may be too distracting for some.

A 1.4GHz dual-core Intel Core i3-2365M Sandy Bridge chip is unfortunately nowhere near as fast as the newer Intel processors used elsewhere in the round-up. We were disappointed with its PCMark7 score of 1905 points, and its HD Graphics 3000 solution also delivered the lowest overall framerates.

A 1TB hard drive is included, which is the most storage offered by any PC here. It also includes 4GB of DDR3 RAM. The one-year return-to-base warranty can be extended to three years for £17.



VERDICT: The IdeaCentre Q190 looks the part and has decent build quality. The optional optical digital output and matching Blu-ray drive make it good for home-theatre use, but it could do with a more modern processor as performance is somewhat lacking.

	CHILLBLAST £549 inc VAT	DINO PC £269 inc VAT	FUJITSU £389 inc VAT PC ADVISOR RECOMMENDED
Model name	Fusion Brix	Minisaur E350	Esprimo Q520
Processor	1.9GHz Intel Core i3-3227U	1.6GHz AMD E-350D	2.9GHz Intel Core i3-4130T
CPU cooler	Custom semi-active cooler	Stock CPU fan	Passive cooler
Memory	8GB DDR3 1600MHz	8GB DDR3 1333MHz	4GB DDR3 1600MHz
Storage	120GB Intel 525 Series mSATA SSD	500GB HGST Travelstar Z5K500 HDD	320GB HDD
Power supply	65W external	60W external	65W internal
Motherboard	Intel HM77	Gigabyte GA-E350N WIN8	Fujitsu motherboard, Intel H81 chipset
Operating system	Windows 8 64-bit	Windows 8 64-bit	Windows 8 Standard or Pro
Graphics card	Intel HD Graphics 4000	AMD Radeon HD 6310	Intel HD Graphics 4400
Sound	Onboard	Onboard	Onboard
Connectivity	802.11b/g/n, gigabit ethernet, Bluetooth	Gigabit ethernet	Gigabit ethernet (Wi-Fi, Bluetooth optional)
Ports	2x USB 3.0, HDMI, Mini DP	6x USB 2.0, HDMI, D-Sub, SATA, 2x PS/2	2x USB 3.0, 4x USB 2.0, DVI, DP
Card reader	None	None	SmartCard reader (optional)
Other	VESA mounting bracket	None	Integrated VESA mount, Microsoft Office, PowerDVD, Nero 2014
Dimensions	29.9x107.9x114.6mm	190x250x60mm	185x188x54mm
Weight	400g	1.5kg	1.6kg
Warranty	2-year collect-and-return warranty	3-year return-to-base (1-year parts)	1-year onsite service (5-year optional)
PC Mark overall	4094	1261	2988
Alien vs Predator ¹	7fps, 5fps	Low, Low	6fps, Low
Sniper Elite V2 ²	21fps, 6fps, Low	10fps, Low, Low	21fps, 7fps, Low
Power consumption ³	10W, 42W	22W, 36W	10W, 46W

'Aliens vs Predator measured at 720p and 1080p, High Quality respectively ²Sniper Elite V2 measured at 720p, Low quality, 1080p, High quality, and 1080p, Ultra quality respectively. 'Low' refers to unspecified scores below 5fps ³Measured when idle and under load respectively



ZOTAC ZBOX NANO ID65 PLUS

£530 inc VAT · zotac.com · tinyurl.com/prsokrd

Just a little bigger than the Chillblast Fusion Brix and Intel NUC, Zotac's Zbox nano ID65 Plus is large enough to allow superior connectivity options in what is still an outrageously small PC.

Its silver and black chassis presents a pair of USB 2.0 ports, audio jacks and a multiformat card reader at the front, while the back finds room for four more USB 3.0 ports, ethernet, full-size HDMI and DisplayPort sockets and an eSATA port. There's also a screw-in Wi-Fi antenna and a Kensington Security slot at the side. It can also be attached to your monitor using the supplied VESA mounting kit.

When powered on the top of the PC glows with a bright blue circle. The PC has a very compact and stylish appearance.

It's powered by a 2GHz dual-core Intel Core i7-3537U processor - the only Core i7 in this round-up. This chip can Turbo Boost to 3.1GHz.

Storage is provided by a 500GB 2.5in hard drive, which offers greater capacity but slower performance than the SSDs found in smaller PCs. The Zotac delivered a PCMark 7 score of 2882 points. If you wish to boost performance you can utilise the included nanoRAID storage accessory, which allows you to install two mSATA SSD modules in a Raid configuration for enhanced performance.

However, the Zotac feels fast and responsive in day-to-day use, so we'd stick with the extra storage provided by the hard drive.



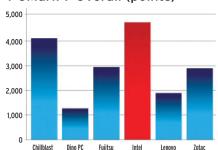




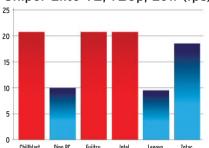
VERDICT: Only a little larger than the smallest mini PCs, the Zotac has room for superior connectivity options. It features a very fast processor and can include either a 2.5in hard drive or up to two mSATA SSDs. Note that the price quoted does not include an OS.

E525 inc VAT PC ADVISOR RECOMMENDED	LENOVO £380 inc VAT	ZOTAC £530 inc VAT
NUC D54250WYK	IdeaCentre Q190	Zotac Zbox nano ID65 PLUS
1.3GHz Intel Core i5-4250U (2.6GHz Turbo)	1.4GHz Intel Core i3-2365M	2GHz Intel Core i7-3537U (3.1GHz Turbo)
Fan cooler	Fan	Smart fan
8GB DDR3 1600MHz	4GB DDR3 1333MHz	4GB DDR3 1600MHz
180GB Intel 530 Series mSATA SSD	1TB HDD	500GB HDD
65W external	19V 1.7A external	19V 3.42A external
Intel Wilson Canyon D54250WYB, Lynx Point chipset	Lenovo custom motherboard	HM77 Express
Not supplied	Windows 8	Not supplied
Intel HD Graphics 5000	Intel HD Graphics 3000	Intel HD Graphics 4000
Onboard	Onboard	Onboard
802.11b/g/n/ac, gigabit ethernet, Bluetooth	802.11b/g/n, gigabit ethernet	802.11b/g/n, gigabit ethernet, Bluetooth
4x USB 3.0, HDMI, Mini DP	2x USB 3.0, 4x USB 2.0, HDMI, VGA, S/PDIF	4x USB 3.0, 2x USB 2.0, HDMI, DP, S/PDIF, eSATA
None	SDXC/MS Pro	MMC/SDXC/MS/MS Pro/xD
VESA mounting bracket, IR sensor	VESA mounting backet, desktop stand	VESA mounting bracket, CyberLink PowerDVD 12, webcam
117x112x35mm	192x155x22mm	127x127x45mm
1kg	1.2kg	1.kg
Varies	1-year	2-year
4681	1905	2882
7fps, 5fps	Fail	6fps, Low
21fps, 7fps, Low	9fps, 5fps, Low	18fps, 6fps, Low
7W, 27W	11W, 34W	11W, 36W

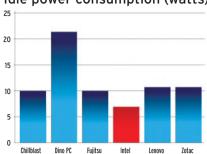
PCMark 7 Overall (points)



Sniper Elite V2, 720p, Low (fps)



Idle power consumption (watts)



Conclusion

With prices ranging from £269 to £550 and a variety of shapes and sizes, there's a good range of mini PCs from which to choose, whatever your needs or budget.

Two distinct categories emerge here: the Mini ITX-size Dino PC Minisaur E350 and Fujitsu Esprimo Q520 are significantly larger than the ultra-compact models from Chillblast, Intel, Lenovo and Zotac.

There are also large differences in performance: none of these PCs offers gaming-level graphics capability, yet the Haswell-based systems offer improved graphics performance.

Application performance varies more wildly, with Dino PC's Minisaur E350 falling a long way short of the competition. It's noticeably slow in general use, but it also costs around half the price of the most expensive alternatives. If you have minimal space, a small budget and simply want a PC for light use and casual web browsing then this PC is worth a look.

Fujitsu's Esprimo Q520 is a different kettle of fish. It's relatively large, but also very fast and offers considerably better build quality than the Dino PC. Its price is also very attractive at £389, making it a very sensible mid-priced purchase for those who don't need a PC they can fit in a pocket. It's a great choice for business use and comes with an onsite warranty.

Lenovo's IdeaCentre Q190 offers unique vertical styling, an optical digital audio output and the option of attaching a matching Blu-ray or DVD drive, making it a good choice for a home-theatre PC. Unfortunately, it's let down by lacklustre performance and a noisy cooling fan. The price may be enough to sway you.

The three ultra-compact PCs, Zotac's 7box nano ID65Plus and the even smaller Intel NUC and Chillblast Fusion Brix, are all considerably more expensive options.

The Zotac offers the fastest CPU and is large enough to incorporate a full-size 2.5in

drive, giving you flexible storage options. It's slightly larger size also allows for fullsize peripheral connectors and more of them. However, when you add in the cost of an OS, it is rather pricey.

Battling it out for the title of smallest mini PC, the Chillblast Fusion Brix and Intel NUC need to make compromises to achieve such a small size. Neither has room for a hard drive and must therefore use faster, but more expensive, solid-state storage, which means you'll have a lower storage capacity for your documents and media.

The Fusion Brix is smallest of all, but more severely compromised in terms of connectivity, whereas the Intel NUC offers the very best overall performance and offers twice as many USB ports.

For general use by those who don't need a really tiny PC we recommend the Fujitsu, while those ultra-compact PC fans who crave the best performance and connectivity should go for the Intel NUC.

How we test

Application performance

Core system performance is measured using PCMark 7, an industry-recognised test suite that uses 25 workloads to measure areas such as storage, computation, imageand video manipulation, web browsing and gaming. We understand that results from this benchmark are not absolute. Nevertheless, the results give an idea of the relative performance.

A full-size PC would typically score between 3000- and 7000 points.

Gaming

We run two games: Aliens vs Predator, at both 720p and 1080p, High quality; and Sniper Elite V2 at 720p, Low quality, and 1080p in both High and Ultra quality modes. Framerates at these settings are horribly low, but by turning down the quality settings or screen resolution you can usually achieve playable results. The lowest framerate recorded by Stalker Elite V2 is 5fps, even if real performance is lower. We have therefore marked all scores of 5fps as 'Low'.

No overclocking

We allow overclocking of the processor only in dedicated gaming computers. Given the low-power nature of a mini PC, overclocking simply isn't on the agenda.

Power consumption

We measure the power consumption of each computer while it's idling at the desktop and when it has settled down after booting up. We then measure again consumption while pushing each PC to the limit by running Prime95 with the maximum number of available threads,

simultaneously running PCMark 7's storage sub-test. Real-world power consumption will fall somewhere between these two measurements, depending on use.

Subjective assessment

It's not all about speed. We also pay close attention to the physical characteristics of each mini PC, its noise output and build quality, and take note of important features such as the quality of components.

Warranty and support

Differences in warranty terms can affect our verdict. Obviously, longer warranties are better, but we also look at the terms and conditions - specifically, whether faulty systems must be returned to the vendor at your own cost, and whether both parts and labour are included.



Versatile and Powerful NAS











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ot many consumer electronics advance as fast as do smartphones, with manufacturers updating their flagship devices at least once a year. Having so much choice is great news for consumers, but it can also make it incredibly difficult to work out which handset to buy - particularly if you'll be tied into a mobile contract for up to two years (see page 146 for our opinion).

If you don't want an iPhone, arguably the most popular handset on the market, it's likely you'll buy a device running Android. There are also plenty of decent devices running BlackBerry and Windows Phone, and a handful of smartphones running platforms such as Sailfish, Firefox, Tizen and Ubuntu coming soon.

Whereas once Apple's iPhone set the standard in terms of hardware specification, this is an accolade most smartphones can hold on to only for a month or two before something bigger and better comes along. The iPhone 5s was, however, the first smartphone to offer a 64-bit processor.



phones









The iPhone runs iOS 7, the recently updated version of Apple's mobile operating system. It's had a makeover since iOS 6, but continues to offer a simple and effective experience. The App Store is abundant as ever, and many developers still write for iOS before Android and other OSes. There's little in the way of customisation, mind, so it's largely Apple's way or the highway.

Apple's key rival, Android, has come a long way and is now a mature platform. Android devices can be had with screens that match the resolution of your TV, while some models boast cameras with more megapixels than your DSLR. Some devices are also waterproof and feature hi-fi-quality audio.

Android has gone from strength to strength, with Google ironing out problems, improving performance and introducing innovative features. You can chop and change almost anything, and the Play store has all the major apps.

Windows Phone and BlackBerry continue to lag behind iOS and Android. Microsoft's mobile OS has shown encouraging

signs of growth and the most recent version supports better hardware. BlackBerry, meanwhile, has found itself in all kinds of trouble in attempting to sell the company. Its future may be uncertain, but the BlackBerry 10 OS is smooth and great for email and multi-tasking.

A down side to both Windows Phone and BlackBerry is their lacklustre app stores: third-party developers who want a turn a profit will always favour the most popular platforms.

Here, we've rounded up the best smartphones on each platform. Each is more than fast enough for any user's needs, so the user experience is arguably more important than the results of our processor- and graphics benchmarks particularly given some handsets' alleged ability to ramp up performance in certain scenarios.

A good way to pick a smartphone is to choose your preferred operating system, then find a handset that offers all the features you want and a design you like that remains within your budget.

Group test: Smartphones





APPLE iPHONE 5s

£549 inc VAT • apple.com/uk • tinyurl.com/mz8jhLf

The iPhone has received a price bump, with the entry-level 16GB option now costing £549, but the 5s is a superb smartphone and a worthy flagship. Just as the iPhone 4s was almost indistinguishable from the 4, only the 5s' gold finish lets it stand out from the previous model. Fortunately, the similarities are largely superficial.

Apple has built a Touch ID fingerprint sensor into the Home button, letting you unlock the device with a single touch, with none of the hassle of entering your PIN code. Despite some controversy, there's no denying that this is a seriously convenient - and cool feature, and more secure than the regular passcode.

The iPhone is the first smartphone to ship with a 64-bit processor, which is a great future-proofing measure. It makes iOS 7 buttery smooth, with nary a judder or stutter when swiping between home screens, or exiting an app and watching your icons fly into place. Apps launch and web pages load faster than ever.

The A7 chip also has a motion co-processor, the M7, which will come into its own when the developers of activity-tracking apps update their software to utilise the new chip. It should mean the 5s can replace the likes of a Fitbit or Withings Pulse.

Both the cameras have been upgraded, although the number of megapixels on offer stays the same. Instead, Apple has wisely increased the size of the pixels, which results in better-quality photos in low light but less of a difference in regular conditions.

The faster A7 processor has allowed the introduction of a 10fps burst mode, while a Slo-Mo feature can shoot video at 120fps. Rounding off great camera performance is the dual 'True Tone' LED flash, which delivers better lighting and more natural results.

One thing that hasn't changed is the 4in Retina display, which keeps the same 1136x640-pixel resolution as the iPhone 5 (and 5c). It is a decent screen but, compared to the larger, full-HD offerings of some of its rivals, it feels somewhat cramped.

Wi-Fi and Bluetooth also remain unchanged, so there's no 802.11ac support, but extra LTE support means better 4G roaming.

VERDICT: If you own an iPhone 5 it's difficult to justify an upgrade to the 5s. Those with a 4s or 4 are in for a treat, though. As well as performance gains, the bigger screen and lighter weight make a huge difference, and the fingerprint scanner is a bonus. Jim Martin





BLACKBERRY Z30

£450 inc VAT • uk.blackberry.com • tinyurl.com/mdkw9zz

The Z30 stands as BlackBerry's new flagship smartphone. It has a large and chunky design, based on a 5in touchscreen and entirely devoid of any buttons on the front.

The build quality is good, but not outstanding. The Z30 feels solid in the hand, and we've no arguments with a heavier phone if it means increased strength and battery life. The clip-on rear panel has a carbon-fibre effect and is non-slip to the touch.

The OLED panel nearly has Retina resolution, at 294ppi, although we found it nowhere near as sharp when reading small text, for example. And BlackBerry has chosen a black theme for most of the OS interface, which we can only guess is to conserve battery in conjunction with this display technology.

Powering the Z30 is an ARM dual-core processor from Qualcomm, clocked at 1.7GHz and backed with a generous 2GB of memory. For storage, card fans will be cheerful to hear of a microSDXC slot to complement the 16GB of flash built-in.

There are few other surprises in the general hardware make-up. An 8Mp rear camera is as good as that of an iPhone 5, if not up there with some of its Android competition.

Controlling and navigating a BlackBerry is a novel experience. Without any Home or Return buttons up front, all interaction is through gestures. From the darkened screen, you can swipe upward to wake the phone. That's tricky with such a huge screen, but just possible one-handed if you have larger mitts.

Once you've learned the other gestures, the interface becomes instinctive to navigate. It's certainly more wieldy than Windows Phone and even some Android overlays.

This phone is highly configurable in many ways, and security features are baked-in throughout, showing the company's business pedigree. The OS lacks apps in general, though.

Battery life was at the better end of the jumbo-smartphone spectrum. Through sporadic use for web browsing and trying various apps it would last around three days.

VERDICT: There isn't the app ecosystem of iOS and Android, but the Z30 offers a useful compromise to businesses that rely on BlackBerry's security model and users who'd like something with the touchscreen power of iPhone-based handsets. Andrew Harrison











GOOGLE NEXUS 5

Build

Features

Value

Overall

Performance

£299 inc VAT • play.google.com • tinyurl.com/nhLgc74

Despite a price bump over the £239 Nexus 4, Google's smartphone remains the cheapest and best-value flagship phone at just £299.

The Nexus 5 has simple and understated style - none of the spangled glass rear cover of the Nexus 4 that divided opinions and made the phone slide off all manner of surfaces. The handset is also thinner and lighter than before; it feels small for a 5in-screen phone.

The soft-touch matt rear cover is slightly curved, which helps it to sit nicely in the hand, but this is a separate piece of plastic so you'll find a seam where the two pieces meet. The build quality doesn't entirely match that of rival flagship devices and, although we'd prefer a unibody, the Nexus 5 still has a desirable design.

The Nexus 5's 5in full-HD IPS screen is beautifully rich, clear and responsive, and offers great viewing angles.

Performance is up there with the best smartphones, thanks to the formidable combination of a Qualcomm Snapdragon 800 processor, Adreno 330 GPU and 2GB of RAM. Storage options have increased from 8- and 16GB to 16- and 32GB, which is one reason for the price increase, but the Google phone still lacks a memory card slot.

An 8Mp rear camera comes with optical image stabilisation and, although it takes decent photos, it's a little way behind its rivals. The video quality in our tests wasn't as good as we'd hoped, with less detail than we expect from 1080p footage.

With the Nexus 5 comes a new version of Google's mobile operating system, Android 4.4. Otherwise known as 'KitKat', this platform has a redesigned interface and a plethora of new features. On Google's phone you get a vanilla Android experience, clean, colourful and intuitive. Google Now is at the forefront, only a swipe away from the main home screen.

The visuals are better than ever, with transparent bars, full-screen album artwork and an immersive mode that lets apps take over the entire screen. KitKat is currently exclusive to the Nexus range.

The Nexus 5 is an average performer in terms of battery life. Unless you're a light user it will need charging every night, but wireless charging is a cool way to top up the non-removable battery.

VERDICT: The Nexus 5 is a very desirable phone at a surprisingly low price. It's one of the best-value phones you can buy, but it doesn't offer the best build quality, camera or battery life. Chris Martin

HTC ONE MAX

£584 inc VAT • htc.com/uk • tinyurl.com/nefvymg

HTC took the excellent HTC One Android phone and supersized it. The One Max is, like its little brother, a beautiful object. The feel of the materials, and the way they fit together, is impeccable. It's mainly aluminium, aside from the glass front and plasticky edge. At 10.3mm and 217g it's extremely hefty, mind.

The HTC One Max is well constructed and feels as though you could use it to shield yourself from flying bullets. It is a solid workhorse that is also stylish. And you won't need a case.

The One Max is the only phone apart from the iPhone 5s to include a fingerprint scanner. You can store up to three fingerprints.

The One Max is built around a 5.9in Super LCD3 capacitive touchscreen. The display's full-HD resolution results in a sharp pixel density of 373ppi. It's great for watching videos and viewing content, but not using one-handed.

A Qualcomm Snapdragon 600 dual-core processor running at 1.7GHz, Adreno 320 graphics and 2GB of RAM power the One Max. We found the device perfectly snappy, but perhaps not as impressive as other flagship handsets.

You can choose 16- or 32GB of storage, with a potentially important microSDXC slot offering expansion up to a further 64GB. Like the HTC One, the Max comes complete with comically named 'BoomSound' front-facing stereo speakers, near-field communication (NFC) and an infrared transmitter.

It also shares the One's 'Ultrapixel' camera, which has fewer but larger pixels than other smartphones. This is a decent smartphone camera that can quickly capture shots and is well suited to low-light conditions.

The HTC One Max runs Android 4.3 Jelly Bean, but it is heavily customised with HTC's Sense overlay. The interface is clean, stylish and slick, but the BlinkFeed content-flow feature is an element that you will either love or hate.

HTC has opted for a huge 12.2Wh battery and, although the rear cover of the phone removable, the battery is not. With average usage the phone will last one or two days before needing a charge.

VERDICT: It won't be for everyone, but if you want a big phone (and we mean BIG), you could do a lot worse than the HTC One Max. This is a serious performer that is built to look good and last. Matt Egan

Group test: Smartphones





**** Build **** **Features** **** Performance **** Value **** Overall

LG G2

£369 inc VAT • Ige.com/uk • tinyurl.com/pafk4sz

After successfully teaming up with Google for the Nexus 4, LG is back with the G2. The front of the device looks similar to the Samsung Galaxy S4 (reviewed at tinyurl.com/ca5p7Lf), although it has no physical or touch-sensitive buttons below the screen. However, flip it over and the handset has a unique design.

We like the fibreglass-style finish, but more notable is the fact buttons are located on the rear below the camera. It's a strange concept, but something to which we soon became accustomed. KnockOn means a double-tap on the screen will switch it on and off.

LG has impressed us by squeezing a large screen into a small chassis. The G2 is smaller than the Xperia Z1, and only marginally larger than the S4, but it has a bigger screen than both at 5.2in.

Matching other top Android handsets, it's got a full-HD 1920x1080 resolution and, although the size means the pixel density is a little lower than some, at 424ppi, the difference isn't noticeable.

The handset is equipped with Qualcomm's latest smartphone chip, the powerful 2.26GHz quad-core Snapdragon 800. Accompanied by an Adreno 330 GPU and a healthy 2GB of RAM, the LG boasts exceptional performance. The phone comes with either 16- or 32GB of internal storage, but there's no memory card slot for expansion.

The impressive specs continue with the G2's cameras. The 13Mp rear-facing snapper takes high-quality photos and videos, with optical image stabilisation a great addition. The 2Mp front-facing camera also offers great imagery, with up to 1080p video at 30fps.

LG has customised the Android 4.2 Jelly Bean interface and installed its own Practical UX interface. This has popping colours, but some areas seem very cluttered - particularly the notification bar, into which LG has crammed everything imaginable.

Things aren't enough of a mess to put us off the phone, however. And we like the Guest Mode that lets you restrict access to certain apps and content for other users, and the Slide Aside multi-tasking feature for keeping your favourite apps close to hand. It's packed with handy features, including NFC, an infrared transmitter and the ability to play 24-bit/192kHz audio.

VERDICT: LG has trumped the competition with the G2. It offers a great design, excellent hardware and handy software features at a very low price. All that's missing is a microSD slot. Chris Martin





NOKIA LUMIA 1020

£429 inc VAT • nokia.co.uk • tinyurl.com/kxcLsng

The Lumia 1020 is a photography-focused smartphone with a 41Mp PureView camera. At 10.4mm thick it's a chunky beast, and that's not including the protruding camera module that can get in the way of your index finger in normal use. It's not light either, at 158g. The matt polycarbonate body is soft to the touch, and well made. The screen has a Gorilla Glass 3 coating and feels luxurious.

The 1020's got the same 1.5GHz Qualcomm Snapdragon S4 dual-core processor as the 920, but its memory has been doubled to 2GB. The interface is mostly smooth, excepting certain sections of the Settings menu and some apps.

The screen is 4.5in, which is surprisingly small considering the dimensions of the phone itself. Windows Phone 8 restricts the resolution to 1280x768 pixels, which looks good but it's by no means a class leader. Its strong points are contrast, colour reproduction and excellent outdoor visibility. Plus, the touchscreen works with gloves.

Combined with a Xenon flash, focus-assist light and Pro Cam app, the camera is the most advanced and powerful we've seen on a phone, and the level of detail is incredible in good lighting. The floating lens and optical image stabilisation come in handy for photos and video, helping avoid blurry messes.

Despite a 41Mp sensor, the 1020 takes two photos when you hit the shutter button, one at 34Mp and a smaller, sharable 5Mp version. You can crop the larger image to create new photos on the phone: capture first, edit later.

The Pro Cam app gives you control over settings including ISO, shutter, exposure and focus; one at a time or all in one go. It's a pain having to change 'lenses' (switching apps, in effect) for panoramas and Smart Cam, with its burst mode.

A bunch of Nokia apps include Maps, Drive+, Music, Cinemagraph and Creative Studio. But Windows Phone is still leagues behind iOS and Android on the app front. Facebook and Twitter are still unofficial, and big-name apps such as Dropbox are missing.

Battery life is unimpressive, and the 1020 struggled to get through a day of normal use - a poor effort for any smartphone.

VERDICT: The Lumia 1020 has an amazing camera, but it is in effect an old Lumia 920 with an improved camera. Poor battery life and a lack of apps put us off. Chris Martin







SAMSUNG GALAXY NOTE 3

£500 inc VAT • samsung.com/uk • tinyurl.com/gakoLzy

The Galaxy Note 3 is one of the biggest smartphones around and can be classed as a 'phablet'. Somewhat surprisingly, then, it's respectably thin at 8.3mm. The thin plastic back that provides access to the battery has a textured leather-look finish, and there's a grooved metal rim around the edges that makes it feel well put together and sturdy. 168g is light for a device this big.

The Note 3 has staggering specifications and performance to match. It pairs a Qualcomm Snapdragon 800 processor with a whopping 3GB RAM. And it shows in benchmarks and from a user perspective. We found games and video worked well, with no lag.

If you like playing games and watching video then the huge 5.7in full-HD screen will suit you well. Vibrant colour and deep hue are standout characteristics. The touchscreen is snappy and sensitive, too, although prone to picking up finger smears.

Storage-wise the options are 32- and 64GB, and there's an SDXC card expansion slot for up to another 64GB of storage.

The S Pen stylus is included for freehand writing, drawing and a range of other tasks. The Galaxy Note 3 is the first device we've seen with Micro-USB 3.0 for faster data transfers.

The Galaxy Note 3 has two cameras, a front-facing 2Mp camera for 'selfies' and video calling, and a 13Mp rear-facing snapper for more serious photography and video capture. The latter is a serious piece of compact-camera kit, offering such features as image stabilisation, Ultra HD video and slow-motion capture.

Taking advantage of the larger chassis used to house a large display, Samsung has included a huge removable battery. In our tests of the Galaxy Note 3 we'd say battery life is a strong point. We could easily get through 24 hours and beyond on a single charge.

The Galaxy Note 3 comes with Android 4.3 Jelly Bean installed, as well as Samsung's own TouchWiz interface. It's feature-rich, but sometimes overwhelming from a user perspective. There's access to all the media and apps that Google Play can offer, plus Samsung's own app store.

VERDICT: The Galaxy Note 3 is a high-quality portable, albeit enormous, device that could serve as a smartphone and tablet in one. It offers excellent performance, a stunning screen and reasonable build quality. **Matt Egan**





SONY XPERIA Z1

£480 inc VAT • sonymobile.com/qb • tinyurl.com/njpm4de

When the Sony Xperia Z launched it knocked the iPhone 5 off the top of our smartphones chart. The Z1 is the successor to that phone and, although it looks very much like its predecessor, there are some noteworthy changes.

The phone is still glass-clad on the front and rear, and both dustand waterproof. The rim is now aluminium rather than the Xperia Z's rubbery plastic, though. Sony has also made the edges more rounded, making the smartphone more ergonomic in the hand.

We're not sure why the Z1 is larger than the original. It's 8.7mm thick compared to 7.9mm, and it's both a few millimetres taller and wider, yet it has the same size screen. The phone is heavier, too; a gain of 25g to 170g means it weighs more than the Galaxy Note 3.

The Z1 has the same 2GB of RAM as the original, but Sony has specified the impressive Qualcomm Snapdragon 800 processor found in the LG G2 and Galaxy Note 3. It's one of the best mobile chips around and ensures excellent performance.

The full-HD 5in screen has a resolution of 1920x1080 with a pixel density of 441ppi, which is up there with the best smartphones. Storage remains at 16GB and there's a microSDXC card slot, which allows expansion of up to an extra 64GB.

Sony prides itself on its photography, and the Xperia Z1 has had an upgrade here. The camera resolution has jumped from 13Mp on the Z to 20.7Mp on the Z1, making it the highest resolution on an Android smartphone. The results are as good as you would expect. The resolution of the front camera has dropped slightly to 2Mp, but it can still capture excellent-quality 1080p video.

Sony has done some spring cleaning with its Android user interface. The overlay looks similar, but is cleaner and more stylish in parts. At the time of review, the Z1 was running Android 4.2.2.

As usual, Sony includes some good-looking and handy widgets. There are also small apps that float around the screen, including notes, calculator and a timer.

We were worried that the improved spec might affect battery life, but the Xperia Z1 comfortably lasted a day of regular use.

VERDICT: Sony has upgraded its fantastic Xperia Z. The Z1 is easily one of the best Android handsets around, but the bulky design and high price mean there are better phones out there. **Chris Martin**



How we test

Smartphones are tested and rated for build quality; hardware and performance; quality of cameras; the operating system provided; and battery life. As well as the subjective opinions of our experienced team of smartphone reviewers, we utilise independent testing software such as the Geekbench 2 performance benchmark, the SunSpider web-browsing test, and the GLBenchmark 2.5 gaming framerate graphics test. Not all tests run on Windows Phone and BlackBerry, unfortunately. Then, considering all the above, our editors rank each phone for build quality, features, performance and value, before arriving at an overall score that reflects the quality of each smartphone at the price it is offered.

	APPLE E549 inc VAT	BLACKBERRY £450 inc VAT	GOOGLE PC ADVISOR RECOMMENDED	HTC £584 inc VAT	
Model	iPhone 5S	Z30	Nexus 5	One Max	
Processor	1.3GHz Apple A7 (ARM v8-based, 64-bit)	1.7GHz Qualcomm Snapdragon Pro (ARM dual-core)	2.3GHz Qualcomm Snapdragon 800 (ARM, Krait 400, quad-core)	1.7GHz Qualcomm Snapdragon 600 (ARM, Krait 300, quad-core)	
Graphics	PowerVR G6430 (quad-core)	Adreno 320	Adreno 330	Adreno 320	
Display size	4in (1136x640, 326ppi)	5in (1280x720, 295ppi)	4.95in (1920x1080, 445ppi)	5.9in (1920x1080, 373ppi)	
Display type	IPS	Super AMOLED	IPS Plus	Super LCD3	
Operating system	Apple iOS 7	BlackBerry OS 10.2	Google Android 4.4 KitKat	Google Android 4.3 Jelly Bean	
Memory	1GB	2GB	2GB	2GB	
Storage	16/32/64GB	16GB	16/32GB	16/32GB	
Card slot	None	microSDXC	None	microSDXC	
Wi-Fi	802.11a/b/g/n, Bluetooth 4	802.11a/b/g/n, Bluetooth 4	802.11a/b/g/n/ac, Bluetooth 4	802.11a/b/g/n/ac, Bluetooth 4	
Cellular	GSM 850/900/1800/1900MHz; UMTS/HSDPA; LTE 800/850/ 900/1800/1900/2100/2600	GSM 850/900/1800/1900MHz; HSPA/WCDMA 800/850/900/ 1900/2100MHz; LTE 800/900/ 1800/2600MHz	GSM 850/900/1800/1900MHz; HSDPA/WCDMA 850/900/ 1700/1900/2100MHz; LTE 800/ 900/1800/2100/2600MHz	GSM 850/900/1800/1900MHz; HSDPA/WCDMA 900/1900/ 2100MHz; LTE 800/900/1800/ 2600MHz	
SIM type	Nano-SIM	Micro-SIM	Micro-SIM	Micro-SIM	
GPS	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	
Camera(s)	8Mp rear camera, BSI sensor with True Tone LED flash; 1.2Mp front camera	8Mp rear camera, BSI sensor, LED flash; 2Mp front camera	8Mp rear camera, LED flash, optical image stabilisation; 1.6Mp front camera	4Mp Ultrapixel camera with LED flash; 2.1Mp front camera	
Video	1920x1080	1920x1080	1920x1080	1920x1080	
Ports	Lighting 8-pin connector	Micro-USB, Micro-HDMI	Micro-USB (SlimPort)	Micro-USB (MHL)	
Other	Dual mics, Siri, AirPlay, Touch ID	BlackBerry Tag NFC	Dual mics, NFC	NFC, stereo speakers	
Battery	5.9Wh lithium, non-removable	10.7Wh lithium, non-removable	8.5Wh lithium, non-removable	12.2Wh lithium, non-removable	
Dimensions	59x124x7.6mm	72x141x9.6mm	69x138x8.9mm	83x165x10.3mm	
Weight	112g	172g	130g	217g	
Geekbench 2 (points)	Not tested	Not tested	3962	2966	
GLBenchmark 2.5 ¹	53fps	Not tested	52fps	40fps	
SunSpider 1.0.2	417ms	989ms	801ms	956ms	

Conclusion

Despite having the best camera on a smartphone we've ever seen, the Nokia Lumia 1020 uses older hardware and pairs a high price with a poor app ecosystem. The BlackBerry Z30 also suffers from a lack of apps, and its spec is lower than that of its rivals here.

Phones have increased in size over the past couple of years to the point that some of the devices in this group are on the verge of tablet dimensions. The jumbo Galaxy Note 3 and One Max are difficult to use day-to-day, but might make sense for those unable to afford both a smartphone and a tablet.

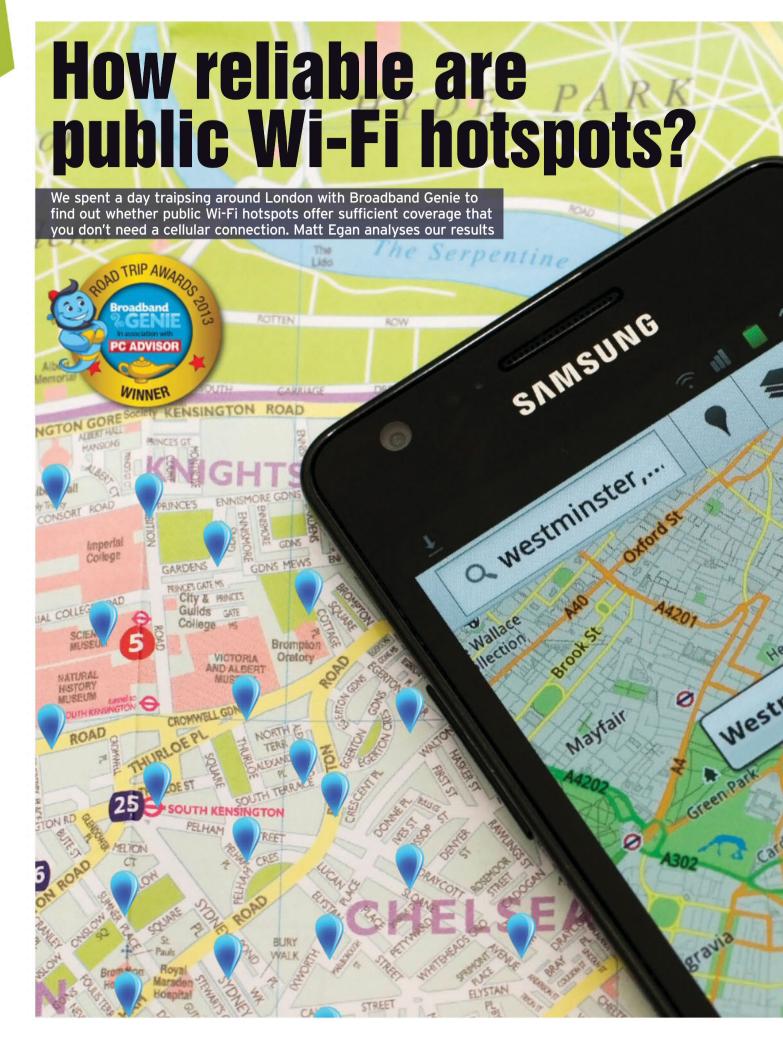
Sony has produced yet another great smartphone in the Xperia Z1. Although it's big for a 5in handset, it's got buckets of style and

substance, plus a dust- and waterproof design that you won't find elsewhere on the market.

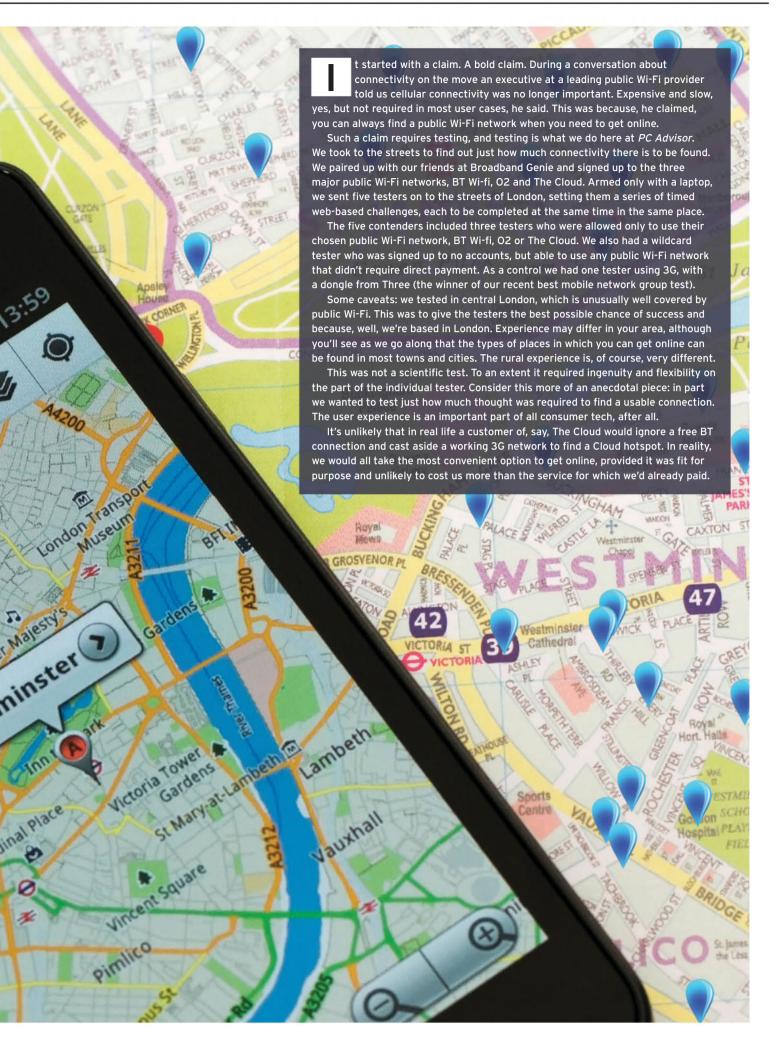
The Nexus 5 earns our Recommended badge on the basis of its sheer value for money. This smart and desirable smartphone offers everything you need at a frankly ridiculous price.

Apple's iPhone 5s deserves a Best Buy award for being an all-round fantastic phone, combining great build, hardware, software and features. LG's G2 is our Best Buy Android smartphone, for offering a similarly excellent package with outstanding value for money. This handset offers innovative design, top-end specifications and clever software features at a great price.

LG £369 inc VAT	NOKIA £429 inc VAT	SAMSUNG £500 inc VAT	SONY £480 inc VAT
G2	Lumia 1020	Galaxy Note 3	Xperia Z1
2.3GHz Qualcomm Snapdragon 800 (ARM, Krait 400, quad-core)	1.5GHz Qualcomm Snapdragon S4 (ARM dual-core)	2.3GHz Qualcomm Snapdragon 800 (ARM, Krait 400, quad-core)	2.2GHz Qualcomm Snapdragon 800 (ARM, Krait 400, quad-core)
Adreno 330	Adreno 225	Adreno 330	Adreno 330
5.2in (1920x1080, 424ppi)	4.5in (1280x768, 332ppi)	5.7in (1920x1080, 386ppi)	5in (1920x1080, 441ppi)
IPS	AMOLED	Super AMOLED	Not specified
Google Android 4.2.2 Jelly Bean	Windows Phone 8	Google Android 4.3 Jelly Bean	Google Android 4.2.2 Jelly Bean
2GB	2GB	3GB	2GB
16/32GB	32/64GB	32/64GB	16GB
None	None	microSDXC	microSDXC
802.11a/b/g/n, Bluetooth 4	802.11a/b/g/n, Bluetooth 3	802.11a/b/g/n/ac, Bluetooth 4	802.11a/b/g/n/ac, Bluetooth 4
GSM 850/900/1800/1900MHz; HSDPA 850/900/1900/2100MHz; LTE 850/ 900/1800/2100/2600MHz	GSM 850/900/1800/1900MHz; HSDPA/WCDMA 850/900/1900/ 2100MHz; LTE 800/900/1800/2100/ 2600MHz	GSM 850/900/1800/1900MHz; HSDPA/WCDMA 850/900/1900/ 2100MHz; LTE 800/850/900/1800/ 2100/2600MHz	GSM 850/900/1800/1900MHz; HSDPA/WCDMA 850/900/1900/ 2100MHz; LTE 800/850/900/1800/ 2100/2600MHz
Micro-SIM	Micro-SIM	Micro-SIM	Micro-SIM
A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass	A-GPS, Glonass
13Mp rear camera, optical image stabilisation, LED flash; 2.1Mp front camera	41Mp rear camera, Xenon & LED flash, optical image stabilisation; 1.2Mp front camera	13Mp rear camera, BSI sensor, image stabilisation with LED flash; 2Mp front camera	20.7Mp rear camera with LED flash; 2Mp front camera
1920x1080	1920x1080	3840x2160	1920x1080
Micro-USB (SlimPort)	Micro-USB	Micro-USB 3.0 (MHL)	Micro-USB (MHL)
NFC, Infrared, 24-bit/192kHz audio	NFC	NFC, Infrared, S Pen	NFC, Water and dustproof (IP58)
11.1Wh lithium, non-removable	7.6Wh lithium, non-removable	11.8Wh lithium, removable	11.1Wh lithium, non-removable
71x139x9.1mm	71x130x10.4mm	79x151x8.3mm	74x144x8.5mm
130g	158g	168g	170g
4085	Not tested	4057	3673
51fps	Not tested	54fps	53fps
901ms	910ms	589ms	738ms









HOW WE TESTED

For each task each tester could use only the Wi-Fi service they'd been allocated, with the exception of the wildcard tester who could use only free public Wi-Fi. All the contenders started in the same place at the same time, then had to find the nearest wireless. connection to complete the task we set.

It wasn't a competition as such, but an experiment to see how feasible it is to rely only on public internet. The contenders had 10 minutes to complete each task. If they couldn't do so, it was considered a failure.

The testers knew in advance which network was theirs to test, so they could research which third-party stores, bars and restaurants would likely offer a connection. They did not know the location or content of the tests, however, so couldn't plan ahead.



TEST 1. Read a book at the British Library

Starting from the yard outside the British Library, we asked our testers to find a web connection, search for the Project Gutenberg website and find Gulliver's Travels by Jonathan Swift. They then had to download and open the ePub (with images) file, and note the time in which they completed the task, and the location of the connection used.

Our O2 tester had previously signed up to O2 Wi-Fi and downloaded the app to their smartphone. Thus it was easy to find a hotspot in a nearby coffee shop. However, it was a lengthy and difficult process to get online. By the time the laptop was connected they had ran out of time to carry out the task.

Our BT tester had a similar experience with a better outcome. They thought the BT signup process could be more streamlined, with less personal data required. However, they were able to quickly and easily download the book in the public lobby of a local hotel.

Our The Cloud tester found several hotspots close by, including three just over

the road. An initial attempt in a Pret A Manger was unsuccessful as the connection was saturated by the lunchtime rush. Our intrepid hack popped next door to a Pizza Express and managed to very quickly download the e-book while standing outside.

There they shared a connection with our wildcard, also nicking Wi-Fi without paying for even some dough balls. Our wildcard initially headed to Starbucks, but it being a café near two major rail stations found it rammed with customers. Our tester could get a flat white and the promise of own-brand internet access, but not a seat. And web access turned out to be false promise, as they couldn't get past the branded pop-up window.

Our wildcard tester ultimately downloaded the book from the same The Cloud network as our The Cloud specialist. Lesson learned: restaurants have better internet access than coffee shops, even if you're next door in the latter.

The 3G control downloaded the book in a couple of minutes from the start point.

TEST 2. Plan your route on the Tube

We then descended to the platform at King's Cross Underground Station, and asked our testers to navigate to tfl.gov.uk and use the journey planner to plan a route to St Paul's. We were miles below ground level so the 3G dongle was a washout.

O2 supports Wi-Fi on the tube, via Virgin Media. On the underground platform our O2 tester was able to sign into the Virgin Media Wi-Fi for free with their O2 credentials. They then hopped online and planned the journey in around three minutes. Neither BT nor The Cloud could match this.

Initially things went well for our wildcard tester. As Virgin Media's Wi-Fi was easily accessible they could either pay for a day's access or log in via EE, Vodafone or O2. We wouldn't let them pay any cash, but as an O2 mobile customer we let them plump for this. Our tester entered their mobile number and was told to expect a text with further instructions. A text they wouldn't receive until we resurfaced at St Paul's Station. So near, and yet so far.

None of our testers noticed Virgin's Wi-Fi hotspot offers free access to the TFL route planner without the need to log in. However, had they needed to access any other website, the results above are valid.



TEST 3. Learn history at St Paul's

We travelled down to the front of St Paul's Cathedral, where we asked our testers to find a web connection and search for a story on the BBC website entitled How St Paul's Cathedral survived the Blitz. Then we asked them to save the main image to the desktop. Needless to say finding the image was no problem for our 3G control, although it did take a minute or two to download.

Our O2 tester had a better time. Their laptop automatically connected to an O2 hotspot at Yo Sushi, without them having to move. They were able to find the BBC news

How was it for you? 02

O2 Wi-Fi was generally good. Setup online was easy, but adding my laptop as a second device proved a pain. From then on, when in range both my smartphone and laptop connected to networks and the performance was great, just like being at home.

The landing page glitch was the main problem I found. Coverage was consistently good in London, although when you're not near a hotspot the smartphone app and mobile data is required to find one. Chris Martin



article and download the image in about two minutes.

Our BT tester could only envy such success. They found a BT Openzone at a Starbucks, and even managed to surf to the BBC home page on another overloaded connection. However, when they could surf no further they closed the browser to start again and found they couldn't reconnect.

Our The Cloud tester found numerous hotspots within a close proximity. Like O2 they were able to get a reasonably good connection sitting on the steps of St Paul's.

There was an odd issue with Chrome, which threw up a strange login screen, and the usual Sky ID did not work. But a quick switch to Firefox and our tester was able to connect. However, they then had to re-register the laptop with The Cloud and this part of the process would not finish, leaving our tester hanging on the device management screen.

A quick switch to a smartphone allowed the The Cloud tester to complete the task in the time allotted. So the connectivity was good, but the user experience not. This was not an unfamiliar occurrence.

And what became of our wildcard tester? Like the other testers they could see many networks, and five were accessible from where they were standing. They simply sat down on the steps and logged on. They also found Starbucks' network overloaded with PowerPoint pitch presentations attached to pressing emails and Russian hair braiding videos from YouTube, but Yo Sushi's Wi-Fi was wide open and the task was completed in no time.



TEST 4. Find out what's on at Tate Modern

After a brisk trot across the river (using a bridge) we found ourselves at the front of the Tate Modern gallery. The task here was simple: find a web connection, open the Tate Modern website and find the What's On page. It should have been simple, and it was for the 3G control test.

It was relatively simple for our O2 tester, too. Using the O2 app they located the nearest hotspot - a five-minute walk away at a local pub. The laptop automatically connected before our tester had even ordered a drink.

How was it for you? BT Wi-fi

I found I had to log in too many times, and there were too many different options: BT Wi-fi, BT Wi-fi with Fon, BT Openzone and BT Openzone Starbucks (the Starbucks option was generally best). As a paid-up customer of BT Wi-fi, I think it should be much simpler.

Many of the hotspots seemed to be outside-only, which wasn't great on a wet, windy afternoon in London, but useful if you are on the hoof.

We weren't impressed with the apps - the hotspot map wasn't very good, for instance. And, on a laptop, it seemed as though you couldn't go back to BT page if you'd already been there but failed to login. It would open the first time you opened the browser, but if you didn't sign in and restarted the browser it disappeared.

In general, then, connectivity was okay, but the user experience wasn't great. Peter Ames

Our BT tester had a much tougher time. Right outside the Tate several different, but apparently usable, networks appeared: BT Wi-fi, BT Wi-fi with Fon and BT Openzone. Our tester opened their browser and was taken to a BT wireless page to log in. However, they couldn't sign into their account because it was the wrong kind of BT Wi-fi. A hop around the corner to a - yes - Starbucks solved this problem, but the sheer variety of 'BT' networks was baffling. Another example of the importance of the user experience as well as the connectivity.

Still, that experience beat The Cloud tester's. The smartphone app displayed a few hotspots in the area that seemed to be a short distance away, but our tester was not able to find them within the time limit. Fail.

Meanwhile, as their colleagues charged off in different directions to find their individual networks, our wildcard tester had cannily noticed that the Tate has its own Wi-Fi, so waited smugly for them to depart and logged on from the café (you have to drink a lot of coffee to surf on the move). Unfortunately, they couldn't connect, so our wildcard tester drank up and moved to a different floor. Again, no luck. There was time for only one more try but, again, nothing. Another fail.

TEST 5. Watch the South Bank Show at the South Bank Centre

Starting from outside the Royal Festival Hall on the South Bank, we asked our testers to find a web connection and navigate to YouTube. They then had to find and watch a clip called 'The South Bank Show Opening'. To pass the test they had to watch the entire clip, something that proved beyond our 3G control. Public Wi-Fi fared much better.

Our O2 tester's laptop again automatically connected to a hotspot, a Yo Sushi network. They were able to load and watch the YouTube video within a minute of taking the laptop out of its bag.

Our BT tester had to enter his login details again, but also quickly loaded and watched the video.

With The Cloud we also found a strong signal even sitting outside. Once again, however, our tester had to register his laptop with The Cloud. After a couple of aborted attempts where it seemed to hang at the final step this was successful. Once that was done the video loaded right away.

Interestingly, our wildcard had better luck with the same network. Their laptop instantly logged on to The Cloud's Wi-Fi, remembering the login from Pizza Express.







TEST 6. Watch ITV at the London Eye

We nipped down the river, stopping just outside the London Eye. There our intrepid testers had to find a web connection, head to the ITV website, then find and watch the opening credits of the most recent episode of 'Coronation Street'. The 3G control test got as far as the web page but was unable to stream, and the Wi-Fi networks proved similarly reticent.

Our O2 tester's smartphone app showed a hotspot at McDonalds, but they couldn't find the network. Fail. Our BT Wi-fi tester had a marginally better experience, finding a BT Openzone, and even navigating to Corrie before the Wi-Fi dipped out. Fail. There's a Cloud hotspot right next to the London Eye, but it seemed far too busy to allow our tester to finish the task. They found the page, but the video wouldn't start. Fail.

Our wildcard tester found another network in the Namco games centre, but couldn't stream the clip. So none of us got to watch 'Coronation Street'. Gutted.



TEST 7. Watch Wills and Kate get wed at Westminster Abbey

Having failed to indulge our taste in high culture, we headed back across the river to Westminster Abbey to find some high society. The task here was to find a connection and watch, via YouTube, the official video of last year's Royal Wedding. To complete the task our testers had only to get the video playing.

Our 3G test did manage this, although the clip was a little jumpy. Not so for the O2 public Wi-Fi. Again, our tester's laptop automatically connected to a hotspot, at Parliament Square, and the clip quickly loaded and smoothly played.

The BT Wi-fi experience was not so good. Despite BT's map suggesting that Parliament Square is one big BT hotspot, our tester could find no connectivity. The Cloud at least spared us the dashed hopes. The Cloud was not available here, although the app did show several hotspots clustered at nearby streets.

Our wildcard tester took advantage of the O2 Wi-Fi account he had set up earlier.



TEST 8. Post a selfie at the National Portrait Gallery

As our test drew toward a close we decided to capture the occasion for posterity, heading to Trafalgar Square and asking our testers to post self-portraits on Twitter, using public Wi-Fi to get online with their smartphones.

This was not a problem for the 3G control test, as it is the sort of thing for which you would naturally use cellular connectivity.

But the public Wi-Fi users struggled.

Our O2 user was connected, but was unable to upload the photo to Twitter or even browse the web. The experience was better with BT, but our tester had similar issues. His phone connected okay, but there were problems tweeting. He had to go into the browser and enter login details, then return to the Twitter app. Our wildcard tester used the O2 hotspot with no problems, however.

The Cloud experience was similar to that of the previous test. Our tester could find no signal in the square itself, but there was some connectivity at nearby bars and restaurants.

How was it for you? The Cloud (Sky)

I had expected this to go a lot smoother, since The Cloud boasts of thousands of hotspots around the country. Frequently, though, it seemed that major areas were bereft of connectivity, even when other networks were available.

The Cloud generally was nearby, but this almost always involved walking to a café or restaurant. That's fine if it's not raining and you can stand outside, or get away with sitting in there while checking your email, but not many restaurants will let you take up a seat without paying for something.

The Cloud smartphone app proved useful for quickly locating hotspots and seemed generally accurate. One oddity of The Cloud network highlighted by the app is the clustering of

the connections – you can walk for ages and not find anything, then there will be three or four in a very small area, often in adjoining coffee shops. It would be more useful if they were spread out, although it does mean that if the place you're in is very busy you can try next door's connection.

All devices should be registered with The Cloud ahead of time as this part of the process can be painful on a busy connection. The device-management screen can take a little while to load up and behaved strangely when the link was slow. Once that was done, though, both my smartphone and laptop instantly latched on to the hotspots instantly without any further fuss. Matt Powell



TEST 9. Find the way to vour hotel from the Tube

We finished our test by using our connections to find our way from Marble Arch tube station to our hotel, using Google Maps.

The 3G control worked fine, if a little slowly. And our O2 tester's laptop had no problems automatically connecting; they were quickly able to plan the route to the hotel. That's the route down which our wildcard tester also travelled with similar success

The BT Wi-fi test wasn't so good: our tester signed in just outside the station, but the connection initially failed despite what appeared to be a strong signal. After a few minutes it began working and they were able to complete the task.

We had a better time with The Cloud. Here we picked up a decent signal just outside the tube station thanks to a nearby coffee shop and rapidly found directions on Google Maps.



How was it for you? 3G control

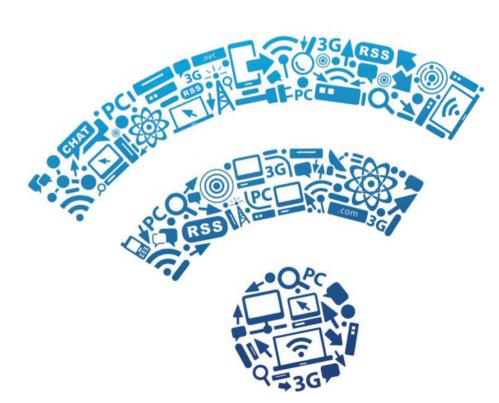
We could get online on every occasion - as you'd expect in London. But it's not all perfect. Streaming video was always a trial. In fact, we couldn't get any of the

videos to play properly. And downloading files on even a robust 3G connection can take a while. And that's before you factor in cost. Matt Egan

How was it for you? Wildcard

Overall, I probably had the easiest time of all. No network is everywhere but, in central London at least, you're usually near some kind of wireless

hotspot you can get on to for free. Unless you're an 02 customer on a tube platform, at which point you're just frustrated. Neil Bennett



VERDICT

So is it true that we no longer require cellular data? Will public Wi-Fi suffice? We'd say not. There was at least one task that none of the public Wi-fi users could complete, and we never failed to get online using cellular data. But we were generally impressed by the public Wi-Fi networks. In central London they are very common, although there is an element of feast or famine. In some areas we could choose from multiple networks; in others we had to move to get online.

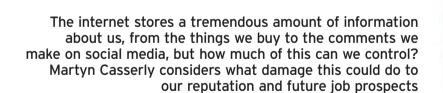
One regular complaint was the poor customer experience. Our test was slightly false because in most usage scenarios consumers would be set up to use their chosen network in advance. But there may be some work required on the user interface and mobile app side of things.

Nonetheless, we were pleasantly surprised at the ubiquity and quality of public Wi-Fi. In general it is super-cheap or free and, as such, it is much cheaper and quicker than is cellular data. The networks themselves all performed at a similar level - no single one stood out.

When you set out on a journey for which you will require connectivity, we recommend signing up to public Wi-Fi, but also taking along a good 3G-enabled device. ⊠

Manage your online reputation





he internet knows a lot about us. Every time we sign up for one of those exciting free, online services, click a 'Like' button, are tagged in a photo or comment on our social media of choice, we leave behind a trail of digital breadcrumbs that lead back to us, sometimes in ways we least expect. As a society we've long grown accustomed to the idea of having a reputation, and how we maintain it in the physical world, but now with the copious

amount of information about us posted online - most of which is freely available to any interested party - we need to seriously consider the state of our digital identity.

The internet never forgets

In the past, any errors of judgement or fleeting, rebellious actions could be quietly put to rest and hopefully forgotten. If we were unlucky enough involved in industrial tribunals, news stories or court cases then

the repercussions could be further reaching, but they would eventually abate. There was always a chance that someone might emerge to remind you of said indiscretions but, for the most part, these moments faded into obscurity, and we could rebuild our reputations without the taint of history.

Today, things are very different. In the digital, always-connected age there is the real possibility that the things we share or experience will relentlessly follow





In the past, any errors of judgement or fleeting, rebellious actions could be guietly put to rest and hopefully forgotten

us throughout our lives, with possible implications on the jobs or financial services open to us in years to come. Society has never before been in a position where our thoughts and beliefs are matters of public record, easily found and collated with the most basic search tools.

"This will be the first generation of humans to have an indelible record," writes Google chairman Eric Schmidt in his book The New Digital Age.

Google yourself

If you are applying for a job, finance, or even going on a blind date, there is a very good chance that the interested party will run a quick Google search on your name. It's important to know what results will be returned. If you type your own name into the search engine then the important listings are those that appear on the first page of results. In many cases all you will find are links to your social-media pages, and perhaps the odd photo or two. This is fine - but we've heard stories where this wasn't the case, and the effects can be devastating.

Simon Wadsworth is an online reputation management consultant for his company Igniyte (igniyte.com), which specialises in helping people fix their digital profiles. While Igniyte has many corporate clients, it still finds many individuals who come to it with problems of how the internet represents them to the world. Sometimes in quite shocking ways.

"There was a lady whose mother had been brutally murdered, and it caught the national headlines," says Wadsworth. "You know the way that you see basically a snippet in Google? You don't see the full story until you click on it. The snippet read, because of the way it folded up, that she was involved in the murder. At first glance - and you know what people are like, they're impatient, click through and don't necessarily see the full details - it looked like she was somehow associated with the murder."

Sadly stories such as this are becoming very common. Another case dealt with by Igniyte concerned a young woman who was working at a London stockbroking company, whose colleague brought sexual-harassment charges against a manager.

"She was subpoenaed to testify against the boss," explains Wadsworth. "She didn't bring the case, didn't do anything at all, but when you looked at the front page of Google it looked as though she was the one who had done it. All because of how the snippets came up when she was a witness in the case, it read like she was the main instigator. For a year after that she really struggled to get a job. She was classified as a troublemaker, and it was nothing to do with her."

In cases of mistaken identity, and poorly written summaries that imply more than they ought, there can often be a straightforward course of action.

"We can go to the papers and explain the situation," says Wadsworth, "get them to make adjustments... and they will respond to that if there's a good reason. As long as you're sure there's a genuine distress caused by a mistake, and you're not aggressive, you're not threatening them, you're not legal with them, you're just talking to them and saying look this is the problem."

"Another way, which is dangerous in some ways, is to counter that story with their own story. But there's a danger you open up another debate then," added Wadsworth.

Removing unfavourable links becomes a far more complicated problem if the details are true, even if they are related to events that might have happened several years earlier. The Guardian recently reported on several people who had found their past very difficult to escape.

One young woman had converted to Islam and wanted to delete her former life from the web. She had previously worked as a professional model and, although the model agency agreed to remove her account and profile, they had already paid for the photographs and now owned the images. These were easily found via a Google search.

Another is the story of a man who suffered financial difficulties in the 90s, which led him to sell his house to pay off his debts. Searching for his name on Google brought up the details of his money troubles 15 years after the event, without mention that he had settled the debt at the time. Because the story was factually correct, the newspaper involved refused to remove it: Google took a similar stance.

Although you can hire a company such as Igniyte to fight these cases for you, doing so is not a cheap solution. Pursuing companies

SOCIAL MEDIA TIPS



can also be a long, drawn-out affair, with the information remaining available online. To really take control of your online reputation, the first and most important step is to take control of that first page of search results.

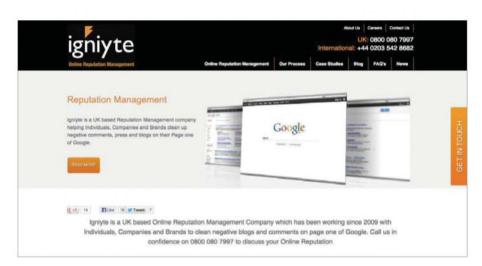
Protect your reputation

With 94 percent of Google searches never reaching the second page of links, what appears on page one is of the utmost importance. Thankfully, there are ways of populating this list with positive content, in essence burying the past under a more reputable present. All it takes is a little work.

"If you want something ranking on page one for your name," explains Wadsworth, "the best place to start is probably LinkedIn. If you do a LinkedIn profile you've got to do it to the point where you've got an all-star rating. If you do an all-star rating with your name, as long as it isn't John Smith, then there's a very good chance you're going to get that on page one of Google."

This same principle applies to Facebook, Google+, Twitter and any other largely populated sites that Google will recognise as significant. The frequency of your visits and posts can also have an effect on where these sites appear in the rankings.

In an ad hoc test we found it was possible to quickly move one link down the page by logging into social-media sites and making changes to a profile or posting



comments. Some results began to appear almost instantly. However, if the link you're attempting to move is to a popular site, it can require dedication to ensure that it doesn't start to climb back up to the top.

"I would say to people that the best way to do it," says Wadsworth, "is that whatever industry they're in, whatever association they're involved with, whatever hobby they have, make sure that they take every opportunity they have to represent themselves. They may not have anything negative now, but when it does hit it can be devastating."

The problem of managing a public identity is not a new one. After all, Shakespeare

IGNIYTE specialises in managing the online rep of companies and individuals

highlighted the challenge in *Othello* when he wrote "Reputation is an idle and most false imposition; oft got without merit, and lost without deserving." The stakes now are higher, though, thanks to the global nature of communication, and the ease with which information is accessed. The internet has brought its many splendours to the modern world, and we would never want to return to a time without it. But as we learn how to live in the truly digital age, we will need to become the active curators of our own online lives.

THE RIGHT TO BE FORGOTTEN

If all this seems a bit scary, and we certainly think it is, then you might feel the compulsion to remove yourself entirely from the internet. The thing is, it takes a lot of work and, in many cases, information will be left behind.

Clearing mentions of yourself on news sites or blogs can be achieved only by contacting them and pleading your case. If they are not receptive, and the posts in question conform to the site's guidelines, then you'll find little help from Google.

A recent campaign for the Right to be Forgotten ended up in the European Court of Justice, where advocate general Niilo Jaaskinen recommended that Google was not responsible for the censoring of available information as it was "not generally to be considered as a controller of the personal data appearing on web pages it processes". This means that references to you that might have appeared in the past are going to remain there. Creating positive content to drown out the negative remains the most

You can, of course, delete your
Facebook, Twitter and LinkedIn accounts,
but anyone who is determined enough can
probably trace any remnants left behind.

A good place to visit if you're serious about removing yourself from the web is AccountKiller.com, which offers detailed notes on an incredible range of sites, with links to their various deactivationand removal procedures.







ifteen years ago BMW proudly announced that its 750i saloon had more onboard computing power than NASA used to put a man on the moon. In reality, that's not saying a lot: back in 1969, when Apollo 11 touched down on the lunar surface, the microprocessor hadn't even been invented.

But today's motors truly are powerhouses of computing, with chips controlling the engine, lights, entertainments system, ABS braking, dashboard instrumentation, airbags and security system.

What's more, current research aims to enhance this local intelligence by providing communication to other cars and the transport infrastructure. Here we'll investigate some of these initiatives to find out how this technology hopes to reduce congestion and pollution, while making our journeys safer and more enjoyable.

The state of play

An average car contains more than 50 processors, with top-of-the-range motors boasting many more. While they're not as powerful as the chips in your PC, many are based on similar cores to those you'd find in a smartphone or tablet.

Given that cars contain many more chips than you'd find in these portable computing platforms, it's clear that we're talking about some serious computing power. To find how all this processing muscle is used, we'll start by looking at some of the latest intelligent systems to impact the world of motoring.

BMW's ConnectedDrive range of features has just been upgraded with the introduction of facilities aimed at improving levels of comfort, safety and performance.

First available in the 5 Series (pictured above) is the Driving Assistant Plus system, which now includes the Traffic Jam Assistant and an enhanced version of the Parking Assistant, The Traffic Jam Assistant comes to the fore in stop-start tailbacks on motorways. It ensures the car maintains a preset distance to the vehicle in front and, when necessary, slows the car to a halt. It also takes over the steering, helping the driver to stay in their lane, even round bends, provided they are holding the steering wheel with at least one hand.

Parking Assistants aren't a new concept, but BMW's technology takes it to a new level in helping the driver to parallel park. As with previous versions, it performs the necessary steering manoeuvres, but it now also controls the accelerator and brake pedal and selects the correct gear. All the driver has to do is signal left or right accordingly, hold down the Parking Assistant button, and the car will autonomously manoeuvre itself into the parking space.

Meanwhile, Volvo now offers Pedestrian Detection across most of its range. It is also progressing other systems, such as cyclist- and animal detection. However, the system doesn't only detect pedestrians who are already at risk. Using a combination of radar and cameras, pedestrians are tracked and their pattern of movement analysed to predict if they're about to step into the road. If an emergency situation occurs, the system sounds an audible warning and flashes a light in the windscreen's head-up display. If the driver fails to react and a collision is deemed imminent, the system takes over by carrying out an emergency stop.

While airbags have done a lot to improve safety in vehicles, the fact that an airbag has inflated indicates that a serious incident might have taken place and that the occupants may require assistance.

Recognising this fact, several motor manufacturers - including Ford, Volvo, BMW and Mini - have introduced a system that calls the emergency services or a call centre when an airbag is inflated. Some systems also sense the activation of the emergency fuel pump cut-off, or the seat-belt tensioners, to indicate that an accident has taken place, and some have an SOS button. The system uses the car's (or your phone's) GPS to accurately report its location.

Nearly all today's systems have one thing in common: they are entirely self-contained. In a way this parallels the world of computing prior to the introduction of the internet. Just as the introduction of connectivity transformed computing out of all recognition, many experts believe the same will happen to motoring. To find out what this could mean in practice we've delved into research that aims to enhance a car's intelligence by allowing it to communicate with the world at large.

A safety drive

sim^{TD} stands for Safe and Intelligent Mobility – Test Deutschland, a German research project supported by many of the country's top car manufacturers and research centres. Its aim is to promote what it refers to as 'car-to-x' communication, with the purpose of improving both safety and efficiency. The mysterious 'x' in that catchphrase relates

either to direct communication with other cars, or linking to roadside equipment such as traffic lights and variable road signs, via a central control centre.

While the intelligent onboard systems that are found in today's cars use a wide range of sensors to detect road conditions, both radar and cameras are limited in how far they can see. The main purpose of the communication technology developed by sim^{TD} is to extend the vehicle's horizon.

A classic example is advanced warning of roadworks with information on the distance to the construction site, any associated speed limits and lane restrictions. This allows drivers to react in a safe and timely manner or perhaps choose an alternative route. While this sort of information is relatively static, and this feature isn't a vast improvement over ordinary satnav systems, the fact that cars are able to transmit as well as

of transport. Perhaps one of its key features in this area is the Traffic Light Assistant. Using direct communication between a car and the lights, a driver is told what speed to drive in order to avoid having to stop at the next junction. Fuel efficiency is improved as energy is not wasted through unnecessary braking. The system also provides the traffic light with information on the speed and





receive information means that much more immediate data can be made available. In the case of stationery vehicles on a motorway, the situation would be reported by the first suitably equipped vehicle on the scene and the information would immediately be reported to approaching vehicles.

sim^{TD} also supports direct communication from one vehicle to another. One application is the electronic brake light. If a car ahead brakes suddenly, an alarm will show on the following car's dashboard, even if the car is hidden by fog or around a corner so that the normal brake light couldn't be seen. Another use of vehicle-to-vehicle communication is for emergency vehicles to make their presence known well before their siren is heard.

Cutting pollution and congestion

While sim^{TD} aims to make motoring safer, it also endeavours to reduce congestion and, in doing so, reduce the environmental impact

positions of approaching vehicles, which it uses to optimise signal sequences so that they can operate most efficiently in the current traffic conditions.

Another application, which both cuts down on futile journeys and avoids the frustrating experience of driving to a car park only to find it's full, is real-time information on the availability of spaces in nearby car parks.

A similar Intelligent Transport System has been the subject of research in the US, funded by the Department of Transportation. While this programme promises a whole raft of benefits, a reduction in carbon-dioxide emissions is a key aim.

The AERIS Project (Applications for the Environment Real-Time Information Synthesis) is researching the provision of real-time information, via infrastructure-tocar and car-to-car communication, to assist the driver in making 'green' choices that will have a positive effect on fuel efficiency.





Warnings of congestion on the road ahead and suggestions of alternative routes are key features but, by being integrated with the broader transport system, drivers can also be informed of public-transport alternatives that might reduce their journey times and pollution.

Somewhat more contentiously, the project is also investigating eco-signals and eco-lanes. Eco-signals (such as traffic lights) adjust their timing to maximise the efficiency of approaching vehicles but, more controversially, could give priority to cars based on their environmental credentials.

Similarly, eco-lanes on highways would be restricted to those vehicles deemed least polluting or for regular vehicles operating more economically, for example by driving more slowly.

The driverless car

According to some researchers, the only surefire way to make cars safe is to remove the driver from the equation. In some quarters, it would also be considered the ultimate in comfort and enjoyment - although the Jeremy Clarksons of this world would surely take issue with that sentiment. Unlikely as it might sound, considerable progress has been made in developing driverless cars.

As long ago as 1997, eight Buick LeSabres travelled autonomously at 65mph, in a so-called platoon, on a section of the Interstate 15 near San Diego, California. With each vehicle separated from its neighbours by 6.5m, the highway could carry 4,300 vehicles per lane, per hour, compared to a more typical 2,000 for ordinary vehicles. In addition, it was shown in wind-tunnel tests

that if a closer separation could be achieved, the cars' aerodynamic performance could be improved with a consequential improvement in fuel economy by as much as 25 percent.

Impressive as this sounds, the concept is hindered by the fact that it works only if all the cars on the road are equipped with intelligent systems for autonomous control, and the highway also has to be prepared so that it could communicate with the vehicles.

Both these drawbacks were overcome in a demonstration of a fully autonomous car in September 2013. The car in question, a modified Mercedes Benz S500 known as the Intelligent Drive research vehicle, drove itself 100km from Mannhein to Pforzheim in Germany. The trip, organised to celebrate the 125th anniversary of the first ever longdistance car journey, made by pioneer Bertha Benz, followed her exact same route.

In driving autonomously along ordinary roads, both in rural areas and town centres populated with ordinary cars, Mercedes achieved a world's first. This feat involved the car dealing with several complex situations - traffic lights, roundabouts, pedestrians, cyclists and trams - using an array of sensors including stereo cameras, long- and short-range radar, and GPS.

If you think this will remain the domain of the research scientists for years to come, using cars far removed from those in the showroom, think again. According to Mercedes, "This trailblazing success was not achieved using extremely expensive special technology, but with the aid of near-production-standard technology, very similar to that already found in the new E- and S-Class." With indications that similar technology could be available by the end of the decade - legalities permitting - it looks as though the era of self-drive cars might soon be drawing to a close.



Prevent laptop theft while travelling

Conventional wisdom about protecting your laptop from theft is wrong. Mike Elgan explains how to keep your stuff safe



fter surviving many trips abroad, often working in coffee shops, I laugh whenever I hear someone at Starbucks saying to a stranger: "Will you watch my stuff while I go to the bathroom?" This provides zero protection against theft.

Here's the global best practice for stealing a laptop: grab it and run.

The commonly used defences against this crime are all wrong. Sitting there won't deter them. They'll steal it even while you're actually typing. If you can outrun a teenager familiar with the surrounding streets (good luck with that), he will drop it before you catch him, destroying the laptop. If you chain it to the table, he'll drop it and smash it trying to get away. If you chase after the guy with the laptop, his partner will casually walk off with your backpack.

To protect your laptop, follow my three-second rule: make sure a thief can't run from your laptop to the door in less than three seconds. Find a place to work that's tucked away in the corner with lots of tables

and chairs between you and the door. And make sure a thief can't approach your laptop without you seeing them. It's more important that you keep an eye on who's approaching your table than your stuff.

Second, if you need to leave the table for any reason, but want to maintain your claim to it, leave easily replaceable personal items on the table and take your laptop and other valuables with you, even into the toilet.

Third, don't appear to have an expensive laptop. That Apple logo screams "black market retail value", so buy a cover that makes it look like a cheap laptop, or something other than a laptop.

And fourth, confuse crooks with the unexpected. Most criminals are looking for specific things - wallets, high-end smartphones, expensive laptops and iPads. I walk around wearing Google Glass with confidence. Nobody is going to steal it because that technology is not yet on their radar. Criminals are confused about what it is, so they leave it alone. Likewise, you can confuse thieves by making them unsure about what you've got.

I'm a huge fan of Twelve South's BookBook line: phone, tablet and laptop cases that look like old leatherbound books. This will at best make them think you've got a book and, in the worst-case scenario, confuse them before they figure out that you've got some unknown type of electronic device. That delay in reaction makes a big difference. Nobody wants to steal your book. They'll never know your 'book' is actually an iPad wearing a Twelve South BookBook cover.

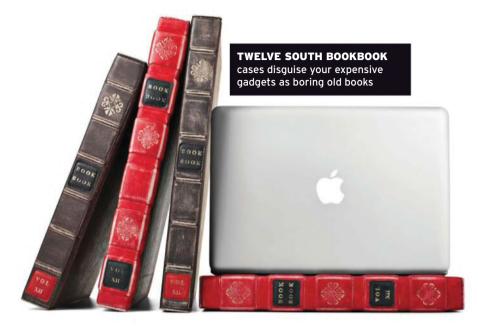
Equally important for the securityconscious traveller is a good backpack but, again, the conventional wisdom is wrong.

Keep your backpack safe

The most important feature of a backpack is security. But the best way to achieve this is different to how nearly everyone imagines it.

There's a whole sub-industry of backpack security that treats the problem as one of fortification. A company called Pacsafe is the leading brand in this space. Wire mesh backpack linings or covers are designed to prevent thieves from cutting your bag. Zipper locks and hidden pockets prevent easy theft.

The marketing around these bags suggests that you're going to leave your backpack in some hotel room or hostel and you'll want to lock it down.



The belief that locking a backpack to, say, a pipe or desk and fortifying it will prevent theft is false. A determined thief will cut through the cables, rip out the pipe or figure out some other way to steal your stuff.

The best protection is social engineering and also following some basic guidelines. It starts with the backpack selection.

There are high-quality backpacks on the market, fortified or not fortified. If you have a conspicuously high-quality backpack, you'll make yourself a target for theft. For example, the SOOT Electropack project looks promising. And I've been tempted by the Pelican ProGear S130 Sport Elite Laptop Backpack. These are great products if you never leave the safety and comfort of safe and wealthy places.

But carry these packs into most countries and you might as well tape a sign to it in the local language that says: "Very expensive gear inside: please steal me!" And a determined thief will do so.

The most important security feature in a backpack is to be boring. Buy a black backpack with no fancy features or designer logos. The plainer the better.

The second most important security feature is that it holds everything of value and is still comfortable to wear.

Gear up in such a way as to never have to leave your valuable electronics behind. Make sure everything fits into one backpack. In my case, I carry a MacBook Pro, iPad, iPhone (my Android phone lives in my pocket), Google Glass, chargers, cables, extra credit cards and more. The total value of what I carry in my backpack is more than £3,000.

Then never, ever leave it behind. Always carry your backpack with you. When you're in a coffee shop, don't place the backpack on a chair or on the floor next to you. Put it on the floor between your legs and under the table.

Finally, whenever you're in a situation where anyone can be close to you and behind you, put the backpack on backward so it's in the front, to prevent razor-blade access. The most likely way thieves will steal stuff is to divert your attention. If something happens that's attention-grabbing, always move the backpack to the front and keep your head on a swivel. Good luck out there. oximes



Making music on your laptop

Martyn Casserly shows you how to unleash your inner composer, with a little help from your PC

reating music on your laptop is a lot easier than you might think. In fact, with the right software, you don't even have to be able to play an instrument. Of course, you'll still need an ear for a tune, and a basic understanding of how different parts of a band work together, but with the help of programs such as GarageBand and Mixcraft you can assemble songs in a surprisingly short space of time.

In this feature we'll take a look at how these impressive music creation tools work, and how you can harness their power with little need for technical or musical prowess. First, we'll focus on GarageBand, which is the most popular application (but it's available only on OS X and iOS), and then look at a Windows alternative: Mixcraft.

GarageBand

Alongside iPhoto and iMovie, GarageBand comes free with every new Mac as part of the iLife package. Bundled apps often tend to be barebones products, but Apple knows that software sells hardware and has made iLife an impressive, highly usable suite of apps, with GarageBand being arguably the pick of the bunch. If you own an iPhone, iPad or iPod touch then you can also buy the mobile version (£2.99); it's much simpler, but still offers plenty of fun.

GarageBand belongs to a class of programs often referred to as DAWs (Digital Audio Workstations), which let you arrange audio files on separate tracks and build up a musical piece. You can also record live audio directly into the program using an interface such as the IK Multimedia iRig or a USB mixer.

On launching the program you'll be presented with a pop-up box that offers you the choice of creating a new project, learning an instrument (there are lessons for Guitar and Piano), Jam along with Magic

GarageBand, or create your own iPhone ringtone. Click New Project, then select Loops. Once you've accepted the default time signature and key (these can be changed later) you can get started.

The simplest way to build an arrangement is through the loops Apple provides. In the main workspace you'll see an empty grey panel with the legend 'Drag Apple Loops here'. It's really that simple.

In the righthand panel is a grid of options that you can use to find loops that fit what you have in mind. The first column has a set of genres - Rock/Blues, Jazz, Electronic and so on. Clicking each button will list the available loops in that flavour. Then you can select the instrument type from the next column, be it drums, guitars, pianos or whatever. The available loops are listed in the bottom-right panel, complete with the number of beats they contain (how long they are).

It's a good idea to start with a drum beat, as this sets the tone for the song and also means you have a solid groove to build upon. Highlight a genre, then select All Drums and listen to a few loops. When you find a beat you like simply click on it and drag it into the main panel. GarageBand will automatically create a track for it once you drop the file.

To listen, click the Play button at the bottom of the screen. Here you'll also find other controls and a display that says how long the song currently runs. One icon to take note of is the metronome, a blue triangle with a line sticking out. As you're not doing any live recording you won't need this, so click on it until the blue light goes out.

Drag different loops on to the main panel to build up a tune. Once you find a loop you like, hover the pointer over the top-right corner of the loop until a curved arrow appears. Now drag the edge to





Try out some percussion to add a bit of depth to the beat, then find a bassline you like to boost the low end. Most of the melodic instruments are automatically in the same key, so you won't have to worry about learning your chord progressions, but they will have different patterns of notes. This means you'll need to pay attention to each instrument playing, avoiding any clashes by swapping the offending loop for another.

The best part is that you can constantly experiment, add, move and remove loops, without damaging the tune. Dabbling often leads to happy accidents. When you're finished click on Share in the top menu, then download your finished creation.

If you want to get an idea of what's possible with GarageBand, listen to some songs others have uploaded to SoundCloud's dedicated group: tinyurl.com/pmkvyfz.

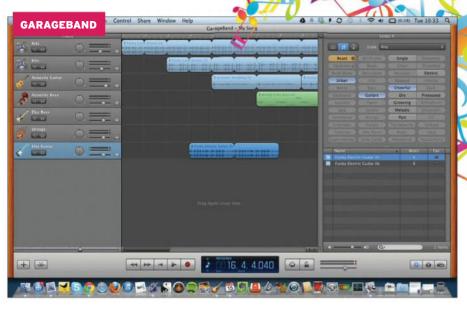
Mixcraft Pro Studio 6

Windows 8 doesn't come with audio-editing software preinstalled, but plenty of thirdparty options are available. Audacity is a free, basic editor, but it lacks refinement and can be an arduous first experience of a DAW.

Sony offers Music Studio 8, a respectable and well-featured program that sells for around £20. Our favourite, though, is the Mixcraft range from Acoustica.

There are several versions of the program, costing from £40 for Mixcraft 6 Home Studio to £160 for the powerful Mixcraft Pro Studio. Each allows you to create music, with the higher end including more advanced features such as video editing and instrument emulation plug-ins. We're using the Pro version, but the same layout and techniques apply across the Mixcraft range.

In much the same way as in GarageBand, you'll use loops of existing music to create a song in Mixcraft. This means you won't have to worry about learning music theory, nor playing any notes; instead you can put together a tune from the building blocks of loops that come free with the software.



To begin the process click on File, New Project. Select 'Build Loop & Beat Matched Music' to open the main control screen. The layout follows a standard design for this type of software. On the left are your tracks, with the main expanse of the centre pane where you'll drag-and-drop your loops. At the bottom you'll find the playback, song duration, key and tempo controls, plus various tabs that include access to the Library. In here you'll find a range of loops that you can use to create your song.

The loops are initially sorted to include all instruments, tempos and keys. You have the option to change this via the two drop-down menus, which allow you to zero in on certain tempos or keys. The lefthand pane has a breakdown of musical styles, and clicking on one will show the relevant loops.

The main pane has the loop name (which lets you know the type of instrument and style), its tempo, key and a few other details. The two you need to keep a close eye on are tempo and key. While building your song you'll need to choose loops with the same tempo, unless you're trying some out-there prog rock epic, which is cool.

The key will determine whether the loops are in tune with each other, so for now stick with the same key for all your melodic tracks. Drums and percussion are rhythm instruments and therefore don't have a key, but remember to check the tempo.

Find a beat you like (clicking on the green triangle will play a sample), then click the blue plus sign to add it to your track. You'll be warned if the tempo doesn't match that of your project.

Now you'll see the waveform displayed in one of the tracks in the main pane. You can move around the loop by dragging it with the mouse, and if you want to make it longer just click on the circle with a plus icon next to the loop's name. Try adding a few new beats to other tracks, then start using some melodic instruments such as guitar, strings or piano. If something doesn't work within your project just click on the loop and hit delete.

It's a good idea to create your song in sections, otherwise it can become repetitive. Use the numbers at the top of the timeline (which represent bars) as a guide. We suggest starting with a eight-bar intro, then change a few loops and have a sixteen-bar verse, sixteen-bar chorus, eight-bar bridge, and then build back up to a sixteen-bar chorus to finish the track.

All this can be changed and adjusted as you go, but it helps to have a rough plan. As your arrangement grows you'll probably want to shrink the size of the loops on the timeline so you can clearly see the project. To do this, position the pointer on the timeline and use the mouse's scrollwheel to zoom in or out.

Once you've assembled a basic arrangement, various tools within Mixcraft let you add finesse, including the setting of individual volume levels, editing loops and recording your own vocals or live instrument. A MIDI controller option lets you to use your keyboard to play organs, synths and a wealth of other sounds.





(tinyurl.com/n3t2wfs) and you'll find several comments from users

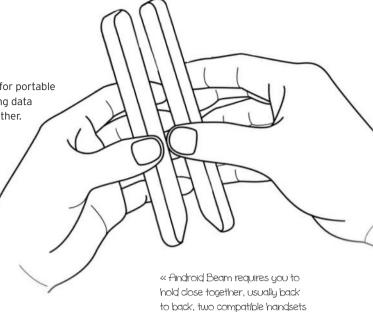
decide once and for all if you need it in your phone.

What is NFC?

The clue is in the name: near field communications. NFC is a set of standards for portable devices. It allows them to establish peer-to-peer radio communications, passing data from one device to another by touching them or putting them very close together. Get it? It's communication between near devices. (It doesn't require a field.)

NFC came out of RFID. Radio-frequency identification is the technology used by shipping companies and in superstores to keep track of goods, and it uses electromagnetic induction in order to transmit information. NFC is similar technology, but standardised for consumer products. NFC standards are defined by a group called the NFC Forum, which includes Nokia, Sony and Philips.

In essence, if your phone has NFC as a feature it can be used to transfer data to other phones or to NFC readers.



tow does NFC work?

NFC is a means of sending data over radio waves. In that sense it is similar to Wi-Fi or Bluetooth, but unlike those protocols (and like RFID) NFC can be used to induce electric currents within passive components as well as just send data. And it is faster than Bluetooth. Indeed the two are closely linked: Samsung Beam uses NFC to pair devices, and then Bluetooth to transfer data. NFC can work with passive devices that don't require their own power supply, such as travel card readers. NFC's data-transmission frequency is 13.56MHz. NFC can transmit data at either 106-, 212- or 424kbps (kilobits per second).

At the time of writing the NFC standard has three modes of operation: the peer-to-peer mode that lets two smartphones swap data, a read/write mode in which one active device picks up info from a passive one, and card emulation, in which an NFC device such as a smartphone can be used like a contactless credit card.

Uses of NFC

So that covers the technical stuff. But what can it do for you? Why do some smartphone users consider NFC an important feature?

As we mentioned earlier, there are peer-to-peer technologies such as Android- or Samsung Beam, wherein you can share a file or a contact by touching together two smartphones. That's cool, but no game changer.

More important is the potential for contactless commerce. If you think about a payment card such as the London Oyster card, then imagine using your phone for this purpose via NFC, you can see the benefit. Or how about using your smartphone instead of your contactless Visa Debit card? You could truly dispense with your wallet, although the dangers of losing your phone are intensified.

> London's transport sustem uses NFC to » collect payments through the Oyster card



Future uses of NFC

Unfortunately, at the moment a lot of this is theory. Google Wallet allows consumers to store credit- loyalty card information in a virtual wallet, then use an NFC-enabled device at terminals that also accept MasterCard transactions. The Wallet app is currently available only to US users, however.

Other potential uses for NFC include the ability to control devices around your home. Perhaps your house would unlock and the heating and lights go on when your NFC-enabled phone passed a sensor in the driveway. And there are potential social benefits: if everyone had NFC-enabled smartphones, swapping contact details would be pretty straightforward.

The Google Wallet app is available to US customers » only, but rumour has it that it won't be long until Google's mobile payments system comes to the UK





you need

Honestly, right now we would say no. The ability to transfer contacts via touch is nice, but not important. But the potential for NFC is huge. Ultimately it all comes down to applications in the real world. If ever you can use NFC to make your smartphone your wallet, travel card and home-automation remote control, expect it to be in every phone. oxdiv

> « Millions of iPhone users have no choice when it comes to using NFC, so do you really need it?



YOUR QUESTIONS ANSWERED

Expert computing advice

We tackle readers' hardware and software conundrums

DELETE A WINDOWS.OLD FOLDER

I've recently updated my Windows 8 PC to Windows 8.1, and am now running low on disk space. Searching through my drive has revealed a folder called Windows.OLD, which seems to be taking up a lot of space. What is this and is it safe for me to remove it?

A Windows.OLD folder is often created during an upgrade of Microsoft's operating system from one version to another. It contains files from your previous installation of Windows, which were either not required or can't be used with the new version. You don't need to keep these unless something has gone wrong with the upgrade and you need to roll back to your previous version.

Unless your low disk space situation is causing problems, we suggest leaving the Windows.OLD folder where it is until you've made sure you're happy with your upgrade, and all your files and settings are in place.

In your case, Windows 8.1 will remove these files automatically in a few days, though, you can get rid of them by running Disk Clean-up. To do so, go to the Start screen and type **Disk Clean-up**. The operating system will find the utility for you. Run it and select your system drive as the drive you want to clean up. It will appear with a small Windows logo as part of the icon.

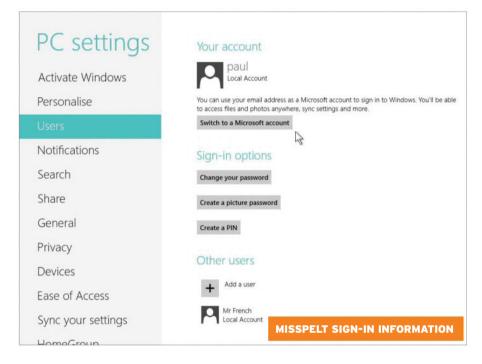
Click the button marked Clean Up System Files (it may ask you to select your system drive again) and the utility will then give you a list of items you can clean up. Tick the box next to Previous Windows installation(s) to make sure the Windows.OLD folder is removed. You may find other files in here you wish to delete to help with your disk space problem, so you can select those, too.

Now click on OK and select Delete files. Your disk space issue should be resolved.

MISSPELT SIGN-IN INFORMATION

l've been signing in to Windows 8 using my Microsoft account email address. My laptop recently started running very slowly, so I carried out a clean re-install of Windows.

Unfortunately, I misspelt my email address but didn't notice until I was asked to verify that it was mine (I had



done this successfully the first time I installed Windows 8). I requested a verification email from Microsoft, but this failed to arrive because I'd entered the wrong email address.

Now I can't find a way to rectify the error. I'm getting increasingly confused by the Microsoft help screens, as I don't understand the terminology. All I want is my email address spelt correctly at the sign in to Windows 8 screen, and for my Microsoft account to be accessible to

me. Can you help?

One way is to clear the email address associated with your account and start again. You can do this by converting the account to a Local account and then changing it back to a Microsoft account. This will let you start again and enter your Microsoft Live email address from scratch.

To do this, press Windows-C to bring up the Charms menu, then select 'Settings'. Choose Change PC settings. This will bring up the PC settings app. Select 'Users' in the left-hand column. In the right-hand column, under 'Your account', you should see a button marked Switch to a Local Account. Click it to dissociate your Microsoft account with the incorrect information from your Windows account. Sign out and then back in.

Now repeat the process, but this time select 'Switch to a Microsoft account'. Now





you can enter the correct email address associated with your Microsoft Live account.

This procedure has, however, changed slightly on Windows 8.1. If you're running this, you'll need to do the following:

Follow the same steps as for Windows 8 until you are in the PC settings app. Select Accounts and then click on 'Your account'. You should now see your incorrect email address in the right-hand pane. Click on the word Disconnect beneath it to dissociate your Microsoft account. You'll need to enter your password and follow the instructions. Sign out and back in with your new local account, then repeat the process until you are in the Accounts settings. Now click on

'Connect to a Microsoft account' to connect to the correct Microsoft Live account.

RESTORE MISSING APP TILES

Yesterday all my Windows apps were working correctly and could be found from the Start screen. I decided to uninstall an app called Ginger because it was slowing down Microsoft Word. To do this. I downloaded Perfect Uninstaller and used it to remove Ginger. This worked, but this morning when I opened my laptop, some of my apps were missing from the Start screen, including standard ones such as Desktop and Store. How can I get these back?



You can return the missing tiles to the Start screen easily, although you'll have to add them one at a time. Go to the Start screen and right-click the mouse somewhere on the Continues >>

CREATE BOOTABLE WINDOWS 8.1 INSTALLATION MEDIA

Windows 8 users can upgrade to version 8.1 free of charge via the Windows Store, but if you have several PCs this means downloading a multi-gigabyte file for each one. If you'd rather only download this once, or perform a clean install of Windows 8.1 without having first installed Windows 8, then Microsoft makes things difficult - although the update is free for all users of Window 8, you can't install it with a Windows 8 product key.

Thankfully there are workarounds that'll let you download a USB flash drive from which you can install or upgrade.

First, you'll need to download a .iso file containing an image of Select Install Windows 8, run the setup program and enter your to start, then quit the program to abort the download. Now go This will download another setup program, but for Windows 8.1.

If you omit the steps above to start the Windows 8 download, you'll be prompted for a Windows 8.1 key and won't be able to start the download with your existing Windows 8 key. Starting off the download of Windows 8 causes the Windows 8.1 downloader to skip the product key request.

Once the download is complete, you can choose to create a bootable flash drive directly, though, we recommend the ISO file Tool (available from tinyurl.com/mry6yqd) to create as many USB flash drives as you wish.

After you've created your installation medium, you'll need to make a small modification in order to prevent the installation



requesting a Windows 8.1 product key when you launch it. Open Notepad and create a file containing the following lines:

[Channel]

Retail

[VL]

Save this file with the filename 'ei.cfg' in the Sources folder on your USB flash drive. You'll now be able to install Windows 8.1 from this drive, which will allow you to skip entering the product key. Once Windows 8.1 has been installed, you'll then be able to activate it with your existing Windows 8 key.

background where there are no tiles or words. A button marked 'All apps' should appear at the bottom right of the screen. Click it to see small icons for all the applications currently installed on your computer. Locate an icon for one of your missing tiles and right-click it. At the bottom left of the screen, you'll see an icon marked 'Pin to Start'. Click it to return the missing tile to the Start screen.

Now go back to the Start screen. Your missing tile will have been added, but you will probably have to find it bit scrolling to the right. You can then drag it to your desired location on the Start screen.

Repeat this process for each of your missing tiles.

VIRTUALISED XP

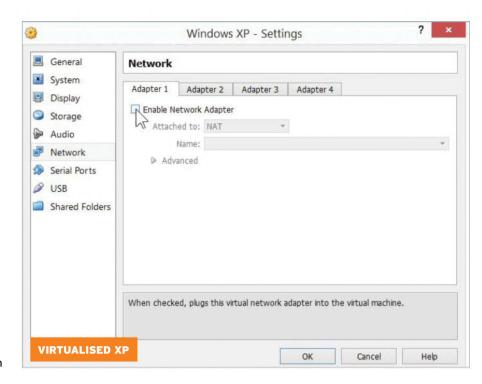
My desktop computer runs on Windows 7 64-bit, which has caused me very few problems with existing peripherals and software. However, I was unable to sync my elderly Palm Tungsten E2 PDA with windows 7 to enable me to print a hard copy. I resolved the problem by installing Oracle VirtualBox and installing Windows XP within it.

Now as April 2014 looms ever larger over the horizon [the date that Microsoft is set to stop supporting XP], I'm left wondering where do I go from here? I've explored the option of a smartphone, but this doesn't meet my needs. I've tried Ubuntu, too, but the software I need to use won't install on this Linux system. If I continue to use Windows XP within VirtualBox, but find a way to have no internet connection at all within VirtualBox, will that prevent me putting my computer as a whole at risk?

We don't have a Palm Tungsten E2 to test, but according to the Palm website, you can download a newer version of Palm Desktop, version 6.2, which some users have reported works with Windows 7.

Assuming that this option doesn't work for you, you can indeed set up a VirtualBox virtual PC without an internet connection. Don't expect the arrival of April 2014 to cause your XP system to spontaneously delete your files, infest your computer with viruses and wire the contents of your bank account to Nigeria. You'll probably be quite safe for some time to come, especially as you're only using XP as a way to print out from your Palm PDA. If you're not downloading software or doing any e-commerce from XP, there'll be little damage that could be done.

We recommend taking a snapshot from within VirtualBox, so your XP system can be returned to precisely the state it is in now, should something go wrong. This would have

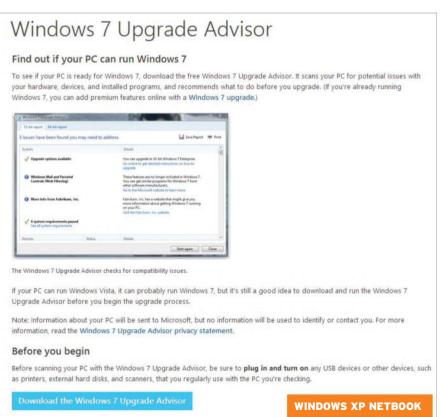


the same effect as erasing your hard drive and reloading it with an image backup containing all your installed software. Any malware would therefore be erased each time you restore the snapshot.

For added security, you could edit the settings for your virtual XP PC and disable the virtual network adaptor. Open Oracle VM VirtualBox Manager and, with the Virtual PC powered off, right-click on the icon for your virtual PC and select Settings.

Click on 'Network' in the left-hand column and then, in the right-hand pane, untick the box next to 'Enable Network Adapter.' Repeat this for any additional virtual network adaptors you may have configured.

This will also disable any network sharing between your virtual XP PC and your Windows 7 PC. If you wish to retain this functionality, you can keep the network enabled, but change the type to 'Host-only networking'.





WINDOWS XP NETBOOK

I have a Dell Inspiron Mini 10 netbook running Windows XP. With support ending in April 2014, what options do I have regarding a replacement operating system. I don't want to ditch a perfectly capable PC.

There's no reason to panic about the end of support for Windows XP, but it's a good idea to upgrade to a supported operating system where possible.

The best choice for you will depend on what you want to do with the laptop. If you're hoping to continue to run the applications you currently have, then you'll need to stick with Windows.

Fortunately, we've seen many reports of people running Windows 7 quite successfully on their Dell Inspiron Mini 10, although it

will run much more smoothly if you upgrade the memory from 1GB to 2GB. Checking Dell's support site (support.euro.dell.com) also reveals some drivers available for Windows 7 32-bit.

If you're not too bothered about maintaining a Windows installation, but just want to keep the netbook working, then you can install Linux. The Dell Inspiron Mini 10 is officially certified for Ubuntu, which you can download and install free of charge.

In general if you're thinking of upgrading any older PC from XP to Windows 7, checking the manufacturer's website for Windows 7 drivers is a good starting point. The presence of these is a good indication that you will at least be able to install the operating system.

You can also run Microsoft's upgrade advisor, available to download from: tinyurl. com/ybgop43. This will analyse your PC's hardware and software, and advise you of any potential problems before you upgrade.

COLOUR PRINT ISSUES

My Epson Stylus SX415 isn't printing the correct colours in any images. The prints always seem to have a blue shade and no other colours are showing up. I've checked all the cartridges - cyan, magenta, yellow and black - and they are all nearly full. Why this is happening and how I can solve this problem?

If you've just changed the ink cartridges, especially if you're not using original Epson ones, then there may be a problem with the cartridges themselves or the installation. However, assuming the printer has previously been printing correctly with these cartridges installed, this is most likely due to a clogged print head.

Your printer comes with a utility called 'Nozzle Check', which will test the nozzles in the print head and help you diagnose the problem. If you can't find this software, you can also run the nozzle check directly from the printer by using the menu buttons.

Users of other inkjet printers will find similar tools available, as this is a common issue with the inkjet system, especially if you haven't been printing for a while. Don't over-use the feature, though, as it can consume a very large amount of ink when cleaning the nozzles.

POWERLINE ADAPTORS

In a bid to increase the Wi-Fi coverage in my house, I've installed some Devolo powerline adaptors with Continues >>

TECH JARGON BUSTER

DEVICE DRIVER: Often simply called a 'driver', this is a piece of programming as a mouse, graphics card or webcam. A large number of device drivers come pre-packaged with Windows and other operating systems, enabling the devices to work without any extra software. However, the latest features and bug fixes will be found in the most recent versions of the drivers, which can usually be downloaded from manufacturers' websites.

FEATURE PHONE: This is a mobile phone with advanced features, though, these are less sophisticated than a fully-fledged smartphone. Feature phones don't run a full smartphone operating system such as

is blurring as technology improves.

GOOGLE CHROME OS: Created by Google and found on its Chromebook range of laptops, Chrome OS is an operating system that's designed almost exclusively also has the ability to run specially-written

KVM SWITCH: Formed from an Mouse, a KVM switch is a device that allows you to connect a keyboard, monitor and mouse to more than one without having to unplug and reconnect

TOOLBAR: A toolbar is a user interface element consisting of a strip of icons, buttons or similar controls. Usually found at the top or the sides of an interface way to access frequently used controls without having to navigate a full menu system. A browser's toolbar is a particular type of toolbar, specific to web browsers, the internet. There are, however, many toolbars you may not want and which may be smuggled onto your system as part of the installation of an unrelated program.



built-in Wi-Fi. I can now get this where I want it, but have to switch networks when I move around the different parts of the house.

I thought the original signal would be boosted and carried to other parts of the house, but I now have the original Virgin media network and a separate Devolo network. Can I set things up so I have just one network throughout my home?

This is easy to achieve, but you'll have to enter the configuration settings of your powerline adaptors and make a few changes. Your Devolo adaptors come with software that lets you configure them from a PC or smartphone. Other brands of powerline adaptor have similar software and almost all can be configured directly from a browser if you know the IP address of the adaptor. This can usually be found by running a similar vendor-supplied utility which searches your network for connected adaptors.

Once you've connected to the powerline adaptor via one of these methods, you'll

need to look for the wireless network configuration options. Specifically, look for an entry called SSID. In here you should see the name given to your Devolo network.

You'll need to change this name to be the same as your main Wi-Fi network. You'll also need to make sure that the encryption settings and password match those of your router. Next, look at the Wi-Fi channel set for your network. You'll want to find a channel that's as far away as possible from that of your main Wi-Fi router to make sure the networks don't interfere with each other.

Recent Devolo adaptors have a feature called WiFi Move, which allows you to automatically copy your Wi-Fi settings from one powerline adaptor to any others you have on your network. This will save you having to repeat the configuration on any other adaptors you may have.

Now when you move around the house, you should automatically switch between wireless access points according to which signal is strongest without having to select a different wireless network.

CONTACT US



Email your Helproom questions to use 'Helproom' as the subject header and give your full name, the operating system you're using and other product details. We will let you know by email if your query has been selected for inclusion in these pages. If your query is urgent, you may find it useful to visit our forum at pcadvisor.co.uk/helproom.

Helproom aims to give you the best assistance possible. But, given the

limitations of this type of advice, we can't guarantee what we say will work any damage arising as a result.

Always back up your system before you make any changes, including software installations.

to respond to letters or telephone requests, but we will endeavour to answer queries submitted by email or via our Helproom forum.

For more PC help go to: pcadvisor.co.uk/helproom



SEARCH THE PC ADVISOR FREE ONLINE HELPROOM

The PC Advisor online Helproom contains an indispensable database of answers to common questions regarding all aspects of PC problems. This ranges from general Windows issues to problems with specific apps, and covers all types of PC hardware and software, including system components and peripherals.

Alternatively, you can ask for help from the experts on our online forums. Sign up to be a registered user - which is free - and then browse to one of the discussion forums. In the Helproom your first stop should be the searchable database of frequently asked and previously answered queries. With more than 1.5 million forum posts, you'll almost certainly find your answer in this archive of queries - just enter a few keywords.

If our online database can't solve your problem, try posting a question in the Helproom forum, where more than 200 queries are answered every day. The forum is manned by our team of Helproom Angels, who are ready and willing to lend a hand with anything from system crashes to virus alerts.

helproom@pcadvisor.co.uk pcadvisor.co.uk/helproom

Update to Windows 8.1

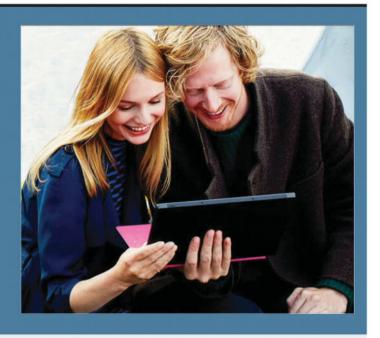


Jim Martin explains all you need to know about how to upgrade to Windows 8.1 and get the operating system's latest features for free

Windows 8.1 has at last been unleashed on the world and, provided that you're running Windows 8, you can update for free. We'll show you how to do this in the following workshop.

Note that those running Windows 8.1 Preview are in a different boat, and may have to install Windows 8 again to avoid having to buy a new licence.

Before you begin be sure to back up any important data, since there is always a chance that something could go awry. It probably won't, since updating to Windows 8.1 is little different to installing the monthly Windows updates, but not having a backup just isn't worth the risk.



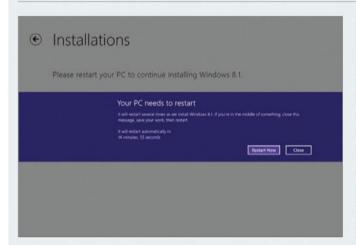


START

Having backed up all the important documents and media stored on your PC, open the Windows Store via its Start screen tile. You should see a message saying that the Windows 8.1 update is ready. Tap on this.



Tap Install to begin downloading the update from Microsoft's servers. This may take a little while, but you can continue to work on your computer in the meantime. The progress bar will keep you updated on the status of the upgrade.



A notification will pop up onscreen when the update has downloaded and requires you to restart the computer for installation. If you choose to ignore this message the PC will automatically restart after 15 minutes. Be sure to save your work.



Your PC, laptop or tablet will restart a few times and eventually you'll see a Licence Terms screen. Tap 'I accept' to continue, then choose your preference for setup on the next screen. Lastly, enter your password and sign into your Microsoft account.

Host video on Vimeo

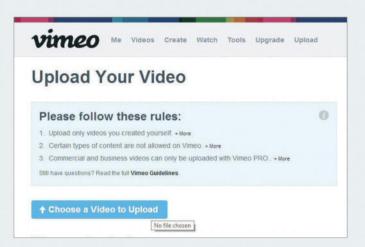


Good-quality videos, lots of customisation and a strong social element make Vimeo a great choice for budding videographers, writes David Bayon

YouTube may be the number-one destination for cat clips and misleading game trailers, but is it the best choice for hosting your own videos? Unless you can drum up a big following, its videos tend to get lost among all the noise and clutter, which is why so many people are turning to more focused, social alternatives, such as Vimeo.

Vimeo has grown quickly, thanks to its focus on quality over quantity. Clips default to the highest resolution available.

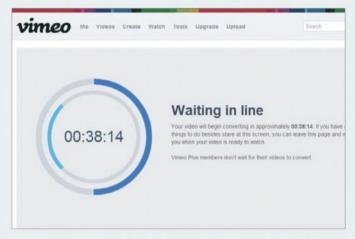
Vimeo can be free to use. A Basic account will get you 500MB per week of storage space, which should be more than enough for most casual users.



Once you've created a Vimeo account there are several ways to upload a video. You could connect to Dropbox and upload from the cloud, for example, or upload a smartphone video from the Vimeo mobile app. Here we'll upload a video from our PC.



When the upload is complete you may be notified that Vimeo has converted your file to 720p for smoother playback. If your original video was 1080p and you want to keep it that way, you'll have to upgrade to Vimeo Plus (\$9.95/month or \$59/year).



The other benefit of a Plus account is not having to wait for processing. Click on the Me tab after uploading a video and you may be told you're 'Waiting in line', and will be unable to play your video until the processing is complete.

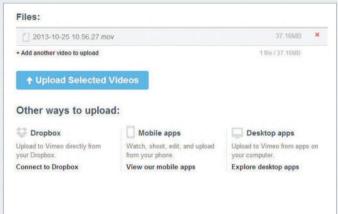


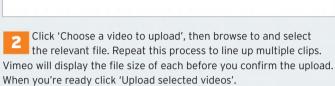
Choose a filter from the selection and it will appear over half your video, with the other half untouched. This enables you to tinker with the intensity of the filter until it looks just right. Click Enhance to confirm your changes.



Your video (and the enhanced video if you made a copy) will now appear in your My Videos section. Click the gear icon on any video to open its settings, from which you can add it to a group or channel to make it easier to find.





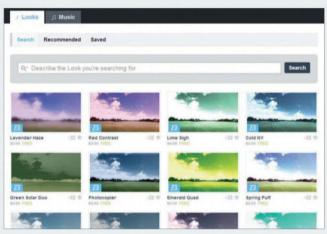




While the file is uploading to Vimeo's servers you can give your video a title, description and tags. Click on the various tabs to change the privacy settings, add your video to a channel, group or album, change the URL and add related photos.



When it's ready, you can open your video and enjoy it in Vimeo's huge playback window - or expand it to full-screen using the toggle on the bottom-right corner. Below the video you'll find stats of the number of plays, likes and comments over time.



You may find your video doesn't look as good as you'd hoped. Click 'Enhance this video' and you'll be presented with a huge range of visual filters and music clips with which you can totally change the feel of your clip.



Click the Share button in the top-right of a video to spread the word. You can simply copy the link and paste it elsewhere, share it via email along with a note to recipients, or click one of the social media icons along the top of the window.



Keep posting and sharing videos and you might pick up followers. You can follow any other Vimeo user, group or channel by browsing to their page and clicking Follow, after which their latest video posts will appear in your home page feed. ⊠

Change your browser



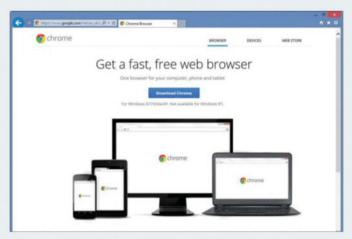
Are you using the browser that came with your PC? There are better, faster browsers you can download for free. Jim Martin shows you how

If you've always used Internet Explorer because it was the only web browser supplied on your PC or laptop, we've got news for you: there are better browsers.

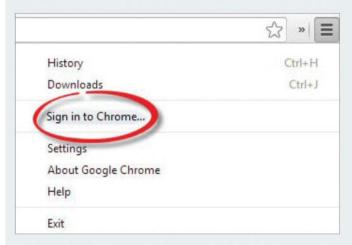
Two of the most popular are Google Chrome and Mozilla Firefox. Both are free and have some features not available in Internet Explorer that can make your life easier.

One of the great things about Chrome is that your bookmarks, browsing history, passwords and even open tabs can be synchronised between all your devices.

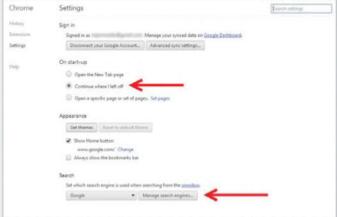
Both Chrome and Firefox also have big libraries of add-ons that give each browser additional features.



It might seem like a backward step, but in order to install Google Chrome you'll need to open Internet Explorer. Enter chrome.google.com into the address bar at the top of the screen, or use a search engine to find Google Chrome.



If you have a Google account you can sign into Chrome by clicking the three horizontal bars icon at the top right and choosing 'Sign in to Chrome'. This will import your bookmarks, browsing history, passwords and other data.



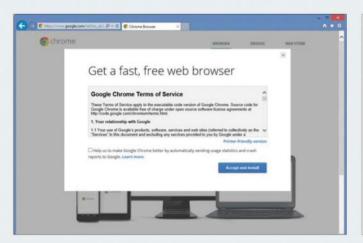
Specify how Chrome behaves on startup by clicking the three horizontal bars icon and choosing Settings. The 'Continue where I left off' option re-opens the web pages you were viewing in the previous session. You can also choose the default search engine.



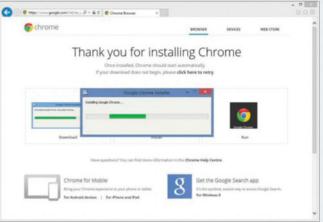
You'll be asked whether you want to run or save the file. Choose Run. As with the Chrome installation, User Account Control may pop up to request your permission to install Firefox. Click Yes and a progress bar will show the installation status.



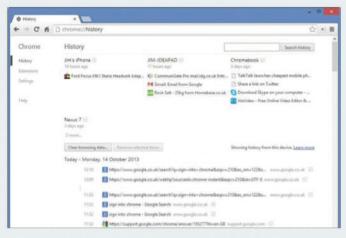
Once installed Firefox will load automatically. On the first launch you will be asked whether you want to import your bookmarks from one of the other browsers installed on your computer. That's entirely your choice.



A window will appear explaining Google's licence terms; click the 'Accept and Install' button. Windows User Account Control might pop up and ask whether the Chrome installation is authorised; click Yes if prompted.



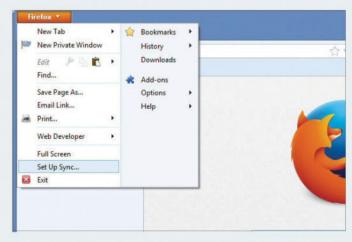
Chrome will automatically download, install and launch itself. It might ask whether you want to import bookmarks and other data from Internet Explorer - we recommend you do so, unless you already use Chrome on another computer.



A couple of useful shortcuts are Ctrl, H, which brings up the browsing history, and Ctrl, Shift, B, which hides or reveals the bookmarks bar. Ctrl, Shift, T will re-open the tabs you've just closed, which is ideal when you accidentally dismiss the wrong tab.



You don't have to stop at installing Google Chrome. Mozilla Firefox is another great free choice, and you might find it better than Chrome with some websites. Head to mozilla.org and click the green 'Firefox Free Download' button.



Firefox can sync bookmarks and other data with your other devices running Firefox. Click the Firefox drop-down menu and choose 'Set Up Sync'. You'll need to create a free account and supply your email address and a password.



Firefox is supremely customisable. Click Add-ons from the Firefox drop-down menu to browse the list of available extensions. Also here is the ability to enable themes, which change the look of the browser. oximes

PDF without Reader

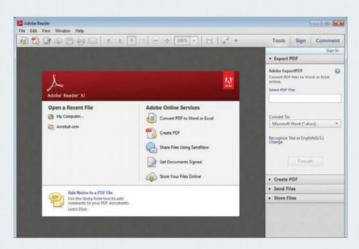


Adobe Reader is a useful tool for viewing PDFs, but alternative products use fewer system resources. Roland Waddilove shows you how to PDF without Reader

PDF files have a range of applications, including manuals, brochures and pamphlets, making a PDF viewer an essential utility. The most popular tool for the job is Adobe Reader. It's free, but it demands a considerable 260MB of disk space, increases Windows' startup time and reduces the amount of memory available to other tasks.

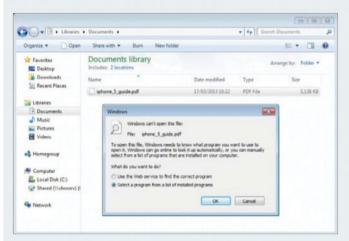
Both low-spec computers with limited memory and high-spec PCs running low-capacity SSDs will benefit from an alternative lightweight PDF viewer to Reader.

In the following workshop we show you how lightweight alternatives can meet all your PDF needs.

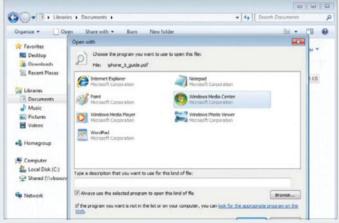


START

If Adobe Acrobat is installed on your computer, it won't be needed by the time this tutorial is finished. Uninstall it from Control Panel, Programs and Features. Now restart Windows. This will free up more than 260MB of drive space.



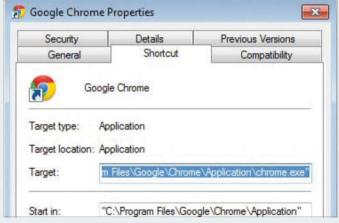
Open an Explorer window and double-click a PDF file.
Choose 'Select a program from a list of installed programs'.
Windows 8 users should instead right-click the PDF and select Open With, 'Choose default program'.



A list of programs that may or may not be suitable for opening the PDF will be displayed. You'll notice that Foxit Reader is not listed here - because it is not installed on your machine. Click the Browse button.



Foxit Reader Portable is an excellent PDF viewer with a good range of features. It is only 93MB in size, saving you 167MB of storage space when compared to Adobe Reader. By default, Foxit Reader will now open any double-clicked PDF on your computer.

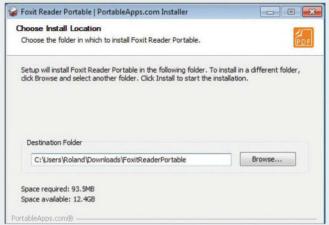


If you use Google Chrome as your main web browser (see page 110), you needn't bother with Foxit Reader. Right-click your Google Chrome desktop shortcut and select Properties.

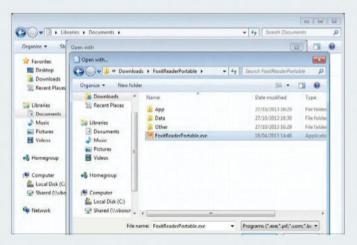
Note where on your hard drive Chrome is stored.



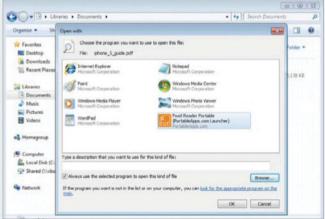
Launch your web browser and head to portableapps.com. Click Get Apps, select the Office section, then choose Foxit Reader Portable. This is a special version of Foxit Reader that doesn't need to be installed on your PC. Download and run the file.



When you run the file this self-extracting archive will prompt you to specify an appropriate location within which it can extract its files. This must be a writeable location, so don't put it in C:\Program Files. A better location is your Downloads folder.



In the Open with window that pops up onscreen you should navigate to the location you specified in step 3. Select FoxitReaderPortable.exe, then click the Open button. This is the program that will be used to open the selected PDF file.



The portable edition of Foxit Reader will now appear in the programs list. Select it, then enable the option to 'Always use the selected program to open this kind of file' at the bottom of the screen. Click Ok to continue.



Right-click a PDF file and select Open with, 'Choose default program'. Repeat steps 5 to 7, but select Google Chrome rather than Foxit Reader Portable. Windows 8 users should click More options, Look for another app on this PC.



After setting Chrome as the default PDF handler, all PDFs will open in the browser. A mini toolbar appears at the bottom with some useful functions. By using Chrome rather than Adobe Reader as your PDF viewer you'll save 260MB of storage space. ⊠

Borrowing content



Many UK libraries lend out their online collections of e-books and audiobooks. All you need is a library card and the OverDrive app. Cliff Joseph explains

Did you know you can borrow e-books and audiobooks from your local library without even leaving your home? All you need is free app OverDrive, which is available for Android, iOS, Windows Phone and Kindle, plus PC and Mac. A full list of supported devices is available at omc.overdrive.com.

OverDrive provides access to libraries all over the world, provided they are signed up to its service - not all are. We found many UK boroughs and cities have already signed up, so there's a good chance you'll be able access your local library.

Note that you'll need a library card so you can enter your membership details into the app. Here's how to get started.

Setting up OverDrive takes a little effort. It uses Adobe's **Digital Editions** software to read copy-protected e-books, so the first time you run the app (we're using an iPad here) it will tell you that you need to register for an Adobe ID.



Tower Hamlets is part of the city-wide London Libraries Consortium, so OverDrive redirects you to the London Libraries website. Similar online library services are available for many UK boroughs and cities. You don't need to see your particular library in the list - your details should work as long as there is a library in your local council area.



Tap Sign in up in the top-right corner of the page to enter the details from your library membership card. You'll need a current library membership number and a security PIN. Contact your library if you don't have these details.



When you've found one that looks interesting, check for a black book icon on the cover artwork: this tells you that it's available to borrow. You can click the Borrow button, or download a sample chapter to get a taste of the book.



Once the book has been downloaded you can read it just like any other e-book on your device. Tap the left- or right edge of the page to move forward or backward, and tap in the middle of the page to display additional controls.

I had just come to accept that my life would be ordinary when extraordinary things began to happen. The first of these came as a terrible shock and, like anything that changes you forever, split my life into halves: Before and After. Like many of the extraordinary things to come, it

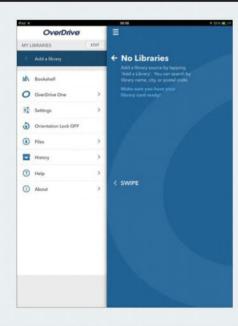
involved my grandfather, Abraham Portman. Growing up, Grandpa Portman was the most fascinating person I knew. He had lived in an orphanage, fought in wars, crossed oceans by steamship and deserts on horseback, performed in circuses, knew everything about guns and self-defense and surviving in the wilderne spoke at least three languages that weren't English. It all seemed unfathomably exotic to a kid who'd never left Florida, and I begged him to regale me with stories whenever I saw him. He always obliged, telling them like secrets that could be entrusted only to me

When I was six I decided that my only chance of having a life half as exciting as Grandpa Portman's was to become an ine half as exciting as Grandpa Fortman's was to become an explorer. He encouraged me by spending afternoons at my side hunched over maps of the world, plotting imaginary expeditions with trails of red pushpins and telling me about the fantastic places I would discover one day. At home I made my ambitions known by parading around with a cardboard tube held to my eye, shouting, "Land ho!" and "Prepare a landing party!" until my parents shooed me





Dig out your library card, then tap 'Add A Library'. You'll be prompted to enter your membership details. You don't need to worry too much about the other settings.



OverDrive can connect to thousands of libraries around the world. You can locate your local library service by entering the name of the city or borough in which you live. We'll enter Tower Hamlets, London.



Now you're free to browse all the e-books and audiobooks held by the library. The books are organised into genres and categories; let's head to the sci-fi section first.



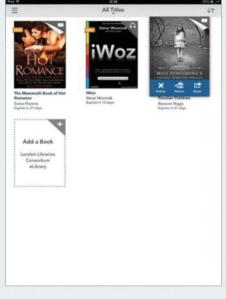
There's a search tool, and plenty of other options for sorting through the list of available books. You can browse books by cover artwork, or use the list and grid views that provide a bit more detail about each title.



Audiobooks are available, too, but the greyedout headphone icon shown on the cover in our screenshot means that someone else has already borrowed it. Click 'Place A Hold' and OverDrive will reserve the audiobook for you and send you an email notification when it's available.



Click the bookshelf icon (three horizontal bars) to view your borrowed books. You can borrow five books for up to 21 days. You can return them earlier, but they will be automatically deleted at the end of this period. oximes



Recover Office docs



Losing Word, Excel and PowerPoint documents is a mistake you won't want to make twice. Jim Martin explains how to recover the files you've lost

It's a heart-sinking moment when you realise you've deleted or failed to save the changes in an Office document. You might have been the victim of a Windows crash, or even a power cut. Hours of hard work wasted. But all might not be lost: there are several things you do and several places to look for temporary files, backups and old versions of your files.

If you've accidentally deleted something in a document which is still open, press Ctrl, Z to Undo the mistake. This works in most applications, including web browsers.

There are no guarantees, but try the following and you could be saved from starting again from scratch.



Look for the auto-recover or backup version

By default Office will regularly save a copy of your open file in case there is a power cut or other failure. In theory, when you next launch the program it should present a list of the files you had open before the crash - but sometimes you'll see nothing at all.

In such a scenario you'll need to do some detective work. Assuming you saved the file at least once you can use Windows Search (or the Start menu search box) to search for the filename,

You need remember only one word from the filename; if you don't, try searching for all documents of that type. Enter *.doc or *.docx to find all Word files, for example. Excel files are .xls or .xlsx, while PowerPoint documents have .ppt or .pptx extensions.

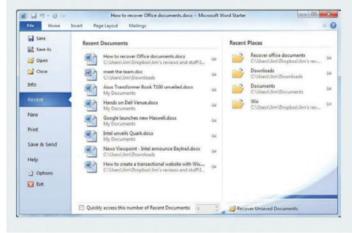
If this fails, try searching for Word backup files using the *.wbk or *.asd wildcards. If nothing turns up, try *.tmp or ~*.*. You can find more detailed troubleshooting advice at tinyurl.com/5frf97.

If you're running Office 2010 or later, click the File, Open, Recent and choose 'Recover Unsaved Documents'. This takes you to the folder in which Office automatically saves your work.

Undelete it

It's easy to inadvertently delete a document, but the chances of undoing that erroneous action are good, especially if you act quickly.

First, look in Windows' Recycle Bin (there should be a shortcut on the Desktop). Your document is likely to be in this temporary folder unless you're in the habit of pressing Shift, Del, in which case it bypasses the Recycle Bin.





If there's no sign of your file try an undelete utility. There are many free options; a popular example is Recuva (recuva.com), which comes in both desktop and portable versions. The latter is especially useful, since the more files you download and install to your PC's hard drive the more chance you will overwrite remnants of your missing document.

Install the portable version of Recuva on to a USB flash drive (using a different computer if necessary), then run it on the computer on which your file has been deleted. Provided that it hasn't been overwritten, you should be able to recover the document. Note that it may be missing its filename.

Locate a copy of the document

There might be a copy of your file, but this is clutching at straws. Unless you ticked the option, Office doesn't automatically create copies of your documents. But if that option is enabled, there should be a second version of your file called 'Backup of X'.

To force Office to make copies go into the Options menu, find the Save section and look for an 'Always create a backup copy' checkbox. Not all versions of Office have this, but you will find options to save AutoRecover data - set the time between auto-saves to a few minutes; that way you'll only ever lose a small amount of work.

Another glimmer of hope of finding your file comes in the form of Windows Shadow Copy. This is part of Windows 7 and 8, plus the Business and Ultimate versions of Vista.

To see whether there's an older version of your file, right-click the folder that contained your document. Click Properties, then choose the Previous Versions tab. Double-click on a date you think the file should have existed and look for the file. oximes



Compress large files



Shrinking large files and folders makes them easier to store and share. Chris Martin explains how to zip files and folders in Windows

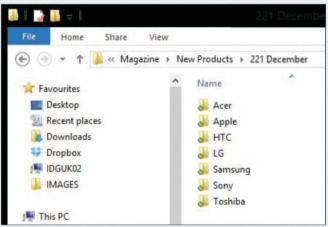
Zipping a file or folder is a quick and easy way of compressing large files before sharing them via email or the web.

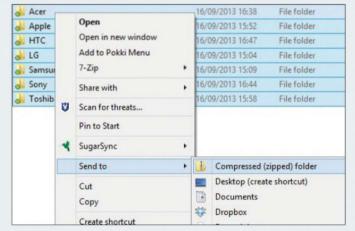
Compressed files take up less storage space on your hard drive and can be more easily transferred to other computers. You can also zip multiple files, making it simpler to share, for example, a group of photos. This means you can attach to an email just one- rather than several files.

Zipping files might also be handy if you want to store them on an external hard drive.

Here we explain how to zip files in Windows, but you can also use free third-party software such as WinZip or 7-Zip.

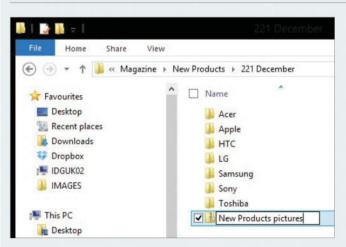




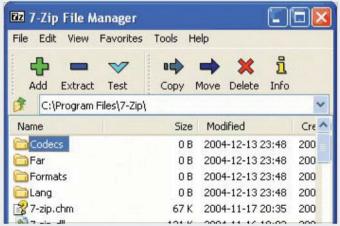


You don't need to install any third-party software to compress or decompress files and folders in Windows - the functionality is built in. Simply open File Explorer and navigate to the file(s) and or folder(s) you want to zip.

If you wish to compress more than one file, hold down Ctrl and select them all. Now right-click the file(s) and choose Send to, 'Compressed (zipped) folder'. Any third-party compression utilities you have installed will also appear in the right-click menu.



Your zipped file will now appear in the same folder as the original file. We recommend you rename the zip file to save confusion, which is achieved by right-clicking it and choosing Rename. To open the file a recipient need only double-click it.



Several third-party compression utilities, many of which are free, are also available. These may offer additional benefits over Windows' built-in tool, such as the ability to add encryption and password-protect your zip files. ⊠

Undelete iPhone texts



Have you ever deleted a text message on your iPhone and instantly regretted it? Matt Egan explains how to undo the damage and get back your texts

As a good housekeeper you've deleted all your old text messages, and then realised that you do in fact need some or all of your old messages. Fear not: you can recover deleted text messages from your iPhone.

Indeed, it's possible you can do so without having recourse to anything more difficult than restoring from a backup. And, at worst, you may be able to get back those messages using a third-party app. Here are three ways to restore deleted SMS messages on an iPhone.





Restore from iCloud

If you have ever backed up your iPhone to iCloud or iTunes you should be able to restore your iPhone text messages from the backup. In fact, unless you disabled the automatic sync option in iTunes, you should have created a backup everytime you synched with your PC or Mac.

Unfortunately, iCloud doesn't back up SMS in all territories, and for all phone operators. My UK O2-operated iPhone 5 falls into this category. So the following may not work (which is a shame because this is the best backup you can have for your SMS messages).

- Step 1. Log into icloud.com with your Apple ID and password.
- **Step 2.** Click on Text Messages (if it isn't there then your messages haven't been backed up).
- **Step 3.** Browse the messages to find those you need.
- Step 4. On your iPhone choose Settings, iCloud.
- Step 5. Turn off Text Messages.
- Step 6. You'll see a pop-up. Select: 'Keep on My iPhone'.
- Step 7. Now turn on Text Messages.
- **Step 8.** Tap 'Merge', and wait. After a few minutes the deleted text messages should appear on your iPhone.

Restore from iTunes

Don't worry if the above didn't work. We have two further options to try. First, let's try recovering your accidentally deleted SMS messages via an iTunes backup.

- **Step 1.** Connect your iPhone to the PC with which you sync it. iTunes should open (if not, open it manually).
- **Step 2.** You should see your iPhone in a box at the top righthand corner. Select it.
- Step 3. Choose Restore backup.

Step 4. All the data you previously backed up will now replace the data on your phone – you will lose anything not backed up. Provided you haven't backed up the handset subsequent to deleting those text messages, they should now appear on your iPhone.

Restore from a third-party app

If neither of the options above has worked, it is time to try a third-party app. But be warned: this may cost you a couple of pounds, and it may not work.

Third-party apps work on the premise that even after you have 'deleted' your messages, they will remain on your phone until they are overwritten.

A couple of apps you could try include WonderShare Dr.Fone for iOS and Tenorshare iPhone Data Recovery. \boxtimes





Turn off Facebook's location-snooping settings



It's easy to give away too much information on Facebook, but you can claw back some privacy. Lauren Dezenski explains how to turn off location data

Do you feel as though you could be sharing too much personal information on Facebook? Fortunately, you can maintain a little mystery in your life by turning off your account's location settings.

By default, Facebook will automatically add a general location to all your posts. Half the time this isn't terribly accurate, but it can nevertheless present a problem.

Perhaps you're going on holiday and don't want your status updates to reveal the fact your home is empty and a target for thieves, or maybe you just aren't where you say you are. Either way, we'll show you how to stop Facebook trackingand publishing your location.



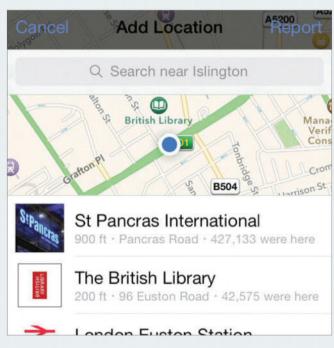
From the mobile app

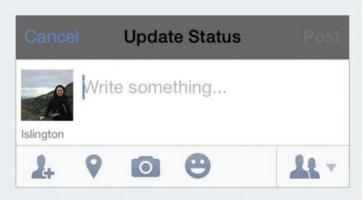
The fastest and easiest way to keep a location from appearing in status updates or chats is to go into your phone's Settings menu and turn off location services. These use GPS and crowd-sourced Wi-Fi to calculate your approximate location.

Many applications use location services - for example, Twitter has a similar setting that stamps tweets with your approximate location. By turning off this setting, you prevent apps from accessing this information in the first place.

However, this approach can adversely affect your experience with other apps, too. If you want to use apps that demand location data to operate, for example Google Maps, Find My iPhone and weather apps, be sure to turn off location services only for the Facebook and other social-media apps.

If you've decided to keep location services running on your handset, you may see your current city listed at the bottom-left of a post. This will also happen if you have previously checked into a location using the Facebook mobile app.





To delete this location tap the pin icon. A list of nearby check-ins will be displayed. Tap the 'X' next to the current city and your location will disappear.

This will also stop Facebook automatically including a location in your subsequent posts. If you later change your mind and decide to reveal your location to the world, you'll have to manually enter your location by tapping the pin icon and divulging your whereabouts. The setting will then remain enabled until you turn it off.

Want to keep information about your whereabouts more exclusive? You can also refine who can see your location by selecting the audience in the drop-down box.

From a PC

The same principles apply when Facebook is accessed via its desktop website. The social-media site will automatically suggest a general location for your post. To remove this, click the pin icon and hit 'X' to delete the location and post ever so covertly.

Some apps and games running within Facebook are also able to access your location information. To combat this, click the cog icon in the upper-right corner of any Facebook page and select Account settings. Click Apps, then look for the setting 'Apps others use'. Click Edit Settings. Finally, untick the box next to 'My status updates' and you're all sorted.

For parents concerned about kids over-sharing on social media, Facebook says it automatically shuts off location sharing for minors. And should the location setting be turned on for an account held by a minor, Facebook says it offers a consistent indicator that the user is sharing their location. oximes

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Avira Antivirus Suite 2014

FULL PROGRAM (SIX-MONTH LICENCE) 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
223\Avira Antivirus
Suite 2014 and open
the file

Online registration required: use code L6QQQ-QQQL6-JVZ4L-4CP7Y-R5K8B before 12 Feb 2014

System requirements

1GHz processor; Windows XP/ Vista/7/8; 1GB RAM; 150MB drive space (additional temporary and quarantine space needed); internet connection; Administrator rights during installation Avira's Antivirus Suite 2014 is an innovative security solution that combines an online storage system with the iron-clad protection you'd expect from an antivirus expert with more than 25 years of experience.

Innovative technologies

Avira Antivirus Suite 2014 is built around the revolutionary Real-Time Scanner with Protection Cloud Technology. This malware scanner automatically analyses any file you touch and instantly compares it to an online file definition database. Not only does this new scanner detect more malware than ever, but the process now occurs online.

Cutting-edge security

Avira Antivirus Suite keeps PCs safe with multiple protection features. The Browsing Tracking Blocker prevents the tracking and reporting of your online habits. The Website Safety Advisor delivers safety ratings for your search results, and the AntiAd/AntiSpyware component blocks ads and online spies. An Android app is also offered.

Secure Backup

To prevent PC disasters, Antivirus Suite 2014 includes Avira's Secure Backup online storage platform. Use this to store important files and protect precious memories from accidental deletion, or use the web interface to share and access your favourite media on the go.

Antivirus made for people

Avira has packed all these technologies and features into a lightweight, streamlined product. Expert users are free to configure their protection, while the average user will enjoy the peace of mind of easy installation, automated updates and one-click scans.





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Ashampoo MP3 Cover Finder



FULL PROGRAM (1-YEAR LICENCE) AVAILABLE ONLY ON THE DISC+

Installation details
Go to My Computer.
Right-click the disc
icon and open the
disc. Select Files
223\Ashampoo MP3
Cover Finder and open
the file

Online registration required: follow the links during installation before 12 Feb 2014

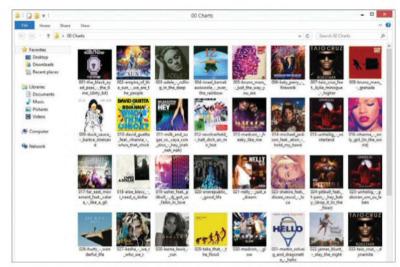
System requirements Windows XP/Vista/7

Album art lets music lovers enjoy a rich entertainment experience in terms of both audio and visuals. Use Ashampoo MP3 Cover Finder to find and select the most beautiful cover artwork for all your MP3 tracks.

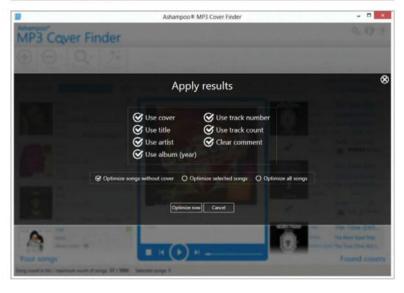
- Intelligent fingerprinting technology can identify your MP3s, including those that are missing their original metadata and filenames
- Download the most suitable cover artwork for your entire MP3 collection
- Choose to download either album- or single covers
- Let Ashampoo auto-assign artwork and take manual action when required
- Enjoy beautiful album artwork across all your devices

With detailed MP3 metadata such as artist, album and genre, your music collection becomes better organised and more easily searchable. With the help of Ashampoo MP3 Cover Finder, you'll be able to more easily create playlists tailored to your listening preferences. Enjoy a whole new listening experience, thanks to Ashampoo MP3 Cover Finder!

- Auto-complete and optimise ID3-tag metadata for your MP3 tracks
- Individually edit metadata
- Search and organise MP3 tracks by artist, album, genre and more
- Benefit from advanced playlist creation in major music players ⊠







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WebSite X5 Compact 9

FULL PROGRAM AVAILABLE ONLY ON THE DISC+



Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 223\WebSite X5 Compact 9 and open the file

Online registration required: head to tinyurl.com/k2pr3wn before 12 Feb 2014

System requirements Windows XP/Vista/7

WebSite X5 Compact 9 is intuitive software for creating websites and blogs in just five simple steps.

Despite its simplicity, WebSite X5 includes all the eye-candy you'll find on the best sites on the web – and you can quickly and easily implement design tweaks without learning complex software.

Choose between 500 professional-quality ready-made templates to get started. Add pages to your site whenever you want. The automatic SiteMap generator makes your website easily accessible to both visitors and search engines.

Simply drag-and-drop text, images, video and sound on to the page to create your project.



ONLINE REGISTRATION REQUIRED

1-abc.net File Washer 6

FULL PROGRAM

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 223\1-abc.net File Washer 6 and open the file

Online registration required: head to tinyurl.com/yhn9lvz before 12 Feb 2014

System requirements Windows XP/Vista/7/8

Emptying Windows' Recycle Bin does not delete files from your PC; it simply destroys the file path. That data remains on your drive until it is overwritten, meaning any number of freely available tools are able to recover your 'deleted' documents.

Delete your files using any one of File Washer's 11 erasure methods, however, and they will be removed beyond recovery.

As an extra fun feature, File Washer lets you overwrite a file with a specific document. You might, for example, overwrite a document containing your online banking login with a text file that reads 'Thank you for trying to un-erase my data, but you are not allowed to get it.'



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Place disc in drive. Open the file 'Click here to begin.pdf' for extra information.

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Ultraportable laptops	PC ADVISOR		3 PC ADVISOR RECOMMENDED	4	5
	Apple MacBook Air 13in	Apple MacBook Air 11in	Dell XPS 12	Samsung Series 7 Ultra	Samsung Ativ Book 9 Lite
Price	£949 inc VAT	£849 inc VAT	£1149 inc VAT	£1,000 inc VAT	£599 inc VAT
Website	Apple.com/uk	Apple.com/uk	Dell.co.uk	Samsung.com/uk	Samsung.com/uk
Build rating	****	****	****	****	****
Features rating	***	***	★★★★☆	****	***
Performance rating	***	****	***	****	***
Value rating	****	****	***	****	***
Overall rating	****	***	***	***	***
Processor	1.3GHz Intel Core i5-4250U	1.3GHz Intel Core i3-5250U	1.8GHz Intel Core i7-4500U	1.8GHz Intel i5-3337U	1.4GHz AMD A6-1450
RAM	4GB DDR3L	4GB LPDDR3	8GB DDR3L	6GB DDR3	4GB DDR3
Storage	128GB SSD	128GB SSD	256GB SSD	128GB SSD	128GB SSD
Screen size	13.3in glossy (anti-glare)	11.6in glossy (anti-glare)	12.5in glossy touchscreen	13.3in glossy touch	13.3in glossy touchscreen
Screen resolution	1440x900	1366x768	1920x1080	1920x1080	1366x768
Graphics	Intel HD Graphics 5000	Intel HD Graphics 5000	Intel HD Graphics 4400	AMD Radeon HD 8750M	AMD Radeon 8250
Video memory	N/A	N/A	N/A	1GB	N/A
Wireless	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11b/g/n	802.11a/b/g/n	802.11b/g/n
Ethernet	Optional	Optional	None	Gigabit	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0	2x USB 3.0	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 1x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	✓	✓	×	×	×
DisplayPort	✓	✓	✓	×	×
HDMI	×	×	×	✓	✓
DVI	×	×	×	x	×
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	None	HD webcam	Webcam
Operating system	Mac OS X 10.8 Mountain Lion	Mac OS X 10.8 Mountain Lion	Windows 8 64-bit	Windows 8 64-bit	Windows 8 64-bit
Bundled software	iLife 11	iLife 11	None	None	SideSync, HomeSync Lite
Fear (Max detail)	Not tested	Not tested	27fps	Not tested	15fps
Battery	54Wh lithium-polymer	38Wh lithium-polymer	Not stated	57Wh lithium-ion	32Wh lithium-ion
Battery life	12 hrs 57 mins	8 hrs 56 mins	6 hrs 45 mins	5 hrs	6 hrs 30 mins
PC Mark 7 score	4602	4080	5205	4889	2142
Dimensions	325x227x4-17.5mm	300x192x17mm	317x215x20mm	324x224x19mm	315x226x15.5mm
Weight	1.35kg	1.08kg	1.52kg	1.65kg	1.5kg
Warranty	1-year return-to-base	1-year return-to-base	1-year enhanced	2-year return-to-base	1-year return-to-base
Verdict	Haswell processor 802.11ac Wi-Fi support Stunning battery life Unsurpassed build Good performance	Elegant lightweight design Good performance Strong on games 11.6in screen rather small Very decent battery life	Can slip into tablet mode Sharp screen quality Strong performance Not great for games Good battery life	Attractive design Twin-GPUs deliver impeccable performance Battery life poor compared to latest Macs	Low price Not amazing performance Chassis feels plasticky Not the slimmest Ultrabook Save £100 w/o touchscreen
FULL REVIEW	TINYURL.COM/KNXWZW3	TINYURL.COM/K64ZPKB	TINYURL.COM/QBAWKLC	TINYURL.COM/NV6TOQD	TINYURL.COM/NTHZV59



Ultraportable laptops

Apple's MacBook Air sets the standard for thin-and-light laptops, which are usually referred to as Ultrabooks or ultraportable laptops.

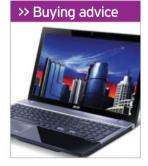
Most run fast and silent SSDs for storage, which can partly explain their higher retail price, but some manufacturers are now fitting slim 7mm hard disks. All Ultrabooks run Intel CPUs (AMD variants are known as Sleekbooks), often a low-power version identifiable by its U suffix. The 1.7GHz Intel Core i5-3317U is a popular example.

Beware of cheap glossy panels with poor contrast and colour gamut and, if possible, judge in person the screen quality and viewing angles before you buy. Ports are limited due to space constraints, but look for built-in ethernet or dongles that allow full-size ports to be connected.

A smaller chassis means a smaller, often non-removable battery. Expect six-plus hours of life.

There's no room for an optical drive, but you can always connect an external USB version.
READ MORE: TINYURL.COM/CEAHEZK





Sub-£500 laptops

Budget laptops are quick enough for most people, but economies are often made in build quality.

At the top end of the category you should find a highly capable Intel Core i-series processor. This will probably be a second-gen Sandy Bridge chip (ix-2xxx part number), but look out for a newer Ivy Bridge model (ix-3xxx).

Windows 7 and 8 run on 2GB of RAM, but 4GB or more is useful.

Hard disks are the norm at this price, with 250GB enough for most people. If you're a video hoarder look for 500GB or more.

Wi-Fi is standard, but Bluetooth is not a given at the price.

The bodywork and display are the main areas in which costs are cut. Expect creaky plastic bodies, bendy frames and faux-metal paint jobs. Keyboards and trackpads are also likely to feel cheap and erratic.

Gloss screens hide inferior image quality. Colours are vivid, but the contrast may be poor. Check the visibility at an angle.

Some laptop manufacturers scrimp on the battery. Look for a rating of 48Wh or more. READ MORE: TINYURL.COM/CA9EXZ6

£501-£1,000 laptops	PC ADVISOR RECOMMENCED	in the second se	3	4	5
	MSI CX61	Scan 3XS LG155	PC Specialist Optimus V	Lenovo IdeaPad Z500 Touch	Toshiba Satellite L50T-A-130
Price	£670 inc VAT	£909 inc VAT	£937 inc VAT	£700 inc VAT	£649 inc VAT
Website	Saveonlaptops.co.uk	3xs.scan.co.uk	Pcspecialist.co.uk	Lenovo.com/uk	Toshiba.co.uk
Build rating	****	****	***	****	****
Features rating	***	****	***	***	****
Performance rating	****	****	****	***	***
Value rating	****	****	****	****	***
Overall rating	***	***	***	***	***
Processor	2.2GHz Intel Core i7-4702MQ	2.4GHz Intel Core i7-4700MQ	2.4GHz Intel Core i7-4700MQ	2.2GHz Intel Core i7-3632QM	1.6GHz Intel i5-4200U
RAM	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3
Storage	1TB HDD	1TB HDD hybrid	1TB hard drive + 120GB SSD	1TB HDD	1TB HDD
Screen size	15.6in matt	15.6in	17.3in	15.6in glossy touchscreen	15.6in touchscreen
Screen resolution	1920x1080	1920x1080	1920x1080	1366x768	1366x768
Graphics	GT 740M/Intel HD 4600	GTX 765M/Intel HD 4600	GTX 765M/Intel HD 4600	Intel HD 4000/GT 740M	Intel HD 4400
Video memory	2GB	2GB	2GB	2GB	N/A
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	10/100	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0, 1x USB 2.0	2x USB 3.0, 2x USB 2.0	3x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0	2x USB 3.0, 1x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	x	×	×	×	×
DisplayPort	×	×	×	×	×
HDMI	✓	✓	✓	✓	✓
DVI	×	×	×	×	×
VGA	✓	✓	✓	✓	✓
eSATA	x	✓	✓	×	×
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	BD-ROM	8x DVD±RW	4x BD-ROM	8x DVD±RW	N/A
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	None
Stalker scores	58/39fps	68/62fps	Not tested	Not tested	Not tested
Battery	49Wh lithium-ion	77Wh lithium-ion	76.9Wh lithium-ion	48Wh lithium-ion	43Wh lithium-ion
Battery life	3 hrs 5 mins	4 hrs	3 hrs 29 mins	4 hrs	5 hrs 15 mins
PCMark 7 score	3241	4700	6099	3011	2850
Dimensions	383x249x38mm	374x250x43mm	413x278x44mm	370x255x30mm	378x244x28.8mm
Weight	2.4kg	2.7kg	3.2kg	2.7kg	2.5kg
Warranty	1-year return-to-base	2-year return-to-base	3-year return-to-base	1-year return-to-base	1-year return-to-base
Verdict	Haswell processor Low price 15.6in matt screen is particularly good Blu-ray drive	Strong gaming performance Good all-round speed Comfortable keyboard Decent battery life A little hefty and inelegant	Decent spec for the price Fast Proficient at gaming Not the most portable Battery life lacking	Ordinary overall speed Decent gaming potential Touchscreen Display not full-HD Not the lightest 15in laptop	Powerful speakers Solid all-round performance Resolution disappointing Touch-sensitive Sturdy build quality

>> Buying advice

£501-£1,000 laptops

If you're prepared to pay more than £500, you can get a laptop with a better selection of internal components, a higher-quality build, and faster performance.

Most laptops at this price have 15.6in widescreen displays, but beware of budget panels with a coarse resolution - 1366x768 pixels is wide, but creates fuzzy text and images. Look for anti-glare matt panels rather than glossy screens.

Intel introduced its third-gen Core chips in 2012, aka Ivy Bridge, which offer integrated GPUs capable of half-decent gameplay. You'll also find 2011's Sandy Bridge chips, identifiable by a leading 2 rather than 3 on the part number.

Battery life can stretch to six hours, but don't take it as a given.

Expect at least one USB 3.0 port, which allows for faster data transfer with compatible peripherals. Gigabit ethernet is now standard, and you may find even faster ports such as eSATA or Thunderbolt at this price.

Look for 8GB of RAM, and an SSD if you don't mind offloading media files to external storage.
READ MORE: TINYURL.COM/BUHSEAR



>> Buying advice



£1,001+ laptops

Invest £1,000 or more in a laptop, and you can be reasonably sure of getting a high-quality PC.

Sometimes that money will be spent on getting a thin-and-light laptop, with good performance to boot. Alternatively, you may prefer a rugged laptop that's able to withstand wear and tear on the road, or a performance-first

high-powered workstation. Whatever your need, accept no compromises in build quality.

The best laptops should offer very good screens. Beware of glossy shiny panels that allow distracting reflections in certain lighting conditions.

Ultraportables may have 256GB or more of solid-state storage, but won't have an optical drive or GPU.

Workstation laptops will have faster - often quad-core - CPUs and a mobile graphics processor.

Rugged laptops are engineered for strength, at the expense of light weight and sleek design. Look out for milspec standard ratings, such as MIL-STD-810G.

You'll find a wide range of ports, high-grade components and extras. READ MORE: TINYURL.COM/CC3KBMM







Tablets

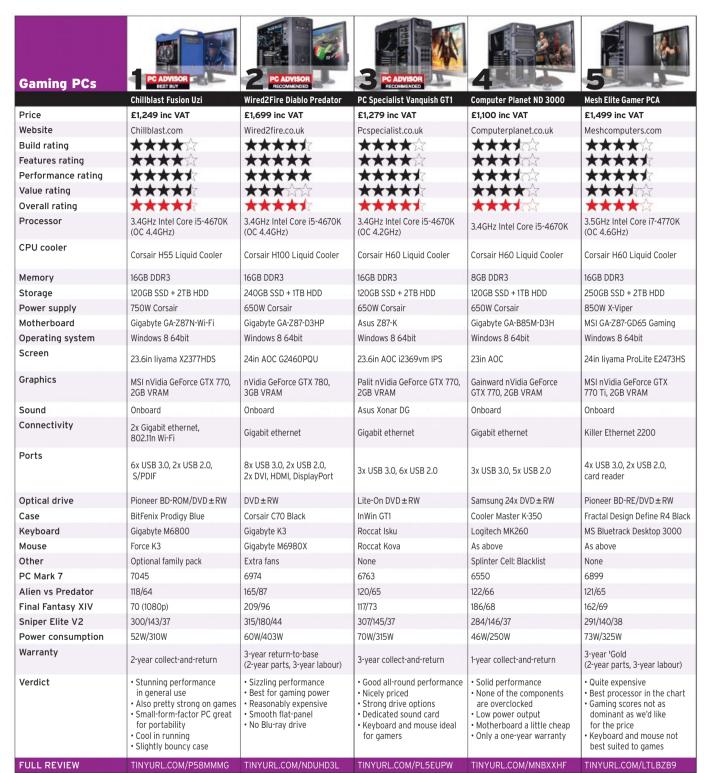
Tablet PCs combine the mobility and connectivity of a smartphone with a larger screen and more powerful processor. Rather than Windows, most run a lightweight, touch-focused OS.

You have two main choices: a tablet running iOS or Android. iOS is slick, supremely easy to use, and has a library of hundreds of

thousands of apps. But the iPad is expensive, it doesn't support memory cards, and the whole system is locked down.

Android tablets are available at lower prices. Many have ports for adding storage and connecting devices, and plenty of apps are available via Google Play although Google doesn't vet them. Look for a dual-core processor for smooth operation and good multi-tasking. Opt for a capacitive rather than resistive touchscreen if possible, and consider a smaller screen to minimise weight.

3G/4G tablets are available on subsidised tariffs, but it's usually cheaper to buy them outright. READ MORE: TINYURL.COM/7YGVBQ6



All gaming scores given in fps. Alien vs Predator 720p, Max/1080p, Max. Final Fantasy 720p, Med/1080p, Max. Sniper Med/Ultra



Gaming PCs

Gaming PCs put performance and upgradability before subtlety and quiet operation. Many run overclocked CPUs to eke out every bit of available speed.

Intel's Core i5-3570K is a popular choice of CPU, but will require a decent cooler and beefy PSU. The HyperThreaded i7-3770K is slightly faster, but dearer.

Cooling is essential for stability. Liquid-cooling systems, dust filters, fan-speed controls and good cable-management can aid airflow.

Most important of all is the graphics card; vendors will often skimp on storage, networking and other features and throw all their budget at the graphics card.

nVidia's GTX 680 delivers unparalleled performance - but at a price. Cheaper solutions include the GeForce GTX 660 and 670.

Look for wired peripherals and a headset. Good warranty terms are crucial for overclocked PCs.

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READ MORE: TINYURL.COM/CZXH443

All-in-one PCs	PC ADVISOR BEST DUY	PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENCED	4	5
	Dell XPS 2720	Apple iMac 27in	Medion Akoya P2002	Chillblast Fusion AIO Ultima	MSI Wind Top AE2712G
Price	£1,749 inc VAT	£1,599 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
Build rating	****	****	****	****	****
Features rating	****	****	***	****	****
Performance rating	****	*****	********	****	*******
Value rating	***	***	****	****	****
Overall rating	****	***	****	***	大大大大公
Processor	3.1GHz Intel Core i7-4770S	3.2GHz Intel Core i5	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 capacity	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 755M	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	✓	✓	✓	✓	✓
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	x	x	×	×	×
Thunderbolt	✓	√ (x2)	×	×	×
НДМІ	✓	×	✓	✓	✓
Media card slot	✓	✓	✓	✓	✓
Max disc speeds	BD-ROM/DVD ± RW	None	DVD±R	BD-ROM/DVD±RW	BD-ROM/DVD±RW
Extras	2.1Mp webcam, wireless keyboard and mouse	1.3Mp webcam, wireless keyboard and mouse	Wireless keyboard and mouse, CyberLink software	Webcam, Microsoft Wireless Desktop 3000	2Mp webcam, DVB-T TV tuner, Wireless keyboard and mouse
Operating system	Windows 8	Mac OS X 10.8 Mountain Lion	Windows 8	Windows 8	Windows 8
Power consumption	54W (idle), 220W (load)	53W (idle), 243W (load)	34W (idle), 92W (load)	32W (idle), 119W (load)	44W (idle), 110W (load)
Sniper 2 Elite (High)	6fps	12fps	5fps	5fps	5fps
Sniper 2 Elite (Low)	94fps	197fps	16fps	28fps	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
Verdict	Screen offers stunning array of colours Great general performance Solid, but not amazing gaming framerates Quite heavy Next-day in-home support	Still svelte and cool-looking Decent performance Class-leading gaming Stunning display No touchscreen	Low price Decent performance for the money Built-in TV tuner Lacks SSD and Blu-ray No touchscreen	Good-looking and well built Blistering Windows performance Disappointing gaming IPS panel offers inferior colour fidelity to iMac and Dell Many of the ports are difficult to reach	Low price for a 27in all-in-one PC Fully featured all-in-one with TV tuner and Blu-ray Lacklustre gaming Disappointing performance
FULL REVIEW	TINYURL.COM/KWZ4KLL	TINYURL.COM/A95Q9VY	TINYURL.COM/MEVSJ9D	TINYURL.COM/LQ4U8FW	TINYURL.COM/MUGFKQ7

>> Buying advice

All-in-one PCs

All-in-one PCs build into a large (21- to 27in) monitor all the components they require to run, making them an excellent- and stylish solution for saving space.

However, with limited internal space for cooling, all-in-one machines tend to include less powerful components than traditional desktops. Expect to find integrated or laptop graphics processors and mobile CPUs inside.

All-in-ones aren't usually easy to upgrade, but many are pre-packed with Wi-Fi, Bluetooth, speakers and even Blu-ray players.

Touchscreen displays are likely to become more desirable once Windows 8 is released. If you buy one now, ensure the image quality hasn't been compromised and that it's sufficiently responsive to touch. The quality of the supplied keyboard and mouse (usually wireless) is critical. TV tuners and HDMI ports are welcome additions.

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READ MORE: TINYURL.COM/87VW5KJ

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Corsair H55 Cooler

Gigabyte GA-Z87N Motherboard

16GB 1600Mhz DDR3 Memory

NVIDIA GeForce GTX 770

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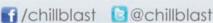
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^{*} Chillblast won more awards in the leading IT press publications PC Pro, PC Advisor and Computer Shopper combined than any other retailer 2010-2012
** World's fastest PC as tested by PC Pro Magazine - http://www.pcpro.co.uk/reviews/desktops/371152/chillblast-fusion-photo-oc-iv

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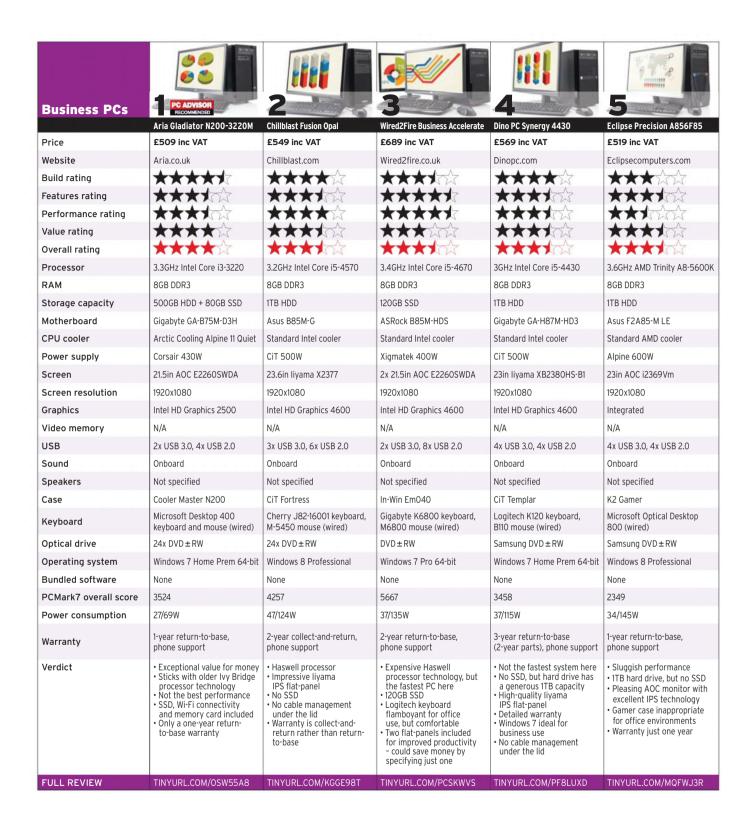


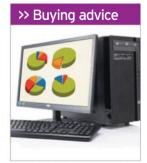






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Business PCs

Provided you have sufficient RAM (at least 2GB, preferably 4GB), any modern CPU will provide enough power for low-level admin tasks. Intel's Core i3 provides ample performance for general use and come with integrated graphics, saving you the cost of buying an additional card. In a typical networked business environment

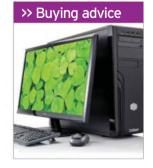
there will be storage available on the LAN, so you're unlikely to need a large hard drive. A 500GB drive should be ample.

Wireless keyboards and mice can cause issues in the workplace due to interference between adjacent workstations. A decent wired kit is ideal, while quiet-typing keyboards can be less distracting. For small businesses with just

one or two PCs, Windows 7 Home Premium is cheaper but can't connect to servers. The Pro edition is a better option for businesses, especially if you need compatibility with older software.

Changes in exchange rates and component supply issues mean we can't guarantee PCs listed here will be available as specified. All our prices include delivery charges.

Family PCs	PC ADVISOR BEST BLY	2 PC ADVISOR NECOMMENDED	3	4	5
	Chillblast Fusion Commando	Quiet PC Serenity Home Value	Dino PC Raging Lizard	CyberPower Ultra Scylla SE III	Computer Planet F2000 Family
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
Build rating	****	****	****	****	****
Features rating	****	***	***	***	***
Performance rating	****	***	****	***	***
Value rating	****	****	***	****	***
Overall rating	***	***	****	***	***
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 capacity	1TB HDD + 120GB SSD	500GB HDD hybrid	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	CiT 600W	Zalman ZM450-GS 450W	Corsair VS450 450W	Cooler Master 500W	Cooler Master 600W
Screen	23in Iiyama X2377	Not supplied	23in AOC i2369Vm	24in BenQ GL2450E	23.6in liyama X2377
Screen resolution	1920x1080	N/A	1920x1080	1920x1080	1920x1080
Graphics card	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
Wireless	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	×	×	✓	✓	✓
Sound card	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 wireless combo	Gigabyte GK-KM7580 wireless combo	Logitech MK260 wireless combo	Logitech MK330 wireless combo	Logitech MK260 wireless combo
Optical drive	LG BD-ROM/DVD±RW	Sony DVD±RW	Lite-On BD-ROM, Samsung 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 (Low/Med/Ultra)	147, 59, 14fps	26, 7, 5fps	154, 62, 14fps	130, 43, 9fps	205, 59, 15fps
Alien vs Predator (720p/1080p)	52, 27fps	8, 5fps	53, 27fps	47, 24fps	77, 41fps
PCMark 7	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	2-year return-to-base
Verdict	Strong performance Good GTX 650 graphics Great 23.6in liyama IPS screen Wi-Fi only through USB adaptor Temperature and noise kept low	Near-silent operation Good power for the money Strong RAM complement Limited gaming power Hard drive capacity a little stingy	Best performance here Good gaming potential Stylish AOC IPS monitor Strong components Not cheap	Pedestrian performance in our benchmarks Solid gaming scores No SSD Large screen lacks colour fidelity and decent viewing angles High-quality Logitech MK330 keyboard and mouse combo	Most expensive of the systems here Powerful performance GTX 660 the best card here Strong storage options No Blu-ray drive
FULL REVIEW	TINYURL.COM/KF6G3T7	TINYURL.COM/KPE3BAD	TINYURL.COM/RAGLIZ	TINYURL.COM/QHT5X2H	TINYURL.COM/NEVWQ4U



Family PCs

Changes in exchange rates and component supply issues mean we can't guarantee PCs listed here will be available as specified. All our prices include delivery charges.

A family PC needs to offer decent performance in every area, able to cater for the needs of each individual - but there are some areas where you can cut costs.

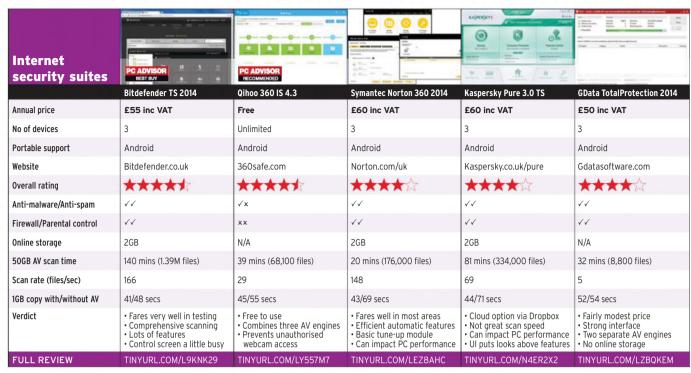
If you're not itching to play the latest games, opt for integrated rather than dedicated graphics. AMD processors are more adept in this regard, while Intel CPUs offer faster application performance.

Intel's Core i5-3570K will form the core of a powerful home PC, although the older Core i5-2500K may be offered at lower cost and supports easy overclocking. Consider 4GB of RAM and a 500GB hard drive as the minimum; both are easy to upgrade later.

Screen quality is crucial, with the best displays using IPS tech. A Blu-ray drive will help make the most of a 23.6in full-HD monitor.

For Skyping, watching films and listening to music, decent speakers and a webcam are essential.

READ MORE: TINYURL.COM/BL4UREB



GLOSSARY: • IS: Internet Security • TS: Total Security

Antivirus software	Norton Pc ADVISOR BSST BJV	bitdefender ANTWRUS PRO PORTORIO ATTENDA ATT	G Data AntiVirus PC ADVISOR RECOMMEDICE	PC ADVISOR RECOMEDIDE	TITANIUM ANTIVIRUS I
	Norton AntiVirus	Bitdefender Antivirus Pro	G Data AntiVirus	Kaspersky Anti-Virus	Trend Micro Titanium AV+
Annual price	£39 inc VAT	£24 inc VAT	£34 inc VAT	£39 inc VAT	£39 inc VAT
Licence terms	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year	3 PCs, 1 year
Website	Norton.com	Bitdefender.co.uk	Gdatasoftware.com	Kaspersky.co.uk	Uk.trendmicro.com
Overall rating	****	****	****	***	***
Signature-based detection	98.7%	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
Verdict	Smooth user interface Large 'Fix Now' button Moderate impact on system performance	Very good performance for malware removal Average scan speeds Three interface tiers	Strong malware detection, blocking and removal Good user interface, but poorly translated	Well-designed interface Easy to use On-demand single-file scans Impacts PC performance	Set-it-and-forget-it security Cloud-based protection Requires web connection Good performance
FULL REVIEW	TINYURL.COM/4P5YCXP	TINYURL.COM/66SK77U	TINYURL.COM/6BFXWCS	TINYURL.COM/6HQA2WB	TINYURL.COM/4HUORV3



Security software

Every connected PC should have at least antivirus, antispyware and a firewall, and it's important that each is kept up to date. Avoid installing more than one real-time scanning component.

We work with world-renowned independent security testing lab AV-Test.org to evaluate the effectiveness of security software.

No security software is foolproof, but some are significantly better than others. And factors such as ease of setup, scan speeds, interface design and ability to deal with new threats set them apart.

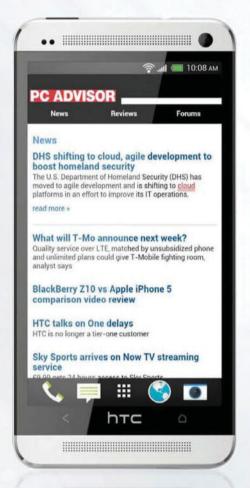
The best products will offer parental controls, cloud protection, anti-phishing, anti-rootkit, virtual web browsers and keyboards, link and file scanners, gaming modes, online backup and more.

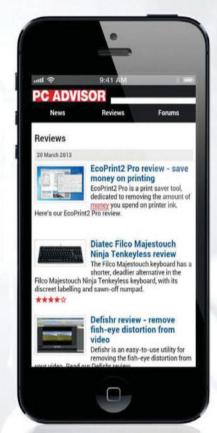
The best value is usually offered by a three-user licence, but you can save some cash if your household has only one PC.

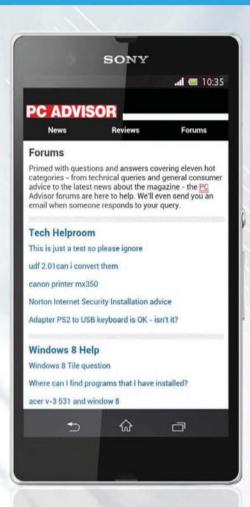
There are some good free antivirus products, but you get what you pay for. READ MORE: TINYURL.COM/7NR8FSM

PC ADVISOR

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£151+ printers	PC ADVISOR BEST BLY	PC ADVISOR GOLD	3 PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENCED	5
	Kyocera Mita FS-1320D	HP OfficeJet Pro X551dw	Canon i-Sensys LBP7780Cx	Lomond EvoJet 2 Office	Xerox Phaser 3610DN
Price	£170 inc VAT	£460 inc VAT	£440 inc VAT	£50-£150 per month	£445 inc VAT
Website	Kyoceramita.co.uk	Hp.com/uk	Canon.co.uk	Lomond.com	Xerox.co.uk
Overall rating	****	***	****	***	***
Technology	Mono laser	Colour inkjet	Colour laser	Colour laser	Mono laser
Max print resolution	1200x1200	2400x2400	9600x600	1600x1600	1200x1200dpi
Actual print speed	B=26.1ppm	B=42.9ppm C=15.8ppm	B=23.2pp C=16.7ppm	B=41.4ppm C=23.1ppm	B=40ppm
Scan/fax facilities	None	None	None	None	None
Supported interfaces	USB 2.0	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet	USB 2.0, ethernet	USB 2.0, gigabit ethernet
Cost per page	B=1.4p	B=1p C=4.3p	B=1.3p C=7.5p	Variable	B=1.3p
Media card/auto duplex	√√	x√	x √	××	x√
Input capacity	250 sheets	500 + 50 sheet	500 + 100 sheets	250 + 20 sheets	700 sheets
Dimensions	375x393x250mm	517x399x414mm	517x530x401mm	542x455x265mm	393x426x315mm
Weight	12kg	17.1kg	31kg	12.8kg	13kg
Warranty	2 years	1 year	1 year	1 year	1 year
Verdict	No frills business laser Lacks Wi-Fi and ethernet Modest running costs Auto-duplex support	Capable of immense speed Potential 1050 sheets input Very cheap running costs Text not the darkest	Immense 1100-sheet capacity Auto-duplex at 19.9ppm Excellent colour depth Secure Print	Monthly payment plans rather than outright purchase Stunning speed No auto-duplex	Great for up to 10 users Very fast Good print quality Handles substantial volumes
FULL REVIEW	TINYURL.COM/6GG9UKV	TINYURL.COM/CZ05P65	TINYURL.COM/CCAPAJF	TINYURL.COM/CLQAQ5V	TINYURL.COM/PB5CUJU

 ${\sf GLOSSARY: \bullet B: mono \bullet C: colour \bullet ppm: pages \ per \ minute}$



Printers

Most printers are inkjet or laser models, and there are colour and mono flavours of each. Lasers tend to be more expensive to buy, but provide better-quality output, particularly where text is involved.

The price you pay instore is only the beginning; also consider the cost of replenishing the ink and paper. Duplexing lets you print to both sides of a sheet, saving paper but slowing output.

Multifunction printers can save you money if you also require scanning facilities; some models include copy and fax functions, too.

A USB port lets you connect a printer to a single PC, but built-in wireless networking allows it to join a home or office network.

A memory card slot will let you bypass a PC for printing.

Never trust a manufacturer's claimed print speeds; we run our own tests to properly assess each printer's performance.

High-capacity paper trays and auto document feeders are also worth looking for. READ MORE: TINYURL.COM/BUX9QMO

External hard drives	1 PC ADVISOR RECOMMENSE	2 PC ADVISOR RECOMMENDED	3	GI PC ADVISOR OOLS	5
	Axtremex Micro SSD	WD My Passport Edge for Mac	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	G-Tech G-Raid Thunderbolt	Toshiba Stor.E Basics
Price	£130 inc VAT	£70 inc VAT	£250 inc VAT	£599 inc VAT	£100 inc VAT
Website	Axtremex.com	Wdc.com/en	G-technology.com	G-technology.com	Toshiba.co.uk
Overall rating	***	***	***	***	***
Capacity tested	32GB	500GB	4TB	8TB	2TB
Capacity range	32GB to 256GB	500GB	2TB to 4TB	4TB to 8TB	320GB to 2TB
Disk size	2.5in	2.5in	3.5in	3.5in	2.5in
Spin speed	N/A	5400rpm	7200rpm	7200rpm	5400rpm
Transfer speed	400GB/s	94MB/s (USB 3.0)	N/A	329MB/s	94Mb/s (USB 3.0)
Encryption	None	Password protection	None	None	None
Other interfaces	None	None	FireWire 800	None	none
Software	Axtremex utilities	WD utilities	None	None	None
Dimensions	73x38x10mm	112x83x11mm	235x130x46mm	235x130x85mm	119x79x21mm
Weight	58g	164g	1.35kg	2.3kg	215g
Warranty	1 year	3 years	3 years	3 years	1 year
Verdict	Stunning performance Requires USAP-enabled USB 3.0 ports for the best performance	Not just for Macs Password protection Faultless build quality Great value	120Mb/s average real-world performance Clearly audible Suits both PCs and Macs	Fast Thunderbolt interface Real-world speed can exceed 200MB/s Pricey, but huge capacity	Good value for money Unashamedly simple No backup or encryption Slow speed
FULL REVIEW	TINYURL.COM/KTRDXUH	TINYURL.COM/BMG7SW9	TINYURL.COM/NV7F32F	TINYURL.COM/CXEF6MH	TINYURL.COM/LBHC8EL





NAS drives

NAS drives are ideal for businesses or home users who require large amounts of dependable and secure storage, accessible to anyone logged into the local wired or wireless network.

Instead of connecting a hard disk directly to one PC, the NAS is connected to a network via a router. Many NAS drives are typically supplied without disks, letting you add your own selection.

Most NAS drives allow virtual partitions, letting you keep data such as PC backups separate from media files. Home-oriented NAS drives also include media servers to allow easy streaming of content.

To augment data integrity, access speed, capacity, or all

three, individual hard disks can be combined in a number of Raid configurations. Raid 0 'stripes' data across multiple drives to increase access speeds. Raid 1 mirrors the contents of one drive on to another, providing a cloned backup. Raid 5 is available with three-plus drives and combines both advantages.

READ MORE: TINYURL.COM/7H3HCNR



Ansi lumens GLOSSARY: • CM: component • CP: composite • ET: ethernet • SV: S-Video

Solid-state drives	SAMSUNG Made live level PC ADVISOR GOLD	PLEATOR PC ADVISOR RECOMMENDED	3 PC ADVISOR PICCOMMERCED	SAMSUNG PC ADVISOR RECOMMENDED	NEUTRON E DE LE DE LE DE LE DEL LE DE
	Samsung 840 EVO	Plextor M5 Pro	Crucial M500	Samsung 840 Pro	Corsair Neutron GTX
Price	£380 inc VAT	£174 inc VAT	£275 inc VAT	£367 inc VAT	£190 inc VAT
Website	samsung.com/uk	Plextor.com	Crucial.com/uk	Samsung.com/uk	Corsair.com
Overall rating	****	****	****	***	****
Capacity tested	750GB	256GB	480GB	512GB	240GB
Price per GB	51p	68p	57p	72p	79p
Memory cache	1GB LPDDR2	512MB DDR3	512MB DDR3	512MB LPDDR2	256MB DDR2
Controller	Samsung MEX (3-core ARM)	Marvell 88SS9187	Marvell 88SS9187	Samsung MDX (3-core ARM)	Link_A_Media LM87800
Encryption	AES 256-bit	AES 256-bit	AES 256-bit	AES 256-bit	None
Flash	Samsung 19nm Toggle NAND	Toshiba Toggle NAND	Micron 20nm MLC NAND	Samsung 21nm Toggle NAND	Samsung/Tosh Toggle NAND
Firmware updated via	SSD Magician for Windows	ISO boot disc	ISO boot disc	SSD Magician for Windows	SSD Toolbox for Windows
ATTO peak sequential	R: 554MB/s; W: 537MB/s	R: 547MB/s; W: 457MB/s	R: 539MB/s; W: 433MB/s	R: 562MB/s; W: 519MB/s	R: 557MB/s; W: 511MB/s
CDM peak IOPS	104k (read)	103.3k (read)	89.8k (read)	103.8k (read)	92.8k (read)
AS SSD (points)	1141	1124	1038	1094	1057
Warranty	5 years	5 years	3 years	5 years	5 years
Verdict	Lightning performance 840 Pro is slightly faster Great value for money Good longevity	High performance figures Nowhere near the value per gigabyte of the EVO Very durable	Best value of all SSDs here Good security Decent speed Multiple OS support	• Impressive speed • Three-core ARM processor • Limited platform support • Bluetooth issues on test	Strong write performance Nice weight and warranty Choice of models available Unusual choice of controller
FULL REVIEW	TINYURL.COM/L5EDQOY	TINYURL.COM/PTYGG27	TINYURL.COM/M2NCSMJ	TINYURL.COM/OU4LEJG	TINYURL.COM/KV954FC

>> Buying advice

Projectors

Projectors designed for home use don't tend to be as bright as office models – anything offering fewer than 1000 ANSI lumens will be usable only in a dark room. And don't forget that the brightness drops as the image size increases.

The cheapest home-cinema models offer a 720p resolution, but you'll notice the extra detail of 1080p when watching Blu-ray films on a large screen.

If you can't place the projector square-on to the screen, look for a model with lens shift. Keystone correction is a cheaper alternative, altering the image digitally, but degrading quality in the process.

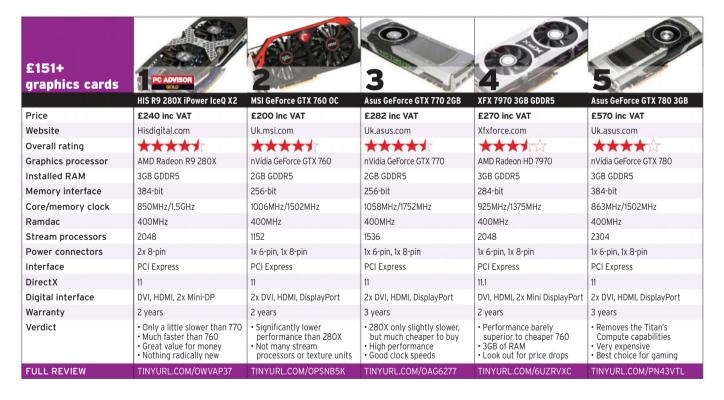
A zoom function offers more flexibility over how far from the

screen you can site the projector. If it's to go in a small room, get a short-throw model that produces a large image over a short distance.

DLP projectors offer better contrast and punchier colours than LCD models, but can suffer from the distracting and sometimes nauseating 'rainbow effect'.

READ MORE: TINYURL.COM/6MTMWJX

Sub-£150 graphics cards	PC ADVISOR COLD	2	3	4	5
	MSI GTX 650 Ti OC Boost	Sapphire HD 7770	HIS HD 7790	MSI GeForce GTX 650	Sapphire Radeon HD 7750
Price	£135 inc VAT	£90 inc VAT	£100 inc VAT	£90 inc VAT	£80 inc VAT
Website	Uk.msi.com	Sapphiretech.com	Hisdigital.com	Uk.msi.com	Sapphiretech.com
Overall rating	****	***	***	***	***
Graphics processor	nVidia GTX 650 Ti Boost	AMD Radeon HD 7770	AMD Radeon HD 7790	nVidia GeForce GTX 650	AMD Radeon HD 7750
Installed RAM	2GB GDDR5	1GB GDDR5	1GB GDDR5	1GB GDDR5	1GB GDDR5
Memory interface	192-bit	128-bit	128-bit	128-bit	128-bit
Core/memory clock	1033MHz/1502MHz	1GHz/1125MHz	1075GHz/1.6GHz	1071MHz/1250MHz	800MHz/1125MHz
Ramdac	400MHz	400MHz	400MHz	400MHz	400MHz
Stream processors	768	640	896	384	512
Power connectors	1x 6-pin	1x 6-pin	1x 6-pin	1x 6-pin	None
Interface	PCI Express	PCI Express	PCI Express	PCI Express	PCI Express
DirectX	11	11.1	11	11	11
Digital interface	2x DVI, HDMI, DisplayPort	DVI, HDMI, Mini DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, Mini HDMI	DVI, HDMI, DisplayPort
Warranty	3 years	3 years	3 years	3 years	2 years
Verdict	Fantastic performance 192-bit memory interface Boost clock to 1098MHz Fairly quiet for the power	• Faster than 650 and 7750 • Decent value for money • Plenty of stream processors • Low sound levels	650 Ti Boost much faster Becoming better value Only 128-bit memory Low noise	Marginally slower than 7770 Superb overclocking Very different to 650 Ti MSI version has second fan	Cheapest card in the chart Low specs include 800MHz core clock Lacks power in some games
FULL REVIEW	TINYURL.COM/DYE30W8	TINYURL.COM/BWJ7BL9	TINYURL.COM/BPRUYS5	TINYURL.COM/AKT2XOM	TINYURL.COM/7ZB50E3





Graphics cards

The key feature of a graphics card is its GPU. Produced by AMD or nVidia, this determines the quality of images displayed and their refresh speed. The more powerful the GPU the better, but you can get away with a lesser card by turning down a game's detail levels.

Even those on a budget should be able to get at least 1GB of DDR

video memory. Look for GDDR5 rather than GDDR3 RAM. This in effect quadruples the clock speed (GDDR3 merely doubles it).

The memory interface (or bus) governs how much data can be sent at once, so a 256-bit interface lets through twice as much data as a 128-bit interface. Graphics cards with the best combination of memory interface size and

clock speed should produce the best performance.

DirectX 11.x support is required for advanced, modern games; cheaper cards lack the firepower to do such titles justice, however.

Check that a card will fit inside your PC and you have sufficient connections from the power supply unit before you buy. READ MORE: TINYURL.COM/7BPUHQE



£200+ flat-panels	BENQ PC ADVISOR RECOMMENDED	PC ADVISOR RECOMMENDED	3	4	5
	BenQ GW2760HS	LG 29EA93	Philips 272P4	Asus PA248Q	AOC 12757Fm
Price	£220 inc VAT	£365 inc VAT	£273 inc VAT	£315 inc VAT	£228 inc VAT
Website	Beng.co.uk	Uk.lge.com	Philips.co.uk	Asus.com/uk	Aoc.co.uk
Overall rating	***	****	***	***	***
Screen size	27in	29in	27in	24in	27in
Panel type	A-MCA	In-plane switching	Plane-to-line switching	In-plane switching	In-plane switching
Native resolution	1920x1080	2560x1080	2560x1400 pixels	1920x1200	1920x1080
Pixel pitch	0.31mm	0.26mm	0.23mm	0.27mm	0.31mm
Brightness	300cd/m ²	300cd/m ²	300cd/m ²	201cd/m ²	237cd/m ²
Static contrast ratio	950:1	560:1	530:1	630:1	660:1
Response time	4ms	5ms	6ms	6ms	5ms
Ports	HDMI, DVI, VGA	3x USB 3.0, 2x HDMI, DVI, DP	3x USB 3.0, DVI, DP, 2x HDMI	4x USB, HDMI, DVI, DP, VGA	2x HDMI, VGA
Dimensions	472x191x623mm	700x209x387mm	639x580x242mm	557x416x235mm	622x449x130mm
Weight	4.5kg	5.2kg	8.5kg	6.4kg	5.7kg
Warranty	2 years	2 years	3 years	3 years	3 years
Verdict	Stunning value for a 27in screen this good Almost true 1,000:1 contrast Great performance	21:9 ultra widescreen Very accurate colours Hardware calibration support Three-port USB 3.0 hub	Great performance Pivot, height-adjust stand USB 3.0 connectivity Advanced features	For graphics professionals Good control over image Very accurate colour 16:10 display ratio	Nice 27in IPS panel Versatile viewing angles MHL Android hook-up Last few remaining
FULL REVIEW	TINYURL.COM/NF3WVFY	TINYURL.COM/CTR7AAW	TINYURL.COM/QXX22QC	TINYURL.COM/CPYX7MQ	TINYURL.COM/C53K8KP



Flat-panel displays

You'll spend most of your working day staring at the screen, so it makes sense to choose one that's comfortable to view.

The panel size will largely depend on your budget and amount of desk space, but those measuring 22in and above tend to offer a full-HD resolution. All bar the cheapest models also have at

least one digital interface (DVI, HDMI or DisplayPort). VGA (or D-Sub) is an analogue interface, and won't provide as clean a signal.

The panel technology is important. Twisted nematic (TN) is the budget option, offering fast response times but limited viewing angles. Multiple vertical alignment (MVA) and patterned vertical alignment (PVA) screens offer

better viewing angles and higher contrast ratios than TN, but slower response times. Advanced MVA screens are more responsive.

In-plane switching (IPS) panels offer excellent viewing angles, contrast and colour accuracy, but they can be rather pricey.

Get a matt rather than gloss coating for fewer reflections. READ MORE: TINYURL.COM/6RMBVR6





Calculating the true cost of technology

ayday loans from the likes of Wonga are hot news right now. The great-and-the-good have lined up to condemn the exploitation of desperate people with cash now for which you pay a lot later. It's a bad thing. But it did make me consider the ways we pay for tech: we don't always pay the full cost up front, and working out the true value of a device can be tricky.

A few years ago broadband suppliers rushed to give away netbooks and laptops with expensive 18-month contracts. Leaving aside the debatable 'value' of netbooks - good only at being cheap - in the end with such schemes you always paid more for the laptop than you would have paying up front. But given the chance of a shiny laptop for 'free', many people were sucked in. It's the equivalent of the free Parker pen Parky gives you just for enquiring about life insurance (and just as good value). Broadband suppliers these days focus more on bundling TV channels or public Wi-Fi subscriptions (see page 82). The real action can be found in mobiles, where consumers can be persuaded to purchase every year or two, even if their existing handset works well.

A 'free' contract phone is always more expensive than buying a handset outright and selecting a SIM-only tarrif to suit your needs. Especially so when you consider the resale value of secondhand smartphones. But, for many people, the desire to walk out of the store with a new iPhone or Galaxy outweighs the long-term consequence. And who has £500 to spend on a phone anyway? Telcos are smart, throwing in SMS messages you will never send, and offering iPads and games consoles to persuade people to sign up for 18- or 24 months. That alone should tell you what poor value such 'deals' are.

But there are hidden costs everywhere. The best smartphone deal on the market right now is to buy the Nexus 5 outright and source your own SIM. But why is the Nexus 5 so cheap, when it is in essence the same handset as the LG G2? Google subsidises each Nexus device. It does so to encourage use of the Google Play Store, for the purchase of apps and media drives cash money into Google's coffers. But it's also a loss leader to drive Android adoption.

Google wants people to use Android not because it is a friendly giant, but because it makes money from selling adverts. The more you use Android, the more Google knows about you, and the more it can make from delivering targeted ads at you on Google search pages, in Gmail, and on the wider web.

It's the same principle with Tesco's Hudl tablet, which costs £119 unless you have enough Clubcard points, in which case it can cost you next to nothing. The Hudl is an extension of the Clubcard: a means of knowing not only what you eat and drink, but what films you watch, music you listen to and books you read. For a retailer the size of Tesco this is hugely valuable data.

I have no problem with any of this activity - I derive my income in part from a website that carries Google ads. But it is part of the total cost of any device. You may not pay up front or in increments, but Tesco, Google and others sell loss-leading hardware because the data they gather makes you more valuable to them. And if the model works that means at some point you will pay with your purchasing power. ⊠

Next issue

ISSUE 224 ON SALE 8 JANUARY 2014



TEST Windows 8 laptops

Faster, better and longer-lasting: we test CENTRE six of the latest mid-range laptops that will make the perfect upgrade from your old PC.



TEST PC monitors

We test premium monitors from 24-27in. CENTRE Whether you want a second display or to

upgrade your LCD screen, don't miss this round-up.

Windows 7 vs Windows 8

Which is the best OS? With the imminent end to support for XP, we compare the two versions of Windows to help you decide to which to upgrade.

Google Chromebooks

We use a Chromebook exclusively for a week to find out whether these low-cost computers are a sensible choice over a budget laptop or even a tablet.

PLUS

Everything you need to know to set up a home network for sharing files and printing to a shared printer.



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RECOMMENDED

















APPROVED

R7-250 Intel G3220

CPU: Pentium G3220 Dual Core 3.00GHz MEMORY: 4GB DDR3 1333MHz (16GB Max)

STORAGE: 500GB SATA Hard Drive

GRAPHICS: Radeon R7-250 1024MB GDDR5

(Price Excludes Delivery)

QUICK CODE: #57993

GIGABYTE



R7 260X Intel i5 4570

CPU: Intel i5-4570 Quad Core 3.60GHz

MEMORY: 8GB DDR3 1600MHz (16GB Max)

STORAGE: 1TB SATA Hard Drive

GRAPHICS: Radeon R7-260X 2048MB GDDR5

(Price Excludes Delivery)

QUICK CODE: #57971

GIGABYTE



i5 - Sabre GTX760

CPU: Intel i5-4670K 3.40GHz (Overclocked - 4.40GHz)

MEMORY: 8GB DDR3 1600MHz (32GB Max) STORAGE: 128GB SSD / 1TB SATA Hard Drive GRAPHICS: NVIDIA GTX760 2048MB GDDR5

£850 .00 Inc VAT

(Price Excludes Delivery)

QUICK CODE: #56519

GIGABYTE



Infinite 4820K

CPU: Intel i7-4820K 3.70GHz (Overclocked - 4.60GHz)

MEMORY: 16GB DDR3 1600MHz (32GB Max) STORAGE: 250GB SSD / 2TB SATA Hard Drive GRAPHICS: NVIDIA GTX770 2048MB GDDR5

(Price Excludes Delivery)

QUICK CODE: #57691

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GALAXY Note 3 + Gear