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IDG UNITED KINGDOM

JIM MARTIN

Get smart

Why a smart heating system will save you money

Welcome to the latest issue of *PC Advisor* and, although the date on the cover may already say March (we can't change this historical anomaly, so don't ask), it is the start of another year, so Happy New Year one and all.

It's still winter, though, so it's the ideal time to look at smart thermostats. Not the usual *PC Advisor* fare, granted, but as these new heating systems can be controlled from PCs, laptops, smartphones and tablets, certainly relevant. They'll also save you money, and we know everyone loves a bigger bank balance, so turn to page 52 to find out more. It you're willing to switch to a new energy tariff, you might even be able to get a free one.

Those looking for a new laptop are well catered for. Starting on page 66 we round up the best-value laptops money can buy right now. Thanks to a new version of Windows which includes Microsoft Bing, manufacturers have managed to bring Chromebook prices to 'proper' laptops, so even if your budget is strictly limited to £200, you can still get a Windows system.

We've also gathered a selection of all-in-one PCs, which take up a fraction of the space of a traditional tower thanks to the fact that the components are bolted on to the back of the monitor. All budgets are catered for, but be sure to read our expert buying advice on page 76 first.

Gone are the days of only being able to listen to music you've purchased: modern streaming services let you subscribe and get access to millions of songs which you can listen to as many times as you like. Some services also offer advert-supported free services, but you'll find all the details and our recommendations starting on page 96.

There's plenty more in this packed issue, including reviews of the latest activity trackers, which we hope will help at least some of you to stick with those New Year resolutions to get fit. ☒

ISSUE 237 ON SALE 11 FEBRUARY 2015

CONTENTS

NEWS & ANALYSIS

REGULARS & OFFERS

FEATURES & GROUP TESTS

66

REVIEWS

TEST CENTRE

HARDWARE

BUSINESS

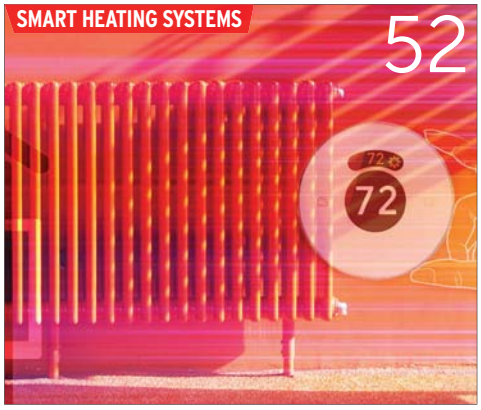
SMART HEATING SYSTEMS

BUDGET LAPTOPS

ALL-IN-ONE PCS

SATNAVS

MUSIC STREAMING SERVICES



ON THE COVER

66

84

76

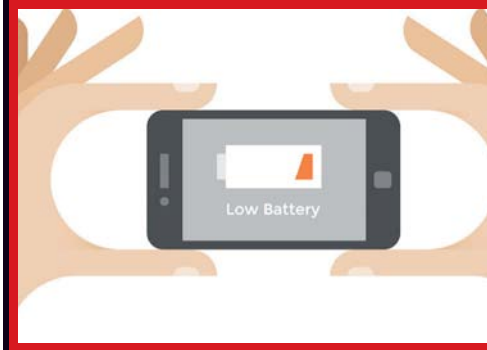
52

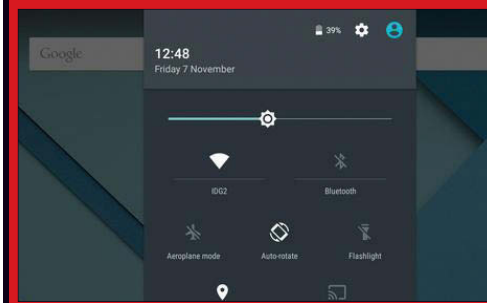
TEST CENTRE

TOP 5 CHARTS: BUYER'S GUIDE

HOW TO Tech Help

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





Intel Skylake chip to ship later this year and usher in a 'wire-free' era

Intel promises biggest innovations in processors for a decade as Broadwell chip risks being leapfrogged

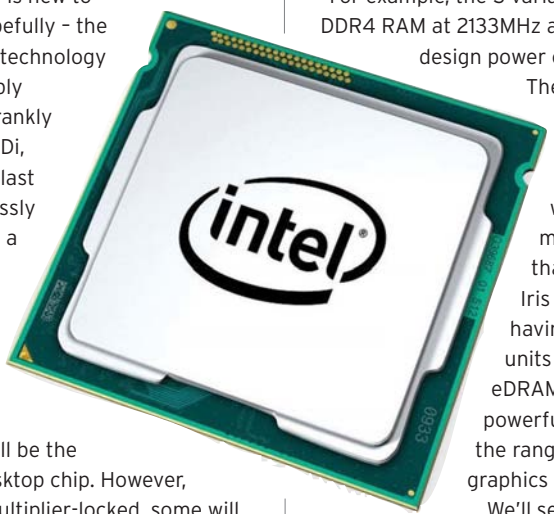
Despite Intel's manufacturing issues with the Broadwell chip design, which have pushed back its appearance to this year, there will be no knock-on delay to its successor Skylake, according to analysts, as the company will be determined not to lose any ground to rival chipmakers.

Skylake is the codename for Intel's forthcoming range of laptop- and desktop processors which, like Broadwell, will be based on 14nm technology. Currently, the only Broadwell chips you can actually buy are the M variants.

If the analysts are right and Skylake desktop processors begin to ship in the second half of 2015, many enthusiasts are likely to wait for it to appear and not bother upgrading to a Broadwell chip in the meantime.

One of the reasons to wait for Skylake is the sheer number of new features that it will bring. Intel says the chips will incorporate the biggest PC innovations for the past 10 years. Rather than being a simple performance bump, Skylake will deliver support for DDR4 memory and usher in so-called wire-free computing.

Part of this will involve wireless charging using the Rezence standard, which is applicable only to laptops (and very cool), but it also means wireless displays. Neither of those things are new technologies, but wireless charging is new to laptops and – hopefully – the wire-free display technology will be considerably better than the frankly disappointing Wi-Di, which was Intel's last attempt at wirelessly beaming video to a separate display.



Computing enthusiasts will be most interested in the S variant of Skylake, which will be the first available desktop chip. However, as Skylake S is multiplier-locked, some will hold out for the unlocked K series, which is likely to follow in 2016. Exact specs and details remain sketchy but leaks have offered some chipset information.

For example, the S variant supports DDR4 RAM at 2133MHz and has thermal design power of 35- to 95W. The flagship 95W quad-core part will have GT4e GPUs. GT4e will be even more powerful than the GT3e Iris Pro graphics, having 72 execution units and a 64MB eDRAM cache. Less powerful processors in the range will have GT2 graphics integrated.

We'll see a new 100-series chipset, codenamed Sunrise Point. The Z170 will replace the Z97, which was itself no massive upgrade from Z87. It will have more PCIe lanes (up to 20), SuperSpeed USB and motherboards that will probably have 10 USB ports as standard. There will also be up to three SATA Express ports. The H170 chipset will replace the H97 for mainstream PCs, while the H110 will be the value offering, replacing the H81 and various other chipsets.

Skylake processors themselves reportedly have both DDR3 and DDR4 memory controllers, so they will be able to be used in a variety of motherboards. They will be compatible with Socket 1151.

Skylake's H, U and Y variants will use a ball grid array and will have a platform controller hub, so basically they will be a system on a chip, like smartphone and tablet processors. This replaces, or succeeds, the old north bridge and south bridge setup, which Skylake S will continue to use.

Skylake will allow devices to be powered and **CHARGED WIRELESSLY**, as demonstrated here

Webcam security under spotlight after exploit

CHRIS MARTIN

Insecam website streams video from poorly protected webcams in homes and business around the world

Thousands of webcams protected only by default passwords have been exploited by new site Insecam in the name, it says, of security.

Don't expect to be able to visit the site and peer willy-nilly into the lives of unsuspecting citizens around the globe, though. Insecam may be routing IP streams through its own servers, so it can serve ads next to the pictures of warehouses, restaurants and gyms. In fact, the vast majority of the site is swamped, with video images quickly replaced by 'broken picture' icons in your web browser. It's the principle that counts, though.

Clicking on an individual webcam stream gives you the IP camera's location, the model used, and the username and password – usually some variation on 'admin'. Fortunately, the site's search tools are virtually nonexistent, so you can't search for a particular city (although a site search via Google will do the trick).

By claiming to make webcam snooping simple, the site once again highlights the fact that eyes in the sky – or in your kid's bedroom – can be connected to just about anyone with the right credentials. Even pitch dark isn't an escape for some cameras.

In a FAQ, Insecam says it is doing all this in the name of security. 'These cameras are not hacked,' the site says. 'Owners of these cameras use default password by unknown reason. There are a lot of ways to search such cameras in internet using google, search software or specialised search sites.'

The bottom line has to be this: if you don't want to give others the ability to peer into your daily life, you need to change your webcam's default password.

Sony smartphones and TVs face production squeeze

Company follows Samsung's lead in cutting production to drive profits at expense of market share

Sony is to cut the number of smartphones and TVs it makes this year to boost profits. It seems that many tech brands have realised that the quantity over quality strategy doesn't always work. With rival electronics firm Samsung having recently revealed it was reducing its smartphone line-up by up to a third in 2015, Sony has now decided to follow the Korean giant's lead.

"We're not aiming for size or market share but better profits," said Hiroki Totoki, Sony's mobile division chief.

According to Reuters, the Japanese firm will be happy even if sales slide by as much as 30 percent across smartphones and TVs, as long as it makes a profit. Sales of the company's Xperia smartphones and tablets have been poor and put a downer on earnings.

Sony will rely on the popularity of its PlayStation 4 console and image sensor businesses over the next three years. The company is looking to boost sales for its videogame division by a quarter to as much as ¥1.6 trillion (£8.7bn). This will be driven by personalised TV, video and music distribution services.

Despite gaining excellent reviews for its Xperia Z3 range, Sony is still struggling against Apple and Samsung. We'll find out what it can come up with to change things around with the Xperia Z4, which should arrive this year.

Sky Go showing on PS4 screens

PlayStation 4 owners can now access Sky Go as 'TV from Sky', although PS3 owners will have to wait a little while for support.

The catch is that Sky customers need a Sky Go Extra subscription for an extra £5 a month to register the PS4 as a device allowing them to watch live and on-demand Sky TV content. It will be free for Sky Multiscreen customers, though.

TV from Sky on PS4 includes all seven Sky Sports channels, Eurosport, 11 Sky Movies channels, Sky Atlantic and third-party channels such as Fox.

MORE: tinyurl.com/pxcsuy6

Amazon multiplies PickUp spots

Amazon has expanded its PickUp location programme.

The move allows customers to collect parcels from more than 10,500 Post office branches, taking the total of PickUp locations across the UK to over 16,000. Existing locations include Pass My Parcel stores, Collect+ stores and Amazon Lockers.

Delivery to Post Office branches is free for Amazon Prime members, otherwise the first-class rate is charged.

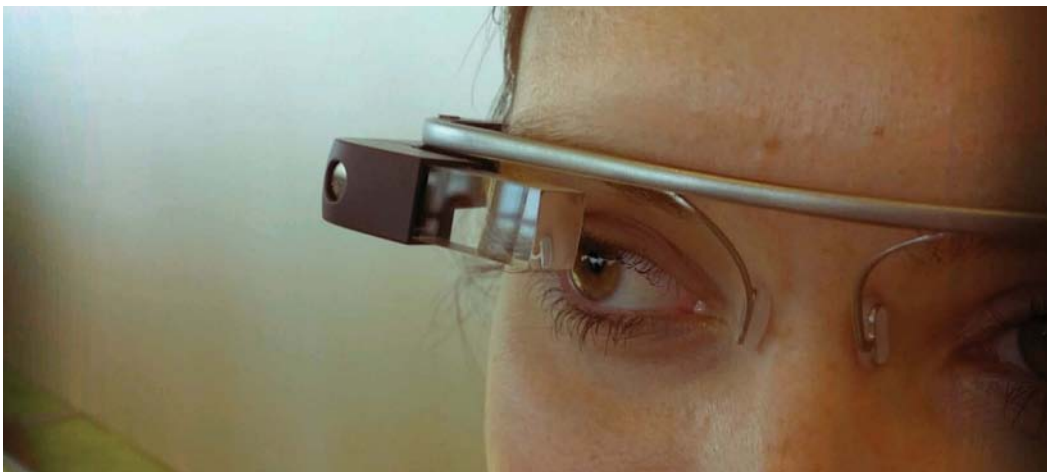
The fastest method is Pass My Parcel, which is run in partnership with Smiths newsagents.

Amazon said deliveries to PickUp locations had more than tripled over the past year.

MORE: tinyurl.com/p8nvvwg

Google sets sights on Glass 2 in 2015

Rumours circulate of summer release for second generation of wearable gadget



Although Google Glass still hasn't gone on sale as a finished consumer product, details of Google Glass 2 are emerging.

According to the *Wall Street Journal*, the next generation of the wearable gadget will arrive this year. When exactly is unclear, although Google's I/O conference in June is a good possibility.

We expect the price to be more affordable than the original. You can buy Google Glass Explorer Edition in the UK for £1,000 but Google Glass 2 will have to be cheaper to be a mass market success.

The *Wall Street Journal*'s sources said the chipmaker will promote Google Glass to organisations including hospitals and construction. It will also develop new workplace uses, as well as targeting the consumer market.

Google is also reportedly about to ditch Texas Instruments in favour of Intel as a chip provider. This should improve the battery life of Google Glass, which has been a problem so far.

Intel as a supplier may also be helpful in terms of promotion as the company has a reputation for going full steam ahead when it backs something, as with Ultrabooks.

Intel is winning more partnerships in the mobile space with many recent smartphones and tablets coming with Atom chips. It has been working with Google on self-driving cars and the Nexus Player.

Final curtain falls on Orange Wednesdays

Two-for-one cinema tickets and PizzaExpress meal deals axed

EE, which owns mobile network Orange, has confirmed that the popular two-for-one Orange Wednesdays deal is to be stopped.

Orange Wednesdays will end on 25 February after running for more than 10 years. The popular offer allowed Orange users to get two cinema tickets for the price of one every Wednesday and two for one at PizzaExpress.

"Orange Wednesday launched over a decade ago and at its peak was a massive success and an iconic promotion," the company said in a statement. "After 10 great years our brand has changed and our customers' viewing habits have also evolved, so it's time to move on."

Orange Wednesdays has been one of the main reasons customers have stuck with the mobile network rather than moving to new owner EE. EE said that it was working on something new.

It is thought that, as well as a gradual decline in the number of people taking advantage of Orange Wednesdays and the rise of streaming services such as Netflix and Amazon Prime Instant Video, EE was unable to reach a satisfactory commercial agreement with the cinemas.

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MATT EGAN

You know what you want – and it's not wearables

The marketing budgets may be fully engaged for Google Glass and the rest, but wearables are still niche

Ask the tech press what is the most important category in consumer tech and a good proportion of the responses will relate to wearables. Along with 'smart-home tech' and 'the internet of things', 'wearables' is the buzzword de jour. And with good reason. New categories of computational devices don't come along too often. And between Google Glass, the Microsoft Band and the nascent Apple Watch, all the big players currently have a stake in the game.

Personally, I think that wearables have an important part to play in our connected future. But not yet.

Smartwatches and activity trackers are on the periphery right now. Nice gifts to have and useful gadgets without a doubt – but rarely on the average consumer's mind. Google Glass remains the stuff of celebrity and science fiction. A cool and exciting idea, but not something people actively desire. Not now, anyway.

And you agree.

Poll results

We ran a poll recently on *PC Advisor*, asking just what you would most like to receive in Santa's stocking. The interesting news for all of those in the business of exchanging tech for money is that only 10 percent of the 5127 respondents wanted either a smartwatch or an activity tracker.

Meanwhile nearly two-thirds of respondents want a smartphone, a laptop or a tablet. And of those, more (21 percent) want a laptop and a tablet (18 percent). There's life yet in the more traditional tech.

Despite the hard-push marketing being put behind smartwatches, bands and fobs it would seem that wearable computing remains no more than a niche.

The most popular answer was 'smartphone'. Almost a quarter (22 percent) of respondents said they wanted a new phone for Christmas. Laptop and tablet were the next two categories, before a large drop to 'games console'. Just 10 percent of respondents said they wanted to see an Xbox or PlayStation under the tree. Only 6 percent of respondents most wanted a smartwatch, and just 4 percent a fitness band or activity tracker. Other product that received more than no support were headphones (3 percent), e-reader (1 percent) and Bluetooth speaker (2 percent). Just spare a thought for the 2 percent of readers who want a printer for Christmas.

For the full list of poll results, go to tinyurl.com/qzevufx. ☒

CHRIS MARTIN

Making Lollipop even sweeter

Android Lollipop is made to love – and here's how Google can make its mobile OS even cuter

Lollipop is here and we love it, but the latest release of the Android mobile operating system is not flawless. Here are five things I think could make Android Lollipop better and therefore what I want to see in Android M (or an update to Lollipop).

Landscape homescreen for phones

It's a completely normal thing to do on tablet – use the OS in portrait or landscape. The Nexus 7 was originally portrait-only but Google quickly fixed this. And it's about time the feature came to Android smartphones.

With screen sizes increasing and many phablets now on the market, including the massive Nexus 6, Android really needs to provide landscape support for phones. Apple has proven it works with the iPhone 6 Plus, so there are no excuses.

Better multitasking

Multi-tasking is great on Android Lollipop but it could be better. Native ability to run two apps side by side would be a great start even though this will only work well on larger screen devices.

Another great idea would be the ability to switch quickly to your last used app by double-tapping the recent apps buttons (the square in Lollipop).

Customisable quick settings

The two-stage drop-down notification bar looks great in Lollipop with the new Material Design and gorgeous animations. Alongside screen brightness you can adjust eight different settings like Wi-Fi and Bluetooth.

What we want is something you can do on many manufacturer user interfaces – the ability to customise which quick settings are displayed. Not everyone cares about auto-rotate and screencasting; what they might really want is Wi-Fi hotspot or battery saving mode at their fingertips.

Synchronised notifications

I've said this before and I'll say it again in the hope that Google will finally take note. When you own multiple devices – even if it's just a smartphone and a tablet – it's really annoying to have to clear notifications on one which you've already seen and possibly actioned on the other.

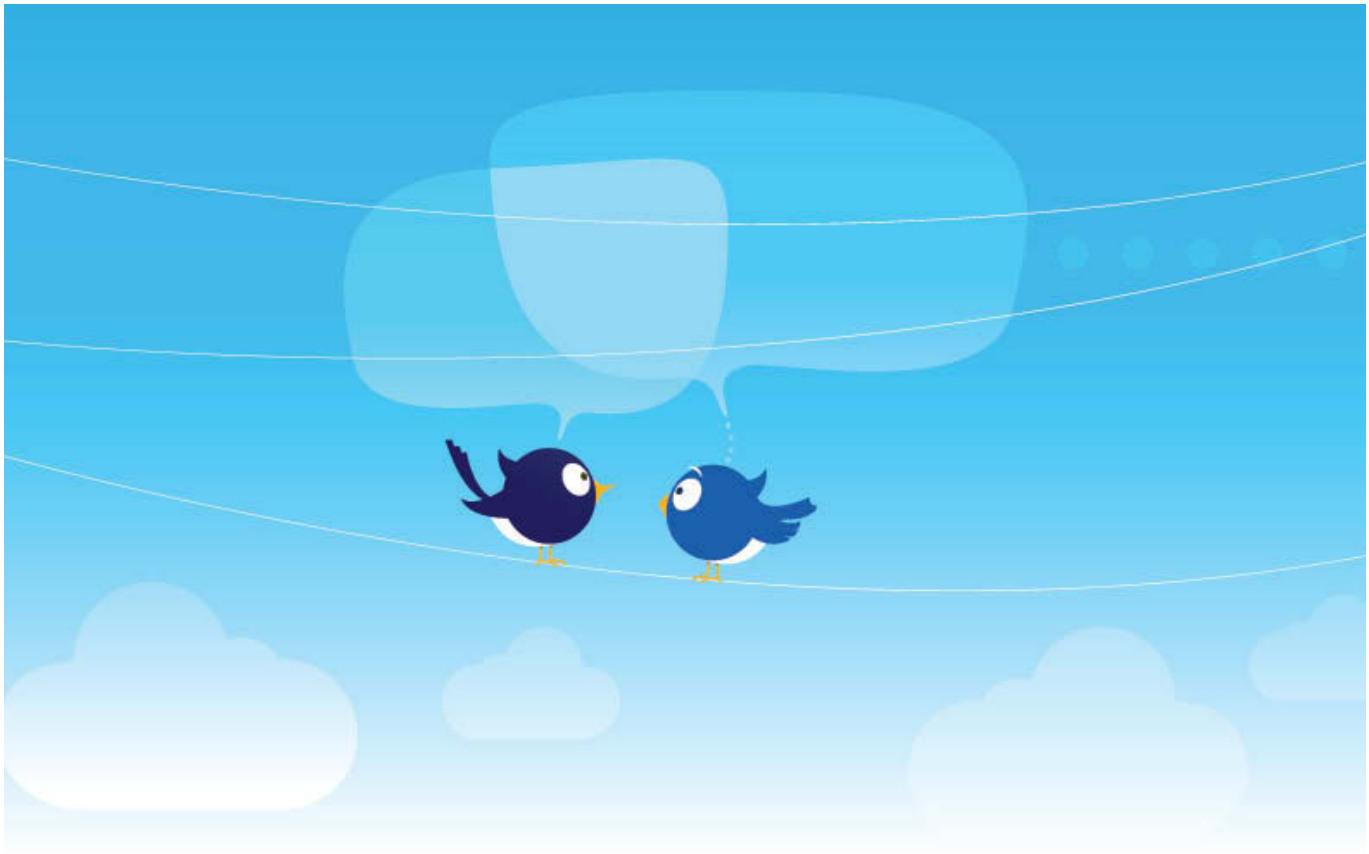
I want an Android operating system where swiping a notification away means that it's gone for good, across all my devices.

Ultra battery saving mode

Google has made improvements in terms of battery saving in Lollipop but I want to see it offer a little bit more on this front. And what just about everybody wants is a longer battery life.

Many smartphones from Google's manufacturing partners have come with ultra battery saving modes. This puts the screen into black and white, switches off anything which uses power (like Wi-Fi), and gives you access to basic features such as text messages and calls.

In general an ultra battery saving mode can get 24 hours from 10 percent battery charge. It can be a real life saver, so I want to see it in standard Android. ☒



Twitter time

David Price reveals everything that's wrong with Twitter

Quiz time. What do the following people have in common? Mario Balotelli, Joseph Kony, Dr Matt Taylor, Anita Sarkeesian, Dapper Laughs, former Egyptian president Hosni Mubarak, Emily Thornberry MP and Lord McAlpine.

No, it's not the line-up for *Strictly Come Dancing* 2015. The answer, of course, is that they have all, in various ways and at various times, been the victims of Twitter witch hunts: by which I mean that a rapidly escalating series of posts on the site, criticising them and/or calling for action against them, has snowballed and snowballed until a point of no return.

Sometimes the end point is an apology, a firing or a resignation; sometimes it's the toppling of a repressive regime. But all of the above have suffered material, real-world consequences following – I hesitate to definitively say "caused by", although in many cases that is patently true – the attentions of social media users.

I use the words "victims" and "suffered" advisedly here, by the way, because clearly some of the people above brought their troubles on themselves. But the extent to which this is true varies enormously. Indeed, I rather hope that the absurd incongruity of that mixed-up rogues gallery – Ugandan warlords alongside bargain-basement comedians, dictators beside Islington MPs – begins to make my first point for me. On Twitter, there is no such thing as perspective.

Twitter's sense of outrage (and I'm going to be speaking about Twitter specifically in this article, although Facebook occasionally shares its younger rival's tendency towards crusading sanctimony, and some smaller social networks such as Tumblr can be even worse) very rarely operates in shades of grey. Its three default states – boredom, silliness and outrage, but mostly outrage – are always dialled up to 11, and always focused on whatever is happening right now. The service has a collective attention span that you can measure in hours.

Emily Thornberry MP - "that bigoted woman!" as Gordon Brown had it. Tony Parsons (@TonyParsonsUK)

Why is Twitter like this? It isn't because the users are all weak-minded zealots – with 500 million users, Twitter attracts normal and abnormal people alike from all walks of life. It's because as a group, as a mob, they (we) behave like weak-minded zealots. And nuanced tweets that look carefully at both sides of the argument (assuming you can even do that in 140-character chunks) don't go viral.

Twitter lets you follow whoever you like, which in practice means that most people are just listening to variations and echoes of their own opinions – opinions that are therefore more likely to be retweeted, restated, copied or amplified than challenged. And in the quest to be heard above the din, users necessarily compete to state the party line in ever more aggressive forms.

Of course, most tweets – even the hateful, vicious claptrap that people with high follower counts (which doesn't include me) have to deal with constantly – don't develop into witch hunts. But it's only a matter of time before the next outrage of the day in one particular Twitter subsphere hits a critical mass and explodes.

No no women are toooootally welcome in our community, just ask the dude in this shirt. https://t.co/r88QRzsqAm pic.twitter.com/

XmhHKrNaq5. Rose Eveleth (@roseveleth) See right image.

Witch hunts and lynchings

The danger with witch hunts is their addictiveness. Who among us hasn't got caught up at least once as someone we despise gets their agonising comeuppance? And who can't remember the first resignation (or arrest) they really enjoyed? For me it was Jeffrey Archer, although in those pre-Twitter days you had to get your kicks watching the news rather than exulting over the developments on social media.

Some of the names above belong to irredeemable monsters with blood on their hands and deaths on their conscience, and the thousands – maybe millions – that have called for their heads on social media no doubt did so with that lovely feeling that they were 100 percent on the side of the angels. But once you've grabbed your pitchfork and joined the angry mob going after a theocratic war criminal, it's a short step before you're doing the same thing for someone who takes the mickey out of England football supporters. Or someone who just makes videos about computer games that you don't agree with.

And it gets worse. Let's think a little more about the last name up there. (Coincidentally - and, I suppose, for full disclosure – I sub-edited perhaps five or six of Lord McAlpine's columns for The *World of Interiors* in my first job, although I never met him.) In 2012 a rumour spread on Twitter that Alistair McAlpine had been accused of child abuse in a care home in north Wales, an accusation that would later prove to be the result of mistaken identity and wholly false. But by then his name was known throughout the country and his reputation was in ruins.

In this case, as it happens, the old-fashioned media was almost as incautious in its coverage of the affair as social media, and the BBC and ITV each paid McAlpine more than a hundred thousand pounds in damages. But it's debatable whether the rumour would have developed beyond the cryptic "senior Conservative" referred to on *Newsnight* if it wasn't for the actions of amateur sleuths on Twitter – many of whom had in turn to pay fines to charity when it emerged that McAlpine was innocent.

Getting offended

By way of a final thought I will make a confession. Back in my early days working for *PC Advisor*, I once went to a PR Christmas party that was themed around the concept of giving. Various displays around the room showed trinkets and gadgets (cool things, but very much 'stuff you don't need') that the organising company sold on its website, and each one was labelled with an apposite quote by a well-known writer. One of the quotes was by Anne Frank, and I thought that using the poor girl as the mouthpiece for a marketing campaign was pretty shabby.

(That's how I would have put it, I think. I was very wary of the idea of taking 'offence', which was something that happened to Mary Whitehouse-esque killjoys who wanted to ban amazing video games, not to vigorous young journalists. But really, it amounted to the same thing.)

So I did what offended members of the media did before we had Twitter accounts: I got into the office the next day, rang the company for comment, and then wrote an article about it. I am still embarrassed thinking about it.

(Fine. You can read it at tinyurl.com/Lekbnxd. Go easy on me; I was young. Youngish. Although at least it yielded one of the funniest 'right to reply' comments I've ever used: "Of course, we appreciate that Anne Frank was not writing about remote-control robots when she wrote 'No one has ever become poor by giving', nor did we mean to imply that she was.")

Why am I so embarrassed by that article? I don't know, exactly, although I think it's something to do with the tone. The tone says, "Something has happened which I don't approve of, and it's my duty to make sure everyone knows about it." And even though I protested that I didn't want to ban anything, or get anyone fired, rereading it makes me wonder what exactly I did hope to achieve.

In the end there's nothing wrong with thinking things are shabby and complaining about them, even if you do insist on referring to that process as "calling out", as if you're the world's referee. There were self-appointed moral arbiters around long before Twitter (I was writing articles like that one several years before I joined the social network, after all) and they will continue to exist long after we run out of oil and everyone has to farm turnips all day long. But Twitter has given the complainers a voice, the ear of the world's media, and the power to ruin lives and careers.

So sure: the next time a newsreader uses the wrong word or a video game fails to provide the right mode or a footballer wears the wrong kind of trousers, then by all means complain about it on Twitter. Just remember that nobody is perfect; and that your no-doubt measured and dignified protest will do one of two things: disappear without trace because nobody cares, or get distorted beyond all recognition as everyone jumps on board the bandwagon, and end up losing someone their job – or worse.

I've gone off Twitter a bit since it became a tool for destroying lives and careers. Rab Florence (@robertflorence)

I miss the days when complaints had to be sent through the post. But I suppose we would have run out of green ink. ☒

DAVID PRICE

Windows 10 could prompt upgrades of 600 million aging PCs

Hardware makers are eager to put Windows 10 on PCs to boost shipments. Agam Shah explains

Microsoft's Windows 10 is still in testing, but hardware makers can't wait for the day the operating system replaces Windows 8.

Millions of PCs are aging, and those who have resisted Windows 8 are expected to upgrade to computers with Windows 10. The initial reception to a test version of the operating system has been positive, as it resolves many usability issues affecting Windows 8.

Speaking at the Credit Suisse Technology Conference in late 2014, Intel president Renée James said there are about 600 million PCs that are four years or older, and those systems are ripe for upgrades.

"When we see a healthy macroeconomic environment and an aging installed base, we expect a new [OS] deployment. The [PCs] are fantastic and at new price points. That's kind of a perfect storm, combined with a new operating system, and the OS usually pushes the upgrade cycle," she explained.

Intel's president revealed she is "very enthusiastic and optimistic" about what Microsoft is doing with Windows 10. "They're being extraordinarily responsive to customers," she added.

All major PC makers are expected to support Windows 10 when it is released early next year. Hardware makers are already customising drivers and products for the operating system. AMD's new PC chip, codenamed Carrizo, will take advantage of new features in Windows 10. The chipmaker is expected to detail those features early next year.

Consistent appearance

According to Neil Hand, vice president of tablets at Dell, the PC maker has found that Windows 10 provides a consistent user experience and solves usability issues plaguing Windows 8 users.

The upcoming operating system will let users run the same programs on both mobile and desktop devices. That solves a Windows 8 problem, which prevented a large number of programs from working across devices. "The ability to create applications that are super-scalable from phone to tablet to PC is the big step in a lot of ways," argued Hand.

One Windows 10 feature that has been well-received is the return of the Start button. The feature will be welcomed in businesses, which have largely embraced PC-friendly Windows 7 and declined to upgrade to Windows 8.

Hewlett-Packard is also looking forward to Windows 10, and believes it could provide a major boost to PC shipments in enterprises. "We're genuinely excited about it," enthused John Groden, director of product development for Elitebook laptops at HP.

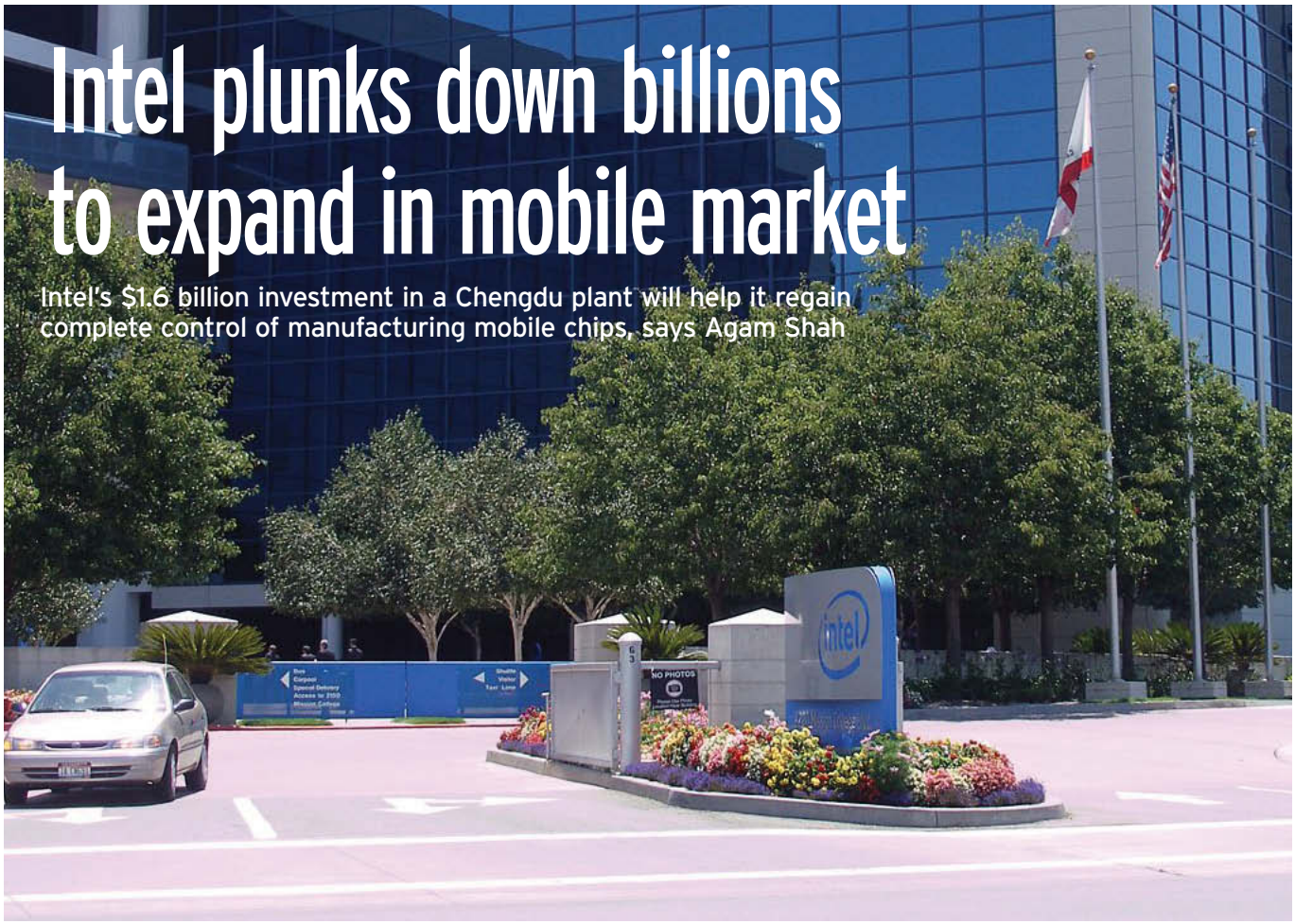
Bob O'Donnell, principal analyst at Technalysis Research has argued that for hardware makers, Windows 10 is a relief as it opens a pathway for upgrading hardware from Windows 7. A lot about Windows 10 is still unknown, especially on the tablet side, he said, adding that details relating to version breakdown, devices and pricing of Windows 10 remain unclear.

Jay Chou, senior research analyst at IDC, told us that it's too early to predict the impact of Windows 10 on PC shipments, but it won't be as big as the kind of boost Windows 7 provided in 2009. This came to market after Vista, which was considered a debacle. At that time, PCs were dominant, but the market has changed, with mobile devices being used as alternatives.

"Vista did not have to compete with smartphones and tablets," Chou explained. PC upgrades may first take place among consumers, as businesses test the OS and wait for initial kinks to be ironed out.

Windows 10 "is more amenable to power users, which is important for commercial upgrades," Chou added. As Technalysis Research's O'Donnell put it, "Windows 10 finally gets past Windows Vista version 2, which was what Windows 8 was."

Intel plunks down billions to expand in mobile market



Intel's $1.6 billion investment in a Chengdu plant will help it regain complete control of manufacturing mobile chips, says Agam Shah

Intel has bought its way into the tablet market, but success seems years away in smartphones, despite billions of dollars spent.

The allure of mobile devices has led the tech giant to take some uncharacteristic moves that defy the company's proud tradition of designing and manufacturing chips in-house. It has partnered with Chinese companies to build some smartphone and tablet chips, and is relying on third parties to manufacture those chips.

Intel bets the partnerships will accelerate its business in China, where smartphone shipments are booming. But it wants to regain complete control over manufacturing, and recently announced it was investing $1.6 billion over 15 years in a China plant for mobile chip development and manufacturing.

The expenditure isn't as huge as investments in its US factories, but the goal is the same: to set up the chip maker for success in mobile devices. Most smartphones and tablets use ARM processors, and Intel wants to break that dominance.

In 2014, Intel partnered with Chinese chip makers Rockchip and Spreadtrum to design chips for low-cost mobile devices. A fallout with Rockchip led to Intel partnering with TSMC (Taiwan Semiconductor Manufacturing Co) to produce an initial batch of low-cost mobile chips, which will go into smartphones and tablets starting at under $100.

During a speech recently, Intel president Renée James said the company will bring the manufacture of those chips in-house by 2016. The first chips from Intel's upgraded Chengdu facilities will start rolling out in the second half of 2016.

The Chengdu plant first opened up in 2005, but will now test and manufacture smaller chips for mobile and Internet-of-Things devices. It's one step in Intel's long-term goal to reduce its reliance on TSMC.

Power-saving and performance features are etched on to mobile chips in factories that are built for a specific process technology. Intel spokesman Chuck Mulloy said that depending on designs, the manufacturing of chips designed with Rockchip or Spreadtrum could well happen in Chengdu or other facilities.

Intel's factories are dedicated to making its own chips, but the company hasn't shied away from making custom chips for a handful of customers such as Panasonic. The processors are large due to the size of custom logic circuitry, but Chengdu provides an opportunity to make smaller custom chips for mobile devices.

Manufacturing chips in China could be cheaper than in the US, and would be preferred by companies like Rockchip and Spreadtrum, analysts said.

Dean McCarron, principal analyst at Mercury Research told us that Intel will be able to control costs and keep its factories busy by moving manufacturing in-house. "It makes sense because Intel likes to make manufacturing facilities in technically sophisticated markets, which China is."

Mobile chips alone may not fill up a facility of Chengdu's size, so Intel may make chips for mobile devices for third parties. "If someone like Apple were to approach Intel and say we want this custom phone part, it's obvious Intel will build it," McCarron added.

According to Jim McGregor, principal analyst at Tirias Research, Intel is also upgrading equipment in its factory to remain in the good books of the Chinese government, which is has been difficult on Western technology companies. Companies such as Microsoft and Qualcomm are being investigated by the Chinese government for monopolistic behaviour.

The chips made in the Chengdu factories won't be based on the latest process manufacturing technology, McGregor said, adding that Intel wants to protect its intellectual property and won't transfer its latest manufacturing process to China.

Samsung's smartphone struggles continued in third quarter of 2014

A showdown between Samsung and Chinese smartphone manufacturers will spur on better designs going forward, says Mikael Ricknås

A successful iPhone 6 launch in the US helped Apple increase its share of the smartphone market in the third quarter of 2014, but nemesis Samsung Electronics struggled, with upstart Chinese manufacturers nipping at its heels and growing ever stronger.

Thanks to record sales in emerging markets and the popularity of Apple's new iPhone 6 (pictured top right) and 6 Plus, overall smartphones sales to end users grew 20.3 percent to reach 301 million units during the third quarter, market research company Gartner said in its recent *Market Share: Devices, All Countries, 3Q14 Update* report.

Samsung's struggles continued unabated in the quarter. While the overall market grew, Samsung's sales dropped by about 9 percent to 73.2 million units. That was enough for a 24.4 percent market share, which still makes it the largest vendor by a large margin.

Samsung's product development team became too cautious, and paid a high price with the Galaxy S5 (above centre), which failed to catch on with buyers. It is now under pressure to develop cooler products across its whole portfolio. The launch of the Galaxy Note 4 Edge with its curved screen has already showed that Samsung is willing to break new ground in the high-end segment. And the recent launch of the Galaxy A3, which has a metal unibody, shows the company is willing to use premium materials even on its lower-priced devices to claw back market share.

Apple was the second largest vendor with a 12.7 percent share. Its sales grew by 26 percent to 38.2 million units, thanks to the success of the two iPhone 6 models. The two smartphones were so popular in the US they helped that market grow by almost 19 percent in the third quarter, Gartner said.

Huawei may have taken the third spot thanks to devices such as the Honor 6 (above left), but fewer than one million units separated it from Xiaomi and Lenovo in fourth and fifth place. They sold between 15- and 15.9 million units, putting their market shares were between 5- and 5.3 percent. Xiaomi had the highest growth of the quarter, with an increase of 336 percent driven by strong performance in China where it became market leader.

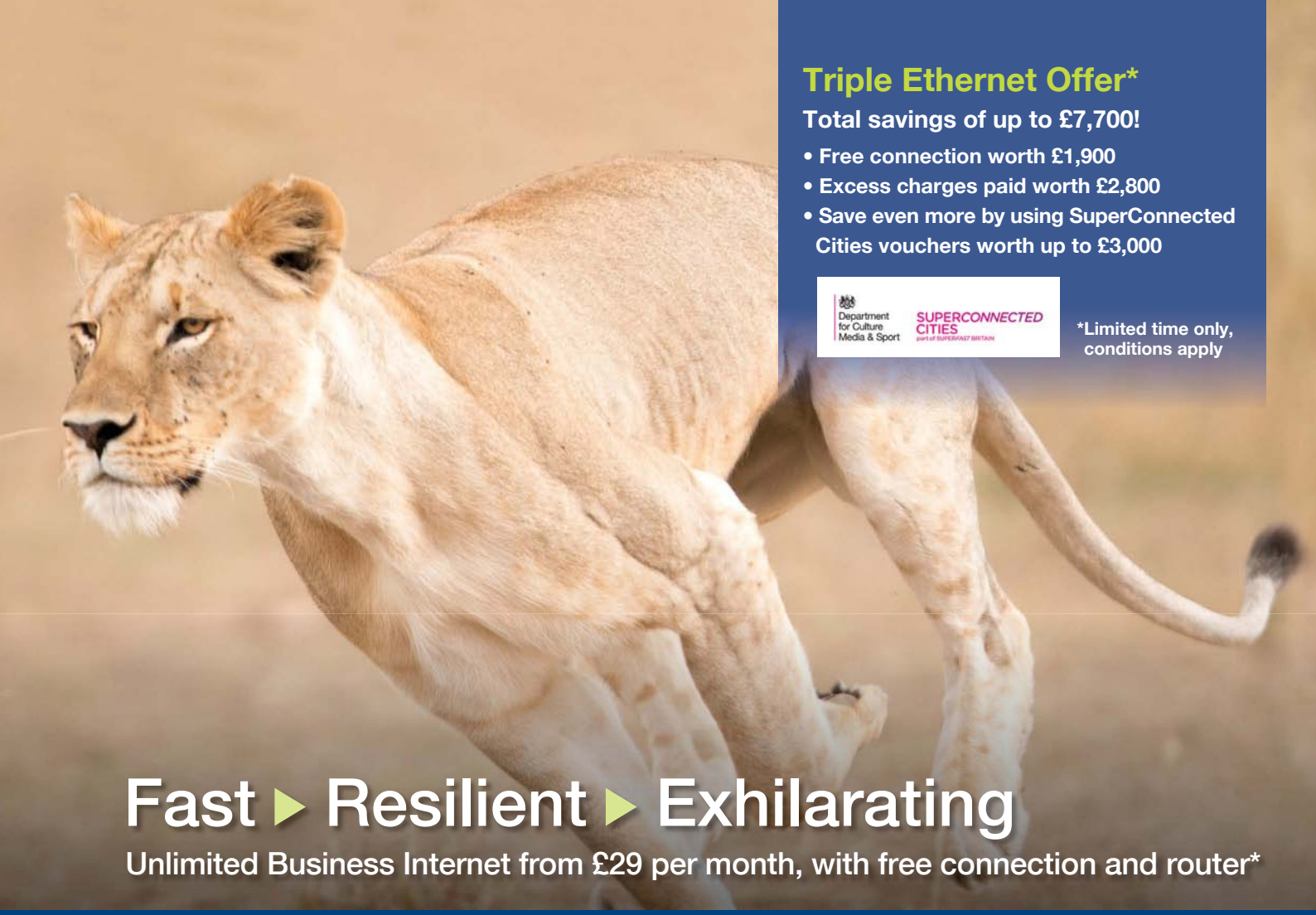
To continue to grow, all three Chinese companies are dependent on selling more smartphones outside their home market. Lenovo has laid the groundwork for an international expansion with its acquisition of Motorola Mobility from Google. Xiaomi seems to be taking a more cautious approach: recently the company said it was scaling back its international aspirations to focus on India and Indonesia.

Attractive, lost-cost LTE smartphones will offer a chance for these companies to grow. While the high-end segment has become saturated for everyone but Apple, the market for more affordable products is still expected to grow.

During the third quarter, emerging markets (where consumers' budgets are smaller) exhibited some of the highest growth ever recorded with Eastern Europe and the Middle East and Africa growing almost 50 percent year-over-year, according to Gartner.

This plays to the strength of the Chinese vendors, which is to undercut the leaders' prices and offer top specs for buyers who want premium phones, but can't afford Apple's or Samsung's high-end products, according to Gartner. The availability of next-gen components will allow manufacturers to build smartphones with LTE connectivity and HD screens that will sell for less than £200 without a contract in 2015.

In the third quarter, smartphones accounted for 66 percent of the total mobile phone market; Gartner thinks that by 2018, nine out of 10 phones will be smartphones.



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Fastest LTE speed will be out of reach for most users

Users in Asia will be the first to get 450Mb/s, while Europeans will have to wait, explains Mikael Ricknås

LTE's theoretical maximum download speed will increase to 450Mb/s in 2015, but the upgrade will be out of reach for most users, as many mobile operators don't have enough radio spectrum.

The broadband speed users get depends on a myriad of different factors, but in the network it starts with the amount of spectrum their operator uses. Future increases will be fuelled by a technology called carrier aggregation, which allows operators to treat up to three radio channels in different frequency bands as if they were one.

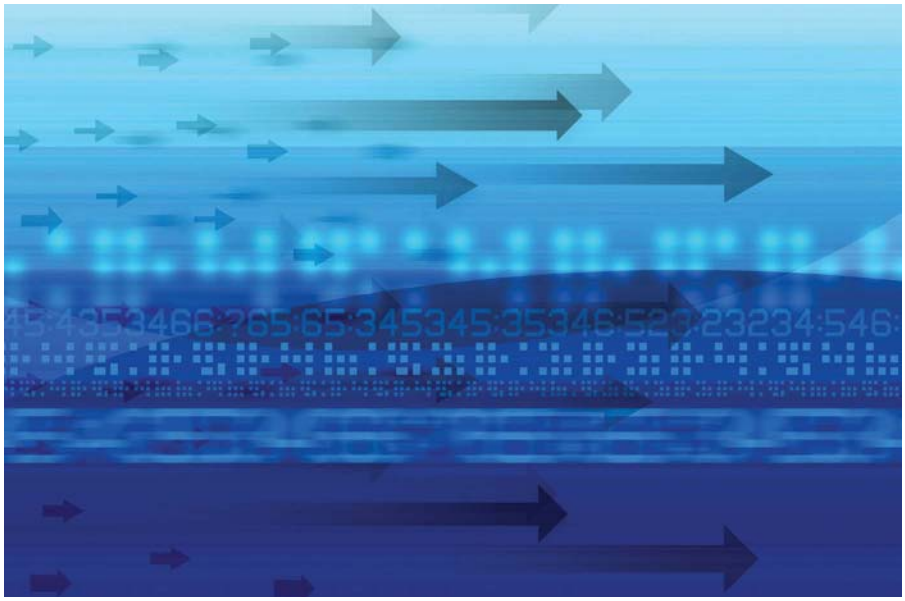
Chipmaker Qualcomm and network equipment manufacturer Ericsson have announced that speeds up to 450Mb/s will be possible later this year, with product launches, interoperability tests and a demo with Australian network operator Telstra.

The demonstration used 60MHz of spectrum made up of three separate 20MHz LTE channels in the 2600-, 1800- and 700MHz bands. That the mobile operators need 20MHz in each of three bands to get to 450Mb/s makes the technology an option for only a select few.

For example, because spectrum in the US is often licensed in 10MHz chunks, North American subscribers are unlikely to see 450Mb/s anytime soon, according to Malik Saadi, practice director at ABI Research. In Europe, LTE penetration is still low, so mobile operators are more focused on migrating subscribers to regular LTE. The first to get 450Mb/s will instead be users in Asia, Saadi said.

Ericsson and Qualcomm are more upbeat, and think there is potential in North America and Europe as well. But the bulk of the deployments will use carrier aggregation at slower speeds, according to Peter Carson, senior director of marketing at Qualcomm. Speeds of 300Mb/s or even 375Mb/s are within reach of many more mobile operators, and that's still a big step for users.

The upgrade isn't just about high speeds when users are close to a base station. "The great thing about carrier aggregation is that it improves performance across the whole coverage area. That's one of the main reasons for using it," said Thomas Norén, vice president and head of product area Radio at Ericsson.



The ability to download data faster because of the higher speeds is also good for battery consumption and network congestion, according to Carson.

The network equipment and modems coming out this year will be able to mix and match LTE TDD (Time-Division Duplex) and LTE FDD (Frequency-Division Duplex), which gives mobile operators more flexibility. The former uses one channel for both uploads and downloads, with traffic alternating between the two directions, while the latter uses separate channels for download and upload traffic.

Operators will be able to use carrier aggregation to increase upload speeds to 100Mb/s, as well.

However, what the latest equipment can do and what mobile operators actually install are two completely different things.

Carrier aggregation hasn't set the world on fire yet. Out of 331 commercially launched LTE networks just 21 had been upgraded by the middle of September 2014, according to Alan Hadden, president at industry organisation GSA (Global mobile Suppliers Association). By the end of 2015 that number will be approaching 100 networks, he said.

A lack of smartphones compatible with carrier aggregation hasn't helped the technology's progress. That has slowly started to change with the launch of products such as Samsung's Galaxy Alpha and Note 4, and Huawei's Ascend Mate 7, which use two channels to get to 300Mb/s.

There have been some recent disappointments, though. The Moto X from Motorola doesn't support carrier aggregation and Apple's new iPhones use a version of carrier aggregation that tops out at 150Mb/s instead of 300Mb/s. They can combine two 10MHz channels, instead of two times 20MHz. The latter omission was especially surprising since Apple's smartphones can handle more bands than any competing product. That might not be an issue today, but for users that plan to keep their phone for at least two years it will be.

Looking at the chipsets that will power this year's smartphones, those disappointments will quickly become a thing of the past.

Qualcomm isn't just laying the groundwork for making carrier aggregation a standard feature on high-end smartphones. The Snapdragon 210 will make it possible to build more affordable smartphones with carrier aggregation, but users will have to make do with a maximum speed of 150Mb/s. The first products, allowing devices to combine two 10MHz channels, are expected to arrive during the first half of 2016.

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Apple Watch and Android Wear: same destination, different routes

The more we learn about the Apple Watch, the less it seems like a revolutionary departure from the existing wearables market – and Android Wear, in particular – writes Jared Newman

Whatever the hype about it being a transformational product, the Apple Watch has a lot of overlap with its precursor rivals such as Google's Android Wear platform.

That much became clear recently, when Apple released its design guidelines for third-party apps. Comparing the guidelines with those for Android Wear reveals two like-minded approaches: quick, contextual interactions are paired with data collection from sensors. The two companies even adopt similar language.

"A Watch app complements your iOS app; it does not replace it," states Apple, adding: "If you measure interactions with your iOS app in minutes, you can expect interactions with your Watch app to be measured in seconds. So interactions need to be brief and interfaces need to be simple."

In like vein, Google writes: "A classic wristwatch is designed to let you see the time in a split second and get on with what you were doing. Designing for Android Wear is no different. The less time it takes to use your software, the more time the user can be present in whatever they are doing. Android Wear is fast, sharp and immediate."

This isn't to say that Android Wear and the Apple Watch are exactly the same. Even if they're trying to arrive at the same place, they look like they're taking diverging paths along the way.

Glances and notifications

On a basic level, the Apple Watch and Android Wear are both driven by actionable notifications, such as the ability to delete an email or respond to a message straight from the watch, as well as information cards that you can quickly glance at. The primary difference appears to be in the way everything's laid out.

> **"The Apple Watch and Android Wear are both driven by actionable notifications and glanceable info. The difference lies in how it's all laid out"**

Android Wear's interface is like a big spinal cord, with glanceable cards, actionable notifications and even music playback controls mashed up into a single, vertical menu. Swiping to the right of any notification brings up potential actions, such as delete- and reply buttons for email. In some cases you can launch a proper watch app from its corresponding notification.

The Apple Watch takes a more tentacled approach. Instead of combining glances and notifications into a single column, the two are distinct entities. When you want a quick hit of simple information, such as a current share price or sports score, you swipe up to the Glances section, then swipe across to the info card you're looking for. Tapping on a Glance leads to its corresponding app if you want to do more.

Notifications on the Apple Watch are more fleeting than on Android Wear, popping up with only minimal information at first. If you tap the screen or keep your wrist raised, more information and possible actions appear. Otherwise, the notification disappears.

There are pros and cons to both approaches. Android Wear's single stack

of cards seems simpler to navigate, and it allows apps to push out glanceable information only when it's going to be helpful, such as when a sports score changes. On the other hand, Apple gives users more control over what they're looking at and more privacy for incoming notifications. Apple's interface also prevents users from having a big pileup of unaddressed notifications to wade through.

Both systems tackle the same overarching concepts in slightly different ways.

App approaches

The two platforms diverge even more dramatically in the way they let you launch deeper apps, such as to-do lists, music players and fitness trackers. The Apple Watch has a traditional home screen for this purpose, accessed by tapping the 'digital crown' on the right side of the watch.

Android Wear has an app launcher as well, but it is obfuscated by the design. To access it, you have to tap the screen from the main watch face, then swipe all the way down to the bottom of a list of options. It's possible to launch apps with a voice command, but Google's guidelines make clear that most apps should automatically jump into the notification stack, presenting themselves at just the right moment based on context signals such as time, location or physical activity.

Apps on Android Wear and the Apple Watch will also have a more fundamental difference, at least at launch. On the Apple Watch, third-party apps will require a paired smartphone to operate until Apple allows for fully native apps later in 2015. It's not clear which of Apple's own apps, if any, will be subject to these restrictions. By offloading computational tasks and storage to the phone, Apple Watch apps can run more smoothly and with less drain on battery life.

Android Wear apps can be loaded directly on the watch, and while most require a phone connection to be useful, the system already allows for the independent operation of basic utilities such as calculators and checklists, as well as offline music playback. Android Wear watches with GPS on-board can also keep track of your location, speed and distance travelled without a paired smartphone.

It seems likely that the differences in these approaches will become less pronounced over time. A future update for Android Wear is rumoured to make launching apps easier, while Apple Watch apps may not need to rely so much on a paired phone as Apple's hardware becomes faster and more efficient.

The **APPLE WATCH** interface takes a more tentacled approach than Android Wear's single menu

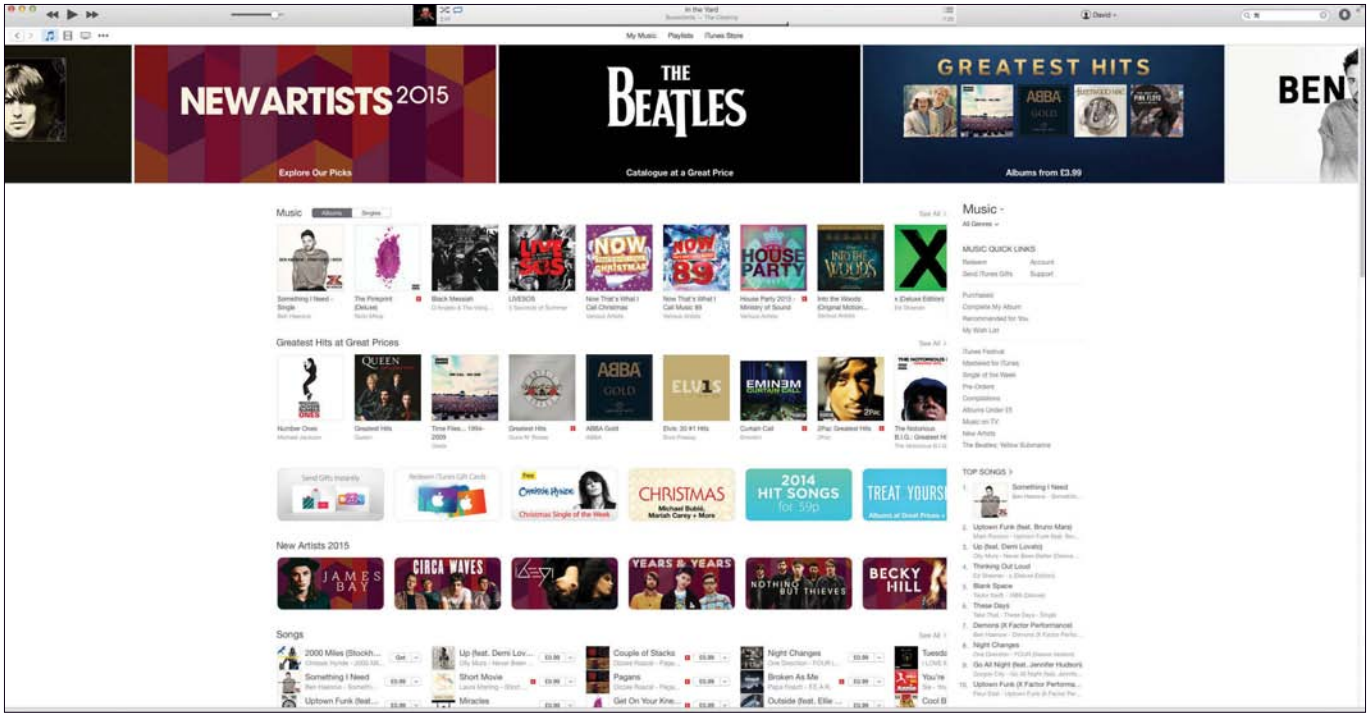
Hardware departures

Several other factors divide Android Wear and Apple Watch. The most obvious is the hardware, with Apple focusing on a single device (in two sizes) and Google working with hardware partners on a wide range of shapes, sizes and prices. By controlling the hardware, Apple is placing a bigger bet on new interaction models, such as the digital crown for non-touch controls and Force Touch for pressure-sensitive touch commands.

The Apple Watch also has the advantage in mobile payments through its support for Apple Pay, which is already gaining traction among iPhone users. Google has its own mobile wallet service, but hasn't announced Android Wear support, and no current watches have the necessary near-field communication (NFC) capabilities built-in.

Despite these differences, the Apple Watch and Android Wear don't seem fundamentally different. They both, in essence, try to save us the trouble of using our phones by delivering quick bursts of information, and acting as collectors of data (fitness data in particular) to help us live richer lives. In doing so, they ensure that the Apple-Google rivalry will be just as fierce on wearables as it has been on smartphones.

Apple is placing a bigger hardware bet on new interaction models, such as the **DIGITAL CROWN** for non-touch controls



We need to talk about iTunes

Has iTunes reached a crossroads, needing to decide definitively whether to retain its many features or to keep trimming back the clutter with a contextualised interface? Christopher Breen reports

The reaction to the appearance of iTunes 12 and its rejigged interface was entirely predictable. While some found the Mac OS X Yosemite-like look less cluttered and easier to navigate in the upgrade, others were confounded by the feature reshuffling and redesign. Each point of view has its merits, but few people would argue that iTunes is perfect. And that invites the question: if iTunes in its current form (not to mention its past several forms) is imperfect, then what can be done with it? This set me thinking.

So many features

A common rejoinder to complaints about iTunes is that the moaners can love it or leave it – if you don't care for it, go use a different media manager instead. But that's a rather short-sighted suggestion unless you think of iTunes only as a simple media jukebox. Sure, iTunes can wear that particular hat, but it handles far more tasks. Its capabilities include:

- Ripping and playing audio CDs
- Converting audio and video formats
- Obtaining, organising and playing media (music, movies, TV shows, music videos, podcasts, audiobooks, iTunes U content)
- Obtaining and organising iOS apps
- Organising and synching ringtones
- Creating and managing playlists
- Synching media to mobile devices
- Sharing media libraries
- Tagging media
- Streaming internet radio
- Streaming iTunes radio
- Offering a gateway to cloud-stored media
- Offering a gateway to the iTunes Store

At one time there were several third-party tools for handling some of these jobs, but nothing then or now can touch iTunes' management of all of them.

This is partly due to the proprietary nature of Apple's devices and some of the media obtained from its stores, as Apple isn't interested in letting others share in the fun. But it's also that Apple has, in this arena as in others, sucked the air out of the room. What developer in its right mind would attempt to create and sell a media manager with fewer features when iTunes can be had for free?

Where some see clutter, others applaud comprehensiveness. Power users want the majority of these features, yet these are the very people who often gripe the loudest as, with each new release of iTunes, their particular favourite obscure feature becomes harder to find or use.

The big rethink

And so we confront both rock and hard place. How does Apple move forward in a way that doesn't invite complaint? With iTunes 11, and even more so with iTunes 12, Apple has attempted to make working with your media a more contextual experience by simplifying the interface. In iTunes 11, for example, when you hide the sidebar, you choose particular kinds of media from a pop-up menu in the top-left corner. Just select the media type that you want and it appears in the pane below. You then navigate through that media by using one of a series of buttons centred in the toolbar.

With iTunes 12, Apple has taken the next logical step and largely done away with the sidebar altogether. If you now want to navigate through your media, you click on a media button in the toolbar – music, movies or TV shows, for example – and, as with iTunes 11, you then select something from the results below. Underlining the idea, when you navigate your way to the iTunes Store, clicking one of those buttons moves you to the associated section in the store, rather than back to your local media. Click the Music button while you're in the iTunes Store and you see what new albums and tracks are on offer that day. It's not difficult

to see why some people might find these dual-purpose buttons confusing.

But if this contextual approach isn't the entire answer, what might be? Let's consider the possibilities.

Tweak it

Filed under 'do the least damage', the tweaking approach acknowledges that Apple's on the right track with its contextual vision. The majority of iTunes users are simply interested in browsing their limited media libraries and having different media types clearly separated.

But tweaking also accepts that some of OS X Yosemite's interface elements are inappropriate for iTunes. Editable fields must be obviously so. Likewise, buttons. And an information window, which is mostly a place where only power users go, should better reflect the needs of those users.

And there might be a recognition that some attempts to declutter the interface have made iTunes more difficult to use than it once was. As I mentioned earlier, dual-purpose buttons can lead to confusion. And ungainly though a sidebar may appear to someone interested in a minimal interface, it's a pretty straightforward way to navigate a media library.

Strip it down

And then there's the 'well, if too many features are the problem' strategy. If iTunes has become unwieldy because of its many talents, why not simply remove some of them and create a few rich third-party opportunities? And by this I mean cut out the power user. To a greater or lesser extent, remove the features that the majority of people simply don't use. Such lesser visited features might include media tagging, CD ripping, app management, data synching, media conversion, iTunes Match and so on.

Alternatively, iTunes could be presented in two views or modes – normal and advanced. The more obscure features could be hidden from ordinary users and they could use iTunes to do little more than organise and play their media. Those who switch on the advanced mode, though, gain all those niche features and more.

Do the splits

And then there's the iOS approach: scatter the many functions of iTunes into a fistful of separate apps. Movies and TV shows could go into a videos app. Podcasts and iTunes U would get their own apps too. Your tracks and albums would be managed and played in an iOS-like music app, which would also provide access to the iTunes Match content. iBooks would take on audiobooks. And App Store and iTunes Store apps would earn their place in the Dock as well.

While longtime iTunes users may find such single-purpose apps more than they care to manage, there's something to be said for the simplicity of this approach under iOS. At least until you factor in practicality.

iTunes may have originated on the Mac, but the vast majority of users now experience iTunes on their Windows PCs. After all, our friends at the company's Californian HQ in Cupertino don't require you to show your Apple tattoo before allowing you to purchase one of their iPhones, iPads or an iPod touch. PC users' money is just as good as Mac users'.

> **"Does it make sense for Apple to invest in an app focused on media ownership when the future promises all the media, all the time, anywhere?"**

And so we must consider that were Apple to bust iTunes up into separate apps, its engineers would then have to tackle the job not only on the Mac, but within Windows as well. You may have noticed that Apple has its fingers in a lot of pies these days – operating systems, productivity apps, media apps, mobile phones, tablets, wearables, computers, financial services, home tech, car tech, desktop computers, laptops, music streaming, and so on.

In short, the people working at Apple have plenty on their plates. Given this, how anxious do you think Apple is to create a whole slew of apps for Windows users? And what engineering impropriety would one of the Apple team of 'geniuses' have to commit to earn an assignment to the team responsible for this drudgery?

While there may be Apple employees anxious to explore iTunes alternatives on the Mac, I have to believe that the notion of bringing parity to Windows users ruins this party in a hurry.

Wait it out

And finally, where I think we're really going with iTunes: a new media model.

If you're still buying popular music, you're one of a dying breed. Worldwide music sales from the iTunes Store dropped 13 percent in 2014. This isn't because of a lack of good music but rather because the population of music buyers is shrinking. Young people listen to much of their music via YouTube and streaming services. And older listeners are reluctant to give today's music a try.

Movie-watching habits are changing as well. Cinema attendance has fallen (although not nearly as precipitously as music sales have) and neighbourhood video stores disappeared years ago. Instead, people are increasingly watching movies and TV shows through streaming services such as Netflix, Hulu and Amazon Prime (as well as cable channels that have embraced à la carte viewing).

How much sense does it make for Apple to invest time, effort and a whole lot of money in an app that's focused on media ownership at a time when the future promises all the media you want, all of the time, anywhere at all? The company purchased Beats Music and routinely adds new Apple TV channels for a reason. And that reason isn't to convince you that media ownership is primed for a comeback.

Apple understands where all this leads. And ultimately, that determines iTunes' fate as an app that will remain largely as it is until such time that it's unneeded. ☒

Where critics ~~SEE CLUTTER~~ in the iTunes interface, its many fans applaud its feature-rich comprehensiveness

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The 3XS Performance GT is an affordably-priced gaming rig that includes a dual-core Intel Pentium G3258, which we overclock up to 4.4GHz for improved performance. Also included is a 2GB NVIDIA GeForce GTX 760 graphics card, 8GB of 2133MHz Corsair DDR3, a Z97 motherboard and 1TB hard disk.

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- 4GB NVIDIA GeForce GTX 970 SC ACX
- 1TB Seagate HDD
- Windows 8.1
- 3 Year Premium Warranty

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The 3XS Gamer 20i is a super-fast gaming PC thanks to its combination of quad-core Intel Core i7 4790 CPU running at 3.6GHz with added Hyper-Threading plus a 4GB NVIDIA GeForce GTX 970 graphics card. These components are installed in an Asus Z97-K motherboard along with a 1TB hard disk.

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- Intel® Core™ i5 4210M processor
- 8GB Corsair DDR3 1600MHz memory
- 2GB NVIDIA GeForce GTX 860M
- 15.6in 1,920 x 1,080 screen
- 1TB SATA 6Gb/sec hard drive
- Windows 8.1

£829 Inc VAT

The LG156 is 15.6" mid-range gaming laptop that includes a NVIDIA GeForce GTX 860M graphics card. The LG156 has won multiple awards in the press for its performance and value for money. The LG156 is ready for next-day delivery and has a 2 Year Warranty.

3XS Graphite LG1720 Gaming Laptop

- Intell® Core™ i7 4710HQ processor
- 8GB Corsair DDR3 1600MHz memory
- 3GB NVIDIA GeForce GTX 970M
- 17.3in 1,920 x 1,080 screen
- 1TB SATA 6Gb/sec hard drive
- Windows 8.1

£1154 Inc VAT

The LG1720 is a 17.3" high-end gaming laptop that includes a choice of powerful NVIDIA GeForce GTX 970M or 980M graphics card, ensuring silky smooth frame rates in all games. The LG1720 is ready for next-day delivery and has a 2 Year Warranty.

Scan Computers recommends Windows.

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Cambridge Audio G2 Limited Edition »

Speaker

London-based Cambridge Audio's new Limited Edition Audio G2 speaker comes with a stylish blue or red finish, adding to the black and champagne models already available. It has backlit, soft touch controls along the top of its aluminium body, too. The wireless Bluetooth speaker is compact and offers up to 10 hours of battery life for optimal portability. It can also be used to charge up your smartphone or tablet via USB.

£99 inc VAT
johnlewis.com

« Smart Power Elgato

External battery

Elgato's external battery not only charges up your smartphone or tablet, but also connects to your device via Bluetooth. It uses the PowerMinder app to monitor the battery pack to tell you how many times you'll be able to charge your device using the remaining juice and remind you when the Smart Power needs to be recharged. The device has a capacity of 6000mAh, and is available in black, silver or gold.

£79 inc VAT
elgato.com

ASHLEIGH ALLSOPP

« Smarter WiFi Kettle

Kettle

Hate waiting for the kettle to boil in the morning? Enter Smarter's WiFi connected kettle that you can control from anywhere in your house using your smartphone or tablet. It has a 'wake' mode that will sound a gentle alarm before asking "Good Morning! Would you like me to pop the kettle on?" There are tailored temperature settings for different types of hot drink, too.

£99 inc VAT
wifikettle.com

UE Boom »

Speaker

Small, portable and good-looking, the UE Boom is stain- and water-resistant, as well as shock-proof. It offers 360-degree audio thanks to its cylindrical shape, and the battery should last for an impressive 15 hours. There's a huge variety of designs of the UE Boom available, too.

£49 inc VAT
ultimateears.com

« Xqisit XQ BH100

Headphones

Xqisit's XQ on-ear headphones offer Bluetooth functionality to remove the risk of getting tangled up in cables. They're only available in a matt black design, but feature soft ear cushions for long periods of listening. The headphones should last for up to eight hours between charges via the USB cable, but there's also a 3.5mm headphone cable included for non-Bluetooth use.

£24 inc VAT
tesco.com

B&W P5 Series 2

Headphones

Bowers & Wilkins' P5 Series 2 headphones retain the same stylish design and high-quality build as the original P5s, but have been improved when it comes to sound quality through the use of a revised, Hifi-like drive unit that aims to let the listener forget the headphones and just feel the music. On the cable, you'll get volume controls and a microphone to making phone calls.

£249

bowers-wilkins.co.uk

Proporta Mohawk TurboCharger 8000

Battery pack

Perfect for busy people who don't always have time to recharge their iPhone before leaving the house, the Proporta Mohawk TurboCharger 8000 is compatible with the iPhone 4 and newer, and is capable of recharging the iPhone 5s five times and the iPhone 6 Plus 2.75 times. You can even charge two devices at once thanks to the dual USB ports. There's an LED display that lets you know how much power the TurboCharger has left.

£29 inc VAT

proporta.co.uk

« Libratone Loop

Bluetooth speaker

Libratone has given its Loop and Zipp speakers an upgrade, adding Bluetooth connectivity into the mix. The new Libratone Loop is a gorgeous, circular speaker that can be wall-mounted or free-standing. There are numerous different cover colours available too, which you can change to suit your interior design scheme. It's also compatible with NFC, PlayDirect and AirPlay.

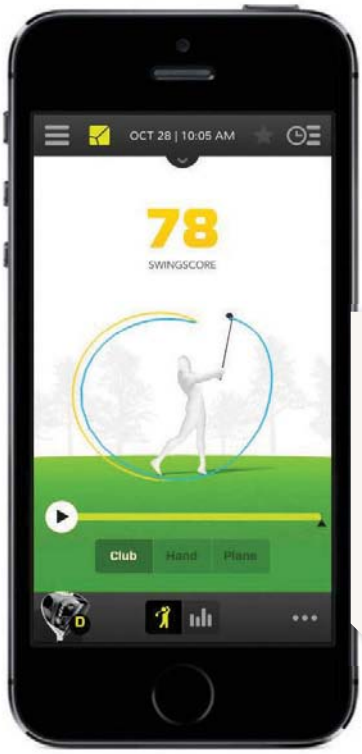
£349 inc VAT
libratone.com

X-Pop by Brand nu »

Bluetooth speakers

These tiny, portable Bluetooth speakers have been covered in awesome artwork by designer and illustrator Radim Malinic. You won't need to worry about the stunning design getting ruined, either, as the speakers are water, sand and oil resistant, so are very durable. They offer up to eight hours battery playback time, and have a built-in microphone for hands-free calls.

£39 inc VAT
wowzr.co.uk



« Zepp Multi Sport Sensor

Sensor

Sports-lovers will enjoy the new Zepp Multi Sport Sensor, which can sense a user's swing while playing golf or tennis. The sensor collects the swing data and provides feedback on your smartphone or tablet. You'll see a 3D analysis of your swing, as well as speed, angles and more to help you improve.

£129
argos.com

DESKTOP COMPUTER

Apple Mac mini (1.4GHz, 500GB, late 2014)

£399 inc VAT

Contact
■ apple.com/uk
Read more
■ tinyurl.com/kfafLj2

System requirements
1.4GHz dual-core Intel Core i5 (Turbo Boost up to 2.7GHz) with 3MB on-chip shared L3 cache; 500GB (5400rpm) hard drive, configurable to 1TB Fusion Drive; 4GB of 1600MHz LPDDR3 memory, configurable to 8- or 16GB; Intel HD Graphics 5000; 2x Thunderbolt; 4x USB 3.0; HDMI port; SDXC card slot; gigabit ethernet; audio in; headphone socket; IR receiver; 802.11a/g/b/n; Bluetooth 4; 36x197x197mm; 1.19kg

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

The 2012 Mac mini may have looked a little over-ripe in computer years but it also didn't need much to improve it. Its Ivy Bridge-generation Intel Core processor remained an efficient chip that helped secure the Mac mini as one of the most power-sipping PCs on the planet.

It came with 4GB of memory, which could be upgraded up to 16GB in seconds through a spin-off hatch on the underside. For storage it had plenty, either a 500- or 1000GB hard disk; or optionally could be configured with a 1TB Fusion Drive or 256GB flash drive.

The new Mac mini (late 2014) is built around exactly the same cool- and understated ingot of aluminium, milled from solid into a perfect round-cornered square of 21st century computing.

Grabbing attention in this revision is the price drop of the entry-level model, from 2012's £499 to a new low of £399. There are down sides, though. The Mac mini's performance peak has been eroded by striking any quad-core processors from the list; and system memory follows Apple's new trend of being soldered to the logic board and cannot therefore ever be upgraded at a later date.

Build different

The Mac mini (late 2014) has two rather than one Thunderbolt ports, these now up to version 2 specification. But in the process it has lost its FireWire 800 connector. If you need FireWire there is an adaptor available (£25), although we note from Apple Store customer feedback that this has its own issues with some peripherals that otherwise work fine with a native FireWire port.

The Wi-Fi card inside has been upgraded to 802.11ac, and with the help of the mini's three-antennae configuration is capable of wireless sync speeds up to 1300Mb/s (with real data throughput typically up to around half this speed).

Storage wars

For storage, the Mac mini still comes in 500- and 1000GB hard-disk configurations, with the same additional Fusion Drive and SSD-only options, the latter now up to 1TB Flash Drive for just the top 2.8GHz processor model.

Since the optical drive was stripped from the unibody chassis with the mid-2011 refresh, the Mac mini has had space for two 2.5in SATA drives inside. That's still the case, although there's just one SATA connector on the logic board now, since the Fusion or Flash Drive models now work with PCIe-attached solid-state drives.

That's great news for performance. Apple's PCIe-attached flash drives are close to twice as fast as those available to Windows PCs, which still rely on the SATA Revision 3 bus protocol. However even now, more than a year after Apple's PCIe-attachment technology was introduced with 2013's MacBook Air, there's still no third-party manufacturer able to make a drop-in replacement to upgrade capacity. So DIYers looking to make a dual-drive Mac mini out of a single-drive purchase will be out of luck.

When it comes to onboard data storage, the 500GB SATA disk should be more than adequate in capacity for many people, if conspicuously short of élan when it comes to system responsiveness compared to, say, the MacBook Air.

Updating the disk drive

You can still upgrade the disk drive yourself, or find a competent technician to do the job – once you get past Apple's tamper proof screws on the underside.

The black plastic 'lid' still comes off easily enough, but behind that, instead of the inviting innards of yore, there's now an edge-to-edge circular steel bulkhead in place, sealed down with Torx T6T security screws. Get passed these and you'll be able to swap the internal disk for something much faster, such as a SATA Revision 3 SSD from the likes of Kingston, Crucial or Samsung.

Soldered memory is perhaps the cause of most anguish among users with recent Mac models, since it means you're expected to anticipate the amount of memory you'll need for the lifetime of the product at the time of purchase; and moreover because you have to pay Apple's inflated prices for SDRAM.

Take the entry-level £399 Mac mini we tested here. This is built with 4GB of memory, and to double that to 8GB will cost you £80 from Apple.

For the previous generation, an 8GB upgrade kit is available from Crucial, currently selling for £61. So the going third-party route saves you just £19 here.

The difference becomes more troubling at the next size jump. To make a 16GB Mac mini, Apple charges £240 on top of the standard 4GB model's price. Turning to the Crucial UK website, it charges £123.59 for its 2x 8GB memory kit of DDR3 PC3-12800 RAM. And this is where Apple gets the bad press, for its near-100 percent markup on other retailers' prices.

If you elect for the middle Mac mini model (2.6GHz, £599) or top

(2.8GHz, £799), you'll already find 8GB memory soldered in place. To configure either of these with 16GB costs an extra £160 at time of purchase. For the previous generation, to upgrade to 16GB still costs £123.59 even if you had 8GB already installed with the typical 2 x 4GB arrangement, so the Apple markup over the independent memory-seller alternatives is reduced to around £36 here.

Lab results

There's now a very wide range of processor clock speeds offered for the Mac mini, from the cheapest model's 1.4GHz Core i5 to a CTO model with 3GHz Core i7.

We tested the entry-level model with its MacBook Air-style 1.4GHz dual-core processor. We don't have performance results for the entry model of 2012 with its dual-core 2.5GHz Intel Core i5 chip and Intel HD Graphics 4000 graphics. But we did find that the new Mac mini's processor and graphics performance was unsurprisingly close to that of the current MacBook Air range, which uses the same Intel chip.

In fact, the entry-level 2014 Mac mini has much more in common with the entry-level 2014 iMac, since they share the same Intel chip and slow 2.5in notebook hard disk.

The Geekbench 3 processor/memory test rated this Mac mini with 2803 and 5401 points, for single- and multi-core speed respectively. When we tested the 21.5in iMac earlier this year, it scored 2838 and 5464 points respectively. The circa-one percent difference in results is insignificant and as easily explained by the wholly new OS X revision of 10.10 on the Mac mini against 10.9 on the iMac.

For comparison, the 'middle' model Mac mini of 2012 had a 2.3GHz quad-core i5 processor, and scored 2966 points in single-core tests (a little bit faster, just under 6 percent for the statisticians). And in multi-core mode it scored 11752 points, which can be written as 218 percent faster.

How much the top-spec Mac mini of 2014 may trail the top-spec Mac mini of 2012 remains to be seen.

In the Cinebench tests we also saw the same kind of performance figures as the iMac (mid-2014, 21.5in). Version 11.5 of the CPU test ranked the Mac mini with 1.1 and 2.49 points (versus 1.13 and 2.58 for the iMac). Version 15 scored the Mac mini with 97 and 236 points (98 and 240 points iMac).

Graphics and gaming

Graphics tests also showed the same kind of performance as the entry-level iMac, with both machines relying solely on Intel HD Graphics 5000 within the Core i5 processor. Cinebench played at 22- and 23.1fps for versions 11.5 and 15 of Cinebench, with the latter result around 1.5fps faster than the iMac – which again could be explained by revisions in the core operating system.

Gaming, we found, is not really viable for the Mac mini unless you play older games and/or turn down video quality to very low settings.

Feral's Batman: Arkham City, for example, averaged 31fps when set to 1280x720 pixels and Medium quality.

Tomb Raider 2013 uses the latest OpenGL 4.1 API, which seems to require more horsepower to run smoothly, in this game. At 1280x720 screen resolution and Low detail settings, the mini mustered 19.4fps. Stepping up to Normal quality lowered framerate further to 15.8fps.

We switched the game to Legacy OpenGL mode, where it then returned framerates of 34.5- and 24.4fps for otherwise exactly the same configuration. With no obvious difference in rendering quality to our eyes, this tweak makes the game a more viable option on this Mac.

Power consumption figures have been reduced, as you may expect from not just a slower processor clock, but a change from Ivy Bridge to Haswell generation silicon. This change introduced Intel's later FinFET '3D' transistors, along with numerous other power-efficiency adjustments to improve battery economy in the laptop and mobile computing age.

The last time we measured a Mac mini, it was drawing just 10W of power from the mains when at the idle desktop. Today's most affordable Mac mini was found to have just 5W requirements, rising to a maximum of 40W when running flat out. That figure of 5W is startlingly low, another important tick in the mini's pros list.

Verdict

The entry-level Mac mini at £399 is in effect the most affordable Macintosh ever sold in the computer line's 30-year history. Yes, the PowerPC G4 version of 2005 started at just £329 in this country, but adjusted for inflation that's closer to £429 in today's money. What you get today is a decently fast mini desktop PC using an older hard disk for storage but which is in every other way right up to date; bleeding edge in fact when you consider just how far ahead of the vast majority of Windows wannabees are its wireless and Thunderbolt credentials.

For the cheapest model our one complaint is the lifetime memory sentence. This means a bump to 8GB for £80 on pay day is almost mandatory, if you want to future-proof the little marvel for several years to come. Storage, for today at least, can still be upgraded with care. ☒ **Andrew Harrison**

SMARTPHONE

Google Nexus 6

£499 inc VAT

Contact
■ google.co.uk
Read more
■ tinyurl.com/npxkcrr

System requirements
Qualcomm Snapdragon 805 quad-core processor at up to 2.7GHz; 32/64GB storage; 3GB RAM; Android Lollipop 5.0; 13Mp main camera with optical stabilisation, dual-LED flash, support for 4K video at 30fps; 2Mp secondary camera; 2560x1440 pixels, 5.96in Quad HD AMOLED, capacitive touchscreen; 802.11ac Wi-Fi with 2x2 MIMO; Bluetooth 4.1; GPS; NFC; wireless charging; 82x159x10.4mm; 183g

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

As with all its predecessors, Google has teamed up with a partner to produce the Nexus 6 – this time around its Motorola. Previous Nexus devices have offered outstanding value for money, undercutting rivals with similar hardware by a large amount. Google may even have been making a loss on those sales to entice more people to Android. For whatever reason things are different now and the Nexus 6 is a big jump in price compared to its predecessors.

The Nexus 4 (tinyurl.com/d7htpfj) launched at the bargain basement £239 (for the time) and the Nexus 5 (tinyurl.com/mmaw8cs) was still an affordable £299. This time around you'll need much deeper (and bigger) pockets as the Nexus 6 starts at £499. This puts it in the same ballpark as flagship devices from the likes of Sony, Apple, Samsung and HTC. For £499, you get the entry-level 32GB model, but if you want to double the storage to 64GB you're looking at £549.

The 6in screen and higher price means it isn't simply the Nexus 5's successor, and isn't an obvious upgrade for existing owners. It means that it can name the iPhone 6 Plus (tinyurl.com/o9rx9un) and Samsung Galaxy Note 4 (tinyurl.com/mrvcqkg) among its direct rivals. Both smartphones are more expensive starting at £619 and £599 respectively making the Nexus 6 look good value.

In terms of design, the Nexus 6 is a super-sized Moto X (tinyurl.com/qcazrav) with a slightly less fancy Motorola logo and the addition of the Nexus brand stamped on the back. It would, however, have been nice to see at least some differences in terms of style and identity.

This is one of the bulkiest phones around, and we recommend that you try one in the hand when deciding whether it's right for you. It's a chunky 10.4mm thick, although that is the absolute thickest point. The curved rear, just as with the Moto X, feels good in the hand and tapers to 6.2mm at the edges. We thought the Note 4 was heavy but the Nexus 6 is even weightier at 183g.

Again, it's important to try one out since if you have small hands, you may find it unwieldy. If you opt for the Nexus 6, be prepared to use it two-handed most of the time.

Moving away from the black and white of previous Nexus smartphones, the Nexus 6 is available in midnight blue and cloud white. .

Build quality is a step up from the Nexus 5 with a precision-machined aluminium frame running round the edge – just like the Moto X. It doesn't meet the Gorilla Glass 3 front, but sits flush with the plastic band which separates the two.

That plastic rear cover feels nice, although it isn't as grippy as the Nexus 5. The logo sits in a dimple providing a nice place for your index finger to rest – although it's easy confuse it with the camera lens. Both physical buttons sit on the right side and the power button has a textured surface that's similar to a metal file (but not as harsh). Cleverly, the front-facing speakers have plastic strips that stick out, so there is a gap between the screen and the surface if the phone is placed face-down.

Hardware and performance

What's impressive is that the Nexus 6 manages to cram in a 6in screen (5.96in to be precise) while being barely larger than the 5.5in iPhone 6 Plus. Google and Motorola have also matched its Android phablet rivals with a Quad HD screen meaning a whopping pixel density of 1440x2560. The pixel density is a little lower because of the screen size at 493ppi but at this end of scale it really makes no difference.

The AMOLED screen is gorgeous offering amazing viewing angles, vivid colours and decent brightness. This is a top-quality display but the big problem is the size. Attempting a text message using the swipe feature of the built-in keyboard is nigh-on impossible one-handed.

The premium theme continues with a Qualcomm Snapdragon 805 SoC – that's quad-core 2.7GHz Krait 450 with an Adreno 420 GPU. There's also a generous 3GB of RAM and although the 805 is not 64-bit – an odd decision since Android Lollipop now supports it – we weren't surprised to find the device out-pacing rivals. (See the table opposite for our results.)

It's no real surprise to see the Nexus 6 virtually identical to the Note 4, which also has a Snapdragon 805, while the iPhone 6 Plus wins on graphics because it uses a lower Full HD resolution.

Benchmarks aside, the Nexus 6 is a slick performer from a real-world user perspective. It's lightning fast almost all the time – only the camera app is a little slow to open but that's the same on any smartphone.

As we mentioned earlier, the Nexus 6 is available in 32- or 64GB options. This is double that of the Nexus 5 and means it comes with more storage than the entry-level 16GB iPhone 6 Plus.

When it comes to wireless, the Nexus 6 packs 802.11ac Wi-Fi (with 2x2 MIMO), Bluetooth 4.1, GPS, NFC and Cat 6 4G LTE. It also has various sensors including a barometer and magnetometer.

Compared to some phones, the Nexus 6 might seem a little lacking with no IR blaster, fingerprint scanner, heart-rate monitor or other gadgetry but Google has

	APPLE iPHONE 6 PLUS	GOOGLE NEXUS 6	SAMSUNG GALAXY NOTE 4
Geekbench 3	2917	3304	3272
GFXBench T-Rex	41fps	27fps	27fps
GFXBench Manhattan	19fps	12fps	11fps
SunSpider	369ms	791ms	1367ms

included wireless charging, which is still a rare feature. Whether that's a better option for you compared to the others depends on how you use your phone.

The Nexus 6 charges faster than most phones thanks to the included Turbo Charger. Google says you can get up to six additional hours of battery life from a 15-minute charge. In general, it will take about 45 minutes to charge the device to 50 percent, which is good considering its large 3220mAh capacity. It's worth noting that the battery is non-removable.

Wireless charging and the Turbo Charger are good features and will help you keep the Nexus 6 topped up with juice. You'll want to make use of them too, as a full day of usage without a quick refill will eat up about two thirds of the capacity or more. It may last longer than a day if you avoid any video playback or gaming but is unlikely to last two.

Unfortunately, the battery-saver mode is buried deep in the settings menu. We're used to seeing 'Ultra Battery Saving' modes, so Google hasn't done enough here for us.

When it comes to photography, Nexus phones have always lagged behind the competition. Google has tried to address this with a 13Mp rear-facing camera, which is a step up from the Nexus 5's 8Mp offering in more than just resolution.

That's because the camera benefits from optical image stabilisation (something sorely missing from the Moto X), a dual-LED ring flash and the ability to record 4K video at 30fps. There's also HDR+, which combines multiple images for a better result but takes them all at the same exposure rather than different value (so it's pseudo-HDR, rather than the real thing). This is available on the Nexus 5, though.

Like most phones, the Nexus 6 crops in on the image if you want photos with a 16:9 aspect ratio, meaning you get 9.7Mp instead of the full 13Mp when you switch to 4:3. Image quality is a big step up from the Nexus 5 with OIS making a noticeable difference particularly in video recording and low light.

Modes on offer include the usual Photo Sphere, Panorama and a new one called Lens Blur which offers touch to refocus. It's a little gimmicky and takes an age to process and render but works well.

At the front is a decent, but not outstanding 2.1Mp camera that can record Full HD video.

Software

The Nexus 6 is one of the two launch devices for Android 5.0 Lollipop, the latest version of Google's mobile operating system. Having 'vanilla' Android has always been a selling point of the Nexus range, offering the interface as Google intends without the extra stuff which manufacturers slap on top.

Lollipop's Material Design looks great on the AMOLED Quad HD screen of the Nexus 6, but the size of the screen makes it difficult to use. For some strange reason, the device doesn't support the double-tap-to-wake feature that's found on the Nexus 9 but does show you the time when you pick it up – which you can then tap to access the lockscreen.

Lollipop is great but not flawless and the change to show multiple cards in recent apps (now called overview) for apps such as Chrome and Gmail can get annoying. Quick settings is still available with a two-finger swipe from the top and has auto-rotate and flashlight options but we'd like to be able to customise what's shown here.

Although Google made the switch to Hangouts for SMS messages, there's a new app preinstalled on the Nexus 6 called Messenger. Hangouts is still present so you can choose which you prefer or install a third party alternative.

Verdict

There are some good things about the Nexus 6 including build quality and some top-end hardware. However, it's too big and pricey to warrant awarding it anything more than four stars. ☒ **Chris Martin**

TABLET

Sony Xperia Z3 Tablet Compact

£330 inc VAT

Contact
■ sony.co.uk
Read more
■ tinyurl.com/nj6vheo

System requirements
Android OS 4.4.4 (KitKat), 8in capacitive touchscreen, 1920x1200 pixels, 283ppi, Qualcomm Snapdragon 801 quad-core 2.5GHz processor, microSD up to 128GB, 16/32GB internal storage, 3GB RAM, GPRS, 802.11 a/b/g/n/ac, dual-band Wi-Fi, DLNA, Bluetooth 4.0 LE with A2DP and aptX, A-GPS, Micro-USB v2.0 (MHL 3), stereo speakers, 3.5mm jack, 8Mp, 3264x2448 pixels, 1080p video, 2.2Mp front camera, non-removable Li-Po 4500mAh battery, IP68 rating, 123x213x6.4mm, 270g

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

It may be a bit of a mouthful and what the Xperia Z Ultra (tinyurl.com/puttzq9) should have been when it launched, but Sony has finally delivered a smaller non-10in tablet. The size is the main design element here. Sony fans can now choose 8- or 10in and this is one seriously thin-and-light 8in tablet. We were impressed by the new Samsung Galaxy Tab S 8.4 (tinyurl.com/qfq7ha5), which is 6.6mm and 294g, but Sony has trumped this at 6.4mm and 270g. It's mainly bragging rights between the two, but Sony has still done a great job here.

It's almost like holding a phone the device is so slender – the one-handed grip is a breeze. The stainless steel frame looks great and we like the rounded curves of the cover. It will be available in black or white only.

The device doesn't have a glass rear cover like its smartphone counterpart, but is still dust and waterproof. Its soft-touch plastic rear cover matches that of the Xperia Z2 Tablet (tinyurl.com/m8bzzun). It may not look as impressive as glass but gives a much better grip. Waterproofing means slightly fiddly flaps (apart from the headphone jack) but they do hide everything neatly away.

Its IP68 rating is something you typically won't find on other tablets and may be a big advantage – there's nothing stopping you watching BBC iPlayer in the bath or taking underwater photos of sea life while you're snorkelling. Like Sony's Z3 smartphones, it has nylon corners in case of drops.

Sony has opted for a Full HD (1920x1200) resolution instead of anything higher but the 8in screen looks nicely crisp and has the advantage of Sony's TV-like Triluminos with live colour LED.

The screen offers decent viewing angles and it's a good tablet for switching between portrait and landscape depending on what you're doing. It's also great to see front-facing stereo speakers although they do distort badly when the volume is at the upper end.

Inside is a Qualcomm Snapdragon 801 quad-core processor clocked at 2.5GHz. Alongside this is 3GB of RAM and we can report smooth performance during our time with the tablet. The Z3 Tablet Compact benchmarked very similar results to the Galaxy Tab S, winning mainly on graphics due to its lower resolution.

Despite clocking the processor higher, Sony touts an impressive 15 hours video playback from the 4500mAh battery.

There are 16GB and 32GB models (11GB and 26GB available respectively after firmware) but the microSD card slot can add up to 128GB. There's an optional LTE model if you want 4G data while out and about via a nano-SIM card. Wireless includes 11ac Wi-Fi, NFC and Bluetooth 4.0 LE but no IR Blaster for taking control of devices like TVs. There's no wireless charging but a dock connector for a compatible accessory – Sony's Magnetic Charging Dock DK39 costs £39.

A new feature in the Xperia Z3 range is support for High-Res audio (including DSD files). If you don't own such files, Sony's DSEE HX technology promises to upscale content to near High-Res quality.

If you're into tablet photography, the Xperia Z3 has a pretty decent 8.1Mp rear-facing camera with an Exmor RS sensor – about par with the Galaxy Tab S 8.4. The high-quality 2.2Mp front camera is arguably more useful for video calls.

You can play around with plenty of camera apps like Sound Photo, AR fun, Face in, Multi camera and more. Using the Superior auto mode will mean 6Mp 16:9 photos and Full HD video, so if you want the full 8Mp (at 4:3), switch to manual mode.

Sony hasn't done much in the way of software but the Z3 does come with the latest Android OS, 4.4.4 KitKat – an upgrade to Lollipop will come in due course. The user interface is like previous Xperia devices. It's close to stock Android but with Sony styling and apps such as Walkman. The icons are bigger and you can double-tap to switch the screen on, which is a boon.

However, the key new feature that will set gamers' hearts racing is that it comes with PS4 Remote Play, so owners of Sony's next-generation console can play fully fledged games on the device with a DualShock 4 controller over the same Wi-Fi network. You can buy a mount that clips on to the controller.

Verdict

It's great to see Sony finally make a smaller tablet and the 8in size is increasingly popular. The Xperia Z3 Tablet Compact is super-thin and light, and waterproof, too. Hardware is decent but not mind-blowing, and while rivals like the Galaxy Tab S offer a bit more gadgetry, Sony offers High-Res audio and a killer feature for gamers in the form of PS4 Remote Play. It's a great effort from Sony if you're looking for a high-end 8in tablet. ☒ **Chris Martin**

E-READER

Amazon Kindle Voyage

£169 inc VAT

Contact
■ amazon.co.uk
Read more
■ tinyurl.com/nxaau3q

System requirements
1440x1080 touchscreen, 300ppi, 4GB RAM, 802.11n Wi-Fi, 3G optional, microUSB for charging, 162x115x7.6mm, 188g

Ease of use: ★★★★½
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★½☆
★★★★☆

Over the years, e-reader prices have dropped hugely and you can now buy the seventh-generation Kindle, which has a touchscreen, for £59; some rivals cost even less, even for a backlit model. Back in 2012, for example, Amazon released its first lit-screen Kindle, the Paperwhite; it cost the same, £109, as the model it replaced, the Kindle Touch. Given that technology generally drops in price, launching an e-reader for £169 is a very bold move indeed.

The Kindle Voyage is a high-end e-reader for serious bookworms. It looks especially expensive next to Amazon's own range of Fire tablets, which includes several models cheaper than the Voyage, so what's the fuss about?

Screen

The Voyage has the highest-resolution display of any Kindle e-reader. Cramming 1440x1080 pixels into the same-as-ever 6in size results in a pixel density of 300ppi. Those, though, are just numbers: what does the screen actually look like? Well, text is laser-sharp with none of the jaggedness you'll get for £59. It's noticeably sharper than the 1024x768 display of the Kindle Paperwhite.

Make no mistake, the tablet-like, edge-to-edge glass is a game-changer for e-readers. No longer the thick, raised bezels of previous Kindles. The Voyage feels like you're holding a supremely lightweight – albeit monochrome – tablet.

As Amazon points out, the micro-etched glass cuts down on glare hugely. It's a little more reflective than a traditional E Ink screen, but not by much.

The backlight is simply brilliant. It's even and has enough adjustment so you can get the perfect level whether you're indoors or outdoors. It even has an ambient light sensor so can set the backlight automatically – a particular bugbear on the Paperwhite.

There's another cunning feature, too: Night Light. This slowly reduces brightness when it gets dark, working in tandem with the auto brightness feature. Brightness changes so subtly you don't notice it and that's exactly what you want when you're engrossed in the latest novel.

PagePress

Another of the Voyage's unique features is touch-sensitive buttons either side of the screen. These replace the old page-turn buttons which have been missing from Kindles for a couple of years now.

They make it possible to go to the next or previous page when you're holding the Voyage in one hand. You press the long line to go forwards and the dot to go back. You can set the sensitivity of the buttons as well as the level of touch feedback, which lets you know you've pressed one.

Happily, you can set the feedback to a very small amount so it's barely felt. It's yet another way to keep your attention focused on what you're reading.

The side bezels are quite thin and it's possible to accidentally press on the screen itself with your thumb and make the page turn. You can turn off PagePress, but not the tapping or swiping on the screen to turn pages.

Performance and hardware

When you put the Voyage side by side with a first-generation Kindle Paperwhite, it's easy to see that screen quality is a big step up. The backlight is much whiter and brighter at the same setting.

The processor also makes a big difference, with super-fast page turns and almost tablet-like responsiveness when navigating menus and typing on the virtual keyboard.

We tested the Wi-Fi model, but if you fork out £229, you'll get free-for-life 3G as well, so wherever there's connectivity you can spend more money in the Kindle bookstore.

Measuring 162x115x7.6mm, the Voyage is a touch smaller than other 6in Kindles, and also marginally lighter at 188g. The 4GB of memory will store thousands of books.

We've not yet had time to run out the Voyage's battery but Amazon claims it will last up to six weeks if you read for 30 minutes a day, turn the Wi-Fi off and set the backlight to level 10 (barely noticeable in daylight, but enough to read in pitch black).

Verdict

The Kindle Voyage is without a doubt one of the best e-readers money can buy. But while the extra resolution, sleek design and page-turn buttons are all nice-to-haves they're not essentials. You'll get a better reading experience on a Voyage than the current-generation Paperwhite, but only just. But if money is no object, you won't be disappointed.

☒ Jim Martin

E-READER

Kobo Aura H20

£140 inc VAT

Contact
■ kobobooks.com
Read more
■ tinyurl.com/mjvr4m9

System requirements
6.8in, 1430x1080 pixels, 265dpi, 1GHz ARM processor, 4GB flash storage, micro SDHC card slot (32GB max), 802.11 b/g/n, Micro-USB port, 179x129x9.7mm, 233g

Build:
Features:
Performance:
Value:

It's what you've been waiting for: a book you can read underwater. Okay, maybe you haven't, but the Aura H2O is the first waterproof e-reader that will shrug off sand and sea, and won't care if you drop it while reading in the bath.

Aside from its water- and dust resistance, the Aura H2O is notable for its 6.8in screen. It's largely the same as the one found on the Aura HD (tinyurl.com/pgmjobr) and feels quite a bit bigger than all the 6in e-readers. It has the same 1430x1080 resolution as the Aura HD – and the Amazon Voyage (page 35) – so the text is nice and sharp, although from a normal reading distance the difference between this resolution and a non-HD e-reader isn't as marked as you might expect.

The bigger dimensions mean you have to pinch it between your thumb and fingers as it's a bit of a stretch to rest it on your palm with thumb on one side and fingers on the other.

The touchscreen handles all interactions, so there are no page-turn buttons, just a power button on the top edge. Hidden behind a waterproof flap at the bottom are a Micro-USB port, a microSD card slot and a reset pinhole. The microSD slot means you can copy PDFs and other documents onto a card and pop it into the Aura H2O.

There's support for a wide range of file types including ePub, .drm, PDF, Mobi, .rtf, .html, .txt and .cbz and .cbr comic-book formats. The only obvious omission is .doc, but it's easy to convert Word files to RTF.

If you've used a touchscreen e-reader, you won't have any difficulty getting to grips with the H2O. You tap on the right to advance a page, on the left to go back, and at the top or bottom to display the menu bars.

You can change the font, size, line spacing and margins to make pages appear exactly how you like, and even choose the justification. You can select passages in a book, highlight them, add notes or share them on Facebook. You can also search for those words or phrases on Google or Wikipedia.

Tap the graph icon and you'll get stats such as progress through the current chapter, time left before you get to the next chapter, and a fun graph of the length of all the chapters in the book, plus an estimate of how long it will take to finish the book.

The latest software update includes a new page-turn option that makes it easier to go forward and back if you're holding the H2O one-handed. A search bar on the home screen lets you find books in your library, or search the Kobo store. The store has a wide selection and prices are similar to Amazon's.

The home screen is similar to Windows 8's interface and changes all the time. The book you're reading is shown prominently, but there are other sections for recommendations based on what you're reading.

You can arrange your book library however you like, including sorting into collections. This could be useful if you have a lot of books and want to view them by author, genre or topic. You just enter a name for the collection and select which books should be in it. And an awards section that is accessible from the home screen gamifies the reading experience: you earn badges for reading more.

The Aura H2O is talented but not perfect. There's no auto brightness, for example. However, our biggest complaint is the lack of processing power. Compared with even the £59 seventh-generation Amazon Kindle, the Kobo feels sluggish.

Menus take longer to display and controls such as the brightness slider aren't always responsive. You're left wondering if you're tapping or swiping in the right place, not pressing hard enough, or if the screen simply isn't that responsive to touch.

The screen is also slow to update – page-turns take noticeably longer than on the Voyage, for example – and because it doesn't completely refresh on every page-turn there's a faint 'ghost' image of the previous screen visible until it does refresh. Text and menu bars (if you've used the menus) appear a little like the show-through of text and images on the other side of a newspaper or magazine page. Finally, the backlight isn't as even as we'd like. It's not bad, but the bottom edge is a little darker than the rest of the screen.

Verdict

Unless you need an e-reader that's waterproof and has an SD slot, you're much better off going for a Kindle Paperwhite, which is cheaper and more responsive. **Jim Martin**

SMARTWATCH

Samsung Gear Live

£169 inc VAT

Contact
■ samsung.com/uk
Read more
■ tinyurl.com/pqecdwc

System requirements
1.63in Super AmoLED 320x320 display, IP67-certified dust and water-resistant, accelerometer, gyroscope, heart rate sensor, 512MB RAM and 4GB of non-user-replaceable internal storage, 1.2GHz Qualcomm Snapdragon 400, Bluetooth 4.0 LE, requires Android 4.3 or later smartphone, 59g, Android Wear, 300mAh battery

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

The most important aspect of any wearable is just how wearable it is. In my view the Samsung Gear Live is perfectly comfortable, if very masculine-looking. It's chunky, but very clean and simple to look at. A wide and curvaceous silver bezel wrapped around a square display that is black when not in use. It is solid, and feels robust though it weighed in at 59g, and even for a smartwatch that is light.

What would be a watch's bezel is replaced by a discreet power/home button on the right of the display. This is neatly tucked away flush with the body of the watch. Easy to find, but not visually- or physically irritating, nor indeed really necessary given you can wake the watch with a flick of the display. Next to the power button is the microphone where you can say "Okay, Google," and be just like the idiots in the adverts. Or like *Star Trek*. Your choice may well dictate whether or not you like the Gear Live.

Around the back of the watch face neither the charger nor the heartrate monitor will cause any physical discomfort. And I like the way you can easily swap out the thick black plastic watch straps.

Samsung offers little beyond the relatively dull black (or purple) plastic/silver clasp combo supplied. But you can, in principle, use any 22mm watch strap. That's just as well – whenever I went out running with the Gear Live on, the clasp came undone. It was beyond annoying.

The square watch face has a 1.63in Super AmoLED display with a 320x320 resolution. That gives an extremely good pixel density of 278ppi. It's bright, vivid, detailed.

You get 512MB of RAM and 4GB of non-user-replaceable internal storage. And the processor is a Qualcomm Snapdragon 400 running at 1.2GHz. I was pleasantly surprised with how zippy Android Wear was on this little beast. The Gear Live lacks nothing in terms of performance, if our user tests are anything to go by.

Sensors include the heart rate monitor tucked around the back, a gyro, a compass and an accelerometer.

It pairs via Bluetooth 4.0. Pairing is a simple affair: you install Android Wear on your smartphone and it guides you through the process. The Samsung Gear Live is compatible with smartphones – not tablets – running Android 4.3 or later.

So what is the Gear Live for? Its principal benefit is the way it extends your smartphone. It shows alerts from apps installed on your Android smartphone, alerting you to incoming messages, news events and diary items.

It's also a full-featured activity tracker. Water and dust proof, it tracks your activity and monitors your health, prompting you to do more. It's also a portable Google device: you're encouraged to "Okay, Google" as you go, and once you get over the awkwardness it is kind of fun to be able to ask the big G semantic questions.

There are Android Wear apps to install, although the value really lies in extending apps on your smartphone. Google Maps is fun and useful on your wrist. The Android Wear software itself is colourful. As with Google Now and Google Glass, it is Android made simple. As such it's reasonably intuitive although it is occasionally irritating to have to think before swiping upwards or sideways. Through gritted teeth I have to admit that the voice activation is actually really good.

Other features are almost great but occasionally annoying. The contextually aware intelligent personal assistant attempts to understand your movements and relationships so as to volunteer information as you need it. This is useful in that you always have a weather forecast to hand, and I can't blame it for not knowing I was hiding from the 49ers score so I could watch the game as live. I'm impressed it knew I cared.

I used the Gear Live for only a week or so. In that time it gleaned an impressive amount of information about me and my movements, and then used it to present me with contextually aware info.

It was at this point that I really fell out with it. The benefits of a smartwatch over a dumbwatch will cost you in terms of having to charge it every day or so, but I needed to charge the Gear Live every single day. Every. Single. Day. Even when I consciously cut down on using it, it still needed a recharge at the end of the day.

The 300mAh battery is simply too small. I eked out a little more battery life by dimming the display, but then found it difficult to read text off the watch under even strip lighting. Which negates the whole point of a smartwatch.

And charging is in itself a bit of a faff. Not for the Gear Live the acceptable compromise of popping your smartwatch onto a stylish, bedside wireless charging cradle. It comes with an ugly and clunky thin plastic claw that wraps around the watch and charges via a spindly USB charger. Now that may not be important, but battery life is. And that poor battery life would prevent me shelling out for the Gear Live.

Verdict

I don't want to be hard on the Gear Live because it is a decent smartwatch at a reasonable price. It's well built and comfortable, although I could live with a better watch strap. But, ultimately, I wouldn't buy it. I'm just not sure it offers me much over a normal watch, and I can't be bothered nursing the battery life of yet another device for relatively low returns. ☒ **Matt Egan**

ACTIVITY TRACKER

Jawbone Up Move

£40 inc VAT

Contact
■ jawbone.com
Read more
■ tinyurl.com/L3davz6

System requirements
Bluetooth 4.0 BLE, tri-axis accelerometer, non-rechargeable CR2032 Lithium Coin 3V 225mAh battery, 28x28x10mm, 6.8g (tracker only)

Build:
Features:
Performance:
Value:

While Fitbit's Zip (tinyurl.com/nhjrr4h) is still a fine activity tracker for anyone wanting to track their steps over a period of time, Jawbone's Up Move adds sleep tracking and an optional wristband. It does, as a colleague pointed out, look as if it came out of a Christmas cracker but it's a clever gadget.

Jawbone has listened to feedback and although it has stopped short of a proper LCD or OLED display, the Up Move can double as a clock thanks to its 12 LEDs. Press the face twice and a LED will blink to show the hour, and then a second will light up to indicate the five-minute period in which the exact time lies. That's good enough when you haven't got a smartphone or a proper watch.

You press the face just once to check the mode it's in – awake or sleep – and animated LEDs show your progress towards your goal. If you want to log an activity, such as a run, you press the face twice and hold on the last press; this starts the stopwatch. The same sequence stops it again. When you have a chance, you can then tag this activity in the app.

The Up Move doesn't have a vibrating motor, so doesn't work as a silent alarm or give you 'move' reminders as the Up24 (tinyurl.com/oa54gLm) does. But like virtually every other tracker, it syncs wirelessly via Bluetooth.

It's water-resistant so you can sweat and go for runs in the rain, although you can't swim or have a bath while wearing it.

Like the Fitbit Zip, it uses a replaceable coin battery, so there's no need for recharging or a proprietary USB cable. Jawbone says it lasts up to six months.

The Up Move uses the same app as other Jawbone trackers. It lets you check exactly how many steps you took, when you took them, and estimates how far you walked and how many calories you burned. It won't track the number of stairs climbed but the accelerometer is able to monitor your sleep.

In the box is a clip for attaching the Up Move to a pocket, bra or other piece of clothing. At night, Jawbone recommends you use an £11 wrist strap, but you can also use the clip to attach the tracker to a sleeve. There are two different straps on offer: wide and thin.

It then works exactly like the Up24, monitoring your movements during the night, with the app presenting a nifty graph in the morning to show how much light and deep sleep you got. You have to hold down the tracker's button to switch between awake and sleep states, but once you get into the habit, it's easy.

Jawbone really has nailed the software side. The main app screen shows two big bars for sleep and steps, with large numbers showing the percentage of your goal for that day. If you manually enter what you eat and drink, a third bar gives a rating out of 10 and a calorie counter.

Below these are motivational cards, offering helpful hints and encouragements. It sounds like a feature you'd immediately turn off, but I found them helpful. Scrolling down further shows an activity timeline, with 'Smart Coach' hints for hitting your goals. You can tap on a steps chart for more info, such as how long you were active (and idle) during that day.

It won't detect some activities such as cycling, so you won't see any extra steps or calories for a 10-mile ride. Instead, you have to start the stopwatch and select 'cycling' in the app for that period, then select the effort you put in.

The left-hand menu lets you set your sleep and 'move' goals as well as a weight goal. You can enter your weight manually or have it imported automatically by using a compatible wireless scale such as the Withings Body Analyser.

The app now integrates with the Health app in iOS 8. If you give it permission it can read and write steps and sleep data. You can also use it with MyFitnessPal for tracking calories, IFTTT, RunKeeper, Strava and many more. You can even link it with your Nest app to 'create the ideal sleep environment'.

The app lets you start and stop the stopwatch, switch to sleep mode and set activity alerts. The default is a smartphone notification every 2000 steps and a summary at 4.30pm. A customisable bedtime reminder can alert you 40 minutes, say, before your target bedtime that it's time to start winding down.

Verdict

For £40, the Up Move is superb value. It's a shame the wrist strap isn't bundled for a few pounds more as £11 for a rubber strap is steep indeed. Cheap copies might become available, of course. Although it doesn't track certain activities or height climbed, its great sleep tracking makes up for that. At this price, it's the best-value activity tracker around. ☒

Chris Martin

GAMES CONSOLE

LeapFrog LeapTV

£120 inc VAT

Contact
■ leapfrog.com/en-gb
Read more
■ tinyurl.com/qbgfcf7

System requirements
Games console; built-in Wi-Fi (802.11n) and Bluetooth 2.1; 1GHz quad-core custom processor; 1GB DDR3 RAM; 16GB internal storage; motion-sensing camera; ethernet (port available cable not included); HDMI output (1280x720); custom cartridges and digital downloads

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

We've seen LeapFrog's children's tablets and now the company the LeapTV, a games console, which comes with a camera and a Kinect-style motion controller.

It's very easy to set up and takes around 10 minutes. Almost everything you need is in the box, including an HDMI cable to connect the Leap TV to your TV. What's not included is a pair of AA batteries for the controller, so make sure you have some at the ready to avoid disappointed children. During setup, you'll need to connect the console to your Wi-Fi network and then use a smartphone, tablet, laptop or PC to create a LeapFrog account and link it with the console. You'll also create individual profiles for your kids this way, and it's how you download and install games from the online app store.

The included camera can be put on the bench in front of your TV, though, there's a bracket in the box to hook it over the top of your TV.

The last step is to make sure the room is well lit, as the camera won't 'see' a child in a dim room. We found it was best to position a lamp next to the TV shining at the child.

Games

Once you've finished the setup process, the built-in Pet Play World game is unlocked. This provides hours of fun on its own, but may well have been a big hit because our two testers, aged three and seven, were both girls.

Each player can create multiple pets, choose their colour and name and then play with them, feed them, wash them and give them toys. There are various sub games that involve core reading and maths skills.

The game uses all three control methods: classic controller, pointer mode and 'full body motion'. The latter works exactly like the Xbox Kinect where you simply move around and use your hands to interact with what's on screen.

The controller has a button that allows it to rotate from 'classic' to pointer mode. When used as a pointer, the end lights up so the camera can see it and the child can move it around to select menu items, or make things happen within games. (It also has a wrist strap which stops them accidentally firing it at your TV or a sibling.)

In our experience younger children get on far better in pointer mode, which is more intuitive, while older kids have the ability to master the joystick as well. However, you don't always get the option to use pointer mode: the classic position must be used in the main menu for choosing user profiles and games, for example.

The console knows which position the controller is in, and will pop up a message to tell you to change it if it's the wrong one.

Don't expect to be able to leave younger kids unsupervised with the console, though, as they'll have a hard time navigating menus and moving between the different parts of each game. It's not as easy to use as a device with a touchscreen. A message which appears when you turn the LeapTV on says that supervision is required at all times.

As well as Pet Play World, we also tried out a cartridge game: Jake and the Neverland Pirates. The proprietary cartridge system is an alternative to downloading games online, but they all cost £25.

Our testers had fun playing the game using the controller in pointer mode to dig for treasure and then the body motion mode to grab gold coins all over the screen.

Throughout the games, children are presented with reading or maths questions which they must answer to continue. Their success will obviously depend on their age, but they are given questions appropriate to their age, which is why it's important to make sure they're signed in with their own profile.

Another great element is badges, which players earn for achieving various things, and they can check on their badge collection to see what's left to unlock.

Since the Leap TV is designed for both those that can and can't read, all written instructions are also spoken. The only confusing aspect was that during some instructions you can move the pointer around the screen but can't select anything until the voice has finished speaking.

Verdict

Retailing at £120, the LeapTV is expensive, but it's already available on Amazon for £89, which is considerably more affordable. Cartridge games haven't been discounted yet and at £25 each they seem expensive when we're used to paying just a few pounds for tablet and smartphone apps. LeapFrog says that there will be a range of prices on the app store, but at the time of writing this wasn't available. All we know is that there will be over 100 titles to choose between. What we do know is that children think the LeapTV is excellent fun: the main problem is getting them to stop playing on it. ☒ **Jim Martin**

MEDIA STREAMER

Amazon Fire TV

£69 inc VAT

Contact
■ amazon.co.uk
Read more
■ tinyurl.com/p4re7wp

System requirements
Qualcomm Snapdragon 8064 quad-core processor at up to 1.7GHz, Adreno 320 graphics, 2GB 533MHz RAM, 8GB storage, dual-band 802.11n Wi-Fi with MIMO, Bluetooth 4, Support for Dolby Digital Plus 5.1 surround sound and passthrough for 7.1, 720p or 1080p output up to 60fps, remote included, 115x115x18mm, 281g

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

★★★★☆

Like the Fire phone, which launched in the UK just a few months after its release in the US, the Fire TV has imposed only a relatively short wait on potential UK buyers. For Amazon, the logic of having a set-top box is indubitable, since a TV is the most logical place to watch videos from the company's Prime Instant Video service, formerly known as Lovefilm Instant but which was bought by Amazon a couple of years ago.

You can access Prime Instant Video from an Amazon Fire tablet, or any other device with access to the Prime Instant Video app, including Android and iOS. So the Fire TV is by no means your only option for getting Amazon video on the big screen.

The Fire TV, like other media streamers, offers plenty of other content including rival Netflix as well as Spotify, BBC iPlayer and more. For some, this already makes it a better choice than an Apple TV, but the Fire TV also lets you play games – more of which later – using the bundled remote or the optional game controller (which costs £35).

Hardware

The Fire TV is uncannily similar to the Apple TV. It's a small black box with all its connections round the back: power, HDMI, optical S/PDIF, and Ethernet. There's also USB, but it's currently unusable.

The top is like the back of a Fire tablet or Kindle: matt black with a glossy Amazon logo. The front and sides are also glossy black and a small white LED lets you know that the box has power – just like an Apple TV.

An external power supply is included in the box with the Fire TV, but you'll need to provide your own HDMI cable.

Setup is easy, as you simply choose your Wi-Fi network (unless you're using an Ethernet cable), enter your password, then enter your Amazon email address and password. It's a bit fiddly using the onscreen keyboard and directional pad on the remote, but it's no worse than the Apple TV in this respect. The Chromecast is easier since the remote is your smartphone or tablet, but then the Fire TV doesn't require you to own any smartphone or tablet – all you need is an internet connection and an Amazon account.

The box's innards are much like an Android tablet's, and it runs a version of the Amazon Fire OS used on Fire tablets and the Fire phone. It's based on Android, but you'll never see so much as a hint of plain Android anywhere.

Software

Fire OS is a dark-looking, easy to use system on Amazon's tablets, and things are pretty much the same here for Fire TV. If you've already used the Prime Instant Video app, you'll know how to navigate around the Fire TV.

A main menu runs down the left-hand side and includes Home, which shows things you've watched or played recently, newly added Prime Instant Video items and other featured or 'top' content.

Other sections include Prime Instant Video, a watchlist (everything you've bookmarked to buy, rent or watch later), TV, films, apps, games, photos and music. There are no books, magazines or newspapers, and no browser or email apps – these are all better suited to tablets. Video Library is a place to see all your bought and rented content from Amazon.

The settings menu allows you to sync all your relevant purchased Amazon content, so you don't have to go through each section or search for that content and download it individually.

You can also set restrictions to prevent anything being purchased without entering a passcode, and even block different types of content entirely, such as apps.

Voice search

The interface couldn't be simpler to navigate and button icons are shown on screen whenever there's a shortcut, such as pressing the play/pause button when you've finished entering your password.

It's a well-designed controller whose only flaw is that it's quite small and easy to lose. One feature which elevates it above its rivals is the voice search. You hold down the microphone button and say what you're searching for. It proved fast and accurate for everything I tried, and far, far easier than trying to enter text via the D-pad. And you're not limited to saying titles; it also works with actors and directors, so you don't need to know the name of what it is you want to watch.

The voice search isn't universal, though. If you're in the Netflix app and use the microphone, the results will show matches for Amazon's content and not Netflix.

Another source of confusion is that prices are shown for episodes and series even if you have a Prime Instant Video subscription. To watch something with your subscription, you have to wait a second until 'Watch now with Prime' appears on the video's thumbnail.

However, even if you're browsing in the Prime Instant Video section, you'll still come across content that isn't included in your subscription. For example, only the first four seasons of *Mad Men* have the all-important Prime tag at the top-left corner, while the remaining three are just tagged as HD. But it's easy to miss that difference as you scroll through the list and wonder why the 'Watch now with Prime' wording doesn't appear on the thumbnail after season four.

A good feature is that a white progress bar is shown across the bottom of each movie or show you've watched, so it's easy to see which episode of a TV show to watch next. Amazon's predictive ASAP technology also works well, with videos beginning almost the instant you press the play button – so much so that you sometimes forget you're streaming them. The 10-second skip forward and back buttons are useful for replaying a section, and didn't cause big buffering delays in our tests.

Games

The game controller has to be paired via the settings menu, but you'll get a warning if you attempt to buy a game which requires a game controller and you haven't paired one. I tried several games, some bought previously on a Fire tablet. Sonic the Hedgehog was pretty much the ideal classic platform title for the controller, while Flow Free proved that games designed for touchscreens aren't much fun on a console-style gamepad. You can use the shoulder buttons to speed up or slow the cursor, but it's hard work.

The games library has a fair bit of choice, including some of the latest releases such as Terraria, but it's limited compared to the choice available on a Fire tablet let alone an Android tablet or iPad.

Content

Amazon Prime Instant video has a fairly decent selection of films and TV shows, and is comparable with Netflix. Each has its own exclusive titles and in-house content too, with Amazon's Transparent and Extant two popular examples.

It's good to see some UK-specific services such as iPlayer and Demand 5, but it's by no means comprehensive. Although the Apple TV lacks even these, you can watch a much bigger selection from your iPhone or iPad via AirPlay.

If you're looking for the widest array of content available directly via the set-top box, then Roku is the obvious choice at the moment, especially as it has just added the Google Play store.

From our testing, the quality of HD video is excellent and if you have an AV receiver you can use the HDMI or optical outputs to benefit from 5.1 or even 7.1 surround sound where the content has it.

You'll also benefit from the X-Ray feature for certain videos; X-Ray lets you pull up IMDB information so you can check which actors are on screen or who directed the video. What's disappointing is the lack of closed captions, or subtitles as we call them in the UK. If you rely on them, or simply like to turn them on when the dialogue is too fast or the actors have an unrecognisable accent, it's a big omission. Amazon says it's working hard to bring subtitles as soon as it can.

One of the Apple TV's limitations is that you can't plug in a USB drive and watch your own content; you have to have a computer or NAS running an iTunes server to be able to do that. It's a similar situation for the Fire TV, although Plex is available so you can store your video library on a suitable NAS and stream content from that. You can also 'root' the Fire TV and install XBMC without losing access to the Fire TV's stock interface.

It's with large libraries that the Fire TV's powerful processor comes into its own. Thumbnails load almost instantly and there's little or no lag scrolling through long episode lists.

Verdict

The Fire TV is a powerful and well-designed set-top box. The voice search works well too, but isn't available in all apps.

There are other foibles too, such as confusion over whether videos are included in your Prime Instant Video subscription or not. I'd like an option to show only content you can watch without paying extra; it's an option in Amazon's app for iPad, so why not on the Fire TV?

It costs the same as an Apple TV, and you don't get a Prime Video subscription thrown in: there's a 30-day trial and after that it's £5.99 a month or £79 a year, which also includes one-day delivery on goods that are tagged with Prime on Amazon's website.

Is the Fire TV the best video streamer out there? It's close, but it only really makes sense if you pair it with a Prime Instant Video subscription and use Amazon's other cloud services. ☒ **Jim Martin**

nVidia GTX 980
£430 inc VAT
Contact
■ nvidia.co.uk

Performance:
Value:

nVidia GTX 970
£276 inc VAT
Contact
■ nvidia.co.uk

Performance:
Value:

Read more
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GRAPHICS CARDS

nVidia GeForce GTX 980 vs nVidia GeForce GTX 970

The GM204 GPU (which lies behind both the 980 and the 970) is the culmination of a process that started with the GTX 750 Ti. As an overall package, we didn't rate it. While it generated an impressive amount of speed given its low power output, in terms of real-world performance it offered customers very little they couldn't get from existing products at a similar price point. We could, however, see where the company was going with the GM204, though.

With its ultra-efficient design, the GM204 clearly had room to expand and create very powerful gaming equipment for a modest power outlay. And the 980 and 970 are the spectacular proof.

Maxwell GPUs are constructed using a 0.28nm manufacturing process. We would expect this process to have shrunk in size by now, as the number typically falls every two years, producing smaller and more efficient designs that generate less heat, and which can be pushed to higher power levels.

Unfortunately, the two-year cycle has been held up this time round, which is partly why nVidia has worked so hard on streamlining the way the technology itself works.

The key to this reorganisation is the enhanced SMM (Streaming Multiprocessor Maxwell). The older Kepler GPUs already made use of the cleverly tweaked SMX (Streaming Multiprocessor neXt generation), but SMMs take this to a whole new level. Each individual SMM is much smaller, meaning that instructions can be handled with greater efficiency. Inevitably, though, this means that single SMMs are armed with fewer weapons than their SMX counterparts. So whereas a standard SMX, for instance, contains 192 shader cores, the humble SMM contains just 128. There's a knock-on effect on texture units too, with each SMM offering a mere eight of these, against the 16 of the SMX.

NVIDIA GTX 970

The first Maxwell-equipped product we looked at, the 750 Ti, came with five SMMs enabled. These allowed it to offer 640 shader cores and 40 texture units. In contrast, the 970 and 980 are considerably beefed up, with 13- and 16 SMMs switched on respectively. So that gives the 970 1664 shader cores, and 104 texture units, while the 980 has 2048 shader cores, and 128 texture units.

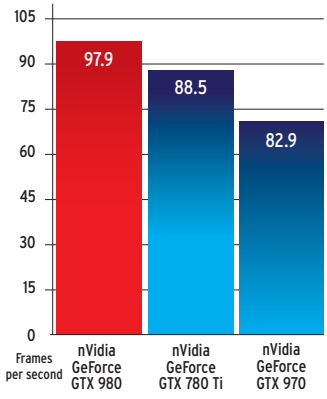
It's also notable that both chips pale next to the figures boasted by, for example, the GTX 780 Ti. The latter's 15 bumper-packed SMXes ultimately add up to far bigger numbers, with a rather massive complement of 2880 shader cores and 240 texture units – the 780 Ti costs a similar price to the 970, but has 73 percent more shader cores and 130 percent more texture units.

Luckily, Maxwell is about far more than simple firepower. Compared to SMXes, SMMs will have to share far fewer resources with one another. And while it's no surprise to find both the 970 and 980 armed with 4GB of GDDR5 RAM as default, the L1 and L2 caches have been bolstered. The shared memory now stands at 96KB for every SMM, and the Kepler's 512KB L2 cache has been quadrupled in size to a 2MB version in the 970 and 980. These ultra-fast forms of memory can be used more efficiently and more consistently by Maxwell, so there should be fewer blockages and faster flow as a result. Again, the 980 has a small advantage here.

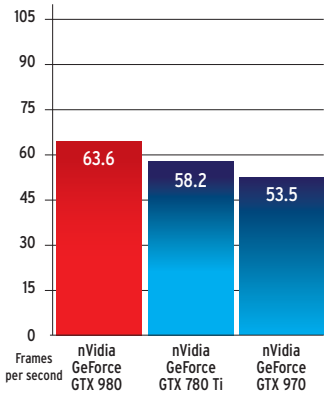
Memory bandwidth

You might expect the 980 and 970 to offer strong memory bandwidth. Unfortunately, the 384-bit memory bus offered by the earlier GTX 780 Ti has been reduced to a 256-bit version in the case of both the 980 and 970. However, Maxwell does have one slick trick up its sleeve – the Third Generation Delta Color Compression. This concept has been seen in AMD products before, but is relatively new to the mainstream nVidia products, and uses compression to allow the memory bus to process more data without causing a bottleneck. The

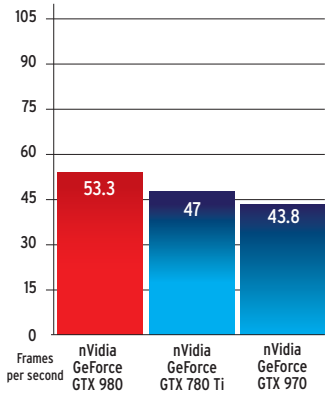
Crysis 3 (1900x1200)



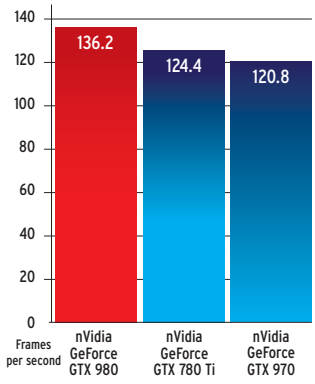
Crysis 3 (2560x1600)



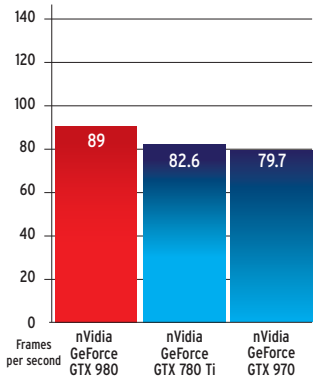
Crysis 3 (3840x2160)



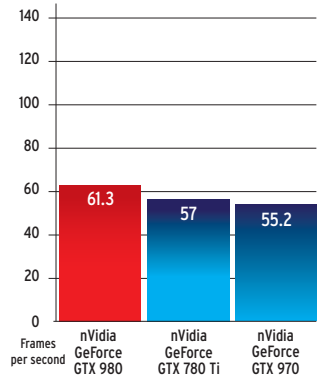
Bioshock Infinite Rage (1920x1080)



Bioshock Infinite Rage (2560x1440)



Bioshock Infinite Rage (3840x2160)



end-result is that the new cards' 256-bit memory interface proves not to be the bar to high-performance that you'd think it to be.

The main idea behind Maxwell is that it does rather more with considerably less. As such, it doesn't fare well in terms of raw figures. That's particularly so when we look at memory bandwidth calculations. The standard GTX 980 and GTX 970 both come with memory clocks of 1.75GHz (effectively 7GHz when you take into account the quadrupling properties of the RAM). Those 7GHz speeds place them on a par with the 780 Ti. However, the 256-bit memory buses of the 980 and 970 push them back on paper, leaving them both with memory bandwidth figures of 224GB/s.

In comparison, the 780 Ti comes with a gargantuan bandwidth figure of 336GB/s. Of course, as we've already noted, the 980 and 970 use compression to optimise the memory bandwidth.

Clock speeds and textures

One of the beauties of Maxwell's smaller and more efficient Streaming Multiprocessors is that they can be pushed to higher clock speeds. Using Boost, the standard GTX 980 and 970 can reach core clock speeds of 1216- and 1178MHz respectively. This is much higher than the GTX 780 Ti's 928MHz. Once more, though, the 980 is only marginally superior to the 970.

And that extra firepower doesn't help everywhere, with the older 780 Ti arguably proving the better card at handling textures, by dint of having greater quantities of texture units. The 980 has a relatively healthy 128 of these, and the 970 falls some way behind with 104. The 970's figure, in particular, is poor when you compare it to the older 780 Ti's 240 texture units.

Power

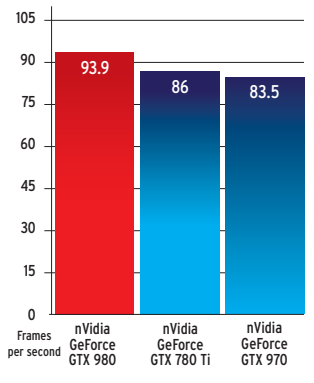
Why would nVidia want to turn out technology that, on paper at least, seems so inferior to the flagships of the previous generation? Well, Maxwell does have one very obvious advantage. And that comes from the power output. The TDP (Thermal Design Power) figure gives us an indication of how much power a system is likely to have to cope with, when using this card. The lower the better. The GTX 970 comes with a modest TDP of 145W. As a point of comparison, even the mid-range GTX 760 came with a TDP of 170W, so the GTX 970 is extremely low on power consumption for a product that can produce this level of performance.

Perhaps even more astonishing, though, is the 980, which comes with a TDP of 165W. This is an incredible achievement, and is put very much into perspective by the corresponding figures for the GTX 780 Ti and Radeon R9 290X, which measure 250- and 300W respectively. In practice, we found that the Maxwell cards weren't as modest on power as this might suggest. But under load, the R9 290X was generating around 72W more than the 980, which was itself around 17W higher than the 970.

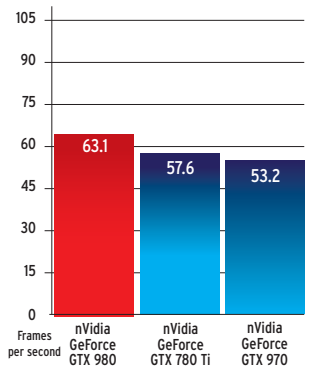
Verdict

The 980 is the best single-GPU solution out there In terms of benchmarks, the 970 seems disappointing. For typical gamers, it will more than suffice. For more hardened players with plenty of money, the 980 is the one to set their sights on. ☒ **Robin Morris**

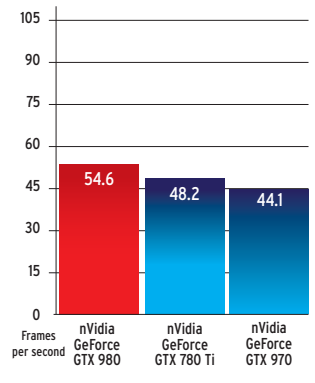
Battlefield 4 (1900x1200)



Battlefield 4 (2560x1440)



Battlefield 4 (3840x2160)



SMARTPHONES

Apple iPhone 6 vs iPhone 6 Plus

iPhone 6
From £539 inc VAT

Contact
■ apple.com/uk

Ease: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆
★★★★☆

iPhone 6 Plus
From £619 inc VAT

Contact
■ apple.com/uk

Ease: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆
★★★★☆

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The iPhone 6 and 6 Plus have been available to buy for a few months now, but which model is right for you? Should you buy the iPhone 6 Plus and its bigger screen, sharper screen and longer battery life, or the iPhone 6 and its more portable body and lower price tag? Here we compare the two for features, specs, design, build quality and visual appeal.

Design and build quality

Design-wise these two handsets are virtually identical, with one exception: scale. The iPhone 6 Plus is like an iPhone 6 that's been stretched along two dimensions (and fractionally on a third – it's a tiny bit thicker, although still thinner than the iPhone 5s); if we scaled up a photo of an iPhone 6, you'd have to look carefully to tell which one you were looking at. (One clue would be to look at the amount of space around the icons, by the way.)

Both phones have attractive rounded edges, slim bezels (the screens are almost edge-to-edge) and slim bodies – even thinner than the iPhone 5s. These are beautifully made, reliable pieces of hardware that won't let you down. Their build quality is off the chart.

Portability

Both handsets sacrifice portability in order to increase screen space. The iPhone 6 is still pocketable, but it's definitely a bit more of a squeeze than the 5s; while the iPhone 6 Plus is more of a rucksack pocket than jeans pocket model, although your mileage may vary.

The 'phablet' form factor that the iPhone 6 Plus follows is an opinion divider. Some feel that it falls between two camps, claiming it's not big enough to provide immersive gaming or movies like tablets, but too big to slip easily in a pocket. Others believe it overlaps both sweet spots. It's all a question of how mobile devices fit into your life – how big a screen you need, how much gaming and TV you'll be using the device for, and how you carry it around.

If you're concerned that the new handsets are too big to be used one-handed don't worry. Apple has introduced a new feature called 'Reachability'. When you double-tap the Home button, the interface slides down so that it takes up less of the screen space – and comes within easy reach. Another double-tap returns everything to normal.

Weight and dimensions

If you want to assemble cardboard dummy models of the new iPhones to try before you buy, here are the dimensions you need:

iPhone 6:
138.1x67x6.9mm, 129g
iPhone 6 Plus:
158.1x77.8x7.1mm, 172g

Note that the iPhone 6 and 6 Plus are both impressively slim – slimmer than the iPhone 5s, even. Their weight, too, is pleasingly low (the iPhone 6 manages to be lighter than the smaller-screened iPhone 5c). It's the width and height that see the big increases.

Screen

We've talked about the negatives, but there's one glorious positive reason why the iPhones have got bigger: screen space.

The iPhone 6 has a stunning 4.7in display, while the 6 Plus goes all the way up to 5.5in (both figures are diagonal measurements, from corner to corner). This compares to the 4in screens of the iPhone 5 series, and the 3.5in displays of the 4s and earlier.

More screen space is what many have been asking for, and it opens up tremendous possibilities for gaming and media consumption on the go. (Even if, as we discussed in the Portability section, some feel that these are a compromise point between the greater-still display size of the iPad mini and the smaller screens but more portable chassis of the iPhone 5 series.)

The larger display may cause some headaches for app developers, incidentally, who will presumably wish to optimise their wares for the iPhone 6 series, just as they did for iPhone 5 and its 4in screen (up from the 4s and its 3.5in screen).

At the iPhone 6 launch event, Apple claimed that it will be a simple matter to scale apps for the new displays. We're not convinced it's as straightforward as all that, but it sounds like you should at least have access to the full range of iPhone apps, even if they're not initially

engineered to take advantage of the higher number of pixels.

The handsets also have higher resolutions than any previous models: 1334x750 for the 6 and an eye-watering, desktop monitor-esque 1920x1080 for the 6 Plus.

The latter figure isn't just proportionately more pixels to be spread over the extra area. While the iPhone 6 has the same pixel density as every model since the iPhone 4 (326 pixels per inch), the 6 Plus pushes the boat out: it's 401ppi, which rather weighs against previous claims that Retina-class screens represented the highest pixel density that the human eye could discern at a normal smartphone usage distance.

Indeed, Apple is now talking about Retina HD rather than simple Retina – yet it applies this term to both the 326ppi iPhone 6 and the 401ppi 6 Plus, suggesting that it doesn't refer to the larger handset's higher pixel density.

There are other changes in the iPhone 6 series screens that are presumably covered under the Retina HD classification: they have higher contrast ratios, for one thing (1300:1 for the 6 Plus and 1400:1 for the 6, compared with 800:1 for both 5s and 5c), along with a technical feature Apple calls "dual-domain pixels" and claims will provide wider viewing angles.

Speed and graphics performance

The iPhone 6 and 6 Plus prove remarkably similar in their internal equipment despite the differences in the physical space available. Both have the new A8 chip, together with its M8 motion co-processor.

On paper this works out at approximately 25 percent faster in general performance than the 5s and 50 percent faster in graphical processing. But the reality is that current apps barely push even the 5s to its limits. As we always stress when new Apple mobile processors make their debut, this should be regarded as future-proofing, not an instant speed boost: gains will become apparent as more demanding apps are written to take advantage of the A8's power.

Stills and video cameras

In essence, the iPhone 6 and 6 Plus have the same cameras: the 8Mp 'new iSight camera' facing the rear and a 1.2Mp camera facing forwards and handling FaceTime and selfies.

The 6 Plus, however, has an advantage over the 6 when it comes to the camera – it gets optical image stabilisation, while the 6 simply has auto image stabilisation. You can therefore expect slightly better results from the 6 Plus.

Colour options

Both new models come in the same colour options: silver, Space Grey and gold. We're still not convinced by gold iPhones, but they have grown on us a little.

If you want bright colours, of course, you'll need to opt for the iPhone 5c – available in yellow, red, green and blue, as well as white – or buy a decorative case.

Storage options

Even though the iPhone 6 Plus has more chassis space to cram in extra components, you get the same storage options regardless of which model you opt for. There are three sizes for you to choose from: 16-, 64- and 128GB. The 32GB middle option has been removed.

We recommend the 64GB model or more unless you keep most of your media in the cloud and rarely install big, space-hogging apps. (Games tend to be particularly big files, so keen gamers should aim for a decent amount of storage space.)

Software and interface

Both iPhone 6 series handsets come with iOS 8 preinstalled, and have access to all of its features.

Thanks to the larger screens, they are able to squeeze an extra row of icons on to each page of the home screen. Whereas the iPhone 4 and 4s had four rows plus the dock, and the iPhone 5 series had five rows plus the dock, the 6 and 6 Plus both have the ability to fit six rows of icons above the dock. (The larger 6 Plus has icons that are the same size as those of the iPhone 6, which means they are more spread out, as previously mentioned.)

Apple Pay

One of the new features in iOS 8 is Apple Pay, which is perhaps better understood as a hardware rather than software upgrade. This is because it depends on two hardware features: the Touch ID fingerprint scanner and an NFC antenna. Both handsets have these.

Apple Pay lets you pay for goods and services with a touch and single tap on your phone. The cloud to this silver lining is that it won't launch in Europe until sometime in 2015.

Battery life

This is a big surprise. We expected both new iPhones to conform to Apple's historical sweet spot for battery life: 10 hours of typical use. While the iPhone 6 does so, the 6 Plus is capable of 12 hours. It has room for a bigger battery, of course, but we expected Apple to upgrade this only enough to compensate for the higher power requirements of the bigger screen.

Verdict

Both of the new models are expensive propositions, but the iPhone 6 Plus is going to test some wallets. Whether these smartphones do enough to justify their price tags is debatable, but they are extremely desirable products.

The iPhone 6 is a beautiful, slim smartphone with a great (although by no means industry-leading) screen, an NFC antenna so you can access to Apple Pay when it launches here in 2015 and a brilliant, user-friendly and swift operating system.

The 6 Plus, on the other hand, adds longer battery life and a high-resolution and even bigger screen. Features-wise you can probably get more of the latest innovations from the Android line-up but the iPhone 6 and iPhone 6 Plus offer stronger security, a generally higher standard of apps and a user experience which many will prefer.

Overall, we would opt for the iPhone 6 and its more cautiously expanded form factor (going from 4- to 4.7in is already a noticeable jump; a leap all the way up to 5.5in is a major change to your day-to-day experience). But those who fancy the better media and gaming potential of a 5.5in iPhone screen (along with the photographic delights of optical image stabilisation) will be well served by the 6 Plus. There may even be Apple fans who currently tote an iPad mini and an iPhone 5-series smartphone, and think a phablet would unite the advantages of both devices in a single unit. ☒ **David Price**

iPad Air
From £319 inc VAT

Contact
■ apple.com/uk

Ease: ★★★★☆
Features: ★★★★☆
Performance: ★★★★☆
Value: ★★★★☆
★★★★☆

iPad Air 2
From £399 inc VAT

Contact
■ apple.com/uk

Ease: ★★★★½
Features: ★★★★½
Performance: ★★★★½
Value: ★★★★☆
★★★★½

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■ tinyurl.com/m2t788q

TABLETS

Apple iPad Air vs iPad Air 2

The iPad Air 2 replaces the original Air as Apple's top-of-the-line tablet. It's thinner than its predecessor, lighter, faster and better at photography. The older model, meanwhile, gets a tasty price cut (and recently gained new features thanks to iOS 8).

However, does the iPad Air 2 do enough to justify the extra cash, or should iPad buyers be looking to the more budget-conscious iPad Air? We compare the two.

The physical design of the iPad Air 2 is strongly reminiscent of the older model, with the same rounded back edges and brushed-metal back panel, and a similar sharp mirrored chamfer on the front edge. And that's a good thing: the original Air is a stunning piece of design.

The Air 2 takes the aesthetics of its predecessor but presents them on a smaller scale. Apple has sliced 6 percent off the weight and almost 19 percent off its depth. These are small but pleasing improvements. The iPad Air was already a slender device, and shaving off a further millimetre-and-a-bit doesn't transform the experience entirely. (The iPad Air 2 is 6.1mm thick, down from 7.5mm.) The new tablet is, however, easier to hold and use in one hand. It's better for reading in bed, it's a lighter camera and is an all-round more portable computing device.

One other physical change worth mentioning is the mute/orientation lock switch, which has disappeared entirely. We don't know why (unless it's the all-consuming drive towards minimalism), but we're not sure we like the change. Mind you, the Control Centre and its quick toggles make it very easy to mute sound or lock orientation without using a hardware switch.

The Air 2 gets a relatively small number of boosts to its specs, but they're in some of the most high-profile areas. The processor gets a bump (by a full 'generation and an x'), the rear-facing camera has its megapixel rating raised from 5- to 8Mp, RAM is doubled, the screen gets a nice antireflective coating and wireless is upgraded with 802.11ac compatibility.

The bump from 5- to 8Mp for the rear-facing camera translates into noticeably better photos. We tested both cameras in low-light conditions, and while neither tablet took brilliant images, the iPad Air 2 took sharper, less noisy images. A posed shot taken under studio lighting also demonstrated the greater detail that the new Air's sensor is capable of capturing.

Many of the more generic shots we took in daylight came out much the same across both models. The iPad Air 2's shots are larger, in the sense that they contain more pixels – 3264x2448 to its predecessor's 2592x1936 pixels – so in principle they can be blown up to a larger size without becoming unpleasantly pixellated. Yet to the average eye our shots of trees, faces and buildings, when zoomed-in to a similar extent, looked pretty similar.

Needless to say, professional and expert photographers may well find themselves able to make more of the Air 2's camera.

Speed tests

The A8X processor chip in the iPad Air 2 is exceptionally quick and powerful. In our battery of tests, it was miles ahead of the original Air and all the mini models.

In GeekBench 3, the Air 2 destroyed all-comers, demonstrating particular dominance in the multi-core tests:
iPad mini: 260 (single-core), 494 (multi-core)
iPad mini 2: 1374, 2484
iPad mini 3: 1376, 2483
iPad Air: 1468, 2658
iPad Air 2: 1818, 4520
(Higher scores are better)

In the SunSpider 1.0.2 JavaScript web browser tests the Air 2 was again hugely impressive:
iPad mini: 1,503 milliseconds
iPad mini 2: 442ms
iPad mini 3: 449ms
iPad Air: 439ms
iPad Air 2: 287ms
(Lower score is better)

These tests illustrate what Apple has claimed: that the iPad Air 2 is monstrously fast, and quicker than any previous iPad by a clear margin. What it doesn't show, however, is what difference this will make in day-to-day life right now. And the truth is that, for the time being, it won't change much.

The problem is that current apps simply aren't demanding enough for the iPad Air 2 to show its power. If you're into the latest games, then it will prove its worth in the coming months and years, as games developers craft more and more graphically ambitious

titles to harness the latest mobile processor chips. The same applies to those who are use video- and photo-editing apps, and anything that is processor-intensive: apps will be launched in these fields in the coming months that will put the iPad Air 2 to the test, and justify this more expensive purchase.

For now, the iPad Air and 2 behave similarly. On a few of our more demanding games, the Air 2 gets the app running a second or two quicker. It also feels a bit nippier in general use (although this appears to be a function of the more responsive screen). But it's mostly about the same, for now. And if you only plan to use your iPad for simpler tasks, such as email, browsing the web and playing light games, you won't see a speed boost for a fair while.

Graphics and gaming tests

Continuing on the themes of speed testing and games, we put the iPad Airs (and the iPad minis) through the GFXBench graphical benchmark. As you've surely come to expect, the iPad Air 2 showed a clear pair of heels to all the other devices.

Manhattan onscreen test:
iPad mini: n/a
iPad mini 2: 8.9fps
iPad mini 3: 8.9fps
iPad Air: 9fps
iPad Air 2: 24.6fps

T-Rex onscreen test:
iPad mini: 6.5fps
iPad mini 2: 22.7fps
iPad mini 3: 22.7fps
iPad Air: 23fps
iPad Air 2: 52fps

(Tests performed using GFXBench 3.0 app. All devices running iOS 8.1. Scores in frames per second; higher scores are better.)

These are impressive figures, but the same caveat applies as in the processing-speed tests: these gains remain mostly theoretical, at least until software is launched that can harness this additional power.

The iPad Air and 2 have similar screens, with the same resolution and pixel density (they're identically sharp, in other words). But there are two differences. First, the iPad Air 2 has a more responsive display. Apple has been a tiny bit mysterious about how this has been brought about, but it's undeniably true: screen response feels near-instantaneous. It's a lovely experience. Secondly, the new Air has an anti-reflective coating. This means the screen reflections caused when using an iPad under electric lighting or outdoors are noticeably diminished and darkened.

We're nearly finished with the new stuff, but there's one big-ticket upgrade left: Apple's Touch ID fingerprint scanner. The original Air doesn't have this but the Air 2 does.

First seen on the iPhone 5s and also now featured in the iPhone 6 and 6 Plus, as well as the iPad mini 3, Touch ID allows you to unlock the device – or third-party apps, if they've chosen to use the system – with a touch of a finger. You can also verify App Store purchases in the same way (although you'll need to enter your passcode the first time you perform each action after a power-down) and, once it launches in this country, you'll be able to use some elements of Apple Pay.

Touch ID is convenient and pretty cool, even if we think it's more of a bonus item than a must-have feature. Luckily, unlike the iPad mini 3, the iPad Air 2 has plenty of other upgrades to offer as well.

The iPad Air 2 has a smaller battery than its predecessor (for obvious slimming-down-related reasons), but it's clearly more efficient. Both models have roughly the same battery life, of around 10 hours of 'normal' use.

The iPad Air 2 gains 802.11ac Wi-Fi capabilities. This can allow for faster data throughput, if your router is compatible with the ac standard.

Most people won't care, but a few will be overjoyed. The iPad Air 2 is available in a rather nice rosy gold. Like the original Air, it's also available in Space grey and silver.

Apple has tweaked the storage options available with the iPad Air and 2. The original model comes in 16- and 32GB options, while the Air 2 is available in 16-, 64- and 128GB.

We don't recommend getting 16GB, unless you're willing to jump through lots of hoops regarding keeping music, photos and so on in the cloud, deleting apps after you've used them and limiting your use of big games. Having just 16GB can also be a pain when upgrading iOS, which often demands as much as 5- or 6GB to download the installation files. Note, the 32GB iPad Air is £40 cheaper than the 16GB Air 2.

This means you should be looking at the 32- or 64GB options. To be fair to Apple, it's priced the 64GB Air 2 at the same level that it previously sold the 32GB iPad Air, so being shoved up to 64GB isn't really the scam it might sound like. (Apple's markup between storage points is steep. Storage components cost very little, but you wouldn't know it to look at Apple's iPad pricing.)

If your heart is set on 32GB (often called the sweet spot of tablet storage), you must therefore look to the original Air. If you're desperate for 64GB or more, then the Air 2 is for you. It's important to remember that iPads can't be upgraded (at least in terms of hardware). This means the storage allocation you go for initially is what you'll be stuck with for the lifetime of the device.

Verdict

The iPad Air 2 is an accumulation of small upgrades that together make for a pretty major overhaul. It's thinner and lighter, so it's more comfortable to hold for extended periods. It's also faster, and while most of this extra speed won't show itself for a few months, it's nice to have a future-proofed device. The camera is better, even if real-world photos showed this off only some of the time. And it gets some of the newer Apple trademarks: Touch ID, a gold colour option, 802.11ac wireless.

If you've got the first iPad Air, we would recommend an upgrade only if you're very rich or extremely keen on top-tier gaming. But those on an iPad 4 or earlier would do well to pick up the Air 2. ☒ **David Price**

MEDIA PLAYER

iTunes 12

Free

Contact
■ apple.com/uk
Read more
■ tinyurl.com/owoea6o

System requirements
OS X 10.7.5 or later; Intel core processor; 400MB of disk space; broadband internet connection to use the iTunes Store

Ease of use:
Features:
Performance:
Value:

Apple's iTunes is the beating heart of music, movies, podcasts and other media sitting on a Mac. It also allows you to manage your iPhone, iPad and any iPods you might have. With iTunes 12, Apple has introduced a stylish new interface and a few (though, not many) features.

What is iTunes for?

Despite its Swiss Army knife nature, we tend to think of iTunes as first and foremost a music player. It's telling that the redesigned logo (now red instead of the historic blue) keeps a musical note motif.

iTunes does a lot more than just play music, though. Indeed, some argue that it does far too much and has done for years. Alongside playing your favourite tracks, it displays video files (TV shows and movies), audiobooks and podcasts. The latest version of the program also downloads, stores and updates apps for iPhone and iPad, manages the content on iOS devices, and is a backup- and update centre for these. On top of all this, it has an integrated iTunes Store and App Store for buying music, movies, apps, podcasts and other kinds of media such as iTunes U content.

Without a doubt, iTunes is the poster boy for 'feature creep', the tendency for software over the years to get bulked out with extra new features and lose its original focus.

Indeed, it's odd that a company so capable of ripping apart programs and taking them back to basics (iMovie '11 and the recent iOS-like iWork apps are prime examples of this) has allowed iTunes to continue juggling so many tasks. Apple has been steadily adding features to iTunes for years, and the only thing that has been removed from it in recent updates is iBooks. This is now a separate app with its own store.

New features

The first thing you'll notice is that iTunes 12 has a new interface. You may find this surprising given that Apple introduced a new look in version 11, but in light of the company's move towards flat design across both its desktop and mobile operating systems, it's understandable.

• **Icons for media** The media selection menu in the top-left has been replaced with a set of icons: Music, Movies and TV Shows are available, while a More icon lets you access Podcasts, iTunes U, Apps and other items. An Edit option allows you to add icons you frequently use to the icon bar.

• **Integrated library and iTunes Store** In the middle of the iTunes window sits options for local media (Music and Playlists) and the iTunes Store. The store changes based on the media you choose. So if, for example you select music, you'll be taken to the music store. While it's easy to be cynical about Apple making the store even more prominent, we like the direct integration of media and the appropriate store.

• **Sorting menu** Tucked away in the right is a drop-down menu for choosing organisational groupings: singles, albums, artists for music, or movies and TV shows for videos. This doesn't always appear, but offers options based on what media icon is selected.

• **Main window** This now displays a row of recently added items across the top, though the sidebar is missing from the default view – it returns when you click on Playlists. Other stylistic changes include the interactive background that responds to album art, which is now subtler effect and displays the original album art in a square. It's a small touch but we like it. In general iTunes 12 is neater and easier to use.

• **Get Info window** This has been radically overhauled, and now splits all the information across a series of tabs. It's more attractive, but is a more long-winded for manually editing track information.

What's the same

The new features introduced in iTunes 11 remain: Up Next and Mini Player, for example, are still present and correct, though, we hardly use either mode. Apple iTunes Match still syncs up music across devices, and enables you to stream your entire collection over the air to an iPhone. The £21.99 per year charge is reasonable, although Google's similar Play Music service is free.

What's missing

For an app so stuffed with features, it's odd that our biggest problem with iTunes seems to be what's missing. A small gripe is the ongoing absence of iTunes Radio in the UK. The ability to enter a track, or artist, and play a radio station based on it would be a great way to mix up our daily music listening.

We're also surprised that the much-mooted HD Audio has not arrived in iTunes 12. Many people were expecting Apple to reach out to audiophiles with 24-bit audio.

The bigger problem is the ongoing lack of recommendations, shared playlists and social media integration. Apple doesn't have any true rivals when it comes to the management of media files in OS X. Apps such as CopyTrans, MediaMonkey and WinAmp all offer interesting features for the discerning music enthusiast, but they haven't tempted significant number of people away from iTunes.

The big rivals are music streaming services such as Spotify, Google Play Music and Napster.

Renting music or listening to ad-interspersed music is a different experience to owning and managing your own tracks, so it's not an easy comparison to make. There is a lot to be said for having an app that manages all your tracks.

However, Spotify and other streaming services, offer a range of interesting features that aren't found in iTunes. Spotify, for example, has fan-created playlists for all kinds of subjects. If we want to listen to Baroque music, then a fan of that type of music will have created and maintain a playlist of tracks far better than any album. Irish Folk Metal, not a problem; songs for sleeping to at night, Spotify has that; Autumnal Acoustic tracks, of course you can listen to that. There's a user curated playlist for every imaginable thought in your head.

You can also hook up Spotify to Facebook and see what your friends are listening to, and listen to the same tracks as them without paying for it. Apple's own movement in this area, Ping, was a rare miss for the company (probably because you had to pay for music to listen to it). We think it's time for Apple to return to social media in a big way.

Steve Jobs said that people want to own music, not rent it. While we agree in principle, it's becoming clearer that the social and sharing advantages of subscription music are – at least for us – starting to outweigh the advantage of having a music collection.

On a personal level, we're using Spotify to discover music and are happy to buy it on vinyl again if we truly love it. We're not claiming our personal experience to be representative of all Apple fans, but we can't be the only ones who find iTunes a boring place where we listen to the same tracks over and over again.

Everybody presumed that Apple bought Beats in part to access its subscription music service and roll it into iTunes. We would have preferred to see some movement in this area, along with iTunes Radio over another interface redesign. These things take time, especially from a licensing point of view, but it's becoming harder to remain interested in iTunes while all our friends are over on Spotify.

Verdict

The media-management side of iTunes remains as stable as ever, and we like the new interface. It's a shame that the story about iTunes has become what it's missing out on, rather than what it features. Music has, for most people, always been a social experience and iTunes is sorely missing out on social interaction aspects of rivals such as Spotify. Apple iTunes is a very lonely place to listen to music if you've used Spotify for a while. ☒ **Lou Hattersley**

NAS DRIVE

Synology DS414j

£224 ex VAT
£269 inc VAT

Contact
■ synology.com/en-uk
Read more
■ tinyurl.com/m643bsg

Specification
4-bay NAS drive chassis; Synology DSM 5.0 operating system; drive bays for 4x 2.5/3.5in SATA drives (not hot-swappable); 1x gigabit ethernet; 1x USB 3.0, 1x USB 2.0; 2x 75mm cooling fans; external 90W power adaptor; 168x184x230mm

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

★★★★☆

For home users who need a decent amount of network storage on tap, it's possible to build a network-attached storage (NAS) box around a simple two-bay device. In fact, with single hard disks now running up to 6TB capacity, you might be able to accommodate all your data needs with a single huge disk.

A four-bay NAS drive like the Synology DS414j may seem a superfluous luxury then. But there are good reasons why four disks is the sweet spot between capacity, security and performance. With just two disks on-board, you get the first options of a RAID configuration – either striping them together to get maximum capacity and performance (RAID 0), or mirroring the two disks for safety (RAID 1).

Stretch up to four disks though, and you get the benefit of decent size, performance and some leeway of safety if one disk should fail. This would be with a RAID 5 setup, where you get around three-quarters the sum of equal-sized disks.

The alternative for this NAS is what Synology calls Synology Hybrid RAID (SHR). This uses a Linux mdadm utility to allow disks of different sizes to be used without sacrificing so much total space – otherwise, with different-sized disks you'd only get an overall capacity based on the sum of the smallest of the array.

Synology's DS414j is the entry-level four-bay unit from the NAS specialist. As such it's made some economies in its specification to keep the price down, principally in the all-important processor.

Where the next model up – the DS414 without the j – has an ARM dual-core system-on-a-chip (SoC) from Marvell, namely the 1.33GHz Armada XP, this junior version of the NAS has an even cheaper chip in the form of the improbably named 1.2GHz MindSpeed Comcerto 2200.

This processor from lesser-known fabless firm MindSpeed is also a dual-core ARM Cortex-A9 design with built-in crypto engine to allow hardware encryption. MindSpeed is now owned by Motorola's spun-off semiconductor company Freescale.

The DS414j has a minimal amount of memory to run the system, 512MB of DDR3 RAM, and a single gigabit

ethernet port for joining your wired network. For connecting outboard storage drives it includes two USB ports, one each of USB 2.0 and 3.0; both at the back.

The outward industrial design of the DS414j follows the desktop bread-maker shape introduced with the DS408, then redesigned into the form we see today with the DS409 facelift in 2009. Unlike the rest of Synology's current range, this chassis is not made for hot-swapping disk drives.

The DS414j runs the same operating system as all other Synology NAS drives, currently DiskStation Manager 5.0. This is a welcoming interface, modelled on the flatter, squarer look of Windows 8 and iOS 7/8, with most elements for configuring and maintaining the DiskStation accessible from a central control panel.

All the usual functions of a NAS drive can be engaged here, such as Windows and Mac file serving, FTP server, and a plethora of optional apps to further extend functionality. With the help of the Package Center you can install added Synology applications such as Media Server and Surveillance Station. There's also a growing ecosystem of third-party apps, including WordPress and Drupal for hosting a website.

We set up the Synology DS414j with four 2TB WD Red disks, and configured these into a RAID 5 array for that useful balance between performance, capacity and limited redundancy.

Tested in Windows 7 first, we assigned our test volume with a drive letter so that it could be treated like an attached volume. We saw read speeds up to 118MB/s and write speeds up to 98MB/s, when measured by the somewhat flattering ATTO Disk Benchmark speed test.

Stepping back to CrystalDiskMark benchmark test, sequential reads extended to 76MB/s while sequential write reached 88MB/s. Importantly, when confronted with a stream of smaller 0.5MB data files, the speed changed little from CDM's headline speed, maintaining 74- and 68MB/s respectively. At the smallest file level of 4kB random read/writes, the Synology with its WD disk payload measured 4.7- and 7MB/s. Stacking up the threads, the QD=32 result was a useful 29- and 1MB/s for 4kB random I/O.

Power consumption for this low-power NAS was suitably low, peaking at 24W with its four WD Red disks spinning and under load, falling to just 7W with the disks spun down and the system idle.

Verdict

The Synology DS414j is well-made and packs just enough power to not embarrass itself in basic benchmark tests. That it runs the same carefully wrought and versatile operating system as its dearer brethren is a definite plus, making it suitable for small-scale business use as well as being turned to home entertainment duties. ☒ **Andrew Harrison**

INKJET PRINTER

Epson Ecotank L555

£275 ex VAT
£330 inc VAT

Contact
■ epson.co.uk
Read more
■ tinyurl.com/n8ns5qL

Specifications
Four-colour (CMYK) A4 inkjet printer; 5760x1440dpi print resolution; 1200dpi scanner; fax machine with 30-sheet document feeder; 9/4.5ppm for mono/colour; 1x USB interface, 802.11n Wi-Fi; 474x377x226mm; 6.2kg

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

Inkjet printers are traditionally sold at very low prices, and the manufacturers then make most of their profit by charging high prices for the replacement ink cartridges. That's starting to change, though, with both HP and Epson recently launching new printers that adopt different pricing models. We weren't entirely convinced by HP's 'instant ink' subscription service, but Epson's new Ecotank printers take a much more radical approach.

They turn the traditional printer business on its head, with a higher initial purchase price for the printer itself but much lower costs for ink supplies. And, instead of using small ink cartridges that can only print a few hundred pages at a time, the Ecotank printers have large built-in ink tanks that can hold enough ink to print several thousand pages.

Exploring the Ecotank range

There are currently two printers available in the Ecotank range. The L555 reviewed here is a four-in-one multifunction device that costs £330 and includes a 5760x1440dpi printer, 1200dpi scanner and copier, along with a fax machine and 30-page document feeder. It provides USB and Wi-Fi connectivity, though there's no ethernet, which seems like an oversight in a printer that will primarily appeal to business users. The 100-sheet paper tray also seems a little small for a printer that needs to run at high volumes in order to maximise savings.

There's also a less expensive model called the L355, which has the same specification but omits the fax machine and document feeder, bringing the price down to £250.

Rather than inserting a set of small ink cartridges into the print mechanism, the L555 has a set of large ink tanks bolted onto the right-hand side of the printer. It's a clever idea, but filling the printer up with ink for the first time is a bit nerve-wracking, as you have to unhook the tanks from the side of the machine and then squirt the ink in using four separate bottles for the cyan, magenta, yellow and black inks.

Epson quotes speeds of nine pages per minute for mono printing and 4.5 pages for colour. During testing, we recorded 8.5- and 4ppm respectively, which is modest for a printer in this price range.

We can't fault the print quality, though, as the L555 produces text that is close to laser-quality, and good graphics output. It also produces bright and bold photo output when using glossy photo papers. Again, a speed of three minutes for an A4 photo print isn't fast, but the quality is more than adequate for printing marketing brochures and product photos.

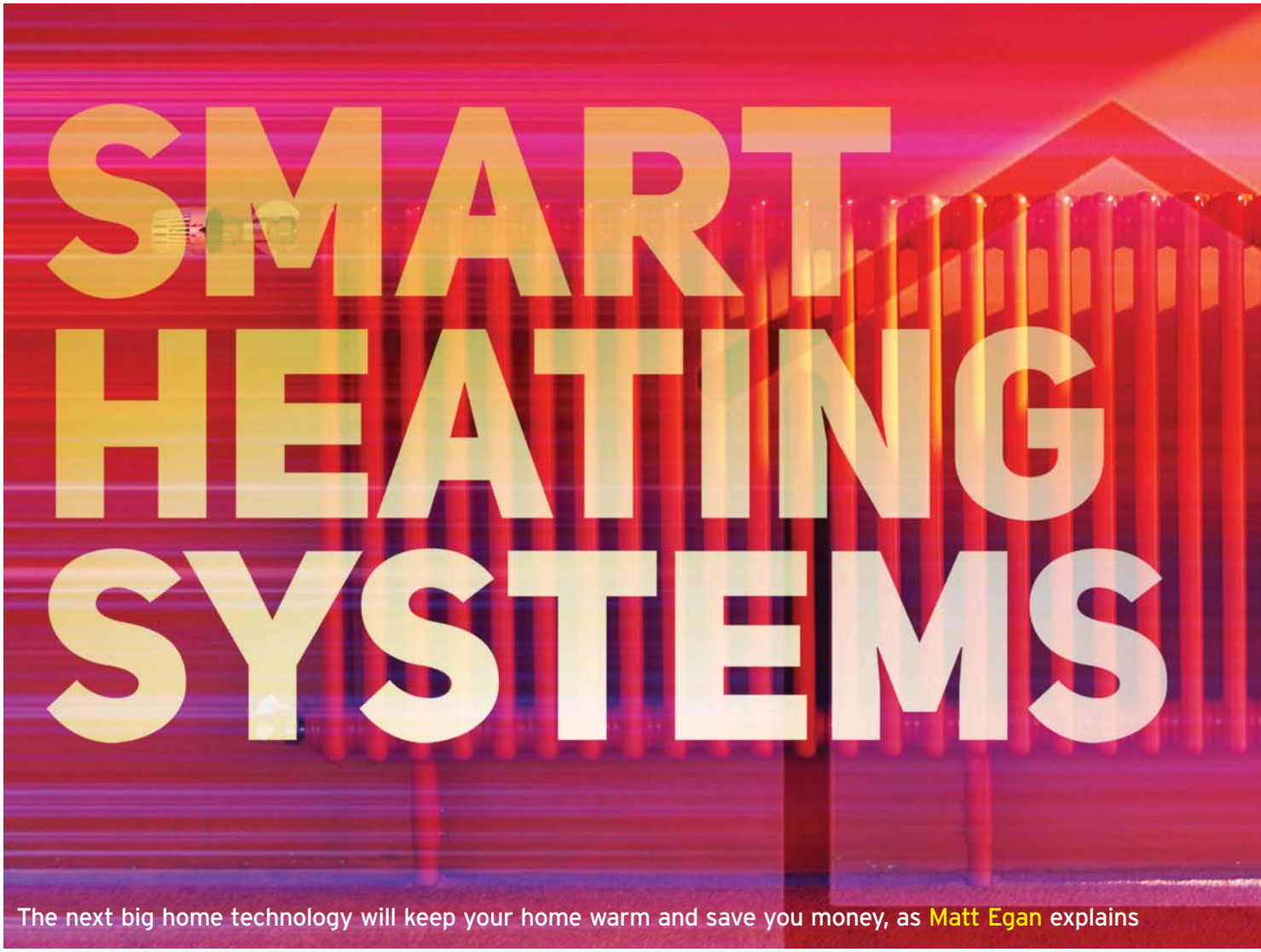
Cheap to run

The real attraction, though, is the long-term cost of using the printer. The L555 costs £330, and includes enough ink to print 4000 mono pages and 6500 pages in colour. We estimate that producing the same number of pages with a conventional inkjet printer would cost more than £500 for the ink alone. That makes the L555 a real bargain in the long run, even if the initial purchase price is relatively high.

Replacement inks are very affordable, too. A bottle of black ink costs £8 and will last for another 4000 pages, which works out at just 0.2p per page. The three coloured inks also cost £8 each but last for 6500 pages, which comes to just under 0.4p per page. Those prices are far lower than any conventional inkjet printer currently available, so you'll definitely save a lot of money in the long run.

Verdict

If you just need a personal printer for occasional use, then you may still be better off buying a conventional low-cost inkjet printer. However, the Ecotank printers offer big savings for businesses that need to print text and graphics documents on a daily basis. There are a few rough edges, but Epson's Ecotank printers represent a real breakthrough in the cost of printing. ☒ **Cliff Joseph**



SMART HEATING SYSTEMS

The next big home technology will keep your home warm and save you money, as Matt Egan explains

You've probably seen the adverts for Hive, with its quirky song about how great it is to control your heating from a laptop, smartphone or tablet. And yes, it is, but more than that, smart heating is likely to be a key part of every home going forward. As fuel costs rise and supplies run dry, the ability to heat our homes efficiently will stop being a nice bonus and become an essential part of every home's economics.

As part of the burgeoning 'internet of things', smart home heating systems are only the beginning of a process that will see us able to control power and fuel consumption. Expect in time to be able to switch off your fridge and freezer during peak hour each day. And even to order food and other supplies only as you need them. The aim of the game is efficiency: maximum comfort for minimal cost to you – and to the environment.

Over the past 12 months, smart thermostats and smart home heating systems have become widely available. If you have a boiler and central heating you will probably be able to fit any of the four systems we review here, and the others we examine. Storage heaters are another matter, as we explain in the box on page 65.

But not all smart home heating systems are equal, and which one works best for you is another question altogether.

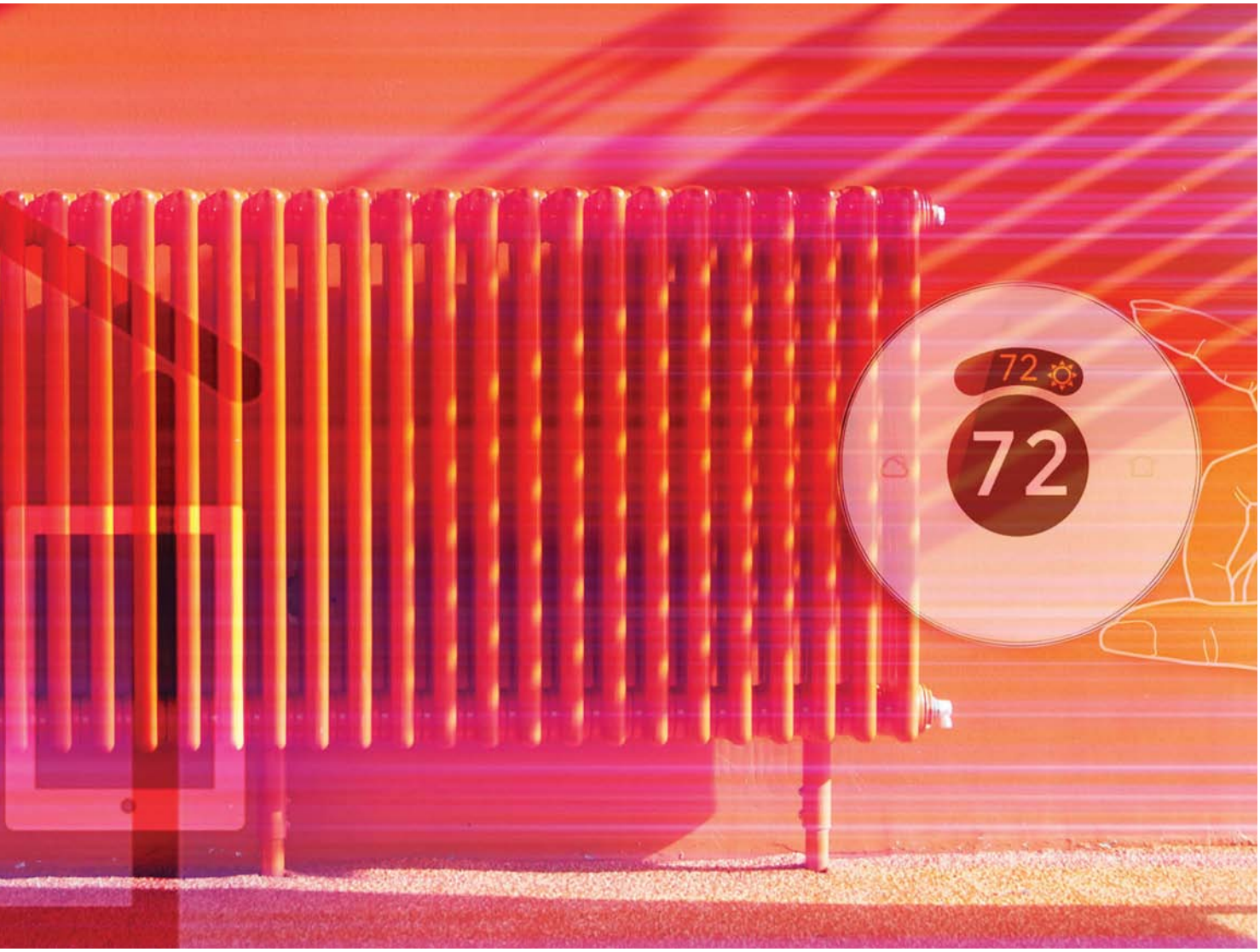
We have been testing these systems for months to give the best possible purchasing advice. It takes time (and a home) to fit and test these systems, so while we have tested four, we haven't yet reviewed HeatMiser or Honeywell, although a feature on them and some other similar systems is on the way.

The key question is how smart you need or want to make your heating. Most of these systems – Hive, Nest, NetAtmo, Honeywell and Tado – simply put a smart thermostat into the most used room in the house, and moderate the whole-house temperature to match. For smaller houses, where most rooms are in regular use, this is probably a cost-effective way of attaining the desired results.

Heat Genius and HeatMiser offer something more. They zone your house and then offer smart heating in each zone, so your guest bedroom is heated only when required, the master bedroom is warm in the morning and at bed time, and the kitchen is hot at tea time. They are more sophisticated and objectively better solutions but they are a lot more expensive. And in the UK at least, all modern houses with a total floor area greater than 150m^2 have to be built with at least two zones of heating, according to the Building Regulations. So again, a small, well-used, modern house or flat is unlikely to need this level of sophistication, while a well-used large home may have sufficient zones built-in to make Nest or Hive a good solution.

The right smart heating system for you will be dictated by your home, your use of that home and your need to save money.

The good news is that there is a way of making every house more efficient and comfortable and the householder more wealthy (or at least less poor). But the best way for each home will differ. Which is why this feature reviews the best smart heating systems currently available and offers an overview of the entire market.



Tado Smart Thermostat

Price £250
tado.com/gb

The Tado Smart Thermostat and remote-control app promises to save up to 30 percent on your heating and energy bills.

With US-based Nest not launching its smart learning thermostat in the UK until months later, its Germany-based rival Tado has got the jump on it. Tado is betting that its eponymous remote-control smart thermostat will take off in the UK in the same way that it has in its native Germany, where it is the market leader.

The company claims that its smart thermostat will help consumers save an average 27 percent in heating costs – about £180 a year for the average user. At a cost of £250 (self-install), the device should have paid for itself in 16 months. If you get an engineer to install Tado, then the cost rises to £308, which would take 20 months to recoup, using Tado's figures. With the price of energy unlikely to fall in the next few years unless the government imposes price cuts on the power companies, reducing your electricity and gas bills as soon as possible makes a great deal of sense.

While we can't confirm these quoted savings until we've run the Tado for a longer period, we can report that using this kind of system is a revelation in monitoring and controlling your domestic heating, and we're confident that savings are there to be made. The more control you have over your heating, then the more money you'll save; and with energy prices still sky-high right now, you'd be silly to ignore all solutions.

Why buy a smart thermostat?

What would you say is the most expensive bit of tech kit in your house? HD TV? Super-slim laptop? Apple iMac? iPhone? Audio system? In most houses one of the priciest chunks of tech of all is the humble but money-burning boiler. A new, energy-efficient boiler will probably set you back anything between £1,200 and £2,500 including installation – that's more than most smart TVs or laptops.

Yet the real cost of a boiler is much higher than the purchase price, as an inefficient model will be costing you hundreds of pounds a year in wasted energy. One option,

especially if your boiler is over 15 years old, is to replace it with a new energy-efficient model. The average saving when replacing a G-rated boiler is £225 a year. If your existing boiler has a more efficient D rating, you can still expect to save as much as £65 a year by replacing it. Even given the cost of a new combi boiler purchase and installation, you'll be saving money in the long run, with the energy savings covering your initial outlay quite possibly within five to seven years.

Based on a saving of 25 percent gas usage, the Energy Saving Trust estimates the average household saving on energy bills after installing a new boiler is £310. And if your current heating system doesn't include a room thermostat, the potential savings in using a smart system like Tado are greater.

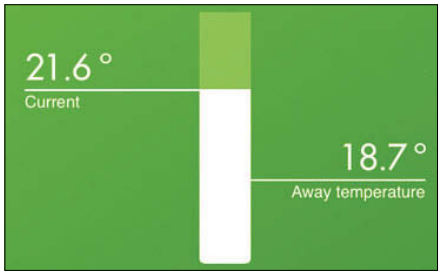
If your boiler isn't that old and is still going strong, a cheaper way to make your boiler more efficient is to get smarter. There is a growing list of smart thermostats and systems appearing on the market, all of which promise to slash your heating bills.

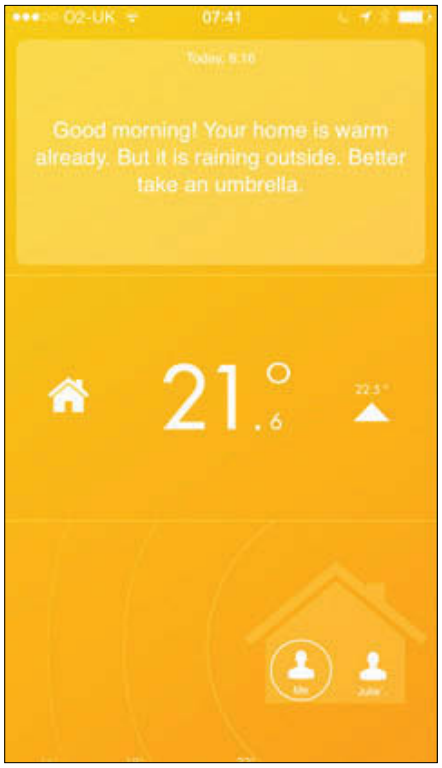
The best known after Tado is Nest, from the ex-Apple guys who originally worked on the iPod. It looks gorgeous, and is simple to use. Google liked it so much it forked out $3bn to buy the company. Since October 2011 Nest claims its US customers have saved more than 1.4 billion kilowatt hours – enough electricity to power more than 135,000 homes for a year. Nest made its UK debut in April 2014.

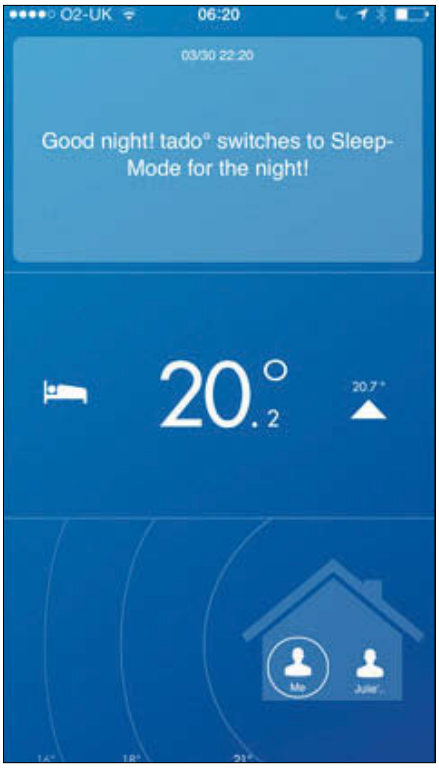
The US Environmental Protection Agency says that customers could reduce their energy usage by between 10 and 30 percent by using the schedules and temperature settings of programmable (semi-smart) thermostats. These let you programme temperatures for certain times of the day, so you can automatically lower the temperature when you'll be out of the house, for example.

Unfortunately up till recently these programmable thermostats have been tricky for the average homeowner to operate correctly. The new, smart remote-control thermostats, such as Nest and Tado, connect to home Wi-Fi networks and come with simple smartphone apps.

What differentiates Tado from Nest is its smarter learning features. Nest programmes itself by learning your behaviour patterns and the temperatures you prefer for certain days







and times during the week – which it calls 'Nest Sense'. It then builds a schedule for your heating system to follow. You control Nest through the outer-ring dial (see page 58) to adjust temperatures or via the mobile app.

However, the brains at Tado believe that the smartphone will become the remote control for everything inside the home. In this way Tado is more revolutionary than Nest. With Tado there's no physical dial that lets you adjust your home's temperature, and, at first, that feels weird. Everything is controlled via your smartphone app (iPhone and Android) or the desktop web app. It creates a more real-time and less static schedule than the Nest approach.

You set Tado a target temperature for the room that you and your family spend most time in, which is where you place the Tado Temperature Sensor. Tado is powered by a solar cell, which the company claims will never run out of power.

As there's only one sensor – Tado may add more in the future to add zoning – Tado is probably best suited to smaller homes (one to four bedrooms).

You also set the usual times you wake up at in the morning and go to bed at night; you can enter different times for weekends. Tado then knows to heat up the house ready for when you bound (or crawl) out of bed in the morning. If you think the heating comes on too soon, it's easy to adjust Tado's settings via the apps. You get to the settings with a simple swipe of the mobile app screen.

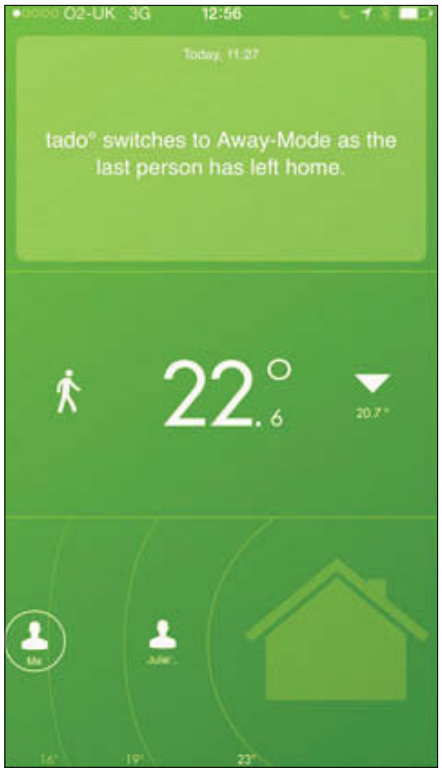
Tado sets a minimum sleep temperature of 15°C, as it argues that letting the temperature drop lower would force the boiler to work harder in the morning. There's also a maximum of 25°C, so if you like your house really hot, Tado might not be for you – although energy efficiency might not be top of a heat-lover's list in the first place anyway.

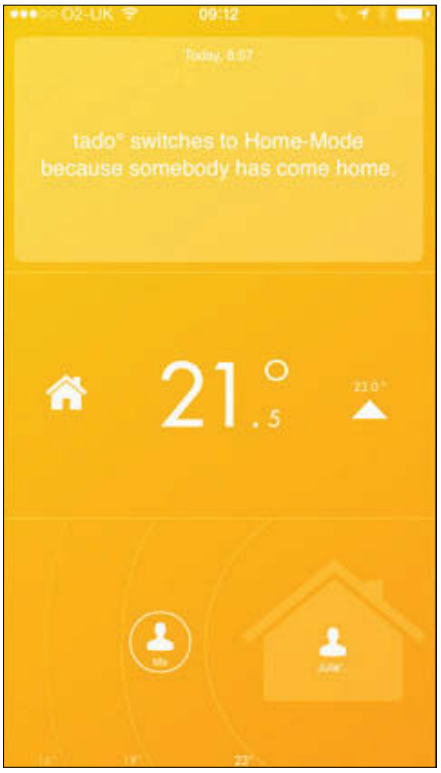
All this smartness takes a bit of getting used to. In the UK we generally set our boilers to come on and off using timers. Creatures of habit, we get up at the same times on weekdays and mostly pretty regularly on weekends too. If we get cold we walk to the boiler and turn up the temperature.

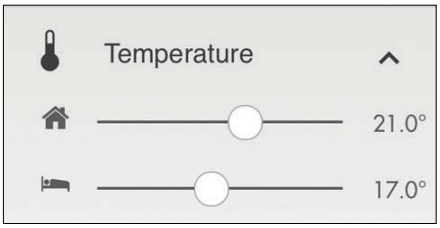
With Tado you leave the heating on all the time (initially scary for energy-efficiency nuts) and the smart thermostat does all the thinking for you. It even knows whether you are at home or elsewhere, so if you do break out of your usual routine – either staying at home for the day when you'd usually be out, or being away when you'd normally be in – Tado will turn the heating up or down depending on your location.

Nest on the other hand creates an auto-away mode based on what it's learned, but doesn't actually know who is in the house. Using sensors and algorithms, it makes a guess as to when people are in or out to prevent heating or cooling an empty home. When it senses you're back, the Nest thermostat returns to the regular schedule.

Via the GPS in your smartphone, Tado uses presence detection to know whether you're at home or away. Indeed, it controls the heating depending on how far away from it you are, and starts heating up the house as you get nearer.







If you pop to the shops for an hour it will gently lower the temperature to save money but raise it again as you head home. If you're out all day on a trip, Tado will lower the heating further and for longer, but knows when to raise it again when you're on your way back.

Depending on how far the residents are away from home, Tado lowers the temperature. As soon as one resident gets near, Tado heats the home up.

If you have a guest or a babysitter who remains in the house while you're away, you can switch Tado to manual mode. If you want to, you can set a temperature manually at any time.

But would all residents who might stay in the house unaccompanied have a smartphone to use the app? Well, they probably would, as most children who are old enough not to need a babysitter have smartphones these days.

Tado is compatible with iOS (iPhone and iPad) and Android. BlackBerry is expected soon, and an app was released a few weeks ago. With the free Tado app installed on all residents' phones, Tado can run your heating to an optimum level.

Another smart thermostat is Hive, available for £199 to customers of British Gas only. Like Nest, Hive doesn't offer presence detection, and is a little less smart than Nest as you have to adjust room temperature as you leave the house.

Tado expects in the future to enhance the system software with an expert mode for even finer user controls. Until then you can contact the company if, for example, you wanted to extend or reduce the area of presence detection.

Tado is a clever little thing. It learns about the performance of your heating and how it works together with your house or flat. The company claims that Tado should be operating at maximum efficiency within three weeks. It examines your daily temperature data to work out how fast (or slow) your house warms up, for instance.

In the first few days the smart thermostat might behave a little erratically as it tests and gets to know your heating system and your home.

Tado also uses a range of local weather data to know when to raise or lower the heating to your desired level of comfort, as solar radiation affects room temperature.

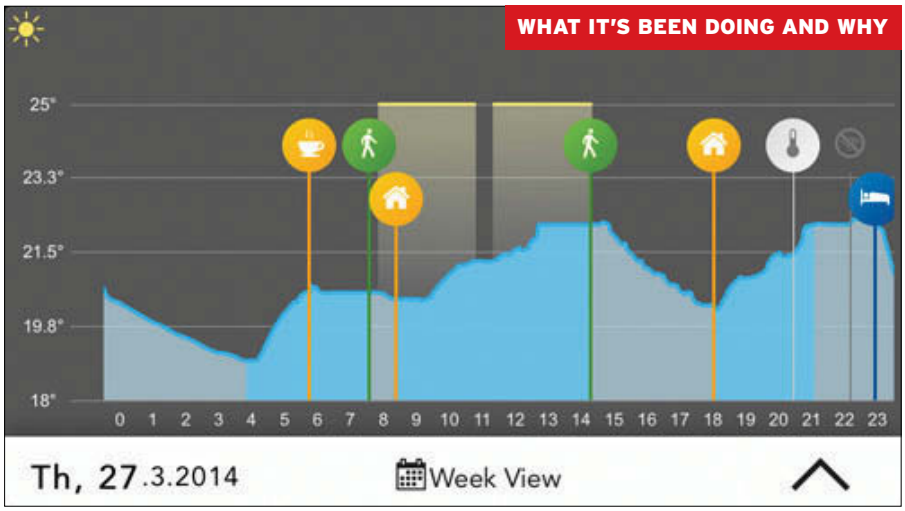
The app is clear and simple but full of information. The background colour changes depending on the mode it is operating in. Orange denotes home mode – for when a resident is home. Green is away mode – after the last person has left the house. And blue is sleep mode – when your sleep time begins.

There is also a Tado web app you can access with a web browser on a PC, Mac or laptop. The web app gives an overview of all Tado's activities: a detailed report with a temperature curve, heating activity and events that influence the temperature regulation. You can also adjust all settings, set a schedule for residents without a smartphone, and manage your account.

So what happens if you leave your smartphone at work and nobody else is home? There's a button on the Tado box that lets you or an unattended guest tell Tado that someone is actually home. This mode is deactivated by pressing the button again, or in the web app you can tell Tado to go back to the programmed heating schedule.

If you turn off your heating in the settings, then it will stay completely turned off except for warm water. But because Tado tracks the room temperature it will nevertheless turn on the heating once the temperature falls below 5°C – a great fall-back safety feature to prevent frost damage to the property.

Pet owners who leave their animal unattended for most of the day will want to consider the best temperature for their pet. A dog doesn't need a room temperature of 23°C. And Tado doesn't let your home cool down completely when nobody is at home. ☒ **Simon Jary**



Hive Active Heating

Price £199
britishgas.co.uk

★★★★☆

Smart thermostats are like buses and, well, you know the rest. For the best part of 30 years there were precisely no technological advances in thermostats and now – boom! – everyone wants to sell you an internet-connected box that lets you control your heating from anywhere. You've probably heard of Nest (now owned by Google) but maybe not some of the others such as Tado, HeatMiser and HeatGenius.

These systems all do pretty much the same thing: they allow you to use your portable devices, such as tablets and smartphones, as well as PCs, to control and monitor the heating system and hot water in your home. The main advantage, of course, is that you can turn the heating on or off – or adjust the temperature – when you're not at home to do it yourself.

British Gas has also decided to get in on the action with Hive, but it's important to note that you don't have to be a British Gas customer to have Hive.

The system will cost you £199, which includes professional installation. Or you can opt for the Hive kit at £159 and install it yourself. At the time of writing, you can get a free Hive system when you sign up to a 18-month contract with British Gas.

The Hive system works with most boilers, but you can check on the Hive website if yours is compatible.

Installation

Assuming you decide to go for the installation option, you'll have to make an appointment for an engineer to install Hive at your property.

The friendly British Gas engineer arrived on time for our install, which took about an hour and a half. There's a hub which is connected to connected to a spare port on your broadband router (and also needs mains power), a receiver which connects to your boiler, and a wireless thermostat which should be placed in the room which you use the most.

The engineer also showed us how to set up the app on our iPhone to check that everything was working as it should. Even without reading the manual, the system is easy to understand and use.

The thermostat doubles as a controller unit and runs on batteries, so it can be installed on any wall. Unlike other systems, such as Nest, the Hive thermostat needs to be installed permanently in one place. There are guidelines on where it

INSTALLABLE-ANYWHERE THERMOSTAT

can be positioned, but the engineer will recommend a location which is best for your heating system. In our case, it simply replaced the old thermostat in the hall.

The last step is to create a Hive account at hivehome.co.uk. You can use only the thermostat to control everything, but this rather defeats the whole purpose of upgrading. As well as being able to control your heating from the app, you'll get live energy usage information.

Currently there are apps for iOS and Android, and a Windows Phone 8 app is in the works. Once you've entered your account details into the app, along with the hub ID, you're ready to start using Hive.

Features

The apps are designed well, being both clear and intuitive to use. While you can use the app on a tablet, it's clearly designed for a smartphone's smaller screen. We actually preferred the look of the web app over the mobile version, since it has clearer navigation and it's easier to set up the schedule.

In the app, the heating section has three main controls: schedule, manual and off. The hot water control also adds a boost feature,

which could be handy if you're heading home early and want to make sure there's enough hot water for a bath.

Big numbers tell you the current temperature and what temperature the heating is set to. You can adjust the set temperature by simply swiping up or down on the screen at any time.

When it's in the off position, the system automatically goes into a frost protection mode. If the temperature inside dips below 5ºC, the heating will turn on to prevent pipes from freezing.

The schedule section has a seven-day, 24-hour schedule preset, but you can easily tweak this to suit your lifestyle. This is quite fun to do with the web app's large, colourful and easy to understand controls.

Apart from controlling your heating and hot water temperature and setting up a schedule, there are many other options.

You can manage your Hive devices. The app will show you whether the hub, receiver and thermostat are connected to each other, their signal strength and their power or battery status.

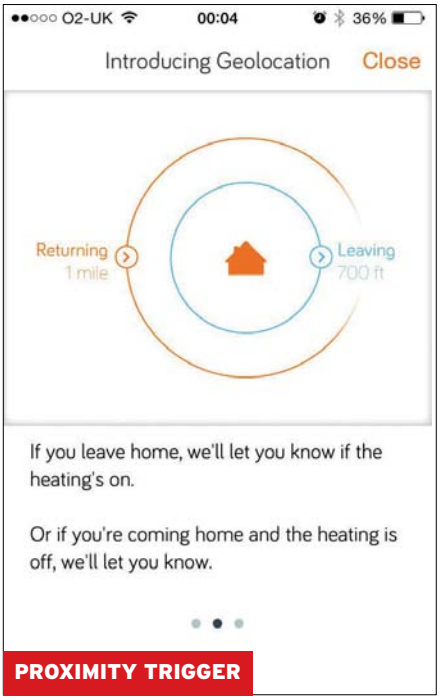
You can also set up notification, which will alert you when the temperature reaches a specified level.

You can set a PIN lock which will prevent others – kids, for example – who share your smartphone from changing the Hive settings you have chosen.

If you don't have a smartphone, or it isn't an iPhone or Android, then you can enable text control, which allows the system to be controlled by sending a text message.

A new addition to the Hive mobile app is geolocation. With this enabled, your smartphone will automatically notify you of your specific away and home temperature settings, or if the heating is on or off, when you leave your home or as you come back. You can also change the distance of these 'trigger areas'.

JUST SWIPE TO ADJUST

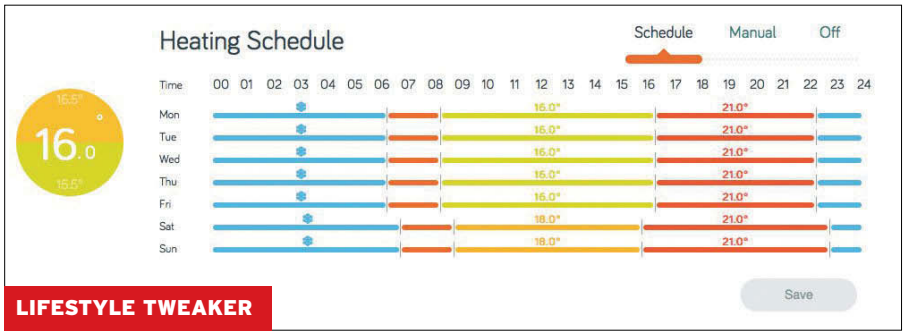


PROXIMITY TRIGGER

Verdict

The Hive Active Heating system is a great upgrade for anyone who wants or needs the ability to be able to control their heating remotely. It's by no means the most advanced or best-looking smart thermostat, but it will do the job for a lot of people. However, it doesn't offer zoning control over individual radiators (yet), and isn't much cheaper than rivals, some of which offer more.

It's still early days for smart thermostats and we haven't had the system long enough to test the claims that they can save you £150 a year (and it's virtually impossible to prove – or disprove - that anyway), but the main advantages of Hive are ease of use, remote control and those great colourful graphs and charts that make you feel like you're in control of the energy you use. And let's be honest, just about everyone loves a nice-looking graph. ☒ **Dominik Tomaszewski**



LIFESTYLE TWEAKER

Nest Learning Thermostat

Price £179
nest.com/uk

Smart thermostats are hot right now, with gas suppliers quick to get in on the act and bundle them with some of the tariffs they use to woo prospective customers. Just as British Gas sells Hive, nPower is offering free Nest thermostats to customers signing up for its Intelligent Control tariff.

Surprisingly, the UK version of Nest isn't the same hardware that's sold in the US. This explains the delay in the UK launch. Houses in the US use different heating systems, as they're also required to cool as well as heat. In the UK, there's barely any need for air conditioning, and keeping warm is far and away the main concern.

Nest stands out because of its circular colour LCD display, which makes it a gadget you'll want to show off rather than hide away as you would with the Hive. Because Nest has a display, you don't need to launch a smartphone app to change the temperature, yet the kit is no more expensive than others which come without a screen.

The stand was developed especially for the UK, but it's not included in the box and will cost you an extra £29. However, while the stand might be useful in some cases, most people should be able to use their existing in-wall thermostat wiring to power Nest's screen. The kit even includes a big plastic plate to cover up the old wallpaper, paint or holes you'll probably be left with when your installer removes your old thermostat. That's

because Nest is much smaller than you might expect, at just 83mm wide.

The display itself has a 44mm diameter and a resolution of 320x320 pixels, the same as the latest Android Wear smartwatches. Viewing angles are good left to right, but not when viewed from below. So if your old thermostat was mounted quite high up on the wall, contrast may not be all it could be.

The rotating dial surrounding the display oozes quality. It doesn't click: any sound you hear is coming from the speaker inside the device. The whole unit can be pushed to select options (and enter the menu), but all settings can also be accessed from the free app, which is available for iOS and Android. There's no official Windows Phone app yet, but you can also check and adjust settings from the Nest website, where you can view energy reports too.

A hidden sensor under the display detects movement and automatically turns the screen on when you walk past or raise your hand to use the dial. Another sensor detects if the sun is shining on the display and ensures it doesn't play havoc with the internal thermometer, which would otherwise signal that it's time to turn the boiler off.

Heat Link

The other gadget in the box is the Heat Link. This attaches to your boiler, and has built-in Wi-Fi to connect the system to the internet via your wireless router. Virtually every other smart thermostat has a third component which connects to an Ethernet port on your router, so this is a much neater solution if your Wi-Fi coverage is good enough.

The Heat Link has a button you can press to put Nest into manual mode, just in case you need it. Holding it down for 10 seconds resets everything.

Nest strongly recommends you have the system professionally installed because of the high voltages involved. However, if you're comfortable changing a light switch, you should have no problems installing Nest.

The Heat Link is compatible with the vast majority of heating systems, including combi boilers, those with hot water tanks, underfloor systems, air-source and ground-source heat pumps and others. You can check Nest's website to see if your system is compatible.

How it works

At its most basic level, you can use Nest just like a dumb, old thermostat. You can walk up to it, turn up the heat and sit down again. If it's too hot, you can turn it down a bit.

It's a lot smarter than this, though, and you'll probably find you won't need to touch the dial (or app) much once the system has learned your schedule. This is partly done through training: for the first week or two after installation, you're encouraged to turn the dial down when you leave the house, and turn it up when you come back in.

Nest's movement sensor also detects whether anyone is still at home. If not, it will turn down the heat automatically, and show auto-away on the display. Pets won't set off the sensor, so you won't end up wasting gas by heating the house up for the cat.

It should go without saying, but we will anyway, that you can control the temperature from anywhere using the app. As long as you have an internet connection, you can change settings and turn down the heat remotely.

The thermostat is also a programmer, so you can use the display or app to set a schedule, just as with a traditional programmer. However, instead of using 'on' and 'off', you set the temperature you want your home to be when you're in, and a low temperature for all other times – Nest calls this the setback temperature.

Thanks to the learning process, the Nest will automatically create a schedule for you, and you can see in the app whether changes in temperature were due to someone manually operating the dial or automatically triggered by Nest based on schedule.

In the couple of months we were testing Nest, the auto-schedule produced some very odd timings. However, because the testing period was summer and no heating was needed, it is impossible to come to any conclusions about this. Nor is it possible to say anything about the effectiveness of the system, including the much vaunted True Radiant feature, until we have comprehensively tested it with the heating on. True Radiant, incidentally, is Nest jargon for learning how long it takes your home to heat up so that it can fire up the boiler at the right time to hit your scheduled temperature.

You can check on the status of Nest's learning feature by going to the settings in the app or on the website, where each feature will either say 'Ready' or 'Learning'. You can also disable any you don't want, apart from Leaf and Time-To-Temp.

The Leaf appears on the display when you set the dial to an 'energy-saving temperature', encouraging you to keep the heat below 19 degrees or so.

Zones

Some rival smart thermostats allow you to control the temperature in different 'zones' around the house. Nest can do this too, but you will need a separate Nest thermostat for each zone for this, which is not a cost-effective option for most people.

HeatGenius, for example, offers smart TRVs (thermostatic radiator valves), which allow you to control the temperature in the most important rooms.

With a single Nest thermostat, you're reliant on any existing 'dumb' TRVs to shut off radiators when the set temperature is reached. For most normal-sized homes this works well enough, and means you're still saving money compared with the £50 or so you'd spend on each smart TRV for a system such as HeatGenius. If your home has 10 radiators, it will take quite a few years before you start saving any money due to the high initial outlay.

Also bear in mind that you can only use multiple Nest thermostats in a home which has a heating system that can heat different zones individually. Older homes with a conventional gas boiler typically heat the entire house, and unless the pipework is physically changed to include two or more valves for different zones (upstairs and downstairs, for example), then adding extra thermostats is pointless.

Nest Protect

As well as controlling heating, the Nest system integrates with the Nest Protect smoke and carbon monoxide detectors. These are available in mains and battery-powered versions, each costing a hefty £89.

However, these detectors are much smarter than traditional alarms as they use vocal warnings instead of meaningless beeps. For example, if you have multiple Nest Protects installed, you might hear the warning, "Be aware: there's smoke in the living room," giving you a heads-up on a potential problem.

If there's a lot of smoke or carbon monoxide, an alarm will sound, along with "Emergency! There's smoke in the living room," helping you to decide on the best exit route in the event of a fire.

The integration also means you'll get a notification on your smartphone or tablet to warn you of low battery power, or when an alarm has gone off – which can be useful if you're away from home.

Another benefit of installing Nest Protect is that the device detects motion, so the thermostat has a better idea of whether anyone is at home or not. In turn this helps to ensure auto-away is more effective.

THE NEST PROTECT DETECTOR

Software version 4.3 update

Since Nest was launched in the UK, there have been a couple of minor software updates, although a much bigger update was being rolled out as we went to press.

The major update includes three new features: enhanced auto-schedule, quick view and system test.

Nest has refined the algorithm for determining an automatic schedule, and claims it could deliver extra savings up to 6 percent. This third version of the algorithm has a better understanding of how long your home takes to heat up, and slightly reduces the time until the system switches to auto-away. The enhanced auto-schedule 'learns all the time and reacts quicker to changes in routine' such as school holidays and the Christmas break.

The second feature – quick view – is much more noticeable since it's a new interface for the settings on the thermostat itself. While the main temperature screen remains unchanged, the new view gives you a lot more information at a glance and means you don't having to go into submenus to see information such as yesterday's energy use or the next item on the heating schedule since the text in the centre changes as you rotate the dial.

Quick view also makes it much quicker to turn off the heating, and easier to see if there's a problem as an exclamation mark appears in the centre of the settings icon if something is wrong.

Finally, the system test feature has been added to solve two issues. First, the installer can test the system and ensure it's working properly before leaving. Second, it lets you test the efficiency of your heating system to make sure it's working properly before winter sets in, and hopefully get a heads-up on any potential issues. It works by timing how long it takes to reach a set temperature, and warns if that is too long based on how long it has taken previously.

There are a couple of other minor updates, such as the addition of more time zones and weather information for eastern Europe and Asia. More relevant for UK users is that error messages will now appear in the iOS and Android app instead of only on the thermostat's display.

Verdict

Nest is the only smart thermostat system which also incorporates a smart smoke detector. Does that make it the best choice for you? It's certainly easy to use and the circular display is a great talking point.

The smoke alarms are on the expensive side, though, especially if you need two or three to cover your whole house adequately. Yet the Nest kit itself – excluding installation costs – is good value at £179, and should pay for itself within a couple of years.

Saving money, though, is only one benefit of smart thermostats: the ability to monitor and control your heating remotely is also very useful. The only way you'll get a cheaper smart thermostat is by getting one bundled with a new gas tariff, so on that basis Nest is good value.

One last thing to bear in mind is that you could buy a system that allows you to control multiple zones cheaply. You could start off with the basic thermostat, and add controllers for other zones later on – possibly when your funds allow – and this would work out cheaper than buying multiple Nest controllers. But for those who are happy to have just one thermostat and rely on TRVs to control each radiator, Nest is a fine choice. ☒ **Jim Martin**

Heat Genius

Price £799 inc VAT
heatgenius.co.uk

Heat Genius is a remote heating control system for your home that is smart and wireless. Unlike the smart thermostat systems already considered (Nest, Hive and Tado), Heat Genius defines zones in your home, and then lets you control the temperature of each via laptop, smartphone or tablet apps. It measures occupancy and temperature, and should reduce heating costs over time as you heat only the parts of the house that need to be warm and only when they need to be warm.

Physically the Heat Genius system consists of a central wireless hub which communicates with smart TRVs to switch your radiators on and off, as well as wall-mounted movement sensors, and smart plugs as required for connectivity. The hub communicates wirelessly with the other composite parts of the system, and is controlled via an app or web interface. Once the hub is hooked up to the broadband network in your home, you can even access the heating system from anywhere that you can get online too. So if you want to switch the heating on during your commute home, you can.

Installation

Let's start at the beginning. When you first enquire about purchasing Heat Genius the company surveys your needs in detail. Don't worry if you don't yet know what a TRV is – you will, but Heat Genius will be with you every step of the way. You're going to spend a lot of money on this system, and the installation feels like a big commitment. But before anything is installed, Heat Genius discovers exactly what you, your family and your home requires – and, indeed, whether a smart heating system such as Heat Genius is an appropriate choice.

Suffice to say that if you have a boiler and a thermostat, then the system will work in your home. But as we discuss below, not all homes will benefit from a system as sophisticated as this one.

The physical installation is handled by a plumber local to you, trained and subcontracted by Heat Genius. They turn up at an agreed time on an agreed date with a detailed plan of what is required in your home. They don't leave until an extensive checklist of tests has been carried out.

By the time the fitter leaves you will have a working smart heating system, and you will have been instructed in its use. You also have a manual override switch on the boiler itself, so that if for some reason the system fails or you can't work it, you can switch the heating and the hot water on and off as before.

Again, with a commitment as big as changing the way your home heating works, this is a critical feature. You don't want to be without the means of controlling your heating as winter rolls in.

Using Heat Genius

I've been using a Heat Genius system in my 1950s semi-detached, brick-built home for several weeks now, as the external temperature has dropped. We have an elderly boiler for both the central heating and the hot water, and radiators in all the rooms. Our Heat Genius installer divided our home into zones: kitchen, bedroom, landing, front room and spare bedroom. Each of these zones has at least one radiator, now controlled by smart TRVs (the control on the end of a radiator that lets you set the level of heat).

This zoning setup does exclude some other rooms with radiators, such as the bathroom, nursery, conservatory and various hallways. Our installer grouped those into a virtual zone called 'whole house'. So now, even though we cannot exactly control the temperature in those rooms, we can remotely switch on the heating in all those places. So we are no worse off than before, even in the spaces that aren't zoned.

It's also worth pointing out it would be easy to define the additional rooms as zones, simply by buying and installing the extra TRVs, and adding them to the system. A simple job. As is moving a zone from one room to another, and renaming it. For example, zoning the guest bedroom probably wasn't all that important on reflection.

Using Heat Genius is simple. You get a guide book, which is useful but not really required. We now heat the bedroom and landing for only an hour or so every morning in time for the household waking up – early during the working week and a little later at the weekend.

The kitchen is heated for the time we return home from work to cook and eat. We set this on a timer via the app, by tapping the rooms and the time of day we wanted to be heated, and the desired temperature for those times.

We've also stopped heating the hot water tank 24 hours a day – a colossal waste of money given that the tank keeps water warm for up to 24 hours after heating.

One early learning curve was that we initially set the warm period in our bedroom for before our usual waking time and just before we get home in the evening, presuming that the system would need to come on early to heat things up. But that is how dumb heating works, and Heat Genius is smart. Very smart.

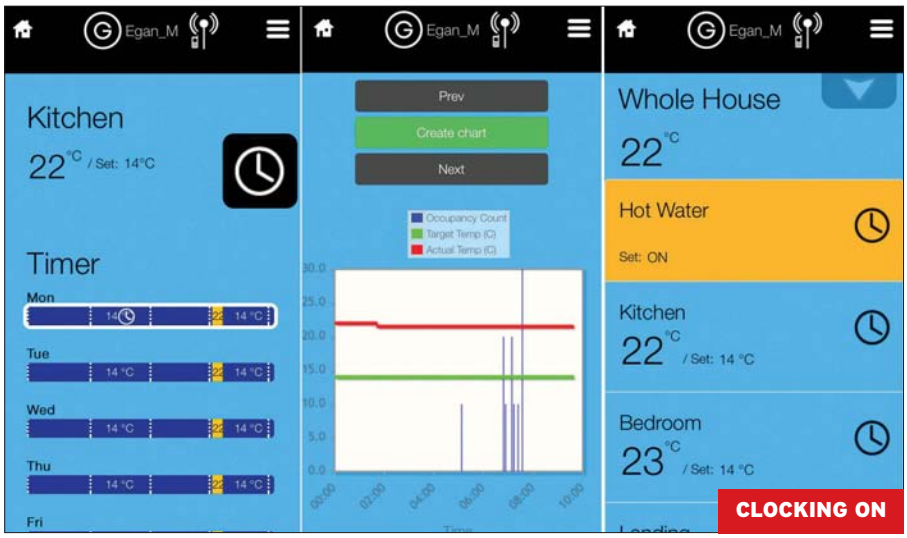
It measures the ambient temperature in the room and puts the heating on only for as long as it needs to maintain the correct temperature throughout the correct time. This also makes the Heat Genius system an all-year-round set-and-forget product: no more spousal arguments about putting on the heating in September. You just tell Heat Genius what temperature you want a zone to be and it will do the rest. And, as with the manual override switch on the boiler, you can always use the app to override and switch on any of the zones. So perhaps those spousal arguments are fated to continue regardless. Such is life.

The timer is just the simplest way of utilising Heat Genius. It's a good start for saving fuel and money, as we are now using only one or two radiators where previously we were using all the heating in the house. But there's more. Over time Heat Genius uses its chest-high in-room sensors to build up a picture of your household's room occupancy. It also plugs in to local weather information to find out the external ambient temperature.

You can therefore enable the eco mode for each zone or the whole house, simply set a desired temperature for when the rooms are in use, and then let Heat Genius do all the rest. This is the smartest way to use the system, and the most aggressive way to save money. And any time you aren't home as usual, you can switch off the heating from your smartphone.

Modes include super eco, eco and comfort, ranging from maximum money saving through to maximum comfort. Reader, I am a Yorkshireman; which do you think I prefer?

The other aspect of the Heat Genius setup is the smartplugs. These can seem incidental, but because the Heat Genius communicates through line of sight and the signal bounces of each device on the system, they do help communication. You can control the smartplugs in much the same way as you control the heating within zones. So you could, say, set lights to come on and go off at specific times via the timer or manually from the app. You could switch off the fridge for an hour or two each day, for instance, and save money (and do your bit to reduce the load on the grid) during peak times. Or you could set your coffee machine to go off five minutes before you rise in the morning.



CLOCKING ON

What is great

I'm really impressed with Heat Genius. Most important is the value of zoning and flexibility. Once you have set the system up, it is easy to use and adjust, and it allows you to heat only the rooms you need to heat, when you need to heat them. Because it is entirely wireless it is very simple to add zones to the system or move them around, and this level of flexibility didn't require a high-impact installation process. Heat Genius is both flexible and scalable. It's worth pointing out that Heat Genius offers constant support post-install too.

Heat Genius lets you do a lot with a relatively small amount of hardware. Between the various eco modes, the timer, overrides and even the smart plugs this system is a true smart home system. It just needs to draw the curtains and put out the bins to have the full 'Tomorrow's World' feel.

The app interface itself may not be the most beautiful, but it is very simple and easy to use. Hidden away in the settings section are the advance settings, which allow for more complex troubleshooting and so on. But, honestly, since the system has been set up we haven't had cause to look in there. My wife just started using the app and the system without a glance at the instruction guide book – that's as it should be, but also good to know.

We like the fact that Heat Genius detects when you open a window, and turns the heating off in response (you can override this). And it is fascinating to view charts of how you use your home and the heating. The truly cost-conscious (hello!) can spot inefficiencies and save money by addressing them. And although we haven't yet been able to test this, Heat Genius can use weather forecasts to predict frosts, and keep your pipes warm to avoid bursts.

Finally, we have been impressed with the level of security baked into Heat Genius. This is important because data about your home usage in the wrong hands could leave you vulnerable to burglary. Your account is password-protected, the data encrypted.

Most important of all, Heat Genius itself doesn't see that aspect of your app use. It can access the advanced settings page of your account to troubleshoot problems remotely, but it doesn't see how hot you like it in the bedroom (so to speak). When you consider that some rival products such as Google's Nest exist principally to build up user data, this is a refreshing approach. And it means that you aren't relying on Heat Genius to keep your crucial data safe.

WIRELESS HUB

What isn't so great

The benefits of a wireless system are great in terms of flexibility and low-impact install. But we did have some connectivity issues when the system was first set up. My house is particularly poor for wireless, being full of thick brick walls and small rooms. Heat Genius got past this but it required the installation of two powerline adaptors, and the hub now lives in the kitchen – closer to the boiler than where the router sits just inside the house. This isn't a massive criticism of Heat Genius, it is an issue with wireless connectivity. And the system works fine now. But it does mean we have another set-top box type device in the kitchen, as well as powerline adaptors dotted around the house. It would be much neater to site the hub under the TV with the router.

We also have very occasional ongoing issues with connectivity. Sometimes, for no apparent reason, the app will indicate that a couple of rooms have lost contact with the hub. To date, this has always resolved itself in very little time, with no intervention required on our part. And it is only fair to point out that when a room isn't connected its radiators act in the same way as the 'whole house' radiators, so they would still come on when any room was set to heat. So the


MANUAL CONTROL

worst outcome is too much heat, which was no more than what was happening every day before we had Heat Genius fitted. But it is a little unnerving.

One other minor oddity is that Heat Genius fits a smart-looking thermostat with an LED display, but this is redundant within the system as it stands. Indeed, if you have guests staying who don't have access to your app, then they have no means of adjusting the temperature beyond using the manual on/off override. What they do have is a visual thermostat that only looks like it might work. Heat Genius told us to expect this feature to be enabled sooner rather than later.

Other than that? Nothing, really. Heat Genius is a system that does a useful thing well. If we were nit-picking we'd say that the app interface is not the best-looking and occasionally it requires a couple of hard presses on the home icon to get to the home screen. Oh, and the smart TRVs make a very quiet noise when they connect and make changes.

The only possible barrier to you rushing out to buy Heat Genius today is the old issue of price and value. And this is not entirely clear-cut. Whether it represents value for you really will depend on how sophisticated your needs are.

What it costs and value: Heat Genius vs Nest, Hive and Tado

Let's be clear: Heat Genius is not the cheapest solution you can buy. The best-known smart home heating systems around are Google's Nest and the Tado and Hive systems. Each of these costs less than £300 installed and up and running (Hive is £199 including VAT). The Heat Genius system in my home would costs £799 including VAT to buy (installation is currently free, although that is not always the case). The Genius hub itself costs £249.99 and the hot water controller is £49.99. Four zonal sensors will cost £34.99 and the smart valves for the radiators are £59.99. You get the smartplugs thrown in, but you can see how the price racks up.

But that is not to say that Heat Genius is poor value. Far from it. It's just not cheap.

The critical issue here is the zoning. Where Nest, Hive and Tado put a smart thermostat in one room of the house, and switch all the heating in the house on and off based on the temperature in that room, Heat Genius does something similar for every room. You could replicate the Nest, Hive and Tado experience for the cost of the Genius hub, one sensor and one valve – £344.97. But that would be overkill if the less sophisticated features of Nest, Hive or Tado would work best for you.

The nearest product to Heat Genius on the market right now is HeatMiser Neo, which offers similar functionality and features but is a wired rather than a wireless device. The HeatMiser Neo hub costs £250, and the additional elements of the system add costs in much the same way as Heat Genius does.

Heat Genius told us that it believes its system could pay for itself in two to three years. That seems feasible in some circumstances, but not all. Consider Heat Genius if, for instance, you have a large house in which some rooms are used only rarely. Especially if it is an older house that is hard to heat, and you spend a lot of time at home but take regular trips away. Heat Genius would be ideal for a retired couple once the kids have flown the coop, for instance – perfect for when the family comes visiting, but also for those three holidays a year (you won the property lottery, boomers, so you might as well enjoy it).

But if you live in a small house or flat, where all the rooms are occupied and everyone is out all day, in my view it would take considerably longer for the investment in Heat Genius to pay for itself. If that sounds like you, the smaller investment in Tado, Hive or Nest may be more appropriate (if less cool).

Verdict

Heat Genius is very good at a very useful thing. It is easy to use and efficient, and over time it will save you the cost of installation. And it is fairly priced. How long Heat Genius takes to pay for itself will depend on your circumstances, and it may be that dropping £799 is too much of a long-term investment for you. But it is a great product, and if you are looking to install a zoned smart heating system in your home, we are happy to recommend Heat Genius. ☒ **Matt Egan**

The smart thermostats we didn't test

HeatMiser Neo

Price £203
heatmisershop.co.uk
HeatMiser must be the closest thing to Heat Genius on the market right now. It's a fully zoned heating system that gives you smart control over the heating for each room in your house. Like the Honeywell Lyric (see below), it comes with a geofencing feature that allows you to set the house to automatically heat up as you get near it. Alternatively, as with Heat Genius, you can set up each room on a timer, or measure the usage of the house and heat rooms only when they are actually in use.

With Neo you get air and floor sensing, and flexible programming similar to Heat Genius. You can set comfort levels for day and night, and easily switch off your heating, remotely. It requires a DHCP-compatible broadband router, and you'll need an iOS or Android-compatible mobile device. The basic kit costs just £203, but realistically you may need someone to fit it for you. And that kit contains only one zone, so to get a Heat Genius-style setup you need to pay out a Heat Genius-style amount.

Honeywell Lyric

Price from £150
lyric.honeywell.com
There are multiple Honeywell smart thermostats on the market, the most recent being the Lyric, which is similar to the much trailed Nest, reviewed earlier. It connects via your home Wi-Fi network, and in principle at least is simple enough for you to set up at

home. The Lyric looks the part of a smart home device, with its 3in-diameter polished glass face and a nice-looking touchscreen interface with cool icons.

You can, as you would expect, control your Lyric thermostat from anywhere with your smartphone or tablet. A geofencing feature automatically regulates the temperature when you're away from home, measuring that distance using the GPS chip in your phone. Honeywell makes great play of a fine tune feature that considers both temperature and humidity – which may not be as useful in the UK as in, say, the US.

At first blush then, we'd say that the Honeywell Lyric looks like a fully featured smart thermostat. It costs between £150 and £199 from various UK retailers.

NetAtmo Smart Thermostat

Price £147
netatmo.com

At the simpler end of the smart heating system scale, there's NetAtmo Smart Thermostat. The company says the system is simple enough to install, and that anyone who has ever changed a light fitting should have no problem installing NetAtmo.

The thermostat itself is a cute little white box with an LCD display. You can either attach it to the wall or use it wirelessly throughout the house. This sounds remarkably convenient for anyone with a smaller house or flat who doesn't want to go to the trouble of zoning.

NetAtmo will still heat the whole house according to the temperature on the thermostat, but at least it will mean that the temperature is right for the room you are in. You can adjust the temperature directly on the thermostat or remotely from your smartphone, tablet or PC.

And that's it really. NetAtmo Thermostat will create a programme to reflect your habits, but it is based only on your habits and the temperature outside. It's about as simple a smart thermostat as you can buy, but none the worse for that if simple is what you need. At €187 (£147 including tax and delivery) it is reasonably cheap to buy direct.

Inspire Home Automation Room Thermostat

Price £124.99
inspirehomeautomation.co.uk

From Inspire Home Automation comes this internet-controlled programmable room thermostat. It costs £124.99 including VAT and can be installed – or so Inspire tells us – by anyone.

Once it's in, it gives you remote access to your existing heating controls and the ability to monitor the central heating system from anywhere with an internet connection. So like NetAtmo, Tado, Nest, Hive and Honeywell, it is a simple system intended to make the whole house hot or cold at your command. There is an app for iPhone and Android devices, but you can also control it from the web. This is a cheap if basic solution that on the face of it will be a simple answer for smaller homes.

PassivLiving Heat

Price £279
passivsystems.com

Equally simple but effective is PassivLiving Heat. For a total of £279 (plus an optional service fee of £3 a month that kicks in after a year), PassivLiving simply installs a smart controller for the boiler that you control via the smartphone app or online interface.

PassivLiving Heat is relatively basic and lacks zoning. You can set your boiler to one of four states: in, out, asleep and away. And you can define what these modes mean to make your home the temperature you want, when you want it. The system measures the inside and outside temperature, and automatically adjusts the system if the external temperature changes. Interestingly you can also see your energy usage data.

PassivLiving Heat is compatible with the majority of boilers available in the UK.

What happens to smart heating when the internet is broken, there's a power outage, or the batteries run out?

Matt Egan looks at the consequences for your smart heating system if the Wi-Fi or power goes off

Smart heating is great, and coming soon to a house near you. The ability to control the temperature of your home from laptop, smartphone or tablet is both a cool function, and a great money-saving device. Heating only where you need when you need it is going to become a big deal in the next few years. Not least because it suits the energy companies to conserve fuel. Expect your provider to start promoting smart heating, even if it isn't yet doing so.

This is all great when it works. But just as you can't tune a digital TV if the signal is slightly out, so smart home functionality is an all-or-nothing proposition. Recently the broadband stopped working in my home and, as well as the usual panic over lack of communications and entertainment, it meant that the heating stopped working.

In fact, it very quickly became apparent that the lack of Wi-Fi didn't have to mean a lack of heat at all, but it pays to know what will happen in the eventuality of a power cut, the internet going down or the batteries running out.

Heating, after all, in the UK at least, isn't an optional extra that can be casually discarded when the power goes out. So here is what we learnt about what happens to smart heating when the lights go out.

What happens to smart heating when there's a power cut?

If the power goes out, then you lose your smart heating system's smartness but the dumb heating keeps working. Or to be precise, the heating will still work as it has always worked after a power cut. But what that means is that in most cases you will not be able to use the heating after a power cut. Only very old heating systems can operate without any power at all.

This is a shame, because in almost all cases the smart controller has to have a battery backup so the smart element of your heating should continue to work just fine. You won't be able to control the heating remotely, or set a new heat regime, but if by some miracle your central heating doesn't require current to operate, you will be able to flick the heat on or off. Like you used to have to.

In all probability, though, you are going to be cold – but that's because of your heating system rather than your smart heating system. I'm indebted to reader Chris Riley for pointing this out.

What happens to smart heating when the batteries run out?

Again, in almost all cases smart heating systems don't rely on batteries. The batteries in smart thermostats such as those of Nest and Hive exist only as backups and should never be required unless the power goes out. As a consequence they should never need to be replaced. But if they do, the thermostat will tell you in good time that a replacement is needed.

The exception here is HeatMiser Neo and Heat Genius, both of which are zoned smart heating tools that use smart TRVs to operate each radiator separately. With smart TRVs you will need to replace the batteries in them from time to time. Again, the systems will let you know in good time that you need to install new batteries. If the batteries aren't replaced, the TRVs will be left in the 'on' position, so that you will have a surfeit of heat rather than not being able to operate the heating.

SMART THERMOSTATS AND STORAGE HEATERS

Smart heating systems and smart thermostat systems are a growing trend, but with little or no knowledge of plumbing you're probably unsure whether they will be compatible with your boiler. After all, do you even know what make of boiler you have? Still, that's nothing that a little digging on the manufacturer's website or a phone call to its help team can't solve.

The problem goes beyond the boiler, though. What if you use storage heaters rather than radiators? Storage heaters run on electricity and are entirely separate from your water-heating system. Here we address whether you can use a smart thermostat if you also use storage heaters.

Storage heaters are one of my pet hates. Not only are they not actually any cheaper than standard heating systems (I have the electricity bills to prove it), they also require you to know in advance exactly how much heat you might need the following day. Get it wrong and you'll either freeze or boil, because other than adjusting how quickly your storage heaters release their stored heat, the only thing you can do is open a window, and that isn't something that's going to work when it's too cold rather than too hot. But now I've just found a whole new reason to hate these ugly brick-laden beasts: smart home thermostats.

The sad truth is that you cannot use a smart home thermostat in combination with a storage heater. And while you can still use a smart thermostat with your hot water boiler, there is little point, as will become clear.

Storage heaters are filled with bricks and work by heating them up overnight when electricity prices are cheaper. They are often paired with Economy 7 energy tariffs, which offer an even lower overnight rate, but a higher daytime rate. They come with two manually operated dials: one that lets you specify how much those bricks should heat up in the first place; the other is used the following day to control the heater's vents and, ultimately, how quickly the heater releases its stored heat. Once that heat has gone, it's gone – at least until the next day.

A smart home thermostat is unable to turn those dials on your behalf. It cannot turn on a storage heater in the middle of the day when you want a bit more heat. And it can't turn the heating off when you're too hot: once the heat has been stored in the bricks, it has to go somewhere.

A smart home thermostat won't save you money by turning on the heating only when necessary. Neither can it do fancy things such as set up zones within your home, allowing you to have different temperatures in the living room and the bedroom, nor heat your home to a desired temperature at a specific time. Storage heaters are just too dumb.

However, storage heaters control only the temperature of your home. You will also have a gas or possibly electric hot water boiler, with which you could use a smart thermostat. You would, though, be wasting your money.

For starters, you probably already have a thermostat on that boiler, which allows you to control at what time it turns on and off. You'll have this set up so you have hot water at the times you need it. The only thing that a smart thermostat could change here is that it would allow you to switch the hot water on remotely. That could be useful if, say, you are coming home a couple of hours earlier than usual and want a hot bath when you get in. But considering the frequency with which you might use this functionality, a smart thermostat is simply not worth the expense. ☒ **Marie Brewis**

What happens to smart heating when the Wi-Fi is down?

We'll get to the specifics in a minute, but in general a lack of Wi-Fi affects only the way that you can communicate with the heating and not the heating's ability to operate. In the cases of smart thermostats it generally follows that the heating will continue to act as it did before, and your problem will be with your ability to change the schedule. With the more sophisticated zoned heating systems you will generally find that you have to disable the central hub and make use of the manual controls.

So what happens to Nest Learning Thermostat, Hive Active Heating, Tado or the Honeywell Lyric Thermostat when the power goes off or the Wi-Fi down? As mentioned earlier, if the power goes, then the smart thermostats have batteries for backup power, which kick in and keep things working (although your heating is probably not going to work). If your backup batteries do get low, you'll get a notification on the thermostat itself and via any app you use to control it.

In each case your heating will continue to work if your broadband goes down. Taking Hive as an example, if your system is in auto mode it will continue to run to the heating schedule that you have set. In all cases you can control your heating settings manually from your thermostat until your broadband connection is restored.

What happens to Heat Genius and HeatMiser Neo when the power or the internet is down?

As before, lack of internet means only that you lose control. You can't then use the mobile app to control things. But neither Heat Genius or HeatMiser Neo uses your Wi-Fi to operate, building their own networks instead. So in the case of Heat Genius, the Genius hub will keep trying to communicate with the boiler, which prevents manual operation; unplug the hub and you can use the manual controls. Once the broadband is back, plug the hub back in and it will work as before.

As mentioned earlier, the smart TRVs are powered by battery so they will continue to work fine if the internet goes down. And if the power goes down you should find that the manual controller on the boiler has a backup battery that kicks straight in. ☒

BEST LAPTOP DEALS

These days, you don't need to spend a fortune on a decent laptop. Here Andrew Harrison looks at six models that are available for under £450

Everyone likes cheap when it comes to spending their own money. After all, who pays more than they need to, to get what they want?

Fewer people like cheap in the sense of cheap quality, but if you can't spend more than £450 on a portable computer and you don't want to play 3D games, read on for a guide to buying a cheap laptop for not much money.

When you see laptops and PCs advertised on the telly, there are usually a few specifications called out to help define what's on offer. These typically include the main processor type, the screen size, and how much memory it has installed. And don't forget, memory means random access memory (RAM) and should never be confused with the storage capacity of a hard-disk or solid-state drive.

Screen size is a good starting point for finding the laptop you need. Most today are sized at either around 13- or 15 inches, the viewable screen area measured diagonally; there are also some 17in models still made as gaming machines, professional workstations or all-round family entertainment centres. At smallest, you may also find some laptops with 11.6in displays.

The screen also gives a guide to the overall weight, helping you make a decision if portability is key to your needs. Most 13in laptops weigh between 1.3- and 1.6kg, while 15in models are usually between around 2- and 3kg.

The screen is frequently the poorest-performing component in a low-cost laptop. Alongside its physical size and resolution listed in advertisements, there's rarely any quantitative indication of quality, helping manufacturers to fit the cheapest and lowest-grade screen they can find to pare costs. Such displays will have very low contrast ratios, and limited colour gamut, while colours will look crude and garish. These crude twisted-nematic (TN) displays also have severely limited viewing angles. Compare these to the better-grade IPS displays now common on your phone or tablet, and you'll notice that it's difficult to view the laptop screen from the side, forcing you to keep your head in certain positions.

Look out for the screen finish, too. Shiny screens became popular about five years ago, as they seem to have better colours and contrast, but in use these untreated gloss panels reflect daylight, bulb light and your own image straight back at you. Matt anti-glare screens are more versatile, but also beware of cheap coatings that give a sparkly, fuzzy effect to images.

The processor is the heart of the computer, although today it's not so much performance we need – laptop chips reached fast-enough years ago – as good battery economy. Apart from the slowest chips such as the Intel Atom, almost any processor from Intel or AMD is fast enough to smoothly handle the Windows operating system and programs like Microsoft Office.

However, the cheapest chips fitted to low-cost laptops, such as AMD's or Intel's entry-level Celeron, also tend to be less power efficient than Core i3/5/7. This means they burn energy needlessly to do the same work, so they require a larger battery to run the same time; or more often they feature the same size batteries but have shorter usable life before running flat.

For better quality laptops fitted with the latest Intel chips and other power-saving

Photography by Dominik Tomaszewski

measures, you can expect seven- to 12 hours actual battery life. Budget laptops meanwhile may run for only around two- to five hours.

The most efficient and powerful chips are currently Intel Core series, such as the i3, i5 and i7. Specifically, the latest generations, codenamed Haswell (2013) and Ivy Bridge (2012). When used in laptops, these are mostly dual-core designs, some with Hyper Threading Technology which makes them perform like even faster quad-core chips with the right programs.

Clock speed should not be used as a guide to speed any more. But clock speed of a processor does give you an idea how quickly it will drain the battery – the higher the number, the faster it's gone. Modern laptops usually have chips running at around 2GHz or lower, and which perform as fast as the 2.5+GHz chips of a few years ago. Watch out for laptop manufacturers who only list an inflated overclock ('Turbo') speed, since most consumers still believe that higher numbers are always better.

And so to memory. Historically, RAM was expensive and represented a significant part of the investment in a computer. Today, however, it's so cheap that whether your laptop has 4-, 8-, 12- or 16GB is less important, providing you can still upgrade yourself if required. Windows 7 and 8 will run fine on 4GB, although even sub-£450 laptops often come with 8GB, now that it's such a cheap commodity.

To make a computer feel fast and responsive it's as important that it have fast storage. The cheapest laptops do not yet feature the best option of a solid-state drive (SSD), so you must make do with a slower hard disk instead. Disks are now so cheap that laptop makers can afford to put in huge 500GB or 1TB disks; great for hoarding weeks of music and video, but don't forget your backup plan to safeguard your personal files when the disk breaks or your laptop is stolen.

As a halfway measure, a small amount of flash and a larger disk are sometimes combined into what's being called an SSHD ('solid-state hard drive'), such as that fitted to the Acer Aspire in this group. This is a cost-effective way to get some of the benefits of both technologies.

Over the following pages we test and rate six laptops on sale in late 2014. Don't expect these to be available exactly as tested when you read this, though – the budget laptop market is extremely volatile, and retailers tend to secure limited stock of any model.

Meanwhile laptop makers such as Acer, Asus, Fujitsu, HP and Lenovo will make many slight variations of the same laptop, with subtly different product codes.

ACER ASPIRE V3-371

£350 inc VAT • acer.co.uk

Build	★★★☆☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★½
Overall	★★★★½

PC ADVISOR BEST BUY

Most laptops that cost under £400 tend to be large and clunky. Not so the Acer Aspire V3 (also known as the V 13), a lightweight cheapie of an ultrabook. It's not much thicker than 20mm and weighs just over 1.5kg. And as a new model from a big brand, it ought to be in circulation for a while.

The chassis is made from attractive matt plastic, and our sample was issued in a snowy white colour. On the back of the display lid is a hard textured finish that catches the light to give a kind of pearlescent effect. Meanwhile, the sculpted bottom that tapers the body edges is reminiscent of the original MacBook Air, but finished in similarly tough-feeling matt white plastic.

In the tradition of modern ultraportables, the battery is not accessible from the underside, nor is the storage drive or memory reachable through separate doors. Ambitious upgraders that wish to expand the 4GB of memory or 500GB hard drive will benefit from experience of tearing down a laptop's chassis.

While 4GB may look stingy, it should be enough for the kind of lightweight tasks run by a typical user of this ultraportable. And while hard-disk based storage is often the slowest link in the chain, Acer has juiced this component by selecting a Seagate SSHD – a 2.5in 500GB laptop hard disk with an added 8GB of fast flash, which helps accelerate performance.

On the left thin edge of the V 13 is an SD card slot and headphone jack. To the right are two USB ports – one each version 2.0 and 3.0 – and HDMI for connecting to a screen or projector. We were impressed to find that Acer has also included a gigabit ethernet port on the narrow edge here too, with a spring-loaded flap that prises open to accommodate the RJ45 plug of a network cable.

The Acer has a full-size Qwerty keyboard that fills the deck without the need for a numberpad to fill the space, as we see on 15.6in Windows laptops. If you do need to tap out numbers with one hand, pressing Fn and F11 engages the number lock, with many keys on the right side doubling up as number keys. Another feather in the Acer's cap is the best Wi-Fi adaptor in this group. It's still limited to 11n performance but while most cheap laptops sneak in the most basic of wireless cards, the V 13 is fitted with a dual antennas and dual-band capability.

Lab report

At 2GHz, the Aspire V 13 may not look the fastest, but in lab tests it proved to have the quickest overall performance, and the longest battery life. The Geekbench 3 score of 1988 points, for example, was the best on test, and trails the benchmark's reference PC by just 26 percent in single-core mode; and 22 percent behind in multi-core mode.

And so to the less welcome news. Like most budget laptops Acer has elected to fit a low-grade display, which here returned the joint worst results among a uniformly bad bunch. With only 55 percent coverage of the least demanding sRGB standard, and a contrast ratio of just 80:1, this is not a display that gives a close resemblance of reality. And like its budget brethren, viewing angles are very limited.

Gaming is also tricky in spite of the Intel Iris Graphics. This graphics solution is a step-up from older Intel chips but should not be confused with Iris Pro, which is a match for many dedicated discrete processors. Here the Acer could manage 34 fps in Tomb Raider 2013, but only at very low resolution and detail settings. Move up to Normal though, and the game averaged a stuttering 19fps.

Battery life was found to be more respectable than any other here, at six hours, 35 minutes, making this laptop the best choice for portable use.

VERDICT: Acer has a winner here, leaving out dumb extras such as touchscreen tech and focusing on better wireless and faster storage. The use of recent Intel chip also rewards the user with better graphics and system performance, including more usable battery life. Besides these components choices, the casework and design as a whole have a simplicity that really benefits the product.

ASUS X715L

£450 inc VAT • asus.com/uk

Build	★★★☆☆
Features	★★★½☆
Performance	★★★☆☆
Value	★★★½☆
Overall	★★★☆☆

With its 17.3in widescreen display, not to mention its substantial 2.6kg weight, the Asus X715L falls into the laptop category we'd call 'desktop replacement PC'. The large glossy screen with its slightly improved image quality make it more useful as a entertainment computer, even if graphics performance may limit some gameplay.

There's a good selection of ports around the black plastic casework. Three USB 3.0 ports is a useful number to have ranged on the left side. Alongside these are an old VGA video port, plus HDMI port for modern TVs and monitors. Also here you'll find a gigabit ethernet port and headphone jack; further up is a large exhaust vent from which you can feel a steady draught of warm air flowing.

Over on the right side is a flimsy tray-load DVD±RW drive, and DC power connector for charging. To read from SD cards, there's a slot under the front lip of the case.

There's no user access to the innards from the laptop's underside, nor is the 37Wh battery easily replaceable without disassembly.

The buttonless trackpad is more precise in use than on some laptops, and has a smooth finish that makes cursor steering easy, even if the click action is rather stiff. The keyboard follows the current trend for low-travel Scrabble tiles, and here has a fast and fluid action that allows typing at speed.

Powering the X751L is a fourth-generation (Haswell) dual-core Intel Core i3 designed for ultrabooks, clocked at 1.7GHz. As an entry-level Core-series chip it doesn't have any Turbo Boost, but does include Hyper Threading Technology to aid performance.

Despite the huge size and large screen, this laptop doesn't have a dedicated graphics processor, instead relying on just the Intel HD Graphics 4400 within the main processor. There is 6GB of 1600MHz memory, shared between the CPU and GPU parts of this processor.

For storage Asus has taken the capacious but slower choice of a 1TB SATA disk, a conventional 5400rpm drive. Meanwhile wireless connectivity consists of the now-standard Bluetooth 4.0, and the most basic of single-stream and single-band 11n Wi-Fi.

Lab report

In terms of performance, this Asus was the second-fastest out of the six on test. It scored 1843 and 3796 points in Geekbench 3 for single- and multi-core modes. This ranks it around 35 percent slower than the benchmark's reference model 2011 PC.

With Futuremark's PCMark 7 and PCMark 8 (Home and Office) tests, the Asus was ranked with point scores around the mid-2000s. These are reasonable scores for a mid-range laptop, dragged back more by the slightly slower storage than the capable processor and memory combinations.

Graphics performance results from our Windows game tests show some potential, with the usual caveat of keeping quality on or near lowest settings. Setting Tomb Raider 2013 to Low detail and 1280x720 pixels, for instance, the X715L could average 43fps with a minimum of 31fps, indicating that fluid gaming is possible.

Batman Arkham City proved more challenging for this laptop though, with just 32fps average and 11fps minimum with the same low-resolution settings.

The 17.3in display just falls short of native high-definition resolution, at 1600x900 pixels, and has highly reflective gloss finish best viewed in a dark room. While poor when compared to decent modern smartphones, its colours were less washed out than many budget models though. The lab measurements backed this up, recording 73 percent sRGB coverage where the worst example barely exceed 50 percent.

With the help of the recent processor and absence of discrete graphics, the Asus proved able to run for more than just a couple of hours away from the mains. In our standard looped-video over Wi-Fi test it survived four hours, two minutes before expiring.

VERDICT: Larger-laptop seekers may find something to like in this 17.3in model. In its favour is a decent CPU, storage capacity and memory, and the screen is not the worst we've seen.

FUJITSU LIFEBOOK A512

£370 inc VAT • fujitsu.com/uk

Build	★★★½☆
Features	★★★½☆
Performance	★★★☆☆
Value	★★★☆☆
Overall	★★★☆☆

Among this selection of low-cost laptops, the Fujitsu LifeBook A512 stands out as the only model designed for business use. But that doesn't restrict it to just the office, as its build and specification can still be of interest to anyone looking for a cheap laptop. Preinstalled with Windows 7 Professional, it also recommends itself to workers or home users that are steering clear of Windows 8.

It's a budget design and a conservative choice at that. At 36mm thick, it out-slabs even Asus' desktop replacement 17 incher, and tips the balances at just over 2.4kg.

Build quality is tougher than the competition, though, tough-feeling black plastic throughout with an eggshell patina that should shrug off daily use. Underneath the laptop is a useful layout of trap doors, through which it is much simpler to access the key areas of hard disk, memory and wireless card. The decent capacity 48Wh battery is also easily removable.

Further evidence that the LifeBook has been built for professional use can be found with the display open for business. The 15.6in display has a matt anti-glare finish to help its use in a typical office, although its low resolution of just 1366x768 is the minimum to just get by before text and images become really blurry.

Comfort level is one of the best on test, thanks to a superior keyboard with more satisfying action, still quiet and responsive to the touch. The trackpad is from an older era of Windows laptops, that is to say small at just 85x47mm, but most importantly it is accurate in use; and with proper click buttons below, too.

Around the sides is some evidence of an older model too – all three USB ports are the slow USB 2.0 type; and we also find an ExpressCard 34 slot, which is no longer a popular way to expand connectivity. Video outputs run to VGA and HDMI.

On main processor duties is an Intel Core i3 dual-core part, clocked at 2.3GHz and with Hyper Threading Technology to better performance. But note that this is a two-year-old Ivy Bridge generation chip. As this laptop doesn't include any discrete graphics, it must rely on the integrated Intel HD Graphics 3000 solution, which is more limited in power than the 5000 generation in current chips. The choice of CPU also means slower memory, 1333MHz rather than 1600MHz, which could hold back system speed slightly.

For wireless, the Wi-Fi is limited to single-band operation but at least uses two antennas to give 2x2 MIMO, which usually begets increased range and performance on that one 11n band.

Lab report

The single- and multi-core scores from Geekbench 3 place it roughly on par with the Haswell-powered Asus X751L with its 1.7GHz Core i3 processor, showing how new chips will perform as well with lower clock speeds, leading to better battery life.

The results from Futuremark benchmark tests were not so comparable, with sub-2000 point results in PCMark 7 and PCMark 8 Home. And the Fujitsu was unable to run the PCMark 8 Work test in our usual GPU-accelerated mode; we tried it again in conventional CPU-only mode, where it recorded a slightly improved 2030 points.

With its slower HD Graphics 3000 integrated graphics chipset, it was little surprise that Windows games would be less well supported. Our two games tests at easiest settings each returned average framerates of 26fps; but in the case of the Batman test, minimum framerate was recorded at just 1 fps, suggesting that the game would effectively freeze at times of peak screen-action demand.

In our standard looped-video test it ran for just over 90 minutes before shutting down. We did note that the default power plan set up by Fujitsu instructs the machine to hibernate at 10 percent battery level, so tweaking this may give a few more minutes runtime.

VERDICT: Very short battery life recommend this laptop to a life on the mains leash, although its low-res screen and chunky build still make it hard to get excited about this dated design. In its favour are relatively easy memory and drive upgrades, and an anti-glare display.

HP 255 G3

£200 inc VAT • hp.com/uk

Build	★★★☆☆
Features	★★★½☆
Performance	★★★★☆
Value	★★★☆☆
Overall	★★★½☆

Illustrating that Intel doesn't have a 100 percent monopoly on processors to power Windows PCs, AMD still makes chips that we find in slower and less efficient laptops and PCs. The HP 255 G3 laptop here can boast of its quad-core chip and Radeon graphics processor, wrapped up in a 15in display laptop for just £200.

To help achieve the low price, HP has installed Microsoft's new complimentary edition of Windows 8.1 with Bing. With no Windows tax to pay, HP was able to focus on just getting the budget components together to make a working laptop.

The chassis is a chunky plastic build in black and gunmetal colours, and the lid picked up indelible fingerprints after light use.

Inside is an AMD A4-5000 main processor, a quad-core running at 1.5GHz, which AMD describes as an auxiliary processing unit (APU). Like the Intel Core series, it integrates CPU and GPU together to save power and money. But the graphics engine inside bears the name of Radeon, a tradable commodity even if the primitive version fitted here cannot reliably play Windows games.

For storage, the HP has a 500GB capacity hard disk, while the APU is backed up with 4GB of memory, the faster 1600MHz type. Wireless connectivity runs to the usual Bluetooth 4.0 and single-band and single-stream 11n Wi-Fi.

Basic operational features don't suffer too much at the hands of economy – this laptop features a USB 3.0 port to the left and two v2 ports on the right, plus gigabit ethernet, HDMI and VGA video outputs, and an SD card slot. There's even a DVD/CD writer that pops out the right side.

Core usability is the HP's forté, since the key areas of keyboard, trackpad and display are up to standard for hassle-free use. The square-tiled keyboard has a great action that makes touch-typing a doddle, and the top deck barely yields under heavy-handed pressure.

The display is the typical low-resolution and low-quality panel we now expect in the cheapest laptops, but at least it's matt finished to reduce glare. And side-to-side viewing angles are not as bad as some budget displays. But this screen more than most will benefit from some calibration, as out of the box it added a blue cast to colours.

Lab report

While the lab benchmark results don't look so impressive against even the slowest Intel Core series-powered laptops, there's enough performance for daily computing tasks, and the AMD chip is a step up from Intel's budget Celeron N2840 that powers Lenovo's cheapest.

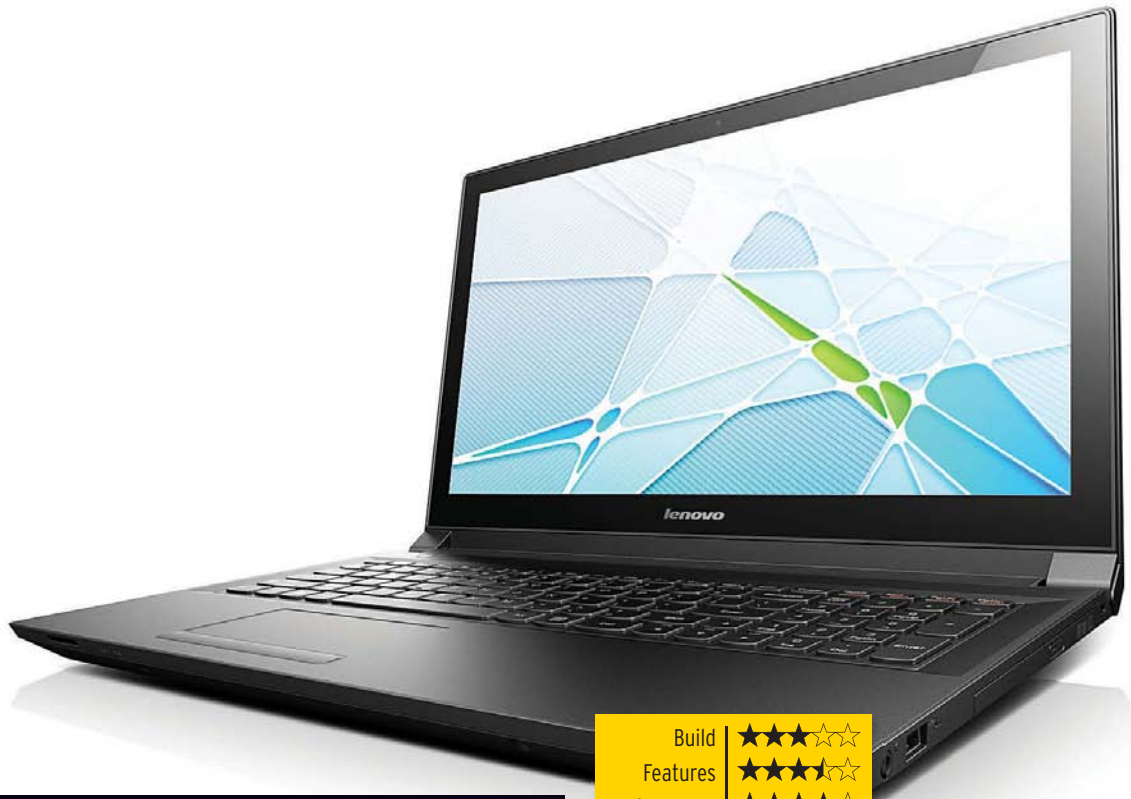
As a guide to raw processor and memory performance, the Geekbench 3 test measured just 915 points for single-core mode, and 2846 points for multi-core. Given the benchmark software's cross-platform universality, we can express this speed as almost the same as that of a Google Nexus 5 smartphone, for example, with its quad-core ARM processor.

AMD Radeon on the specs list suggest some graphics clout, but in practice this GPU has been pared back to reduce price and power consumption. Again, the HP was just pipped from last place by the Lenovo B50-30, and may be capable of some rudimentary gameplay with older games. In Batman: Arkham City it managed 23fps in our lowest resolution and detail test (1280 x 720, Low detail). However, that average figure is accompanied by a minimum framerate of 9fps that would be apparent as dropped frames. Similarly, Tomb Raider 2013 just about limped through with an average of 22fps.

Display quality was measured the same as other budget laptop design, hitting just 55 percent sRGB gamut and an 80:1 contrast ratio.

Battery life from the removable 32Wh battery was also around average at three hours 58 minutes in the looped-video rundown test.

VERDICT: Design and build quality of the HP 255 G3 are workmanlike, but importantly the main comfort areas of keyboard, trackpad and display are quite usable, if with the usual issues of poor display quality we find at this low price. But for only £200 the HP is more than creditable as a get-you-by budget Windows laptop.



LENOVO B50-30

£200 inc VAT • lenovo.com/uk

Build	★★★☆☆
Features	★★★½☆
Performance	★★★★☆
Value	★★☆☆☆
Overall	★★★½☆

With the Lenovo B50-30, we have the first of a new wave of laptops that hark back a little to the netbook, but with much better potential for real work, while actually costing less money. It includes a special version of Windows, known as Windows 8.1 with Bing.

The laptop is a 15in laptop with a new Intel Celeron N2830 processor, a low-power chip designed for low-cost computers. For storage, it uses a 320GB hard disk, providing plenty of capacity compared to solid-state options but inevitably slower performance.

Unusually for a modern laptop, the B50-30 has an optical drive, a tray-load DVD reader and writer. Of three USB ports, one is USB 3.0. You can connect to an external display through either its HDMI or VGA ports, while network connectivity is handled by a gigabit ethernet port and single-steam 11n Wi-Fi adaptor.

Overall build quality is tidy, a matt-black plastic chassis that is not without its creaks. We also found it could collect fingerprints with use. But as a means to transport and keep together the laptop's components it does the job.

The display is a 15.6in 16:9 widescreen panel using budget TN technology. Relative to the physical screen size this has a very low resolution of just 1366x768 pixels – the widescreen equivalent of the old 1024x768 XGA panels of old – and in use this did mean that type and interface elements appeared fuzzy and defocused.

Lab report

The Lenovo's Intel processor is 64-bit capable, and brings out-of-order instructions to Intel's low-cost chip platform though. And with its Tri-gate transistors built on the 22nm scale, it also promises lower power consumption. Its stated TDP is 7.5W, and Intel also quotes a scenario design power (SDP) of 4.5W. For this laptop Lenovo includes its own power management software, and we found this set as default in the middle of three options, economy versus performance.

Used this way, it returned a Geekbench 3 score of 248 points in single-core mode, and 401 in multicore (the Intel N2830 is dual-core but with no Hyper Threading Technology to virtualise four cores out of two). These scores are the lowest we'd ever seen from this benchmark test. It normally takes around two minutes to complete; here it was taking in excess of 20 minutes.

After setting Lenovo's management settings to full speed, Geekbench 3 now scored the Lenovo B50-30 with 964 and 1674 points respectively for single- and multi-core modes.

For context, the Apple A7 (ARMv8-A) processor in last year's iPhone 5s scores around 1410 and 2530 points in this CPU performance test. But left at its default Lenovo power settings, the Lenovo B50-30 would be trounced by the older version of the Motorola Moto G, with its 334/1162-point results.

In the PCMark 7 test, the Lenovo returned an overall score of 1663 points, again a very low result. In PCMark 8 Home it scored 1199 points in the conventional test, and failed to complete the graphics-accelerated version of this benchmark.

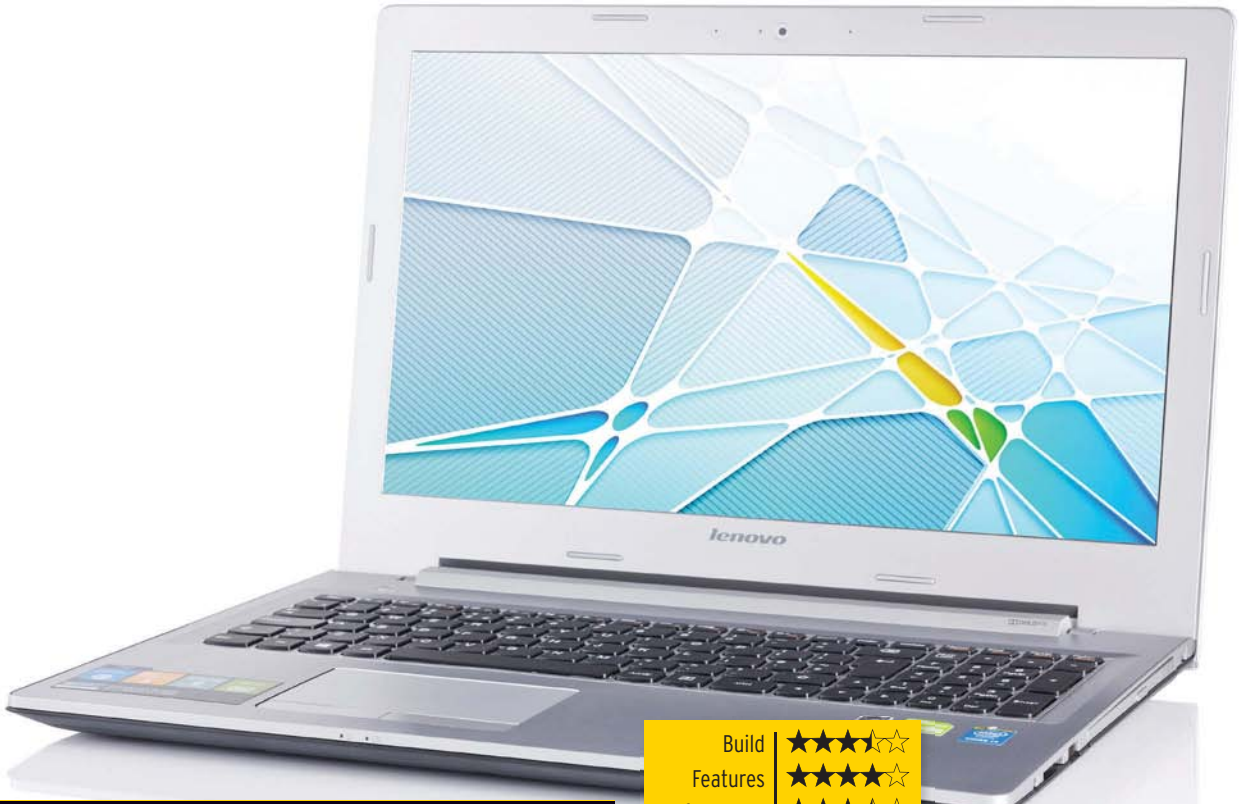
Batman: Arkham City at native 1366x768 resolution and Medium detail, played at just 8fps. Tomb Raider 2013 fared worse, with around 7fps at this same resolution and detail preset.

The budget TN panel has low resolution and very limited side-viewing scope. We found that when we moved our head away from straight-on, the screen images quickly deteriorated into a dark mess.

In our test, the panel had a reduced colour gamut, little over half of the basic sRGB colour space at 54 percent coverage. Adobe RGB gamut measured just 40 percent. As telling of the overall poor screen quality was the contrast-ratio result of just 80:1.

Our battery tests suggest you may get close to five hours use from this Lenovo, with it left at its slow midpoint power setting. In our endurance test of playing an MPEG-4 video over Wi-Fi on loop, with screen at 120cd/m^2, the Lenovo lasted four hours, 51 minutes.

VERDICT: The B50-30 has a poor screen, bendy keyboard and a processor so slow that it's overtaken by budget Android phones.



LENOVO IDEAPAD Z50-70

£379 inc VAT • lenovo.com/uk

Build	★★★½☆
Features	★★★★☆
Performance	★★★½☆
Value	★★★½☆
Overall	★★★★☆

PC ADVISOR RECOMMENDED

The IdeaPad Z50-30 is a 15.6in model with a fourth-generation Intel Core i3, and its discrete nVidia graphics processor will even enable you to play 3D games. The design aesthetic is upmarket and premium-looking, even if most of the silver on display is just painted plastic. But the top deck as well as the metallic trim that runs the laptop's circumference are made of real metal.

The back of the display lid has a satin silver finish that mimics aluminium, while the underside is black plastic with a fine-textile pattern imprinted. Three screws are all that stands between you and a large plate that covers the memory and hard disk, should you need access. The 41Wh lithium-ion battery is removable, and helped this Lenovo turn in one of the longest runtimes of the six on test here.

Edges of the Z50-70 have been tapered down slightly – not enough to miss out on the chance to install a DVD±RW optical drive on the right, but enough to inspire Lenovo to fit the special space-saving ethernet port on the left side with a sprung-loaded flap.

There are two USB 2.0 ports, one on each side; as well as an extra 3.0 port on the left that joins HDMI and VGA video ports there. Hot air exhausts over an internal finned heatsink on this side, while power connection is through Lenovo's unique rectangular connector that resembles a USB plug in yellow.

Sunken below the deck level slightly, the keyboard is not quite the premium type for which Lenovo business notebooks are famed, but it's still a cut above those found on some low-cost laptops. It's a low-travel type with textured matt flat-top keys, each shaped with a bowed bottom to give the Lenovo trademark shield shape of key. A number keypad joins directly to the Qwerty on the right.

A roughly textured trackpad works well and includes natural two-finger scrolling direction as standard. Separate left and right click buttons sit below for unfussy clicking.

Economies have been made by fitting the cheapest specification Wi-Fi adaptor, single-band and single-stream only. But the main processor is a competent dual-core Intel Core i3-4210U, the 'U' suffix reminding us that this chip was made expressly for ultraportable notebooks. Only 4GB of memory is installed, but easily upgraded if required, and the 1TB hard disk is a generous amount of space for a model under £400.

Lab report

With the same processor and hard disk as the Asus X751L, we see roughly the same middle-of-the-road results.

In Geekbench 3 is was a few points behind the latter, with 1735 and 3622 points respectively for single-core and multi-core modes, perhaps influenced by a smaller complement of 1600MHz memory.

PCMark 7 awarded this Lenovo 2222 points, while PCMark 8 recorded 1959 points (Home) and 2638 points (Work), which are competent results in line with the chipset and hard disk specification.

From this group of six, the IdeaPad Z50-39 is the only laptop fitted with a proper graphics adaptor capable of better performance than Intel's current best attempt in its dual-core mobile chips.

We measured a playable 33fps in Batman: Arkham City at our lowest settings, but beware of a 4fps minimum that may make even this setup less than smooth. Turning to Tomb Raider 2013 though, the action picked up to 67fps at 1280x720 (Low detail), and still maintained 36fps at 1366x768 and Normal quality.

The large display appears sharp in the Windows interface, aided by the default 125 percent scaling applied which makes fonts appear a little less fuzzy. Its colour reproduction is poor, covering just 56 percent of the humble sRGB gamut in our tests, while its contrast ratio of 90:1 is lousy but typical for a cheap Windows laptop.

Battery life stretched to nearly five hours (four hours, 58 minutes) in the looped-video over Wi-Fi endurance test.

VERDICT: The Lenovo Z50-70 is a well-rounded 15in laptop with a full-HD display and discrete nVidia graphics that can handle better gaming than many comparable budget laptops.

Conclusion

From this selection of six laptops, none of them are too slow that we'd advise walking away. The chunky Asus 17in laptop is not too slow to get by and some customers may prioritise a large screen to use the laptop as a small TV or DVD player. But at £450 it's at the top of our budget range and does little else to justify that price.

The Fujitsu LifeBook is a solid lump of a laptop, which may withstand a few knocks, and has more than a hint of business build quality to it. This enables it to include the more popular Windows 7 OS, since many businesses are swerving Windows 8 due to its unsuitability for professional use. But this LifeBook is several years behind the curve with its older processor, slower memory and USB 2.0-only port complement.

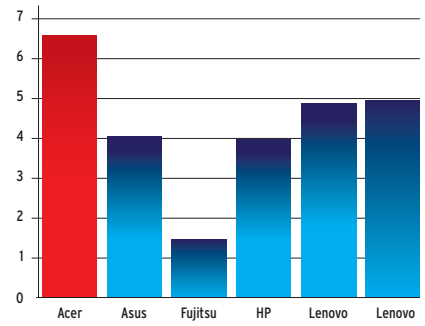
The HP 255 G3 can show off its quad-core processor, although in reality it's nothing to boast about, performing around the same as a two year-old Intel dual-core chip. Despite the AMD Radeon-branded graphics, it's also no better at games than the business Fujitsu with its integrated graphics. But taken as a whole, it's a workable machine with good keyboard and trackpad with twice the Fujitsu's battery life, and only costs £200.

The Lenovo B50-30 similarly hits the golden £200 price point, using the same money-saving trick of installing the free Windows 8.1 with Bing operating system. Like netbooks of the noughties, this Lenovo and the HP share almost identical specifications like most-basic Wi-Fi, 500GB hard disk, 4GB memory and low-res 15in screen. But while the graphics in the HP are so-so, the Lenovo's are a no-starter for anything gamey. Battery life was marginally better than the HP, but only because Lenovo ships this laptop severely underclocked, making it feel conspicuously more lethargic in use. You can reset the power management yourself, at the cost of battery runtime.

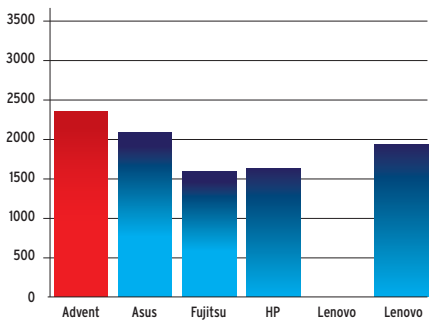
	ACER £350 inc VAT (£290 ex VAT) ★★★★½ PC ADVISOR BEST BUY	ASUS £450 inc VAT (£375 ex VAT) ★★★☆☆	FUJITSU £370 inc VAT (£308 ex VAT) ★★★☆☆
Model	C720	X715L	LifeBook A512
Product code	NX.MPFEK.052	X751LA-TY033H	A5120M7311GB
Processor	2GHz Intel Core i3-4158U (2C/4T)	1.7GHz Intel Core i3-4010U (2C/4T)	2.3GHz Intel Core i3-3110M (2C/4T)
Graphics	Intel Iris Graphics 5100	Intel HD Graphics 4400	Intel HD Graphics 3000
Display	13.3in (1366x768, 118ppi) matt TN LCD	17.3in (1600x900, 111ppi) gloss TN LCD	15.6in (1366x768, 100ppi) matt TN LCD
OS	Windows 8.1	Windows 8.1	Windows 7 Professional
Memory	4GB 1600 MHz DDR3	6GB 1600 MHz DDR3L	4GB 1333 MHz DDR3
Storage	500GB ST500LM000 SSHD with 8GB flash	1TB SATA HDD (5400rpm)	320GB SATA HDD (5400rpm)
Optical drive	None	DVD±RW	DVD±RW
USB	1x USB 3.0, 1x USB 2.0	3x USB 3.0	3x USB 2.0
Wi-Fi	Dual-band 802.11a/b/g/n 2x2 MIMO	Single-band 802.11b/g/n 1x1 MIMO	Single-band 802.11b/g/n 2x2 MIMO
Bluetooth	Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
Ethernet	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet
Video output	HDMI	HDMI, VGA	HDMI, VGA
Card slot	SD	SD	SDXC, MS Pro; ExpressCard 34
Battery	Non-removable 48Wh lithium-ion	Non-removable 37Wh lithium-ion	Removable 48Wh lithium-ion
Dimensions	327x227x20.6mm	414x272x28-34.3mm	378x251x36.2mm
Weight	1527g	2598g	2411g
PERFORMANCE			
Battery life	6 hours 35 minutes	4 hours 2 minutes	1 hour 33 minutes
Contrast ratio	80:1	90:1	90:1
Colour gamut sRGB	55%	73%	72%
Geekbench single	1988	1843	1766
Geekbench multi	4188	3796	3938
PCMark 7	3420	2495	1535
PCMark 8 Home	2358	2061	1630
PCMark 8 Work	3396	2831	DNR
Batman: Arkham City[1]	29/24fps	32/26fps	26/22fps
Tomb Raider 2013[1]	34/19fps	43/23fps	26/16fps

[1]1280x720, Low; 1366x768, Med

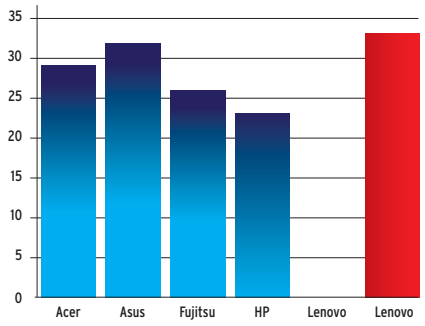
Battery life (hours)



PCMark 8 Home score (points)



Batman, 720p (fps)



At almost twice the price of £379, the Lenovo Z50-70 gives more than a taste of a midrange laptop in its build quality and component specification. And if Windows gaming is on your wishlist, this is the nearest thing to a good bet here for some Windows action games. A full-HD screen also commends it to sharp HD video viewing, even if the panel quality is poor and family.

HP **£200 inc VAT (£166 ex VAT)**	**LENOVO** **£200 inc VAT (£166 ex VAT)**	**LENOVO** **£379 inc VAT (£315 ex VAT)** PC ADVISOR RECOMMENDED
255 G3	**B50-30**	**IdeaPad Z50-70**
K7H92ES#ABU	MCA29UK	20364
1.5GHz AMD A4-5000 (4C)	2.16GHz Intel Celeron N2840 (2C/2T)	1.7GHz Intel Core i3-4010U (2C/4T)
AMD Radeon 8330	Intel HD Graphics	nVidia GeForce 820M with 2 GB
15.6in (1366x768, 100ppi) matt TN LCD	15.6in (1366x768, 100ppi) matt TN LCD	15.6in (1920x1080, 141ppi) gloss TN LCD
Windows 8.1 with Bing	Windows 8.1 with Bing	Windows 8.1
4GB 1600MHz DDR3	4GB 1600MHz DDR3	4GB 1600MHz DDR3
500GB SATA HDD (5400rpm)	500GB SATA HDD (5400rpm)	1TB SATA HDD (5400rpm)
DVD±RW	DVD±RW	DVD±RW
1x USB 3.0, 2x USB 2.0	1x USB 3.0, 2x USB 2.0	1x USB 3.0, 2x USB 2.0
Single-band 802.11b/g/n 1x1 MIMO	Single-band 802.11b/g/n 1x1 MIMO	Single-band 802.11b/g/n 1x1 MIMO
Bluetooth 4.0	Bluetooth 4.0	Bluetooth 4.0
Gigabit ethernet	Gigabit ethernet	Gigabit ethernet
HDMI, VGA	HDMI, VGA	HDMI, VGA
SD	SDHC	SDXC
Removable 32Wh lithium-ion	Removable 32Wh lithium-ion	Removable 41Wh lithium-ion
377x257x26.5mm	380x260x32.5-26.5mm	382x265x27.5mm
2183g	2225g	2363g
3 hours 58 minutes	4 hours 51 minutes	4 hours 58 minutes
80:1	80:1	90:1
55%	54%	56%
915	248	1735
2846	401	3622
1550	1663	2222
1646	DNR	1959
2266	DNR	2638
23/20fps	N/A/8fps	33/29fps
22/13fps	N/A/7fps	67/36fps

All-in-one

An all-in-one offers the power of a desktop system in a stylish and slimline chassis. Paul Monckton reviews six of the latest models

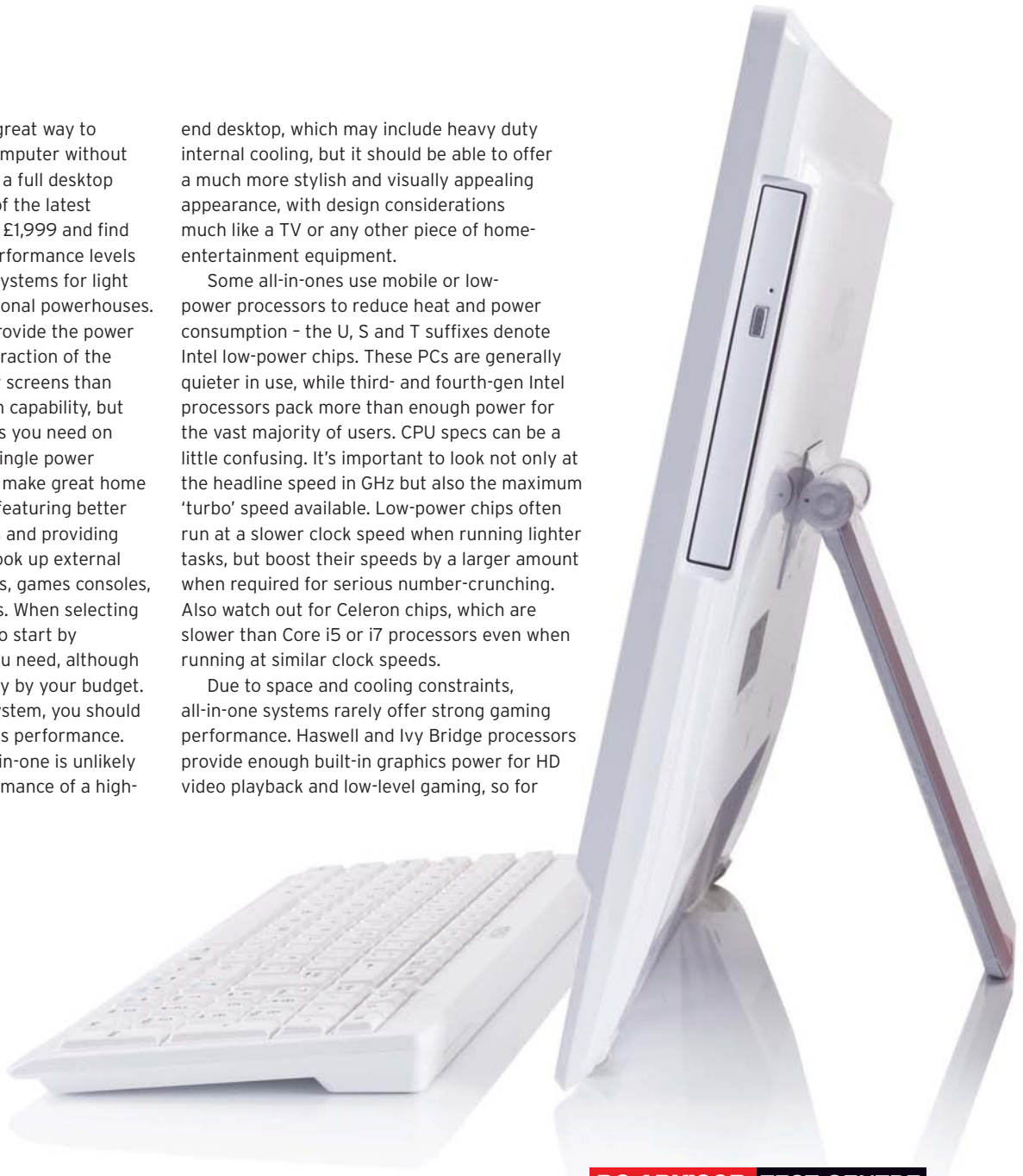
The all-in-one PC is a great way to get a large-screen computer without the inconvenience of a full desktop system. We take a look at six of the latest models, ranging from £299 to £1,999 and find very different features and performance levels available, from 19.5in budget systems for light web browsing, to 27in professional powerhouses.

A good all-in-one PC can provide the power for a full desktop system in a fraction of the space. They offer much bigger screens than laptops, often with multi-touch capability, but cut out most of the ugly cables you need on a traditional desktop using a single power connector instead. All-in-ones make great home entertainment PCs too, often featuring better internal speakers than laptops and providing HDMI inputs to allow you to hook up external devices such as Blu-ray players, games consoles, set-top boxes or media players. When selecting an all-in-one, it's a good idea to start by considering the screen size you need, although this may be constrained largely by your budget.

In choosing an all-in-one system, you should take into account more than its performance. Due to its compact size an all-in-one is unlikely to be able to match the performance of a high-end desktop, which may include heavy duty internal cooling, but it should be able to offer a much more stylish and visually appealing appearance, with design considerations much like a TV or any other piece of home-entertainment equipment.

Some all-in-ones use mobile or low-power processors to reduce heat and power consumption – the U, S and T suffixes denote Intel low-power chips. These PCs are generally quieter in use, while third- and fourth-gen Intel processors pack more than enough power for the vast majority of users. CPU specs can be a little confusing. It's important to look not only at the headline speed in GHz but also the maximum 'turbo' speed available. Low-power chips often run at a slower clock speed when running lighter tasks, but boost their speeds by a larger amount when required for serious number-crunching. Also watch out for Celeron chips, which are slower than Core i5 or i7 processors even when running at similar clock speeds.

Due to space and cooling constraints, all-in-one systems rarely offer strong gaming performance. Haswell and Ivy Bridge processors provide enough built-in graphics power for HD video playback and low-level gaming, so for



PCs

many people there's no need to pay for discrete graphics. However, some of the systems here incorporate a discrete graphics processor to boost gaming performance. If you really want to enjoy games to the full, the 27in iMac offers by far the quickest graphics of the group – at a price, and with a much reduced choice of titles, unless you install Windows alongside Mac OS X. Discrete graphics processors also increasingly allow better performance in non-gaming applications such as video editing and processing tasks.

Some systems incorporate Blu-ray drives and Freeview TV tuners, and are supplied with a remote to control them from across the room. Most of the PCs reviewed here incorporate a touchscreen interface, freeing you from the keyboard and mouse in some activities.

Other all-in-ones, most notably Apple's iMac, don't offer touch control – favouring traditional input methods instead. Although Apple's use of multi-gesture control on its mice and trackpads is anything but traditional. Touch input is often available as an option, so if you like a PC in this review but would prefer it with the touch control either added or removed, you will usually be able to order a version meeting your preference.

Most of the PCs we look at here have flexible configuration options and can be tweaked to fit your requirements and budget. If one is too expensive, consider cutting back on some of the options. Faster versions of the less-expensive systems are often available by selecting a quicker processor at the time of purchase.

However, we wouldn't advise trying to save money by opting for processors slower than the ones reviewed here: Microsoft's operating system needs a certain performance of chip to process its touch control. By a Celeron-based PC and the lack of responsiveness will certainly be noticeable if not actually frustrating.

If you're considering making use of touchscreen input, look for a system that tilts a long way towards the horizontal, to enable comfortable prolonged use. Holding your arms out to control a PC will otherwise soon prove tiring. Windows 8 increased the demands made on touchscreens with Microsoft requesting its hardware makers to create flush, frameless screens with 10 touch points for a satisfactory experience. All the touchscreens here meet this requirement.

ACER ASPIRE AZ3-615

£799 inc VAT • acer.co.uk

Build	★★★½☆
Features	★★½☆☆
Performance	★★★½☆
Value	★★★★☆
Overall	★★★★☆

Acer's Aspire AZ3-615 is great mid-priced family all-rounder, featuring a 23in touch display, solid performance, and decent multimedia capabilities. At a push it'll also handle a bit of light gaming.

It's finished in a stylish matt black and silver, but it's not as svelte as most of the competing systems and comes across as rather bulky. The PC is mounted on a simple stand, which offers a tilt adjustment from -5 to 25 degrees.

The left-hand side provides a handy memory card reader and one of two USB 3.0 ports, the second of which is fitted at the rear, along with two USB 2.0 ports and an ethernet connection. There's also a Mini PCI Express Slot available for future expansion, while HDMI in and out ports allow you to hook up a second monitor or use the Aspire AZ3-615 as a multimedia display for an external device such as a laptop or games console.

Performance-wise, the Acer is rather impressive, being outpaced only by systems costing considerably more. Its 1.9GHz quad-core Intel Core i5-4460T is a low-power model that can turbo boost up to 2.7GHz as required. The AZ3 is also one of only three PCs reviewed here to feature a discrete graphics processor. The installed nVidia GT480M is the least powerful of these three, but it's enough to give a very noticeably performance boost over the standard Intel HD Graphics integrated into the processor. This is no gaming PC, but if you set the quality settings low enough, you'll get away with playing games less systems simply can't cope with.

The IPS panel delivers wide viewing angles and reasonably accurate colour with a good level of contrast. We were rather more impressed with the built in speakers which delivered considerably volume levels without distortion and good bass response.

VERDICT: This is a mid-priced PC with decent features including ten-point multi-touch, discrete graphics, great sound and much better than average performance. As such, it makes a good family all-in-one PC, although there are slimmer, more attractive options available.

APPLE iMAC WITH RETINA 5K DISPLAY

£1,999 inc VAT • apple.com/uk

Build	★★★★★
Features	★★★★★
Performance	★★★★☆
Value	★★★★½
Overall	★★★★★

Apple's latest iMac stand out for a number of reasons, but most obvious of all is its amazing 27in 5K display. With a 5120x2880 screen, it offers the highest resolution of any display currently available, and this alone makes the £1,999 price tag seem reasonable.

Being an Apple product, the build quality and ergonomics are second-to-none: it's incredibly well made and almost impossibly slim. The system comes with OS X Yosemite installed, along with a large selection of bundled software you'll only get from Apple, including Final Cut Pro X, Logic Pro X and Aperture.

However, there's also a lot you won't get – there's no built-in optical drive or touch support. Apple has also disabled the ability to use this amazing display as an external monitor – even at lower resolutions. Placing all of the I/O ports at the rear is also a mild annoyance, but is the price you pay for having such a slim design.

We've tested the entry-level model here, which includes an Intel Core i5-4690 quad-core processor, 8GB of DDR3 RAM and a 1TB Fusion Drive, which uses fast solid-state storage to boost the performance of the storage subsystem. Unfortunately, this feature doesn't work when running Windows, meaning our tests can't show the kind of performance you're likely to get under OS X. So, keep in mind that the iMac is actually even faster than our already impressive performance results show.

The Retina display is not only amazingly sharp but it also delivers excellent colour, being the only display in this round-up able to fully display all the colours in the sRGB gamut. It also delivers by the best contrast ratio and can go around twice as bright as any of the competition, which is great for watching movies in the daytime. The movies will also sound good, thanks to its powerful internal speakers.

VERDICT: The iMac with Retina 5K display is obviously in a class of its own, as well it should be at this price. However, the level of performance and ergonomics you get make it a very good value for money option if you can afford it.

ASUS EEE TOP ET2321IUTH-B013Q

£799 inc VAT • asus.com/uk

Build	★★★½☆
Features	★★★★☆
Performance	★★½☆☆
Value	★★★☆☆
Overall	★★★★☆

Asus's ET2321IUTH-B013Q, is a mid-priced family PC in a slimline package. It looks just like a standard 23in monitor, and unlike bulkier designs doesn't give away the fact that there's an entire computer fitted inside. It may be made of plastic, but it's rather pleasing on the eye and much less imposing than some competing models.

Powered by a 1.6- to 2.6GHz Intel Core i5-4200U processor, the Asus is the only dual-core system here. However, it still manages to outperform the inexplicably slow Envy from HP and the low-cost MSI Adora20, which features a less powerful Celeron CPU.

No discrete graphics processor is provided, the PC relying instead on the Intel HD Graphics 4400 integrated onto the Core i5 CPU. This level of performance is suitable for very basic gaming only, although again the Asus PC outperforms the HP system.

Sound from the stereo speakers of the Asus Eee Top ET2321IUTH came with plenty of volume, but seemed rather thin, lacking the considerably better bass response of the Acer and the HP. They're adequate for general multimedia use, though, if you're not fussed about quality. If you're willing to spend a little more, there's an optional Asus subwoofer available, which connects via a dedicated port at the rear of the PC.

Here you'll also find a TV antenna connection, three USB 3.0 and two USB 2.0 ports, HDMI in and out and a wired Gigabit Ethernet socket. Microphone and headphone sockets are provided on the underside of the monitor bezel for easy access, along with a fourth USB 3.0 connection and a memory card reader. The right-hand side of the case houses a DVD/RW. Despite turning in better than acceptable results from our objective display tests, the picture quality left a little to be desired. Text seemed somewhat oversharpened and we wouldn't find a way to reduce this effect.

VERDICT: The ET2321IUTH is a stylish and affordable all-in-one PC with a unique Freeview TV capability, but at £799 it's up against the somewhat bulkier Acer, which outperforms it at the same price.

CHILLBLAST VOLANTE AIO

£1,299 inc VAT • chillblast.com

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

Unlike the other PCs in this round-up, the 24in Chillblast Volante AIO has been built into an off-the shelf all-in-one housing. This shows in its boxy design, which doesn't match the style and ergonomics of all-in-ones designed from the ground up by the manufacturer.

That said, the Volante AIO is one of the fastest PC in the group. Beaten only by Apple's considerably more expensive 27in iMac, the Volante has a desktop-class 3.4GHz quad-core Intel Core i7 4790S processor supporting turbo speeds of up to 4GHz – the fastest CPU of the entire group. It also features 16GB of DDR3 RAM, twice as much as any other reviewed here, and comes with a full terabyte of solid state storage in the form of a Samsung EVO SSD. The latter, giving the Volante AIO untouchable storage performance in this group.

The graphics card in question is an nVidia GeForce GT 750M graphics card, delivering performance good enough for gaming and a whole lot faster than most of the competition, although not up to the standard of the 27in iMac. Also unlike the iMac is its 24in display with 1920 by 1080 resolution. This is perfectly adequate for a home PC, but obviously nowhere near the size or resolution of the iMac – which costs £700 more. No touch input is supported, but it's available as an optional extra for £109 ex VAT and can be retrofitted to an existing system if you decide you want to add the feature later.

The display performs well, with accurate colour and better than average brightness and contrast and is complemented by a pair of stereo speakers for multimedia use. They don't sound amazing, but they're much better than either the Asus (without additional subwoofer) or MSI PCs can manage. The Volante AIO is also the only PC here to include a Blu-ray player as standard.

As is usual for Chillblast, the system is covered by a full two-year collect-and-return warranty with five years warranty on labour.

VERDICT: To be fair, the Volante AIO isn't going to win any style awards, but when it comes to performance it's streets ahead of all but the much more expensive 27in Apple iMac.

HP ENVY BEATS ALL-IN-ONE 23-N001NA

£900 inc VAT • hp.com/uk

Build	★★★★☆
Features	★★★☆☆
Performance	★★½☆☆
Value	★★★½☆
Overall	★★★★☆

With its bright red finish and glowing 'beats' logo, the HP Envy Beats AIO has striking good looks matched by high build quality. It's a 23in model featuring ten-point multi-touch and an IPS display panel delivering good colour reproduction and viewing angles. The PC has a hinged support at the back, which allows it to tilt back 60 degrees, allowing comfortable touch input for extended time periods. It also has a small slide-out hook, where you can hang your headphones and a built in DVD re-writer.

The PC offers an impressive specification including a 2.2GHz quad-core Intel Core i7-4785T processor with turbo speeds up to 3.2GHz, however its performance was sadly disappointing.

Leaving aside MSI's budget Adora20 which costs one third of the price, the HP turned in the slowest benchmark results of all. Even the graphics performance is worse than we wold have expected.

Measured display performance was also underwhelming, with rather low (but comfortable) brightness and poor measured contrast, but in general use there wasn't much perceptible difference between higher scoring displays and text rendering was pleasing to the eye.

Performance aside, the HP is a very nice PC to use with build quality that makes it feel like a premium product. However its stand-out feature is most certainly its built in audio system. Featuring a total of eight speakers, the HP delivers by far the best sound quality of the group with greater clarity and superior bass.

VERDICT: The HP Envy Beats All-in-One 23-n001na is a great-looking, and -sounding PC. It has a fast Intel Core i7 processor and feels responsive, but there's no getting away from the fact that it should have performed much better than it did in our performance tests.

	ACER £799 inc VAT (£665 ex VAT) ★★★★☆ PC ADVISOR RECOMMENDED	APPLE £1,999 inc VAT (£1,665 ex VAT) ★★★★★ PC ADVISOR RECOMMENDED	ASUS £799 inc VAT (£665 ex VAT) ★★★★☆
Model name	Aspire AZ3-615	iMac with Retina 5K display	Eee Top ET2321IUTH-B013Q
Processor	1.9- to 2.7GHz Intel Core i5-4460T	3.5- to 3.9GHz Intel Core i5-4690	1.6- to 2.6GHz Intel Core i5-4200U
Installed memory	8GB DDR3 1600MHz	8GB DDR3 1600MHz	6GB DDR3 1600MHz
Storage	1TB SATA HDD (5400rpm)	1TB Fusion Drive	1TB SATA HDD (7200rpm)
Motherboard	Not stated	Intel Z87 Express	Custom/Lynx Point-LP
External USB ports	2x USB 3.0, 3x USB 2.0	4x USB 3.0	3x USB 3.0, 3x USB 2.0
Display size	23in (1920x1080)	27in (5120x2880)	23in (1920x1080)
Graphics	nVidia GT840M, 2GB VRAM	AMD Radeon R9 M290X, 2GB VRAM	Intel HD Graphics 4400
Speakers	Stereo	Stereo	Not stated
Networking	Gigabit ethernet, 802.11n	Gigabit ethernet, 802.11n	Gigabit ethernet, 802.11n
Other ports	Headphone	Headphone, optical digital audio	HDMI in/out, headphone, subwoofer jack, mic, TV jack
Keyboard & Mouse	Wireless keyboard and mouse	Apple Magic Mouse, Apple Wireless Keyboard	Wireless keyboard and mouse
Optical drive	DVD±RW	None	DVD±RW
Operating system	Windows 8.1 (64-bit)	OS X Yosemite	Windows 8.1 (64-bit)
Extra items	1Mp webcam, Mini PCI Express slot, card reader	Final Cut Pro X, Logic Pro X, Aperture, card reader	Freeview TV, 2Mp webcam, 6-in-1 card reader
System weight	8.76kg	9.54kg	9kg
System dimensions	540x489x579mm	650x203x516mm	571x359x50-214mm
Warranty	N/S	1-year return-to-base	1-year return-to-base
PCMark 8 Home	2906	4008	2828
Sniper Elite V2	47.7/18.7/5.1fps	113.8/84/21.2fps	31.4/7.8/5fps
Power	46/91W	46/215W	33/69W

MSI ADORA20 2BT

£299 inc VAT • uk.msi.com

Build	★★★☆☆
Features	★★☆☆☆
Performance	★☆☆☆☆
Value	★★★☆☆
Overall	★★★½☆

At the opposite end of the scale to Apple's huge and expensive 27in iMac comes MSI's small and low-cost Adora20 2BT. At only £299, this PC costs £500 less than the next least expensive systems and expectations should be adjusted accordingly.

It's a 19.5in non-touch display featuring a low-cost TN display panel and a 1600x900 resolution that falls below the full HD standard of 1920x1080 pixels. It suffers from poor viewing angles and lower-quality colour, although brightness and contrast are good.

The display tilts back quite far, but this is of minimal use on a PC which doesn't support touch input. It also lacks an HDMI input, although the quality and resolution aren't really high enough to warrant its use as an external display. A pair of small stereo speakers is integrated into the stand – the sound quality isn't very good, but is acceptable in the context of the low asking price.

The Adora20 2BT also feels sluggish to use. It features a 2GHz – 2.4GHz quad-core processor, but don't let those numbers fool you: this low power Celeron J1900 CPU could never be described as fast. The chip features integrated graphics and they are also slow – so don't think about playing any graphically intensive games on this PC. In fact, we would advise against running anything at all intensive on this PC. Stick to basic web browsing, emailing and other similar tasks and this PC will serve you well. Demanding anything more of it is likely to lead to frustration.

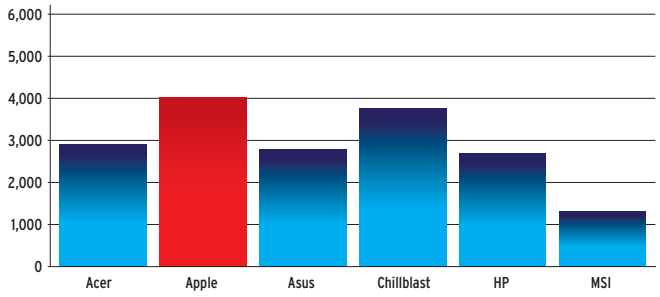
VERDICT: The MSI Adora20 2BT costs so much less than anything else in this group test that it's bound to come up short in both specification and benchmark results. However, it still offers good value if you only need a basic system.

	CHILLBLAST £1,299 inc VAT (£1,082 ex VAT) ★★★★☆	HP £900 inc VAT (£750 ex VAT) ★★★★☆	MSI £299 inc VAT (£249 ex VAT) ★★★½☆
	Volante AIO	ENVY Beats All-in-One 23-n001na	Adora20 2BT
	3.2- to 4GHz Intel Core i7 4790S	2.2- to 3.2GHz Intel Core i7-4785T	2- to 2.4GHz Intel Celeron J1900
	16GB DDR3 1600MHz	8GB DDR3 1600MHz	4GB DDR3 1333MHz
	1TB Samsung 840 EVO SSD	1TB SATA HDD	500GB SATA HDD
	Intel H87 Express	Intel H87 Express	Intel HM86 Express Chipset
	4x USB 3.0, 2x USB 2.0	4x USB 2.0, 2x USB 3.0	4x USB 3.0, 2x USB 2.0
	24in (1920x1080)	23in (1920x1080)	19.5in (1600x900)
	nVidia GeForce GT 750M 2GB	Intel HD Graphics 4600	Intel HD Graphics
	2x 5W stereo speakers	Beats Audio stereo speaker system (8x 12W)	2 x3W speakers with Sound Blaster Cinema
	Gigabit ethernet, 802.11n	Gigabit ethernet, 802.11n	Gigabit ethernet, 802.11n
	Line in/out, HDMI in/out	HDMI in/out, headphone	HDMI out, headphone, mic
	Logitech MK520 wireless keyboard and mouse	Wireless keyboard and mouse	Wireless keyboard and mouse
	Blu-ray reader/DVD writer	DVD±RW	DVD±RW
	Windows 8.1 (64-bit)	Windows 8.1 (64-bit)	Windows 8.1 with Bing
	Optional multi-touch	720p HD low-light webcam with microphone	1Mp webcam, card reader, Microsoft Office 2013 SP1 (30-day trial), QuickSetting, Smart Media Link, WhiteBoard, PowerDVD, THX, Norton Internet Security 2013 (60-day trial), Fresh Paint
	14.6kg	8.35kg	6.43kg
	585x200x450mm (including stand)	563x143x413mm	495x376.5x32.3mm
	5-year labour with 2-year collect-and-return	1-year limited parts, labour, and pickup-and-return service	2-year manufacturer warranty
	3776	2702	1360
	91.5/41.2/10.5fps	27.7/7.4/5fps	8.9/5.1/5fps
	35/177W	43/81W	28/37W

>> How we test and our conclusion

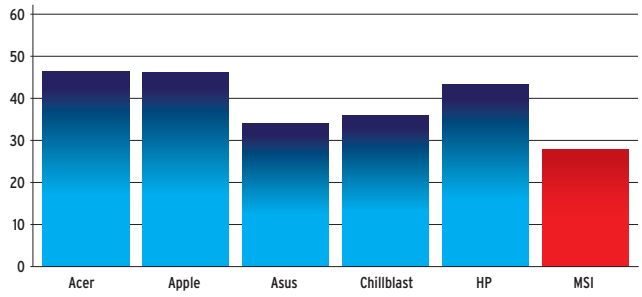
OVERALL SYSTEM PERFORMANCE

PCMark 8 Home score (points)



POWER EFFICIENCY

Idle power consumption (watts)



Conclusion

There's a massive range of prices on offer here, so your decision will be party determined by budget. If you have only £300 to spend, then it's the MSI Adora20 2BT for you. You'll need an extra £500 before you can afford the next step up in the form of either the Acer Aspire AZ3-615 or the Asus ET2321IUTH, both of which come in at £799. We feel the Asus is the better-looking of the two, but the Acer model gives you a lot more performance for your money, thanks to a faster processor and the addition of discrete nVidia graphics. It also offers better sound quality from its built in speakers and earns a Recommended award.

If sound quality is what you're after, the HP Envy 23 Beats all-in-one comes with a total of eight built in speakers and delivers by far the best sound of any of the group. Unfortunately, it's also a little pricier and delivers unimpressive performance despite a specification that should really do better.

If you need the ultimate in performance, then you have two very different options. Chillblast's 24in £1,299 custom system offers the fastest CPU, twice as much RAM as most rivals and a huge 1TB solid state drive teamed up with powerful graphics. However, the build quality is a world apart from the near perfection of Apple's 27in iMac with Retina 5K display. Neither PC offers touch support, although Chillblast can add the feature for an extra £109. The iMac offers an unbelievably high resolution with the best overall image quality to boot. This entry-level model offers a slightly slower processor than the Chillblast Volante AIO, but makes up for it with superior graphics power, which delivers the best gaming performance while also boosting scores in several of the PCMark tests. It also comes with a hefty £1,999 price tag, but we feel it's justified given the sheer quality and performance the iMac has to offer. Our second recommended award therefore goes to the iMac.

How we test

Application performance

We test with Futuremark's PCMark 8 v2.0 benchmarking suite. Unlike PCMark 7, it doesn't produce a single overall figure. Instead, results are divided into Home, Creative, Work and Storage tests.

The Home benchmark reflects command tasks for typical home use with lower computing requirements such as web browsing and low-end gaming. The Creative benchmark is aimed more at enthusiasts and professionals working with multimedia and entertainment content. It is more demanding on the processor and includes transcoding tests. The Work test is geared towards office work tasks like creating documents, web browsing, spreadsheets and video conferencing. This test does not stress the gaming and multimedia capabilities of the PCs in this group test.

Gaming

Most all-in-ones aren't designed for gaming, although some do offer powerful discrete graphics chips. We've run a single game Sniper Elite V2 at medium and ultra quality settings at 1920x1080 and then at low quality settings at 1280x720 to give PCs with low-end graphics a chance. This is enough to reveal differences in gaming performance. Systems with integrated graphics seldom perform to a satisfactory level in these tests, but Windows applications and casual games will usually run sufficiently well.

Power consumption

We measure the power consumption of each PC while it's idling at the desktop and after it has settled down following bootup. We then measure each system's consumption while pushing it to the limit by running Prime95 with the maximum number of available threads, and at the same time running the storage test from PCMark 7. Real-world power consumption will fall somewhere between these two measurements, depending on use.

Display quality

We use a Datacolor Spyder4 calibrator to measure colour gamut and accuracy, contrast and uniformity across the surface of the screen. We also take into account the viewing angles afforded by the display technology used by each panel.

Subjective assessment

It's not all about speed. We also pay close attention to the physical characteristics of each all-in-one 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 if both parts and labour are included. In-home support is particularly welcome.

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SATNAVS

Mike Bedford and Jim Martin test out the latest satnavs, including the smartphone apps that are threatening the extinction of the standalone device

Getting lost while driving is a thing of the past thanks to the miracle of satellite navigation. Many cars have built-in satnavs, but millions still don't. These days you can pick up a very basic satnav for under £100, but with free or cheap smartphone apps to guide you, why bother with a dedicated GPS device?

We tested out four of the latest satnavs with 5in screens. This is roughly the size of a smartphone screen, but if you don't fancy carrying a huge phone in your pocket, dedicated units with 6- or 7in screens are available. What's more, unless you go for one of the few low-cost 'phablets, large-screen satnavs will almost always be cheaper, especially if you're mid-contract.

Another advantage of smartphones concerns map data. With a smartphone app, either the maps are stored locally at the expense of a chunk of your phone's storage, or they're downloaded on the fly which means using up your monthly data. With a dedicated unit, all your maps are stored locally in memory that you don't need to free up for other purposes. Plus, if you're driving in an area with poor mobile coverage, you might find yourself stranded with no map at all, while a dedicated satnav always has its map data.

In the case against dedicated in-car units, most have resistive touchscreens that are less responsive than the capacitive screen you'll find on smartphones. However, some of the latest satnavs adopt this technology. Given that you probably spend a lot of your time driving in familiar areas, you won't always need navigational facilities. Being able to lend out your satnav is, therefore, another benefit.

A lot of the new dedicated satnavs require a smartphone for its data connection. They use this for live traffic data and searching the internet for points of interest. To us, though, this makes no sense: your smartphone already has a GPS receiver so you may as well buy an inexpensive car mount and use that instead.

Of course, dedicated satnavs can have more features, including lane assistance which guides you to drive in the correct lane prior to joining or leaving a motorway, and advanced routing features which can give you the most economical route rather than just the fastest.

GARMIN NÜVI 52LM

£99 inc VAT • garmin.com/en-GB

Build	★★★½☆
Features	★★★☆☆
Performance	★★★½☆
Value	★★★★☆
Overall	★★★½☆

As one of the cheapest satnavs around (although you can go lower by opting for a 4in screen), the 5in nüvi 52LM is notable for having free map updates for life, even if it covers only the UK and Ireland, while many rivals cover most of Europe. Other than this, the specification is typical of other lower-priced units, being comparable to the TomTom Start 50, but lacking the various advanced features that are available on, say, the Garmin nüvi 2599 (page 86) LMT-D and the TomTom GO 50 (page 87).

If you did happen to want full European maps, then it's only £10 extra – Amazon sells both versions for £75 and £85 respectively. You can even opt for a 6in screen for £99, although that's technically a different model: the nüvi 65LM and comes with only UK and Ireland.

Free updates to its internal maps for the lifetime of the unit means you keep up to date with changes in the road network. While not universal, such a scheme is becoming more common and is a welcome change from having to buy upgrades once your unit is a year or two old, and typically costs £40 or £50.

Updates to safety camera alerts, however, is by subscription. The unit has no means of knowing traffic conditions, either as a free or a subscription service, because it can't connect to a smartphone and doesn't have a built-in receiver. This is typical of cheaper devices.

Installation is simple. A mount with a suction cup attaches to the windscreen and the unit itself clips into this mount. While the nüvi 52LM has an internal battery, it will normally be connected to the car's power socket using the lead provided. The GPS antenna is internal like all modern satnavs. However, unlike satnavs of old, and both the TomTom units, the touchscreen is capacitive – like a smartphone – which makes it more responsive than resistive screens.

The menus are straightforward and navigating them is intuitive without even glancing at the manual. Voice control is available but you first have to select it on screen, which is inadvisable while driving. Because of this, we didn't use it. The facilities offered for planning a route are basic but perfectly usable, offering standard options such as going to your destination via another location, though, without giving you a choice of routes.

On the road, the maps are easy to read with the usual choice of a 2D- or 3D view, but without the 3D buildings that are available on more advanced satnavs such as the TomTom Go 50. Verbal turn-by-turn instruction are clear and given at appropriate times. You also get lane assistance as shown above, and also the maximum speed limit of the current road. You'll also see warnings of upcoming speed cameras.

In the main, the routes offered to us seemed reasonable and, in familiar places, were usually the ones we'd have chosen ourselves. However, we were able to entice it to suggest a route that would have taken us along a road that we knew became unsurfaced and rutted, and which would only be passable with a 4x4. This is a common and much reported issue with many in-car sat navs although, in reality, it normally won't cause problems.

The Foursquare database of points of interest is provided with the 52LM. This allows you to be shown and optionally guided to, a nearby petrol station or car park, for example.

VERDICT: While lacking the advanced features of more expensive satnavs, the Garmin nüvi 52LM is good value at the online price of £75, especially with a decent-sized 5in screen. The main drawback, for which you'd have to pay a fair bit more, is live traffic information.

GARMIN NÜVI 2599 LMT-D

£180 inc VAT • garmin.com/en-GB

Build	★★★★☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★½☆
Overall	★★★★☆

With its 5in screen, the nüvi 2599 LMT-D looks almost identical to its little brother – the nüvi 52LM – but, while some of the extras might be thought of as just icing on the cake, there are some key differences.

First and foremost, while the Garmin nüvi 52 LM and the TomTom Start 50 lack any sort of connectivity, the nüvi 2599 LMT-D has several options. First of all, it has a built-in receiver to access the live traffic information, that is carried by digital and FM radio stations. This is used for route planning and to provide warnings while driving, and subscription to the service is provided for the life of the unit, together with map updates. As a special offer, you also get free safety camera updates for two years. Compared to the nüvi 52 LM, the geographical reach of this unit extends from the UK and Ireland only to most of Europe. The second connectivity option is Bluetooth, which it uses to communicate with an iPhone or Android smartphone. This can provide live traffic information in those countries where it isn't available from broadcast radio, and there are other benefits as we'll see later.

Like all the other units reviewed here, physically attaching the unit to the car windscreen and power socket is simple enough, following the usual mounting system. Initial impressions were favourable since the touchscreen is very responsive, being based on capacitive technology rather than the old resistive screens many satnavs (and car infotainment systems) still use. The menus are easy enough to understand and navigate and most users should be up and running from the off. Route planning is similar to that of the nüvi 52 LM, though, now you can choose from several alternative routes.

Although all the units included here allow you to use voice control, this is of limited value when driving since you first have to select it via onscreen menus with obvious safety implications. This unit, however, allows you to activate it while driving by issuing the magic phrase "Voice Command", so we were put it through its paces. In general, it proved reasonably reliable, even with road noise, although we found some street names that it was incapable of recognising.

The maps are clear and you can choose between a 2D- or 3D view although 3D buildings don't make their appearance in the Garmin range at this price point. The verbal instructions given while driving are easy to understand and timely, and with the addition of so-called Real Directions. This feature, which isn't available on any of the other units reviews here, gives you extra confidence by being more specific in providing instructions. So, for example, instead of just saying "turn right", it may tell you to turn right at the lights or after a particular landmark. However, from our experience it seems that guidance by landmarks is limited outside the major cities. Except for suggesting the same poor route as the nüvi 52 LM, the routes offered were sensible. Like all the units in our group, Foursquare POI is provided.

Another feature unique among our group is the nüvi 2599 LMT-D's ability to act as a hands-free unit for your phone and compatibility with the free Smartphone Link app for sharing data with your phone. When you park, for example, the in car unit will send the location to your phone so you can navigate back to it on foot.

Although the recommended £180 price is quite high, you can pick up the 2599 LM-D for much less online. At around £150 it's much better value, especially since you don't always need a smartphone to make the most of it.

VERDICT: This is a feature-laden satnav with a responsive 5in capacitive touch screen. You also get voice recognition with voice activation, and a built-in receiver for live traffic information. We doubt that many people will need more from a navigation device. If you can afford it, you won't be disappointed.

TOMTOM GO 50

£160 inc VAT • tomtom.com

Build	★★★½☆
Features	★★★★☆
Performance	★★★★☆
Value	★★★★☆
Overall	★★★★☆

TomTom's Go 50 is set apart from cheaper units by its ability to communicate with either an Android phone or an iPhone via Bluetooth in order to receive up-to-the-minute data on road conditions. Live traffic is available for free for life as are updates to the mapping data, for 39 European countries. Also available is warnings of safety cameras, both mobile and fixed but free updates are only available for three months, so you'd have to take out a subscription when that period expires if you want to keep the database up to date.

In the box you get a USB cable and cigarette lighter adaptor for in-car charging. The Go 50 itself is well built and the mounting bracket offers a good amount of adjustment and a firm grip on your windscreen. On turning it on, we were taken to a map showing the car's current position with an indication of nearby traffic conditions.

The bad news is that the Go 50's screen is a resistive touchscreen. The matt finish means that there's barely any glare or reflection but you need to press the screen firmly to get a response. We found this okay for the most part, but the keyboard feels a little cramped compared to most smartphones and is much less accurate. You have to force yourself to slow down and press each key rather deliberately.

The menu system gives you many options, but you need to scroll through these with your finger because they are not all displayed on a single screen. This is where the screen struggles as resistive screens don't lend themselves to swiping gestures and we often found ourselves hitting the wrong menu option.

However, this annoyance is offset by the voice recognition which can be initiated by speaking a phrase, in this case "Hello TomTom". This makes it a sensible proposition while driving and, we found it reasonably useful. Like the Garmin nüvi 2599 LMT-D, it refused to recognise some addresses. However, since specifying a destination often requires you to select an option from a list of addresses presented onscreen, it makes more sense to select a destination on screen before setting off and use voice control only for making simple adjustments while driving. Once you type in your destination it shows up on the large map. You can then press the destination icon to zoom in to make sure it is in fact the right location.

We particularly like the new interface, which uses more of the display for the map, and shows real-time traffic information so you can see which routes are currently busy. The navigation screen is split into two sections. The majority shows you your position on the map, while a strip on the right-hand side gives you information like the ETA and how far away you are from your destination.

The bar also gives shows you what's coming up ahead, and how far until you reach events or places. You get live traffic warnings, upcoming points of interest and weather warnings.

As we said at the start, the Go 50 is a 'smartphone connected device'. Instead of having a built-in SIM like older TomToms, the new range relies on your smartphone for a data connection. It won't use all that much, but it will require your phone to offer a personal hotspot feature so the Go 50 can connect to it via Wi-Fi. You'll need to make sure you have a tariff that allows tethering – using 3G- or 4G data on a different device – and also one that works abroad if you want to get real-time information when you're not in the UK.

VERDICT: The TomTom Go 50 is a great satnav with lots of useful features, including voice recognition that doesn't require you to touch the screen. You'll need a compatible smartphone and data tariff to make the most of it and benefit from timely information on traffic jams and the fastest route. It's generally easy to use, and it's reassuring to have free map updates.

TOMTOM START 50

£119 inc VAT • tomtom.com

Build	★★★½☆
Features	★★★½☆
Performance	★★★½☆
Value	★★★☆☆
Overall	★★★½☆

The Start 50 is currently TomTom's cheapest in-car satnav (it's the same price as the smaller-screened Start 40), but it has mapping for 39 European countries which explains why it's a bit more expensive than, say, Garmin's entry-level nüvi 52LM which has only UK and Ireland maps. In other respects, though, the Start 50 has a similar specification to the nüvi 52LM.

Lifetime updates to the mapping data is provided, a welcome inclusion for a lower-priced unit. There is no provision for traffic conditions to be taken into account in planning a route, and this is not available as a subscription service since the Start 50 doesn't have any way of communicating with a smartphone as with the Go 50, for example. However, it will provide warning of fixed safety cameras, albeit updated free only for three months with an annual subscription payable thereafter.

Installing the Start 50 in the car is easy, being almost identical to all modern satnavs with a twist-to-grip suction mount. The screen, unfortunately, uses old-school resistive touch technology, so is less responsive than smartphones and satnavs with capacitive screens (Garmin has switched to capacitive screens). This was our main gripe when we first used it, in particular, swiping isn't particularly easy so navigating the menus isn't as simple as we might have hoped.

The requirement for a firm touch is particularly annoying as it can cause the unit to wobble on its windscreen mount. Furthermore, it's very easy to hit the wrong keys on the on-screen keyboard if you have big fingers. Other than this niggle, though, the menus are perfectly intuitive and most people would be up and running without reference to the manual.

The unit powers up to a map view instead of a main menu that looks nice but really isn't the benefit that TomTom claims, given that the first thing you'll probably do is select the main menu.

What we like is the combined address and POI search, called Quick Search. Rather than forcing you – as so many satnavs do – to enter an address in exactly the right format, or by selecting the right option first, the Start 50 lets you search for anything – a restaurant, hotel or simply a road name. It splits results into addresses and POIs, and you can tap on one to either navigate there or see where it is on the map.

The Start 50 has voice recognition, which can save time tapping away on the keyboard but you have to activate it via an onscreen menu, so you can use it only while stopped.

In general, the maps were easy to read and the verbal guidance was clear enough although you don't get 3D buildings when viewing a map in 3D mode as you do with the TomTom Go 50. The routes offered seemed to be perfectly reasonable and, unlike the Garmin nüvi 52LM, we were able to ask for alternatives. We were also pleased that the Start 50 didn't take the bait, as the Garmin unit did, when we asked it to guide us to a destination when the most direct route would have been along a wholly unsuitable road. Again, points of interest are provided in the form of Foursquare.

Online, you can pick up the Start 50 for around £110, which isn't much of a saving. TomTom says the Start models (there's also a 6in version as well as 4.3in) are aimed at the 'leisure traveller', which is why you don't get live traffic. We'd have preferred a capacitive screen, but the interface is easy to get to grips with and routing is very good. If you need traffic, it's worth getting the Go 50.

VERDICT: While more expensive than some entry-level satnavs, you do get coverage of the whole of Europe and free updates for life. The resistive touch screen is a disappointment, though, and this isn't really compensated for by voice control since this can only be activated from the screen.

SATNAV APPS

The choice of apps is huge, although it depends on which smartphone you have as to which apps are available

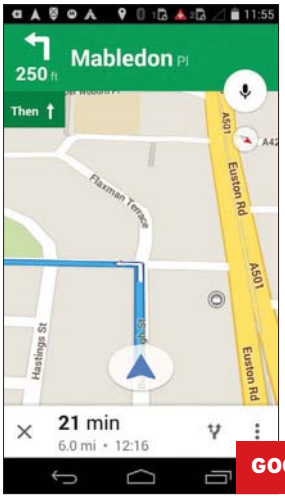
Google and Apple Maps

Free; Android, iOS
google.co.uk, apple.com/uk

★★★★☆ **Google Maps**

★★★☆☆ **Apple Maps**

The built-in mapping apps in iOS and Android aren't dedicated to in-car use, but they do offer turn-by-turn directions. They're basic when compared to Waze and the best standalone satnavs, but they have the benefit of up-to-date maps and traffic info. Both apps also benefit from being able to search the internet for destinations. It isn't possible to download maps for offline use either.



GOOGLE MAPS

APPLE MAPS

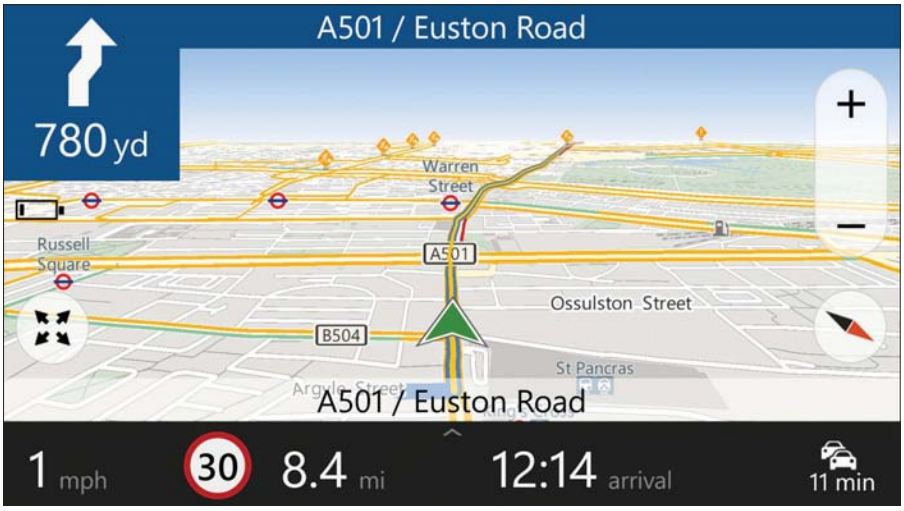
Here Drive

Free, Android, Windows Phone
here.com

★★★★☆

Included on Windows Phones but also available for Android, Here Drive allows you to download entire country maps to use offline. The latest version offers real-time traffic information, with arrival times estimated based on traffic conditions.

Voice instructions are clear, and road names are read out, just as with every other app and device mentioned here. The fact you can use it offline like a dedicated satnav makes Here Drive a fantastic free option.

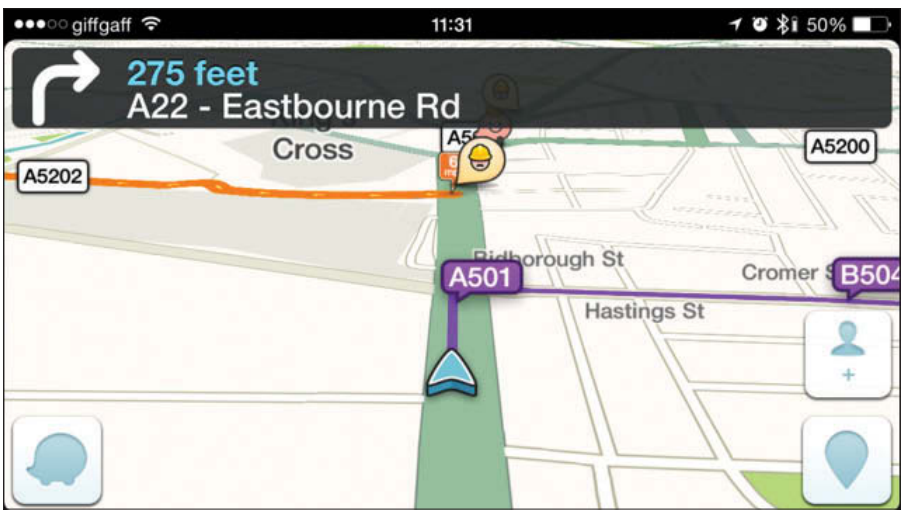


Waze

Free, Android, iOS, Windows Phone
waze.com

★★★★½ PC ADVISOR RECOMMENDED

The best satnav app is Waze. It's unusual to be able to be this clear cut about an app, but Waze is head and shoulders above the competition. It scores full marks in virtually every area. It's free, has a clear and easy-to-use interface and routing is top-notch. Because it uses data from thousands of other 'Wazers', you get free real-time information on traffic jams, automatic rerouting around jams, notifications of temporary and fixed speed cameras and more.



PC ADVISOR TEST CENTRE

BEST FREE PARENTAL CONTROL SOFTWARE

How to make a PC, laptop, tablet or smartphone safe for your kids to use

Protect your children online for free with these helpful applications and safety tips

By Martyn Casserly

Until recently, ensuring your children remained safe online was a reasonably simple affair. Often the only computer they used was the family PC, which could be set up with parental control software that would limit the web browser and instant messaging chats, and hopefully prevent them handing over passwords or financial and personal details. These applications also provided a way to limit the time that kids spent on the computer, and some packages even offered ways to keep an eye on what they were doing.

But with the advent of mobile technology, this landscape has changed rapidly. Now it's not uncommon for a family to have tablets, laptops, phones or even iPods that can access

information online, and keeping control of all these devices can feel like a Sisyphean task. Take heart, though. *PC Advisor* is here to help, with this guide on how you can use system settings, device features and parental control software to chase the digital wolves from your doors.

Before we move on to the various software and hardware solutions, though, it's important to point out that none of these things can replace the unique role of a parent or guardian.

'Talking to your child is one of the best ways to keep them safe,' states the National Society for the Prevention of Cruelty to Children (NSPCC). 'Preventing your children from using the internet or mobile phones won't keep them safe online, so it's important to have conversations that help your child understand how to stay safe and what to do if they ever feel scared or uncomfortable.'

Creating an awareness of the wonderful possibilities the internet holds is a very positive approach, but it should definitely be augmented with conversations about the potential dangers of inappropriate content, cyberbullying and talking to strangers. As your child grows older they will also need different levels of supervision, and conversations should be ongoing, rather than just having 'the one'. Many schools now include these subjects in lessons, which gives you an excellent opportunity to continue the discussion at home. This doesn't mean you

shouldn't implement software restrictions to safeguard their internet access. So much hard-core material is available online within a few key presses, that it would be foolish to let your little ones loose in such a jungle without protection. But preparing your child for eventual exposure to something adult is the wisest course, as even if you successfully lock down your own home and devices, there will always be friends at school with tablets or phones and unfettered internet access.

In the end, you are still the parent and the one who remains in charge. If you feel your child is ignoring warnings, or actively seeking out the wrong sites, then you can remove their internet privileges or move them back into the centre of the house where you can monitor their behaviour.

While some software does allow you to keep tabs on the internet activity of your children, it is best to tell them in advance that you are doing this. A child's trust in you could easily be damaged if they thought you were secretly spying on them and eavesdropping on their every conversation.

Again, and we really can't stress this strongly enough, talk to your children rather than rely on a software solution. Unless you do that, then the settings and applications featured here to help you protect your young family will be of limited value.

Ways to make the internet safe

While there exist many tweaks and features within browsers and software that can make your internet access more secure, one almost foolproof step you can take is to go to the source itself – the router. That little box with all its flashing lights is your gateway to the web, and it's possible to use special apps such as Family Shield by OpenDNS to directly filter all the content that pours forth from its glowing heart.

We have a guide showing you how to install Family Shield, but before you rush over there (it's at tinyurl.com/nt2dueh) it's worth noting it is a unilateral setting – there is very little in the way of fine adjustment. You choose from either high, moderate or low filters, but the setting applies to everybody on the network, not just your children. There are ways around this, as explained in the guide, but they can be complicated.

KINDLE CHILD Customisable controls

It's not just Family Shield that suffers from this broad-brush approach. Many internet service providers, such as Sky, BT and Virgin, offer family security filters, but once again these are blanket apps that apply across all content, reducing the internet to a children's version for everyone.

We have seen improvement recently, though, with products such as Sky's Broadband Shield allowing you to set time limits, so access is opened up after a watershed time when the kids are in bed. Obviously the advantage of this approach is that all devices connecting to your home Wi-Fi will have the same restrictions, so you don't need to go around setting up each tablet or PC. Remember, though, that Broadband Shield doesn't apply to 3G or 4G signals on mobile phones, or any other Wi-Fi connections that are in range and don't have passwords.

User settings

If the nuclear approach of router-based solutions feels too restrictive or cumbersome, then you can work on an individual device level. Depending on the operating system you're running, the approaches are slightly different. On both Google's platforms – Chrome and Android – you are able to set up different user profiles so that a number of people can share the same device, but not the same security levels. If your children have their own Google accounts, then these profiles are independent of one another and therefore harder to control, as the settings are always available to the user.

For younger children, the answer here is to create what are called supervised user accounts on the Chrome browser. These are linked to your full Google account, but allow you to set limits for the websites they can visit, as well as keeping a log of their online habits. If you share an Android tablet such as the Nexus 7, then a similar feature is restricted user accounts.

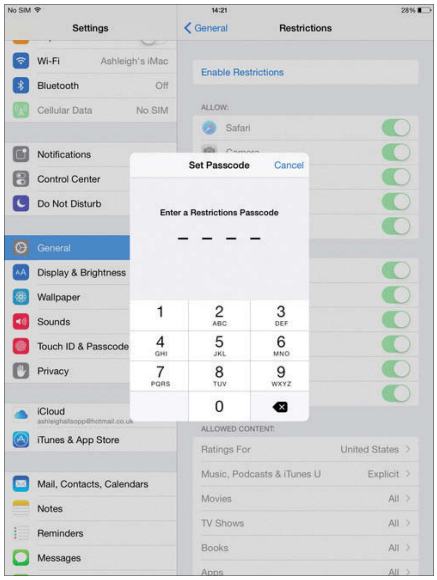
They are easy to set up via the Settings option on the User menu, and give the administrator (you) the ability to select which apps the account can access, and block any purchases or even the app store itself. It isn't a completely satisfactory solution, though,

NEXUS 6 Allows separate user profiles via Android Lollipop

HOW TO SET UP PARENTAL CONTROLS ON AN iPHONE AND iPAD

To access this, go to Settings on your iPhone or iPad and scroll down until you find Restrictions (which should be off)

1. After selecting Settings, you will see a menu of the available options. Tap the Enable Restrictions option at the top to access these settings.



2. You'll be prompted to create a passcode for the restrictions. This will ensure your children don't simply go to Settings and disable your choices.

3. Now you can select the options you feel are appropriate to your child, remembering to look at the Allowed Content section, as here you can limit explicit songs and TV shows from iTunes.

as content settings are still available within YouTube and Chrome, so explicit material could still sneak through. In many ways it's more a feature to stop your children running up bills through in-app purchases or installing random apps on your device.

With the release of Android 5.0 (Lollipop), Google has also created for the first time the option to create separate profiles on an Android phone. While this can be useful in short bursts, as you can disable phone calls and SMS messaging, for example, it's not really suitable for children as such, as it doesn't let you limit the things they can access online.

Child-friendly tablets

There has been a real rise in child-focused tablets over the past couple of years, so it's not always necessary to buy a fully fledged device and then try to restrict it. Some newer Android devices we've seen arrive complete with their own suite of parental controls already installed. The latest Tesco Hudl 2 features specially designed child safety settings that allow parents to restrict when their children are allowed to go online, for how long, and the sites they can see. The Amazon Fire range of tablets (such as the Fire HD 6) is also child-friendly, with its FreeTime controls offering the same level of

HUDL 2 Safety built in

customisation as the Hudls, while also letting you share specific books and movies from your Amazon account with your children.

> **Preventing your children from using the internet or mobile phones won't keep them safe online, so it's important to have conversations that help your child understand how to stay safe and what to do if they ever feel scared or uncomfortable**

FreeTime even has advanced settings that can withhold access to entertainment apps until user-defined targets for educational tasks (reading, for example) have been achieved. We recently conducted a series of reviews to find the best child-friendly tablets on the market and were pleased to see that the range is wide and varied in its approach. It's something to bear in mind when choosing a tablet as a gift for your child.

Apple's iPad is often regarded as the most desirable tablet around, but the company has a different approach when it comes to user accounts – one per device. You can't create a child account on iOS; instead, there is a Restrictions area in Settings that can be switched on and off. Within Restrictions you'll find on/off buttons for apps, websites, TV shows, movies, music and others. If your child is the only user of the device – say, an iPod Touch – then you can create an account for them (as long as they have a valid email address), then set restrictions and lock them with a passcode. This is a relatively quick solution and means you can adjust the settings as the child grows older.

How to activate Kid's Corner on Windows Phone

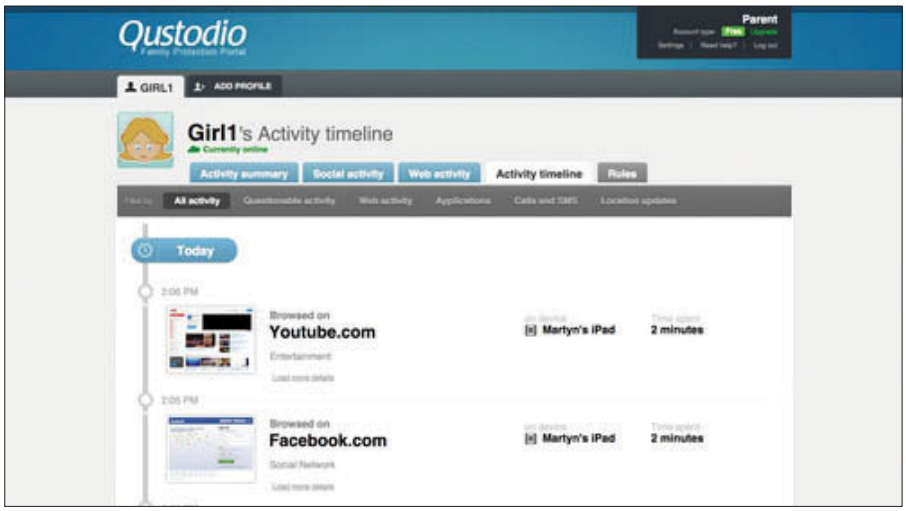
Windows Phone also comes with its own safety features, such as Kid's Corner, a built-in safe area on your handset where your children can play. Here they have access to apps and media decided by you, and won't be able to accidentally delete any of your photos, contacts or emails. In many ways it's similar to the Amazon approach and can be switched on and off as and when you need it. To activate the feature go to Settings > Kid's Corner, and follow the instructions.

YouTube and Facebook

Two of the most popular websites around are Facebook and YouTube. Facebook is something of a mixed bag when it comes to content. There are no obvious filters that can restrict explicit content, although the friends you follow have a great effect on the kind of material that appears in your newsfeed. You can block individual users and apps in the settings options, but that's about the extent of your controls.

It's worth remembering that the minimum age requirement for a Facebook account is 13 years old, so it's not really intended to be entirely child-friendly. Many of the family security software packages available now often include social media features, so if your child is a regular Facebook user, it would be worth investigating some of these.

YouTube is another huge draw for younger users, especially because of the huge number



of music videos on the site. Google does provide a safe mode option; once applied, it covers any instance of YouTube that logs in with the same account. On your PC all you need to do is navigate to the YouTube site, scroll to the bottom of the page, and click on the 'Safety:' box. Here you'll find an explanation of how it works and the restrictions it applies.

To set up the safe mode on a tablet is slightly different. On Android devices, launch the YouTube app, then tap the three dots in the top right-hand corner. This opens the Settings menu, where you'll need to choose Search and then tap on the SafeSearch option. If you have an iPad or iPhone, launch the app and you'll see the cog icon in the top left next to the account name. Tap on this and then select the SafeSearch option.

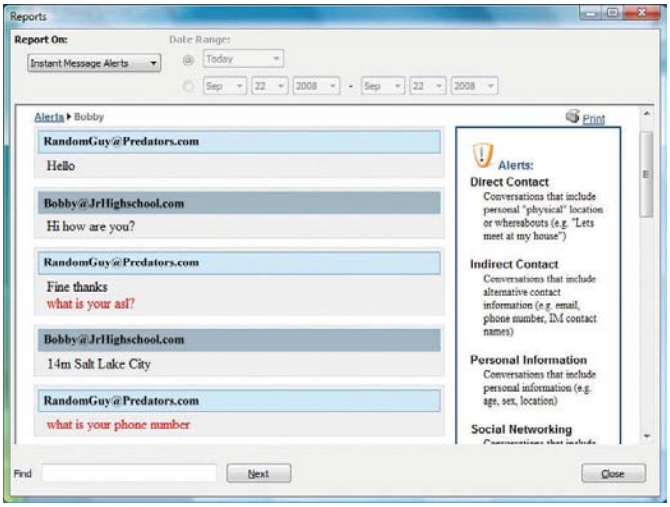
It's not foolproof, but it will at least limit the amount of unsuitable material that might otherwise get through.

Parental control software

While system settings and user accounts are useful, they often don't have the same kind of complexity as dedicated software. Also, the restrictions on an iPod won't mean anything when your child moves on to the family PC. In years gone by the effectiveness of a centralised computer in the home meant you only needed to set safety restrictions in one place; but now, as we've established, controlling access is more challenging.

Many of the software solutions currently on offer cover pretty much every platform available, and also usually come with some form of remote control so you can adjust settings without needing access to the device itself. Norton Family, McAfee Family Protection, AV Family Safety and Net Nanny are among the prime examples of cross-platform protection, each providing an impressive level of security for your family.

The initial setup of dedicated software is more time-consuming than simply adjusting settings, as you'll need to install the software on every device individually. Once this is done, the content your children can access should be far more regulated than the often generic approach of browsers and profiles. One way mobile apps often implement this is by replacing your existing browser with a purpose-built version from the security company. AVG offers this service for free on iOS through its Family Safety web browser,



QUSTODIO
Cross-platform protection

but hasn't released an Android or Windows Phone equivalent as yet.

There's also a financial element to consider, as many of the advanced features found in these suites usually appear in the premium versions, and might need to be renewed annually at a cost of around £30. In the long run, though, if you're serious about protecting your children from the various dangers lurking behind a web browser, it's a worthwhile investment.

A good example of dedicated software is Qustodio, which offers a decent blend of control and flexibility, without users needing a degree in network administration to understand its features. There's also a free version that allows you to install it on one device and create one user profile, which would be a good way to experiment with the service. If you think it's useful, then, much like the others mentioned here, you can upgrade to a year-long premium package (five users and five devices) for just under £30.

Qustodio's clean interface makes it very easy to understand, and you control everything via a web portal that displays the sites your child is visiting and how long they are there. It also lets you change the content filters and set usage time limits, all remotely. It's not perfect, as we were able to avoid a safety filter on sports sites by visiting *The Guardian*'s site and then navigating to the Football section without detection, but in many cases it's an effective safeguard.

There can be no doubt that the job of a parent has been made a little more challenging by the internet. While we've gathered together as much helpful information as possible in this feature, and there are some fine tools available, in truth none of them is a guarantee that your child will be safe online. That's not to say that they won't help, but, as we made clear at the start, they can only be fully effective if they are used in conjunction with your own presence and ongoing engagement with your children.

Combining many of the features, though, will at least limit the potential of unsavoury material appearing before their young eyes. Ensure that the various safe modes are enabled on search engines, add restricted profiles if possible, and if you're happy to pay the money, then invest in one of the safety suites we mention above. This will get you a good way along the road to security.

But most of all, remember to take time out to talk with your young ones about how they use the web, what they like and what their friends are into. It could just be the very best way to protect them.

NET NANNY
The dedicated approach

Music streaming services

Stuck for something to listen to? Roland Waddilove looks at the most popular music streaming services

There are many streaming music services and for the price of a CD each month, you can have not one album, but tens of thousands containing millions of tracks. It makes sense to subscribe if you love listening to music and with unlimited access to so much, you will discover new sounds you never knew existed. In this comparison we look at Rdio, Spotify, Google Play Music, Deezer, MixRadio and Blinkbox. Yes, there are more, but these are the most popular and most people use one or the other. Which is the best though? Each service has a different number of tracks, but all try to cover the most popular artists and albums, so the chances are that your favourite music is on all of the services. There are a few exceptions, though, and it is hard to find anything from AC/DC on any service, and Taylor Swift recently had a bust up with Spotify and pulled her music.

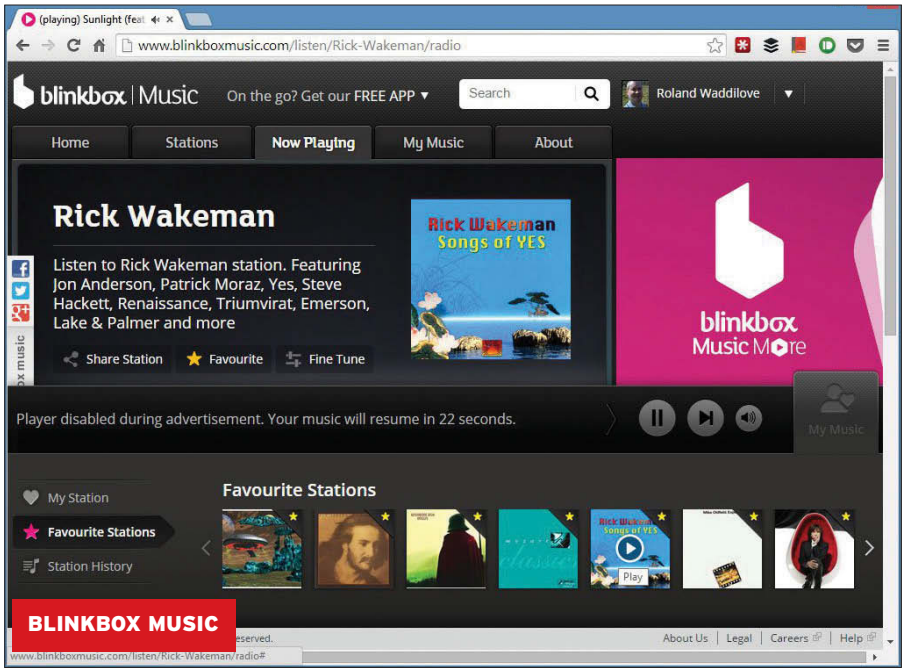
Blinkbox Music

Free, £4.33 per month
blinkboxmusic.com

This service is owned by Tesco and along with the music are ads for tins of beans, chocolate and other supermarket items. Surprisingly, they aren't as irritating as you might imagine. There are apps for Android, iOS and Windows Phone, and the website can be accessed on a PC or Mac. There are just 12 million tracks, which is over 20 million fewer than Deezer and it makes you wonder what is missing, but a lot depends on what music you like. The missing music may be foreign, or genres or artists you don't listen to, so don't immediately dismiss the service. Perhaps more important to audiophiles is the 192Kb/s streaming, which is lower than most rivals. Not everyone can hear the difference though.

The free service lets you search for artists and tracks, and it creates radio stations based on them. Liking a track while it is playing ensures that it is played more often and more music like it is played. There are also many ready-made radio stations to listen to, such as the top 40, number ones, new rock, dance and urban, and many more.

Subscribe for £4.33 per month and you get all the free radio station features minus the ads, access to the latest albums, the ability to create playlists of your favourite tracks, and you can play albums. It is a cheap service that has good support for mobile devices, but the quality and range of music may not be adequate for some people.



Deezer

Free, £9.99 per month
deezer.com

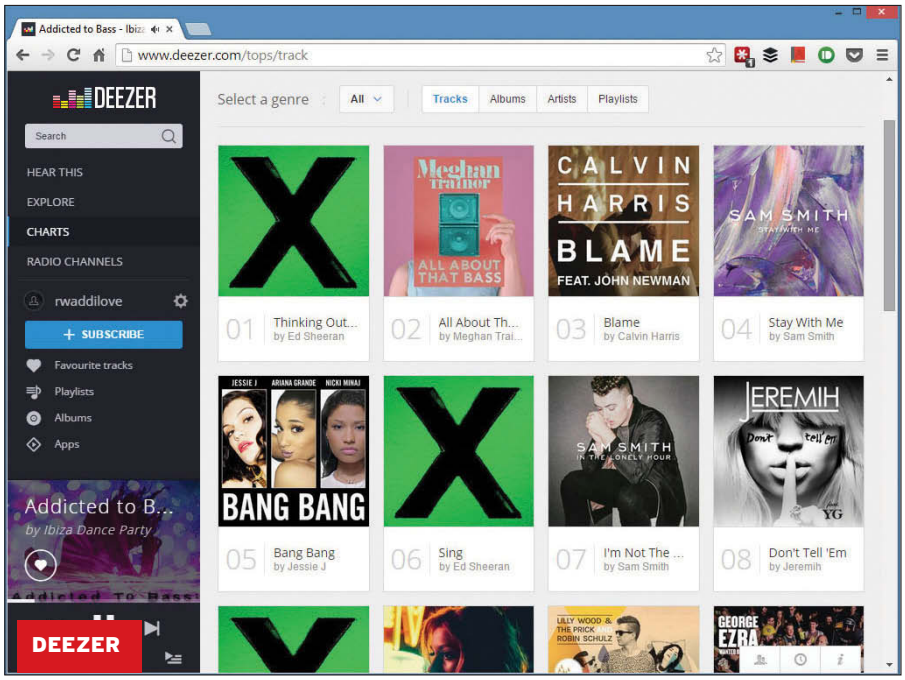
PC ADVISOR RECOMMENDED

Deezer has the largest music library with around 35 million tracks. This means there is a greater chance of finding music you like than with Blinkbox, for example, which has just 12 million. There are free and Premium+ accounts, with the latter costing £9.99 per month. The main benefits of subscribing include the removal of the adverts that interrupt the music in the free version, offline access means that you can continue to listen to music even when you don't have an internet connection on your phone or tablet, and you can increase the music quality.

Social networking is built in and you can share tracks or albums to Facebook, Twitter or Google+. A favourites button enables you to build a list of your most liked tracks and albums, and playlists can be created and they can be private or collaborative with comments from other people and fans.

An Explore feature enables you to browse and discover new music. Select the genre or region of the world and album after album is displayed. There are Deezer picks and new releases. The Charts section is another way to browse the music and you can see the most popular tracks, albums, artists and playlists in any genre you select. There are numerous radio channels too, and these are organised by artist and genre.

Deezer is very impressive, it is a great service and the website and mobile apps are excellent. The way you can view a discography, similar artists and a biography is useful. This service is one of the best.



Google Play Music

Free, £9.99 per month
play.google.com

Trying to describe streaming music services is like trying to hit a moving target because they are under constant development. Google Music Key is in beta and its launch is imminent. This consists of high quality ad-free music videos from YouTube and included in the subscription will be Google Play Music All Access. At the moment, you just get streaming music, but eventually streaming music videos will be included in the £9.99 per month subscription fee.

Google Play Music also lets you upload 20,000 tracks of music from your PC or Mac and stream them to any computer, phone or tablet for free. This means that if you have a CD collection, you can create your own streaming music service.

Go to the Google Play store on a computer, phone or tablet, and select the music section. When you subscribe, the prices are removed and you can play any of the music. There are fewer tracks than some services, but 18 million isn't bad. You can search for artists and tracks and create your own playlists. You can also create Instant Mixes and this is an automated playlist creator. It instantly builds a playlist containing the selected track or artist and similar ones.

Custom radio stations can be created by selecting an artist or track and the songs played are all from similar artists in the same genre. There is an 'I'm Feeling Lucky' station too. The free online storage of your own music collection and the upcoming Music Key service make this a serious contender in music streaming.

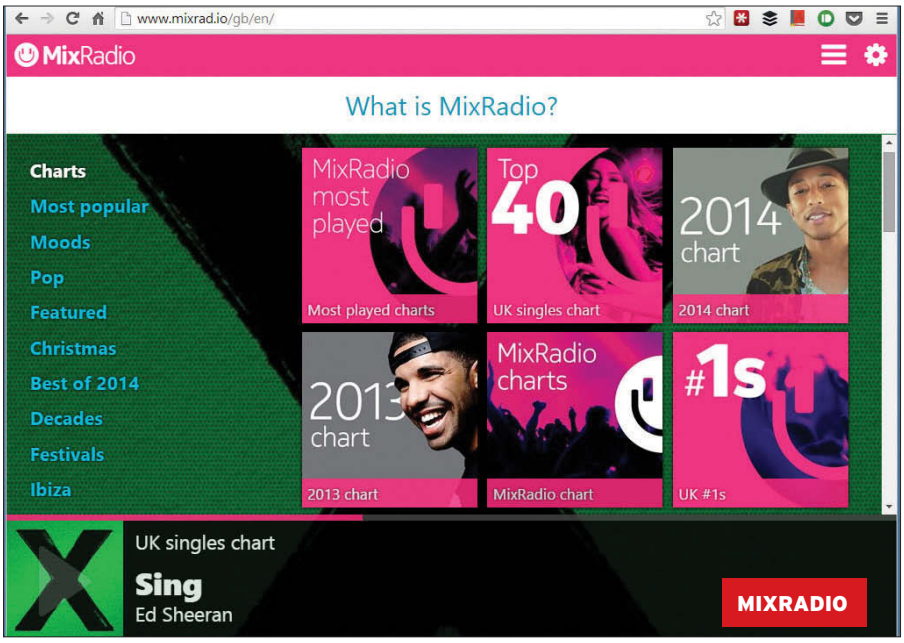
MixRadio

£3.99 per month
mixrad.io

MixRadio was originally run by Nokia for owners of the company's mobile phones. Microsoft took over Nokia and ended up with two music services, Xbox Music and MixRadio. The latest news is that MixRadio is being spun off as a separate company. The £3.99 monthly cost makes it the cheapest music service, but before you rush and join, there are some serious limitations. The only mobile app is for Windows Phone.

The radio in the name hints at the music this streaming service provides – radio stations. There is a good selection and they cover a wide range of genres and interests. Examples include MixRadio Most Played, Top 40 UK Singles Chart, UK number ones, pop, jazz, indie, hip hop, dance, decades, and so on. A search facility enables you to find your favourite tracks and artists, and you can listen to a radio station based on them. There is an interesting facility to create mixes - radio stations - based on a list of artists. Just type in your favourites and then sit back and listen to the station play their songs and similar music and artists.

The future is uncertain for MixRadio. It has to stand on its own without the backing of Microsoft/Nokia and it desperately needs Android and iOS apps in order to build membership. It's only useful for Windows Phone owners.



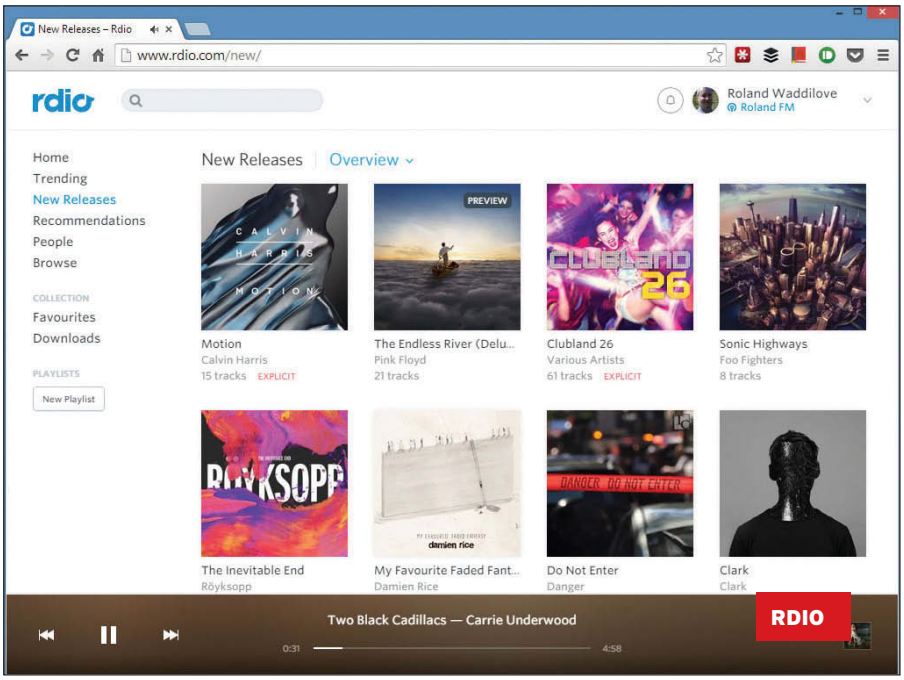
Rdio

Free, £9.99 per month
rdio.com

There are four types of account and a free one provides access to the full 30 million track music library on the web and on mobile devices. You can search for artists or tracks, but then you can only listen to a radio station based on them. Subscribing enables you to select and play individual tracks as well as stations. For £4.99 per month you can stream any tracks to your computer and for £9.99 this applies to mobile devices, too. There are family subscriptions with discounts for second, third and fourth users.

The home page shows music you recently listened to and there is a search facility to find tracks, albums and artists. There are sections that display new releases and trending music, and there is a recommendations section that shows music similar to tracks you have previously listened to. All these are useful if you want to discover new music or see what other people recommend. Playlists can be created and there are options to make them public or private.

The mobile app is good and there is a useful facility to set different bit rates for mobile data and Wi-Fi, such as low and high respectively. Music downloads are available and you can listen offline. Rdio is good, but not quite the best.

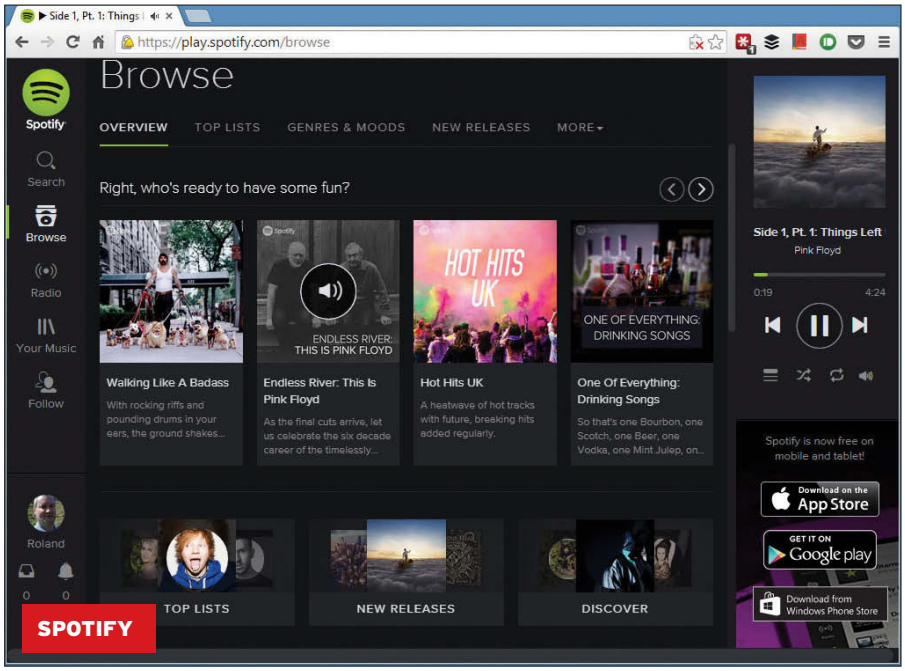


Spotify
Free, £9.99 per month
spotify.com

PC ADVISOR BEST BUY

When streaming music is mentioned, Spotify is one of the first services that springs to mind. There are apps for iOS, Android and Windows Phone, and it can be accessed in a variety of ways on PC and Mac.

It can be used for free provided you don't mind adverts, a slightly lower quality, although 192Kb/s is hardly low, and the inability to select which track to play on mobiles. There are fewer limitations when using a web browser and any track can be played whereas mobiles must use shuffle play. Select an album for example, and the tracks play in random order. Subscribing for £9.99 a month removes the ads, provides better quality streaming, offline listening, and no adverts.



Radio stations are available in numerous genres, but you can also create them based on artists or tracks. While any track is playing, you can start a radio station or share it on Facebook, Twitter or Tumblr. You can follow people and it shows Facebook friends already on Spotify, and suggests people to follow. Spotify is an excellent service and is our pick of the bunch.

Conclusion

Blinkbox and MixRadio are cheap, but are not really worth it and you are better off with the free ad-supported versions of the other services. There isn't much to choose between Deezer, Rdio, Spotify and Google and all are good services that cost exactly the same, offer identical streaming quality, offline listening, social features and so on. The services are so similar that really this streaming music comparison boils down to who has the best software. Spotify's website and apps are preferred to the others, making it the best service, but Deezer is very good and is very close behind in second place. Google offers a broader service with online storage of your own music, streaming, and (coming soon) Music Key videos, which some people may prefer.

	BLINKBOX Free, £4.33 per month	DEEZER Free, £9.99 per month PC ADVISOR RECOMMENDED	GOOGLE Free, £9.99 per month
Website	blinkboxmusic.com	deezer.com	play.google.com
Songs	12 million	35 million	18 million
Best quality	192Kb/s	320Kb/s	320Kb/s
Offline music	Yes	Yes	Yes
Free limitations	Ads, no playlists, not latest albums	Ads (including on free mobile version), no offline, lower quality	Upload your own music
Devices	PC, Mac, iOS, Android, Windows Phone	PC, Mac, iOS, Android, Windows Phone, some TVs, Hi-Fi, cars	PC, Mac, Android, iOS, some TVs

	MIXRADIO Free, £3.99 per month	RDIO Free, £9.99 per month	SPOTIFY Free, £9.99 per month PC ADVISOR BEST BUY
Website	mixrad.io	rdio.com	spotify.com
Songs	26 million	30 million	20 million
Best quality	192Kb/s	320Kb/s	320Kb/s
Offline music	Yes	Yes	Yes
Free limitations	PC, Mac, Windows Phone	PC, Mac, iOS, Android, Windows Phone, Blackberry, Roku, Sonos	PC, Mac, Android, iOS, Windows Phone, Roku
Devices	4GB 1600MHz DDR3	4GB 1600MHz DDR3	4GB 1600MHz DDR3

Apple CarPlay

Apple CarPlay lets you integrate your iPhone with your car. Karen Haslam reports

Apple's CarPlay system places Siri on your steering wheel, and an iOS-inspired dashboard display enables you to interact with the iPhone while you drive. Introduced by Apple at WWDC in 2013 and formally announced as CarPlay in March 2014, until recently it was only available when you bought a new car. However, now Pioneer has launched the SPH-DA120, which means your car may be able to have a CarPlay system installed.

There are a limited number of apps available in CarPlay currently: Phone, Messages, Maps, Music and Podcasts. Their features are limited, too, but that's so you can use them safely while you are driving

In Messages, for example, there's the option to have Siri read out unread messages and incoming ones, though, you won't see the messages onscreen, nor the transcript of what Siri says or what you say to Siri. And you certainly won't be able to tap in a message on the screen. One issue with relying on Siri to compose and send a message is the fact that it relies on your phone's data connection – and we all know how useless the data connection is on motorways in the UK.

> **"The 6.2in, 800x480 touchscreen display can be installed in the vast majority of modern cars in place of the existing radio or CD player"**

The 6.2in, 800x480 touchscreen display can be installed in the vast majority of modern cars in place of the existing radio or CD player, and it hooks up to your iPhone displaying information and making copious use of Siri to keep your attention focused on driving. Indeed, thanks to the Siri update in iOS 8, you can also say "Hey Siri" to start the assistant hands-free.

As for satnav, the only option is Apple's Maps – you can't use Google Maps or TomTom. You can ask Siri to "take me home" and have your iPhone plan a route from your location to your house, or you can ask Siri to find a restaurant nearby, but as a satnav, Maps is limited. It lacks speed camera warnings and other options you'd find in a standalone satnav.

Luckily the satnav features don't rely on the GPS inside your iPhone – the unit has a built-in GPS receiver – which is essential in built up London streets.

The SPH-DA120 also has a built-in microphone, so you won't have to rely on those on your iPhone. The screen's resolution is good enough, though, we found it a little too reflective and hard to see in certain situations.

The SPH-DA120 costs £349 and is available from Halfords, where fitting will set you back an extra £30. Note, you'll need an iPhone 5 or later to use the CarPlay features.

Get CarPlay on the cheap

Apple's CarPlay system places Siri on your steering wheel, and an iOS-inspired dashboard display enables you to interact with the iPhone while you drive. CarPlay makes driving a lot more fun.

The **CARPLAY SYSTEM** will be available in models from these manufacturers

But what if you can't afford to splash out on a new car and the £350 Pioneer system is out of your price range? You can still have CarPlay in your car. Here we show you how to get CarPlay features.

Mount an iPad mini on the dashboard

One of the easiest ways to enjoy the iOS experience in your car is to mount an iPad mini (with a cellular connection if you want to use Maps on the road) to your dashboard. An iPhone might seem the better choice in this scenario, but unless you own an iPhone 6 Plus, we think the iPad mini hits the sweet spot: it's large enough for you to easily read the screen while driving, yet small enough to not block your view.

Several solutions are available that let you achieve this. RAM Mount sells a good selection of iPad mini mounts, including the £56 RAM-A-CAN II. You can also attach the iPad mini to your windshield with the Double Suction Cup Mount with Tab Time for iPad mini.

Another great option is the TomTom ProClips system, which requires you to purchase a mount and vehicle-specific holder. You can purchase the ProClip Car Kit for iPhone and iPad models, so the TomTom ProClips are a good choice if you want the device to be sturdy in your car.

Power your iOS device in the car

The iPhone and iPad have pretty good battery life, but if you're going on a long journey or you want to be able to continue to use your device once you reach your destination you'll need to power the device in the car. A range of USB chargers that plug into the cigarette lighter is available.

Put a Siri button on your steering wheel

As we've mentioned, some CarPlay systems place a Home button on your steering wheel that you can use to call up Siri, then interact with the system through spoken commands. Siri can be used to control playback of the music stored on your iDevice, request navigation instructions, read and reply to messages, and more.

Although you can't physically install a Home button on your steering wheel, you can add a Bluetooth-connected Home button anywhere within your car. The Mobile Home from Beanco is one such device. You can purchase one on Amazon for £60. That's no more expensive than many Bluetooth handsfree kits.

A number of apps come preinstalled with CarPlay, including **MAPS** which is handy of you need directions

Connect Siri to your speakers

If your car has a Bluetooth speaker system you'll be able to output the audio from your iPad or iPhone through your car's own speakers. This will make the CarPlay experience more realistic, and ensure you don't miss any spoken directions when the music's up too loud.

Place your car speaker system in Bluetooth mode and click on Settings Ð Bluetooth, then set Bluetooth to On. Now choose your car speaker system from the Devices list. If your car does not have Bluetooth, you can add it with the Scosche MotorMouth II (£83 on Amazon) or install a new car stereo with Bluetooth connectivity.

Set up CarPlay in your car

With a dashboard mount, car charger and Home button you'll have a pretty decent makeshift CarPlay system. Using the parts we've mentioned here it will set you back only £140 to set up (assuming you already have an iPhone or iPad mini). To use your CarPlay system, press the Home button on the Mobile Home unit. This will activate Siri on your iPad mini. You can now speak out your Siri commands to the iPad mini, which will respond through your car speakers.

Here are some things you'll be able to do with your home-built CarPlay system:

- Ask Siri for map directions
- Check the weather at any location
- Check your email
- Send a message or initiate a phone call
- Look for nearby restaurants, petrol stations and other businesses
- Create reminders

An exciting in-car unit for CarPlay

Susie Ochs spent 72 hours testing CarPlay on pioneer's in-dash navigation system

If all you want to do is play music from your phone in the car, cheap and easy solutions abound, from a regular audio cable, to picking up a head unit with Bluetooth. Fancy in-dash 'infotainment' systems promise more, combining music, navigation, and hands-free communication. But the few I've sampled have had clunky interfaces that made me go right back to performing those tasks with my phone – yes, I'm that person messing about with her phone at traffic lights until you beep at me to go.

Green light

Pioneer's AVIC-8000NEX is one of the infotainment units that can be updated to run CarPlay. You can find the firmware update on the company's website (pioneer.eu.uk). Setup is so simple you can hardly call it setup – all you do is plug in your phone. It has a capacitive touchscreen, and a row of tiny physical buttons along the bottom, along in a few cases I found myself reaching for my iPhone when the touchscreen and Siri weren't getting things done.

> **"Apple's CarPlay is intended to bridge the chasm between your iPhone and your car stereo, letting you access Maps, Messages, Music, and more"**

Apple's CarPlay software is intended to bridge the chasm between your iPhone and your car stereo, letting you access Maps, Messages, Music, and more, including compatible third-party apps such as Spotify and Beats Music. CarPlay has a lot going for it – all the data it needs is on your iPhone already, and the Siri integration can be a godsend, letting you reply to incoming texts without taking your eyes off the road. But with a dash-mounted microphone for talking to Siri. The microphone is a nice touch – it's always listening for the "Hey Siri" prompt, and I didn't have to worry about my iPhone being close enough to pick up my voice over its own microphones.

You can also pick up your tethered phone and navigate with that (I had to a few times), but the goal is to be able to use your voice most of the time. CarPlay systems that come in a new car will have a Siri button on the steering wheel and preinstalled microphones. But the real beauty of CarPlay is that you don't have to install apps, update apps, log into iCloud, or sync anything. The apps and information are on your phone already, and CarPlay just gives you a familiar, car-friendly interface for using them.

Deja vroom

The interface immediately looks familiar, using the same icons as on the iPhone and iPad. A home button in the bottom-left corner always lets you go back to the home screen, although I did find it a little small compared to the larger, easier-to-tap icons on the home screen grid.

If you have an active phone call or navigation session going and you switch to another app, the Phone or Maps icon appears in the top-right corner, so you can tap it to quickly go back. That worked well, but I wished that corner also had a universal Back button to go back to whatever app I was using last, not just Phone or Maps.

The Now Playing icon on the home screen is a nice touch. Tap it to go to the currently playing song, no matter what app is actually playing it. You won't have to remember if you're listening to the Music

Pioneer's AVIC-8000NEX can be **UPDATED TO RUN** CarPlay

app or Spotify. When you're presented with a long list of items, such as your contacts or a list of songs, you can scroll through on the touchscreen, or scroll faster by tapping or dragging the scrolling list of letters on the right side of the screen.

CarPlay-compatible third-party apps show up as icons if they're already installed on your phone, and for the most part they work the same. I didn't have to log into my Rdio account, for example, and all my favourites and playlists appeared instantly. But not every Rdio option was accessible on the CarPlay touchscreen – I couldn't toggle the shuffle feature on and off without reaching for my iPhone, for example.

At least the phone stays synched up to what you're seeing on the CarPlay stereo's screen. When I was using Rdio on the stereo, Rdio launched on my phone. When I was following directions in the Maps app on the stereo, my phone displayed a list of every turn. You wouldn't want to consult this while actually driving, but it's nice to be able to hand off to a passenger.

Siri is my copilot

Hands-free communication worked well. When you tap Phone or Messages, you don't see a list of contacts automatically. Instead, it's a Siri prompt, with a smaller button to access your actual list of contacts. The idea is, assuming you know who you're trying to contact, you can just ask and Siri will take care of it.

During my tests, I was driving in rush hour traffic when my mum texted me that she and my son wanted a ride home from the station. I saw a notification that a text had come in, and asked Siri, "Please read me that text." She did, and I said, "Reply that I'll be there in 15 minutes." Siri dictated that back to me, and when I confirmed it was right, she sent it. But I didn't have my son's car seat with me, so I then asked Siri, "Call my husband." The call was placed, I asked him to do the pickup, and that was that.

The whole thing took two minutes and I didn't have to take my hands off the steering wheel. Before CarPlay, I could have tried to do this all with Siri while I was driving – just by talking to the phone – but to be honest, I probably would have exited the freeway to pull over and take care of it myself.

Still, using CarPlay also reminded me that Siri can't always parse natural-language requests every time. "Take a note for me!" resulted in a note saying "Me". I could say, "Are we there yet?" for a driving time ETA, but "When will I get there?" didn't work. I was able to get weather, sports scores, and directions to the nearest Starbucks. Siri could tell me who had emailed me last but not read the messages. It has come a long way since its debut, but I kept running up against situations where it still has room for improvement.

Just getting to the point where I could ask Siri a question was frustrating too. Saying, "Hey, Siri!" reliably brought up the Siri screen on the CarPlay unit, but often without the little high-pitched chime that means Siri's listening. If I didn't say anything because I was waiting for the chime, the Siri screen would fade out and I'd have to call it up again. So I found myself having to say, "Hey, Siri!" and then tap the microphone button on the screen – sometimes repeatedly – until I heard the chime.

Touchscreen

In fact, on the AVIC-8000NEX I tested, the CarPlay firmware update on the capacitive touchscreen stunk. As Apple fans, we are spoiled by bright, responsive touchscreens, some of the very best on the market. This screen doesn't scroll smoothly, and taps often took more than one try to register. In all the music-playing apps, I would tap and tap and tap the Next Track button without the music advancing – then on the fourth or fifth tap it would suddenly advance two tracks. This isn't the end of the world, but if you've paid a lot of money for your Pioneer system the performance of the screen is disappointing. The company has many systems that run CarPlay at various prices. The AVIC-8000NEX, for example, cost £605, while the SPH-DA120 will set you back £349.

Verdict

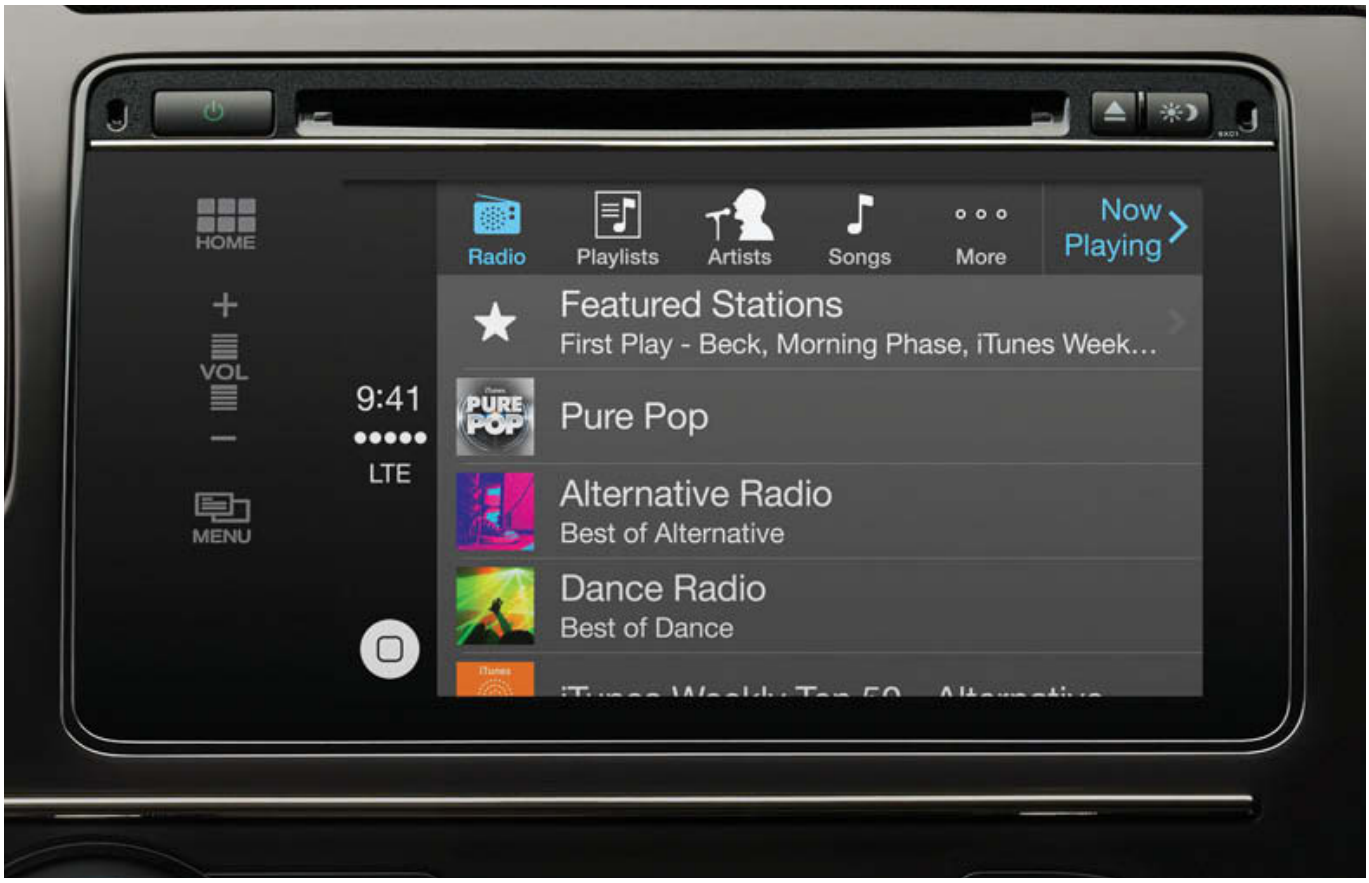
CarPlay is cool, and if I was buying a car that had it, I would definitely use it, but I'm not going to upgrade the stereo that's in my 2006 Subaru to this aftermarket Pioneer system.

For starters, CarPlay can't do anything my iPhone doesn't do on its own, and obviously the iPhone has a lot more apps. I really missed using Waze for navigation – I could still set up a Waze route on my iPhone's screen and the directions would play over the car's speakers, but since it's not a CarPlay compatible app it can't show the map on the stereo's screen.

Add in the high aftermarket cost, and the hit-and-miss results from using Siri for everything, and CarPlay doesn't seem worthwhile just yet. But navigation and hands-free communication work well, and it's nice to have an Apple-designed interface on a car stereo. Since it's so easy to update the software and apps on your phone, CarPlay should keep improving. It's already better than other infotainment systems I've tried – and a lot safer than trying to use my phone while I drive.

Hook up a smartphone to a car's stereo

Fed up with the rubbish on the radio? Steve Paris reveals how to play music from your smartphone



For some, the promise of CarPlay features may be a pipedream, with their old banger unable to support such technology. There are, however, ways to connect your smartphone to even the oldest car stereo.

Cassette adaptors

Let's start with the oldest of the bunch. Some of us still use radios equipped with cassettes players. Even though cassettes are no longer manufactured, the hardware is still around, so what can we do with them?

A quick look online for 'cassette adaptor' will reveal page after page or similar devices ranging in price from £1.99 to upwards of £20. The Iomax Car Cassette Adaptor, for example, will set you back just £5.99. We would imagine a mid-range model would be ideal. To operate the device, slot the cassette part of the adaptor into the tape deck, connect the mini-jack to your smartphone, turn on your car's stereo, choose a song and then press play.

IOMAX CAR CASSETTE ADAPTOR

Charging your iPhone in your car

Don't forget that playing music will drain your battery, so getting a 12V charger for your smartphone would be useful. Again, you'll find a long list of available options through Amazon, but consider choosing one that can handle enough power to charge up a tablet. Even if you don't yet own a tablet, more power means your phone might charge up faster. Also, should you have a tablet, you won't need another charger for it – you'll be able to swap between the two devices.

Using your smartphone with your CD player

If your car stereo has a CD player rather than a tape deck, unfortunately, you won't be able to use the above solution. Instead, you need to look for an alternative, one which would also work on those old stereo cassette players: an FM transmitter.

FM transmitters

These are unsurprisingly more expensive, but they can work very well. The idea is

GRIFFIN iTRIP AUTO UNIVERSAL PLUS

simple: you connect your smartphone to the device and it will broadcast the audio on a particular radio frequency. Tune your car radio to this and you'll be able to hear your music wirelessly.

The Griffin iTrip Auto Universal Plus (pictured top right) allows you to connect anything with a headphone jack to your car. It sounds great, but it's not a flawless solution. You could, for example, hit some interference even if the device usually broadcasts in little used frequencies. You can, of course, change that frequency manually, but you might end up taking some time finding the perfect one, only to move to another geographical location on your travels and have to do the process all over again.

What about iPhones?

Before you spend any money, make sure the device will work with your model of iPhone. It's not only the type of connector it has – either the original one or the new Lightning connector – the innards have changed from generation to generation, too. This means it's possible that a device that works with the iPhone 3G may not work with a 4s even though their connector is exactly the same, so a little research will be necessary. Griffin Technology has solved this with its iTrip Auto Universal Plus. The device connects to your iPhone's stereo minijack, so it's compatible with a wide range of iPhones and iPads.

Get a 'Made for iPhone' car stereo

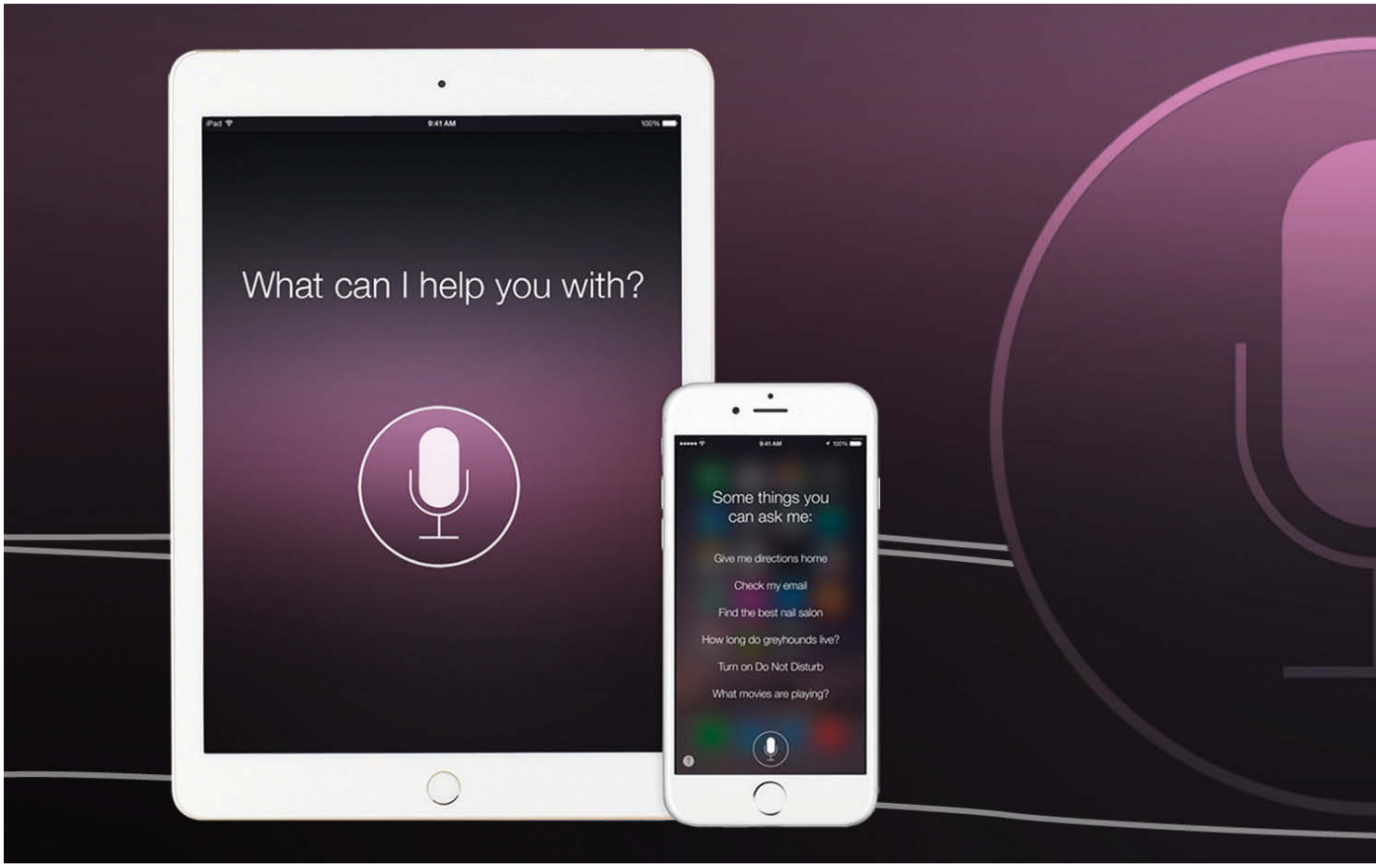
Unless there's a specific reason why you don't wish to part with your car's old stereo, the best option would be to fit a new one. The Philips CE139dr (pictured below) is an in-car stereo that will work directly with your iPhone. You need to be careful, though. Not all stereos with USB ports work with iPhones. And although it may play music from your handset, it won't charge it.

Of course, this would be the most expensive solution, but what you'll get is much better clearer sound (beating the cassette stereos hands down), no interference from radio stations (take that, FM transmitters), plus your phone will be charging while playing, saving you from having to buy a 12V charger. Yes, car stereos can cost upwards of £300, but some iPhone-compatible models will only set you back £45, and at that price, it may well be worth leaving the past behind and embracing the iPhone-music-enabled future.

"FM transmitters work well. The idea is simple: you connect your smartphone to the device and it will broadcast the audio on a radio frequency"

PHILIPS CE139DR

Complete guide



Using Siri, Apple's voice assistant, you can speak commands to your iPad or iPhone and have it do your bidding. To activate Siri, hold down the Home button on your compatible iPad or iPhone, or hold down the control button on your earphones. Constantly improving, Siri became faster and more reliable than ever with iOS 7 and iOS 7.1, gaining new features and a female voice for the UK, while iOS 8 has added music identification, "Hey, Siri!" voice activation and real-time feedback of the words that Siri thinks you're saying.

Siri works by recording your voice and sending it to a server that interprets what you've said and returns it as plain text. If you haven't got an internet connection, then Siri won't work.

It's a massive leap forward from old-fashioned speech recognition. This used to mean a limited vocabulary and a glaring inability to do very much. Worse still, for non-Americans, voice recognition struggled with European, Australian and other accents.

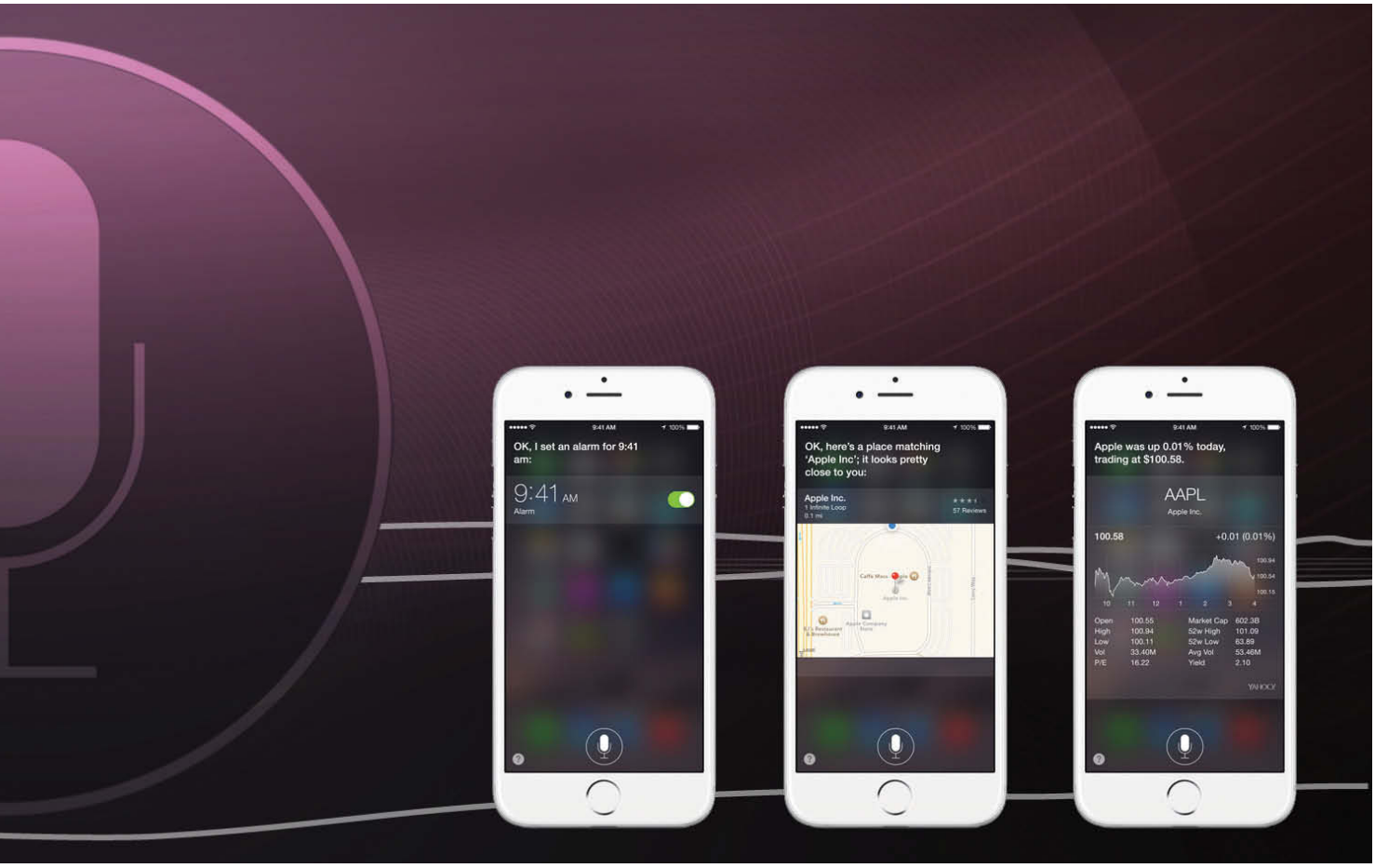
Siri, however, doesn't depend on a limited stock of words – it'll generally figure out what you're trying to say. That makes interacting with it seem much more natural. It also works pretty well with a range of accents, and has American, British and Australian settings.

The voice assistant is comprehensive. It's tied into Messages, Calendar, Music, Reminders, Maps, Mail, Weather, Stocks, Clock, Contacts, Notes and Safari. It's also linked to Wolfram Alpha, the computational knowledge engine that can provide answers to numerous factual questions, and Yelp, the directory of local businesses.

It's also capable of searching Twitter and adjusting settings, and can perform a web search for you. These days it uses Bing as its default search engine, but specifically asking Siri to "Google" something will get it to use Google instead.

to Siri

Siri has become an impressively useful voice command system for iPads and iPhones. What's more, it's fun. Here David Price explains just what you can do with Siri, and how to get more from it, along with the valuable updates added to it by iOS 8



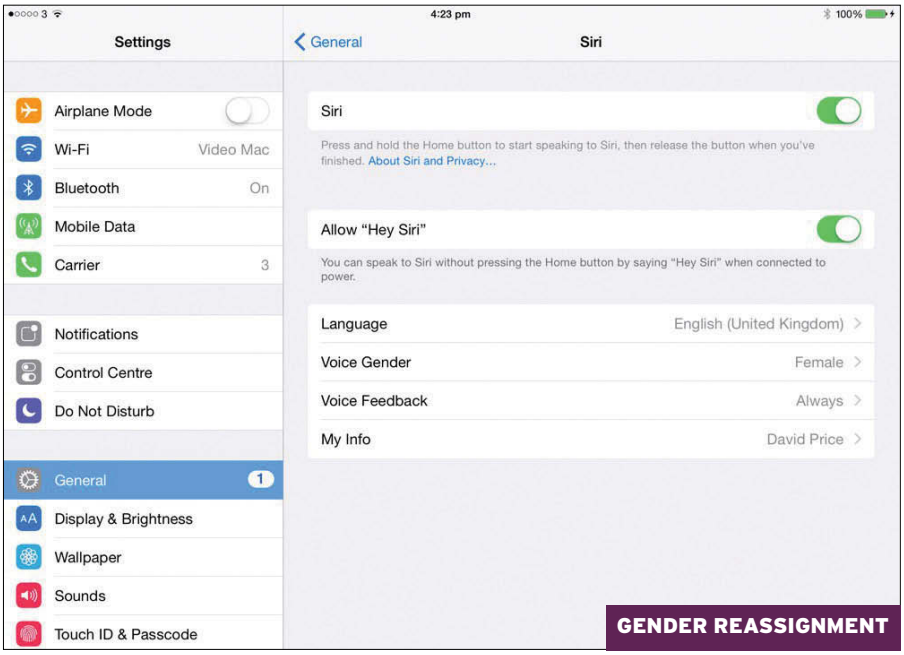
Get started with Siri

Getting started with Siri couldn't be easier. Simply press and hold down the Home button. The background will blur, you'll hear a ba-ding sound and 'What can I help you with?' appears onscreen. You should also see a wavy white line at the bottom of the screen.

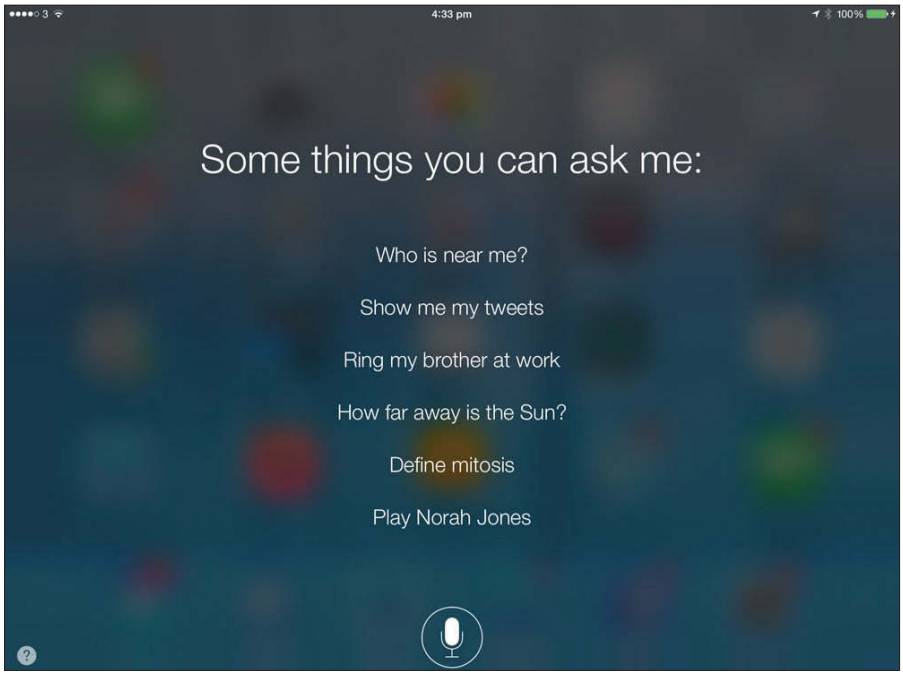
Simply speak your request into the iPad or iPhone. When you've finished speaking, the white line turns into a round microphone icon and Siri will get back to you with an answer. Sometimes it takes Siri a few moments to think about the answer, but it's a lot faster than it used to be.

You can also manually control how long Siri listens to you for, rather than having to wait for it to work out you've stopped speaking. To do this, hold down the Home button as you speak a command or ask a question, and release it when you've finished.

In the UK, the male Siri voice was updated in iOS 7.1 to sound less robotic and more



GENDER REASSIGNMENT



natural, and a female voice option was added. You can switch Siri's gender to female by going to Settings > General > Siri and tapping Voice Gender; choose female.

You can ask Siri all sorts of things, and the more you use it the more accurate it becomes. You soon become aware of just how useful it can be, and what its boundaries are. It knows a great deal about weather, restaurants, films and football, for example, but nothing about Formula 1.

It is also hooked up to the Maps application, so it can locate businesses, movie times, restaurants and bars near you. One of the great things about Siri is that it can find things in your local area.

There are a few scenarios in which Siri truly excels. The first of those is when you're in a hands-free situation, most likely when driving a car. The iPad knows when you're going hands-free and becomes chattier, reading text aloud that it might not if it knows you're holding it in your hand. Siri is also deeply integrated with the directions feature in Maps, and the iPad works as a fantastic (if slightly oversized) voice-activated satnav.

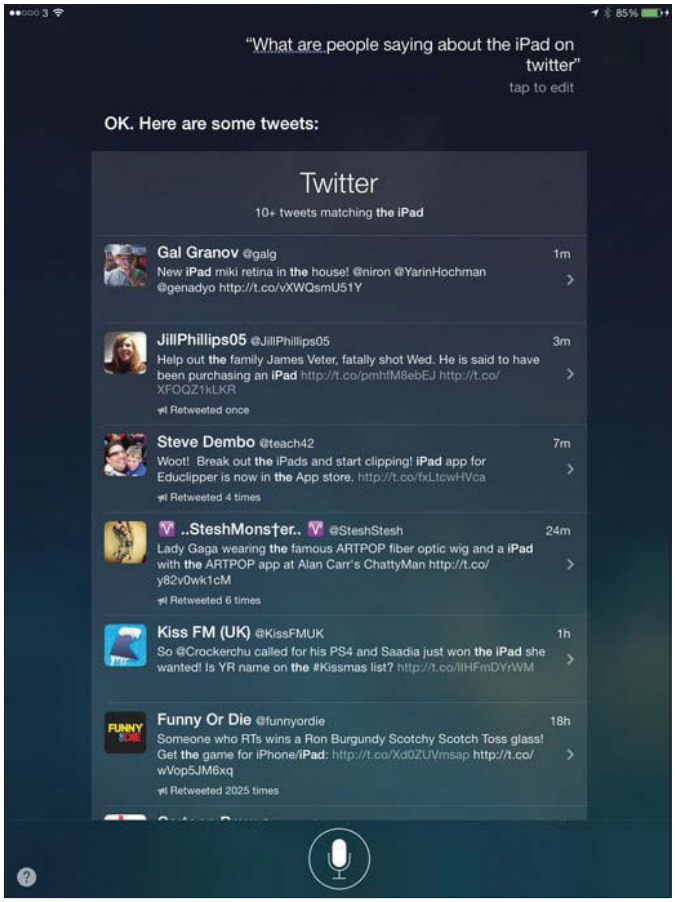
When you get a message, you can instruct Siri to read the message, and it will. You can then tell it to reply to the message, dictate the entire message, have Siri read it back so you can check it makes sense, and then send it. You can also ask Siri to read out your Mail messages and it'll let you know who sent you a message and what the subject line is.

There are still some gaps. For example, Siri won't read your emails out to you and it'd be great if you could get it to read out whole books and web pages. And while iOS has the nifty Notification Center, which gives you granular control over how different apps notify you about what's going on, there's no option to read alerts out loud when you're in hands-free mode. A missed opportunity.

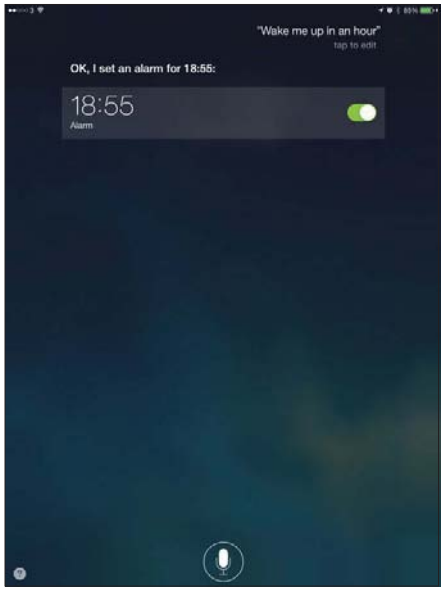
Siri self-help

The rest of this feature will go through all the commands and features that you can activate using Siri, but Siri itself also offers some tips worth knowing. You can get to them by holding down the Home button to start Siri and then waiting without asking any questions: Siri will start cycling through pages of suggested commands.

If you're not driving, Siri can still be useful. In fact, some tasks can be done much



SIRI CAN PULL INFORMATION FROM TWITTER ABOUT WHAT THE PEOPLE YOU FOLLOW ARE SAYING, OR WHAT'S HAPPENING



FAFF-FREE ALARMS

faster through speech than through clicking, tapping and swiping. It's much easier to set an alarm or timer using Siri, for example, than it is to unlock your tablet, find the Clock app, and tap within the app. You just tell Siri "Set a timer for three minutes", and your iPad begins to count down until your tea is ready. "Set an alarm for 5 am" does what you'd expect, with no further faff. "Remind me to record my favourite show" and "Note that I need to take my suit to the cleaners" work equally well too. These are short bursts of data input that can be handled quickly by voice, and we've found they work well.

It's also much faster to ask Siri to access settings than it is to dive through the menu. You can just say "Change wallpaper" rather than opening Settings and tapping Wallpaper.

You will soon become impressed by Siri's ability to understand the context of conversations. It doesn't always work, but when it does, it's magical. We asked Siri for suggestions for places to have lunch and it provided us with a list of nearby restaurants that serve lunch.

Talking to your iPad or iPhone is not much different from talking on your mobile phone. Clearly, it's not appropriate in all contexts. If, for example, you're quietly reading in the library and need to set a reminder, you should use the Reminders app, not Siri. And if you're out in public, well, you can use Siri, but you'll probably get some funny looks.

Apple's integration of Wolfram Alpha with Siri is a smart move. If you need answers to factual questions, such as the speed of light or the number of days until Christmas, the answer engine can provide the solution.

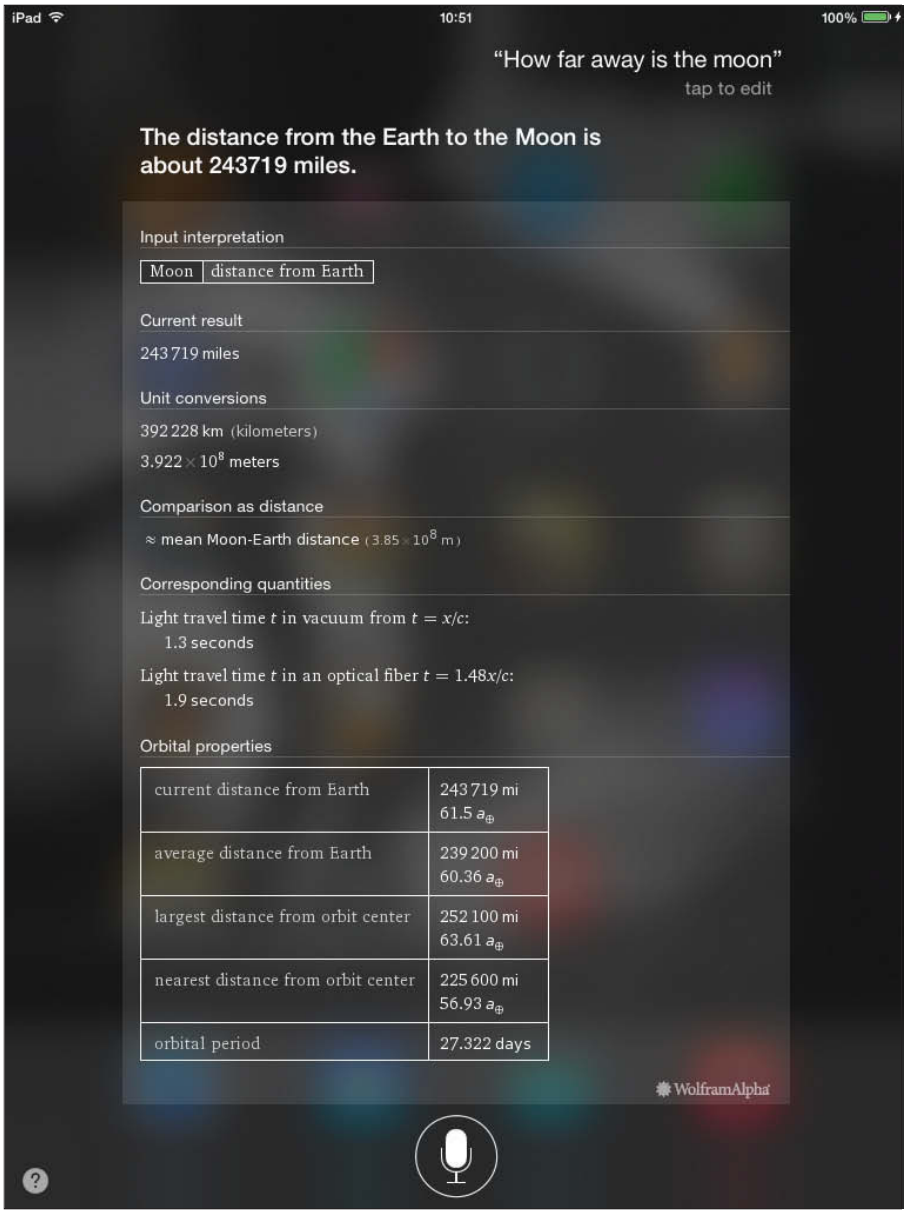
How to use Hey Siri

A new feature added in iOS 8 is known as Hey Siri, and it's very sci-fi. By saying those words ("Hey, Siri!"), you can activate Siri from a sleep state without pressing the Home button at all. The device will wake, Siri will start and it will listen out for your next command.

Sadly, though, this works only when the iPad or iPhone is plugged into a power supply; if this wasn't the case, your iDevice would presumably burn through its battery supply from constantly listening out for those magic words.

Hey Siri is very cool, albeit not always incredibly reliable. The feature appears to be deactivated by default, so if it's not working (and remember that the device needs to be plugged in as well), try going to Settings > General > Siri and then slide the switch next to 'Allow "Hey Siri"' so that it's green.

And, of course, if you're concerned about battery life – or people keep passing your desk and saying "Hey, Siri, play Don't Stop Believin'" – you can deactivate it in the same options menu.

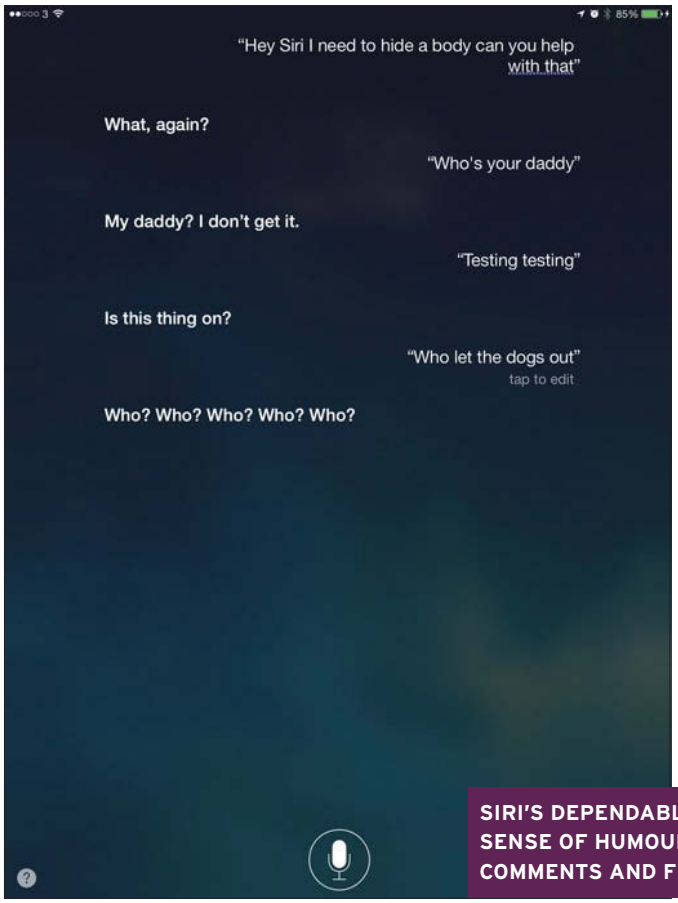


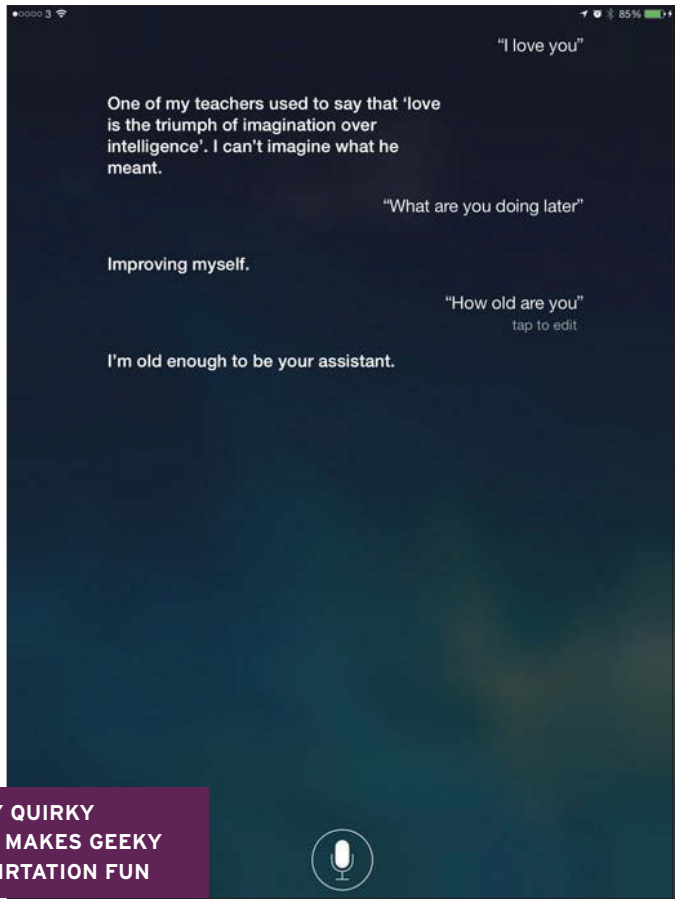
Personal dictation

While Siri gets the bulk of the iOS feature hype, another speech-related technology may ultimately prove to be more important and a bigger boost to user productivity. On the keyboard you'll see a new button in the bottom row, to the left of the spacebar, with the image of a microphone on it. Tap this button and the iPad will transcribe whatever you say. It will send the results over the internet to a server that analyses your speech and converts it into text. We were impressed at just how fast the results came back, especially over Wi-Fi. And they were generally an accurate representation of what we had said.

To get the most out of dictation, you'll need to start thinking in punctuation. For example, to construct a decent email message, you might say, "Dan. Comma. New paragraph. What do you think about writing

SIRI'S ENCYCLOPEDIC RECALL OF MUSIC, SPORT AND BUSINESS STATS AND ALL-ROUND GENERAL KNOWLEDGE COULD SPELL DOOM FOR THE PUB QUIZ

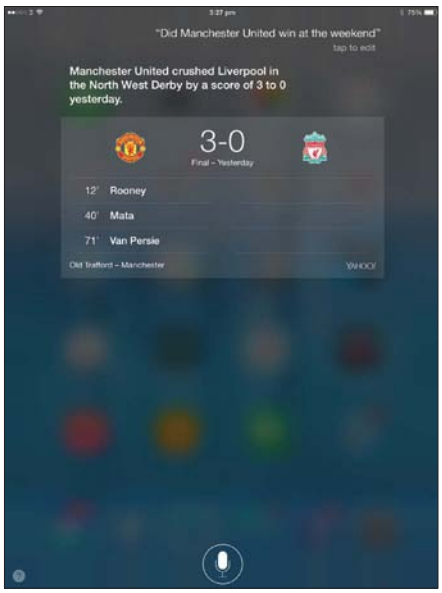




SIRI'S DEPENDABLY QUIRKY SENSE OF HUMOUR MAKES GEEKY COMMENTS AND FLIRTATION FUN

a review of iOS numeral five. Question mark. New paragraph. Let me know what you think. Exclamation mark." It's a bit long-winded but it does work.

Part of Siri's charm isn't in its feature set, but its personable nature. Siri feels a lot less robotic than other voice-activated technology. Even when it gets out of its depth and doesn't know what to do, it's difficult to feel too frustrated.



GET WHAT YOU ASK FOR

And you can joke around with Siri. Apple has clearly spent a lot of time providing Siri with a range of comebacks to joke questions. Try telling Siri you love it, or "Who's your daddy?" or "Who let the dogs out?" These common sayings that Siri has a neat response for are constantly being updated too – a recent one is to keep saying "Okay, Glass" (the phrase used to activate Google's rival) and Siri will start to get annoyed.

Siri is by no means perfect, and occasionally can mistranslate what you're saying, either transcribing the wrong message or finding the wrong result from Contacts. But it gets better the more you use it, and ever more useful.

And it's fun! Siri is one of the most entertaining aspects of the iPad, so be sure to hold down the Home button and try it out. Siri has a quirky sense of humour and will respond to geeky comments, flirtation and famous sayings.

Useful things to ask Siri about

Siri is able to learn names quickly as long as you keep repeating them and selecting the correct option from a list. So with a bit of practice you can quickly hurdle the frustration of Siri attempting to text, message or phone the wrong person. And if you have relationships added – 'mum', 'dad', 'wife', 'husband' and so on – it quickly starts to feel a lot less formal.

Music

It's not generally known that Siri can identify music. From iOS 8, you can identify music that's currently playing, thanks to Siri's new Shazam integration. Activate Siri while a song is playing and it will display a moving audio waveform and a musical icon to indicate that it's interpreting the music. Then it will tell you what song it was, and offer links to Shazam itself and a Buy Now for iTunes.

Also – and this isn't something that you're likely to be doing yourself, but we thought it would interesting to try it out – it turns out that Siri is a passable rapper. Well, passable might be pushing it a bit but a producer called Skeewiff has done a remix using Siri for vocals.

Sport

We hope you like Premier League football. There's no Formula 1, no cricket, no rugby, no golf and no football outside the top-level English league – yet. In fact, when we asked who was winning the Championship, Siri just went ahead and decided that we must mean the Premiership.

General knowledge

Siri uses Wolfram Alpha to provide statistics and facts. It can answer questions related to mathematics, geography, chemistry, words and linguistics, and all kinds of things. ☒

Take better selfies

Thanks to smartphones and social media, snapping self portraits has become a global obsession. While it's easier than ever to take good pictures of yourself, it's all too easy to send the wrong (or a ridiculous) message. Lesa Snider offers her top tips

Backgrounds matter

Evaluate the setting of your selfie and ensure it's appropriate. Happily, your smartphone has a front-facing camera so you can compose with confidence. For example, the background shouldn't reveal anything inappropriate. As a general rule, hospitals and funerals are out.

Also be careful of surroundings that reflect negatively upon your work. Don't, for example, post beach selfies on sick days and don't subject anyone to your messy bedroom, filthy bathroom, crumb-riddled sofa or cluttered car. If you do succumb to the siren call of a car selfie, park the car and ditch the seat belt. Try shooting your reflection in the wing mirror instead.

You are what you're (not) wearing

For better or worse, it's human nature to judge others at first sight, and the pictures you post online live forever and are viewable by anyone. So while a bubble bath shot may have seemed like a great idea at the time, your parents or boss may disagree.

It goes without saying that nude shots always come back to haunt you, but chest-up images that capture bare shoulders are also risky – they make people wonder whether you're naked, which can come off as creepy.

Let there be light

Take a moment to assess the lighting before firing off a shot. Ideally, you'll want this to be in front of or beside you. If you're desperate for more light, try using the flashlight feature of a friend's smartphone (if they have this option) or position your monitor or laptop in front of you to create more light. Finally, if it's possible, turn off your camera's flash to avoid shiny a forehead or nose.

Shoot targeted close-ups, shadows and reflections

Chances are good that, by now, your friends and family know what you look like. To avoid the appearance of seriously low self-esteem, treat them to something more creative than your whole face. For example, take a picture of one eye, fill the frame with your hair or capture your feet in interesting places (shoot from the waist down to elongate legs).

Try shooting your shadow or your reflection in something other than a big mirror such as a puddle or a rainy window. The problem with mirror selfies, besides making you look like you're trying too hard, is that the camera is visible in the shot and, if the flash fires, you get a nasty glare.

Strike a (pleasing) pose

The dreaded trout pout pose – big eyes and puckered lips – should be avoided; it's the opposite of sexy and makes you look like you're trying too hard. Instead, smile. Alternate between closed and open-mouthed smiles for selfie variety. Or try funny expressions, or even a signature hand gesture, such as peace.

For an extra slimming effect, shoot slightly downward, turn to the side, place your hands on your hips, and shift your weight to your back leg. Tilt your chin slightly downward – nobody wants to see up your nose – and keep your tongue in your mouth.

Stabilise your camera

To avoid blurry selfies, stabilise your camera by setting it atop a surface before firing or by holding it with two hands. If there's more than one person in the shot, employ the person on either end to hold one side of the smartphone. Remember also that most phones have a self-timer, which allows you to set the device on a surface and pose yourself in front of or above it.

Shoot at different angles and positions

For extra creativity, try shooting a selfie panorama or hanging off a surface for an upside-down effect. If there's more than one person in your shot, try getting behind them or lying on the ground next to them. If you're going for an 'into the lens' look, be sure to tell everyone where camera is on your device.

Add people, props, and pets

Selfies are generally more interesting when there's more than just you in them. When possible, include other people, pets or well-paced props. For example, if you've got a drink or funky sunglasses, put them in the shot. You can also add a theme to your selfies, for example, by always taking them in front of a same-coloured background in different locations (say, white or red).

Edit your images

Once you've captured the perfect selfie, you can improve it further by using image editing software. For example, the free photo-sharing app Instagram or Paint on your PC. They include correction tools and filters that can turn the ordinary into artistic. ☒

Spillproof a laptop and fix it if that fails

Perhaps one of the worst threats your laptop faces is the chance of being doused with water or other liquid: in an instant, a cup of coffee could leave you £1,000 down if you have to buy a new computer (plus £3 for another latte).

Warranties don't cover accidental liquid damage, and built-in sensors that can indicate whether liquids may have contributed to the problem at hand could give the game away. Here are Topher Kessler's tips for avoiding disaster, plus how to fix a laptop should it get wet

Use protection

Use a lid: While it is always nice to have a drink with you while you're working, the easiest way to prevent a spill is to avoid drinking liquids around it. However, that expectation is a non-starter for most people; instead, consider alternatives to simply popping open a can, beer or cup of coffee or tea and plunking it down next to your system. If it's a cup of tea, put a lid on it. If it's a bottle of water, ditto. If it doesn't have a lid of its own, find something that can serve the purpose (tin foil, for example).

Keep your distance: Any spilled liquid will take time to spread as it pours around and among the various obstructions in its path. So while you might like to have your drink right next to your keyboard or laptop, consider moving it a bit further away. The distance will give you time to clear the area before the liquid gets to it.

You could also place something like a book between it and your system. If you do spill, the book will divert the flow away from your system. Alternatively, when using your laptop, elevate it on a book or even a few magazines. That could prevent the liquid from getting into its vents and other channels.

Cover your system: Keyboard covers can help prevent liquid getting in. There are countless such products on the market; pick one and use it.

What to do if you spill?

Even if you take all the precautions you can, you might still find yourself at some point with a wet computer. All may not be lost, but it may take some time before you will be up and running again.

First, do not wait to see if the system is okay. Assume the worst and immediately turn it off and unplug it. If you can, remove the battery. After you've shut off the system, you'll need to try to dry it out. Unfortunately, doing this takes time. While liquids on a surface will evaporate relatively quickly, those trapped in nooks and crannies will take much longer. However, you can speed this process up in the following ways:

Open it up: The first thing you can do is keep the system as open as possible, to allow air to circulate and dry the moisture. On laptops, you can do this by undoing the screws on the back and popping open the lid, then removing any easy-to-access parts such as RAM and the hard drive (if it's removable).

Blow in some compressed air: Use compressed air – either in a can or from an air compressor (if available) – to blow out as much moisture as possible. This is one of the better things you can do to speed up the drying process. Try to blow in and around every nook and cranny, and especially if you see any spattering or other indications that liquid is sill in the area. Be vigilant here, and work the air into as many areas as you can while keeping an eye on other areas to see if any liquid shoots out. Soak up anything you see with paper towels, cotton buds, or something else that's absorbent.

Use a desiccant: The rate at which water evaporates depends partly on how dry is the air around it. So to help the water escape, you can try using a desiccant such as Silica Gel.

An alternative is rice, which isn't a great desiccant, but it can be better than nothing. Put a few cups of the desiccant in a bag, and then place your laptop into the same bag, ensuring it is covered by the material. Then simply wait about three days to thoroughly ensure the system is dry. Granted it may be painful to go this long without your system, but it may be better to be safe than sorry. (If you use rice, remember that it can get into port openings and such.)

Finally, here are two alternatives to try when you're desperate.

Bake it: Heat is obviously a good way to dry things out, but you have to be careful: your laptop can withstand sustained storage temperatures of about 40- to 44ºC (when shut off). So if you can put it in an environment that will safely and reliably stay at or just below the temperature, you can try it.

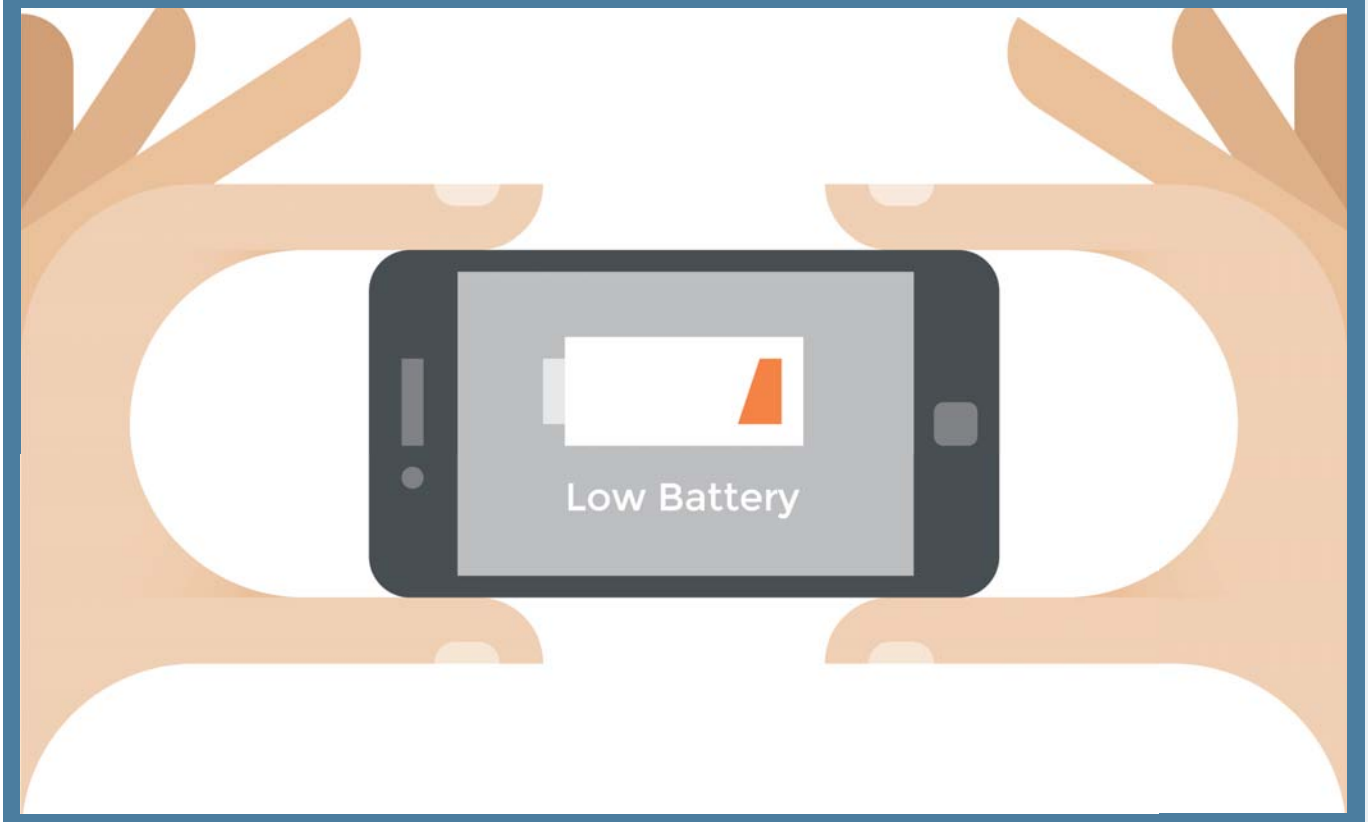
To use a standard kitchen oven, place your laptop in the oven along with a thermometer, then turn on the oven at its lowest setting. Prop open the oven door and monitor the temperature. When it reaches 38ºC, turn off the oven and close the door. The inside temperature should remain constant for a while. As it drops, you can then turn on the heat again for a few minutes, then turn it off and wait.

An alternative to the oven is a heating pad. The benefit of this is that you can heat the system while it is encased in desiccant, using two methods at once.

Alcohol or distilled water: Not all liquids spilled on to electronics are plain water, unfortunately. Sticky, salty or creamy messes are less forgiving. In these cases, you may need to have a technician fix the system by replacing parts or cleaning it.

However, if you want to chance it, consider washing the laptop with distilled water or isopropyl alcohol. Again, this measure is a last-resort to fix – something you should try only if you have a system that isn't covered by warranty, or if the problem is too costly to fix. Try pouring the isopropyl alcohol into the same area as the original spill, and then blow it out. Repeat this several times to clear out as much of the original liquid as possible, and then follow the previously mentioned suggestions to dry out the system.

You should try most of the steps here (especially the last two) only as a last resort – if your laptop won't start, it's out of warranty (or the warranty is voided by the liquid damage), and you can't afford the repair bill. A bit of prevention is a much better bet.



Charge your iPhone faster with these tips

Charging an iPhone seems like a straightforward process, but it can be slow. However, many people don't realise that the charging speed will varies depending on how you charge the device. With a bit of knowledge you can dramatically reduce the time it takes to charge up an iPhone. Lou Hattersley reveals how

Pick the right charger

The tech specs of your charger make a big difference to how long it takes to power a device. Not all iPhone chargers are born equal, though, and some charge much faster than others.

iPhone chargers use a USB-to-Lightning or 30-pin dock cable, which is attached to a mains iPhone- or iPad plug or a USB socket on a computer. The iPad charger may fill up your iPhone's battery faster than an iPhone charger (we'll cover this in more detail later), and significantly quicker than a computer's USB port. That's because of the varying outputs (note that we're quoting official Apple product tech specs, and third-party alternatives may differ):

Computer USB: 5V, 0.5A, 2.5W
iPhone charger: 5V, 1A, 5W
iPad charger: 5.1V, 2.1A, 10.7W

The figure that's relevant from a charging-speed point of view is wattage, which is measured by multiplying the voltage and current. Wattage is a function of time, and defines the speed of energy transfer. The higher the wattage, the faster the charger can fill up your battery. We say 'can', because other factors may limit the charging speed, and in fact the 'charger' is not the adaptor, as that is found inside the phone, and it's that which regulates the charge coming from the adaptor. Buying a 50W charger from a third-party maker wouldn't necessarily result in proportionally faster charging.

So the charger you pick has a dramatic effect on the amount of time it takes to charge up an iPhone. Given the choice you should always use an iPhone- or iPad adaptor, although at times it may be more convenient to use the USB port on your computer – when you are transferring files or working at your desk, for example.

Remove the case

Many people swear by this for more efficient charging: take off the iPhone's case. We're not convinced that this will produce appreciable benefits, but it may go some way to prevent heat build-up during charging. Excess heat can cause the battery to wear out faster and lose capacity. Keeping things cool therefore may help your battery to operate at maximum performance for longer.

Faster charging via USB

Let's say you want to charge your iPhone via a computer's USB port. Note that not all USB ports carry the same specification.

Again, wattage is what's important here. Whereas a MacBook fitted with USB 2.0 ports specified at 5V and 0.5A can offer 2.5W of power, a Mac with USB 3.0 ports specified at 5V and 0.9A can offer 4.5W of power and therefore charge your iPhone faster.

Plus, under certain conditions Apple claims its Macs can offer 1.1A at 5V, or 5.5W of power. For this your iPhone will need to be plugged into the Mac or display, rather than a USB hub, and that computer must be switched on and awake. On most Macs only one port will be able to offer 5.5W, and it will offer that to the first connected Apple peripheral that requires it. Note that these rules don't apply to Macs running Boot Camp. See tinyurl.com/psnguLn for further details.

If you are going to charge an iPhone via your Mac's USB port, for faster charging you should remove other Apple peripherals, attach the iPhone and then re-attach your peripherals. You should make sure that the computer is on and awake, too. If you're charging your iPhone using a MacBook's USB port, ensure that the laptop is also plugged into the mains.

Can you use an iPad charger with an iPhone?

Yes. This is completely safe, despite fervoured debate on the Apple Discussion forums, with some people suggesting that using an iPad adaptor to charge an iPhone will fry or severely damage its battery.

The general consensus is that because the actual 'charger' is inside the phone, not the adaptor, it won't damage the iPhone to use a higher-wattage adaptor.

The load determines the current drawn from the power source. The power source does not push current; it supplies voltage up to a specified maximum available current and the phone or tablet will draw only what it requires.

However, this also means that using an iPad adaptor to charge an iPhone won't necessarily charge it any faster. The iPhone will draw only what power it requires, regardless of how much power is available to it. So, whichever charger you use, the iPhone may accept only 5W. (There are rumours that the iPhone 6 and 6 Plus accept a higher input, which we are working to verify.)

Can you use an iPhone charger with an iPad?

Yes. It's perfectly safe to use your iPhone charger to fill up your iPad, but it will charge up much more slowly when fed with a 5W adaptor rather than the 10.7W model shipped with the iPad or the 12W version sold separately by Apple.

Use Airplane Mode

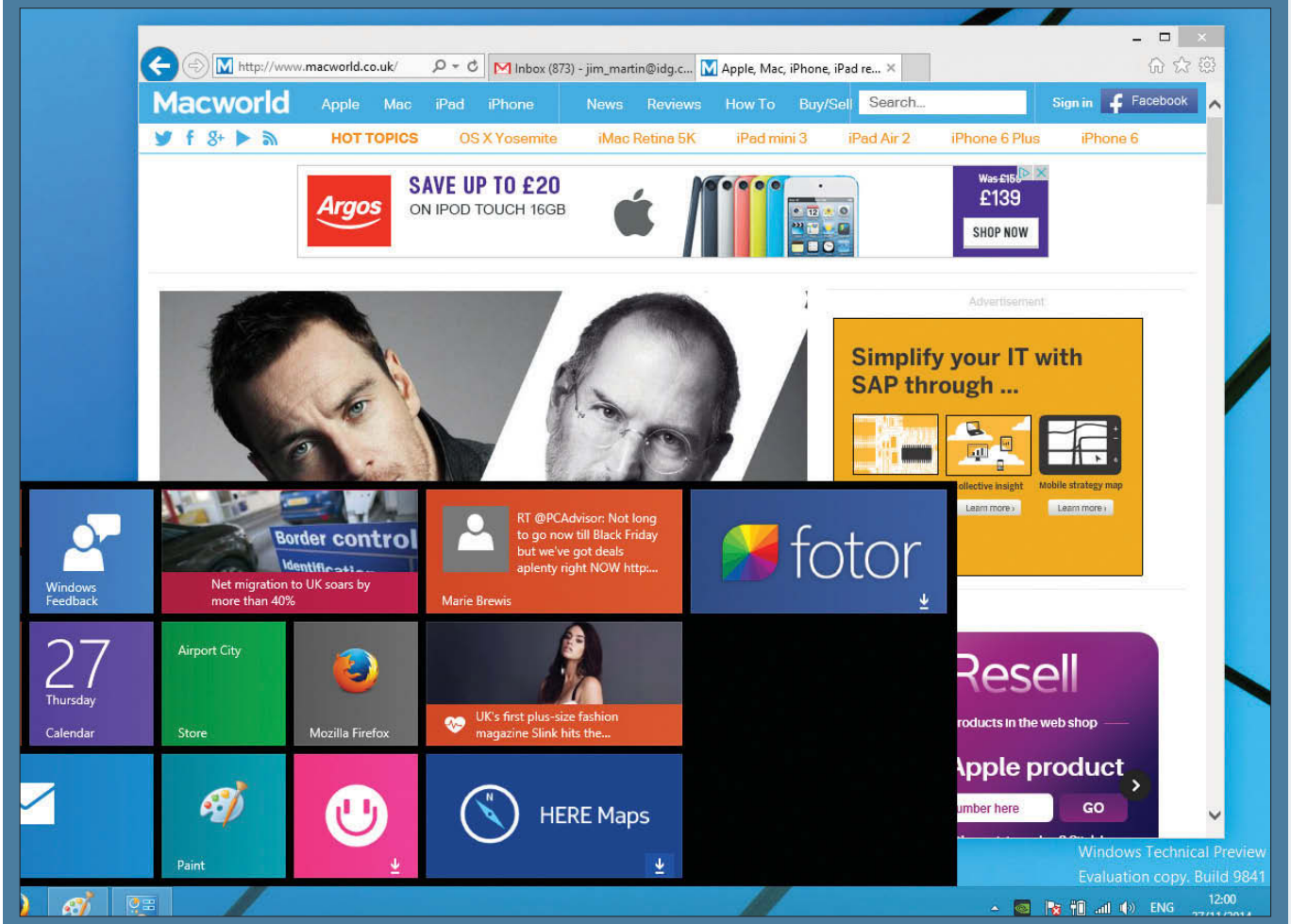
One neat trick that's worth mentioning is that you can charge an iPhone slightly faster by switching on Airplane Mode – but slightly is the key word here.

This is because it turns off 3G and Wi-Fi and uses less power while charging. Open Control Centre and tap the plane-shaped icon when charging. Note that while Airplane mode is activated, you won't be able to take phone calls or use your iPhone to browse the internet; but the iPhone will charge a little bit faster.

Turn off the iPhone

In a similar way, switching off your iPhone during charging enables it to charge faster. Again, the difference will be fractional, but may be worth it if you're in a rush.

This is because the iPhone isn't draining any power during charging. Plug the iPhone into the wall charger, hold down the Sleep/Wake button and tap 'Slide To Power Off' to switch off the iPhone. Leave it to fully charge. ☒



Install Windows 10 Preview on a Mac

It may seem akin to mixing oil and water but, as it turns out, installing Windows on your Mac isn't a violation of natural law – your Retina display won't explode into flames. In fact, installing it is a relatively pain-free process.

To give the Windows 10 Technical Preview – an early pre-release version of Windows 10 – a whirl, you don't even have to pay for a Windows licence or already have Windows on your Mac. The Technical Preview is free to test. Intrigued? Derek Walter reveals all

Decisions, decisions

There are two ways to get the Windows 10 Preview on your Mac. The first is to install Windows on a separate partition of your hard drive using Apple's Boot Camp software. When finished you can boot directly into Windows, in essence transforming your Mac into a Windows PC.

Another option lets you run Windows as a virtual machine inside an OS X program. We'll be using the open-source VirtualBox (virtualbox.org) from Oracle, although Parallels Desktop (parallels.com/uk) is a popular alternative (it costs £64). A virtual machine is the route we recommend, given that the Windows 10 Technical Preview is still in very early form, with the occasional rough edge or bugginess popping up. If something goes wrong on a virtual machine, it won't affect your hardware or OS X installation – you can just wipe it and start over.

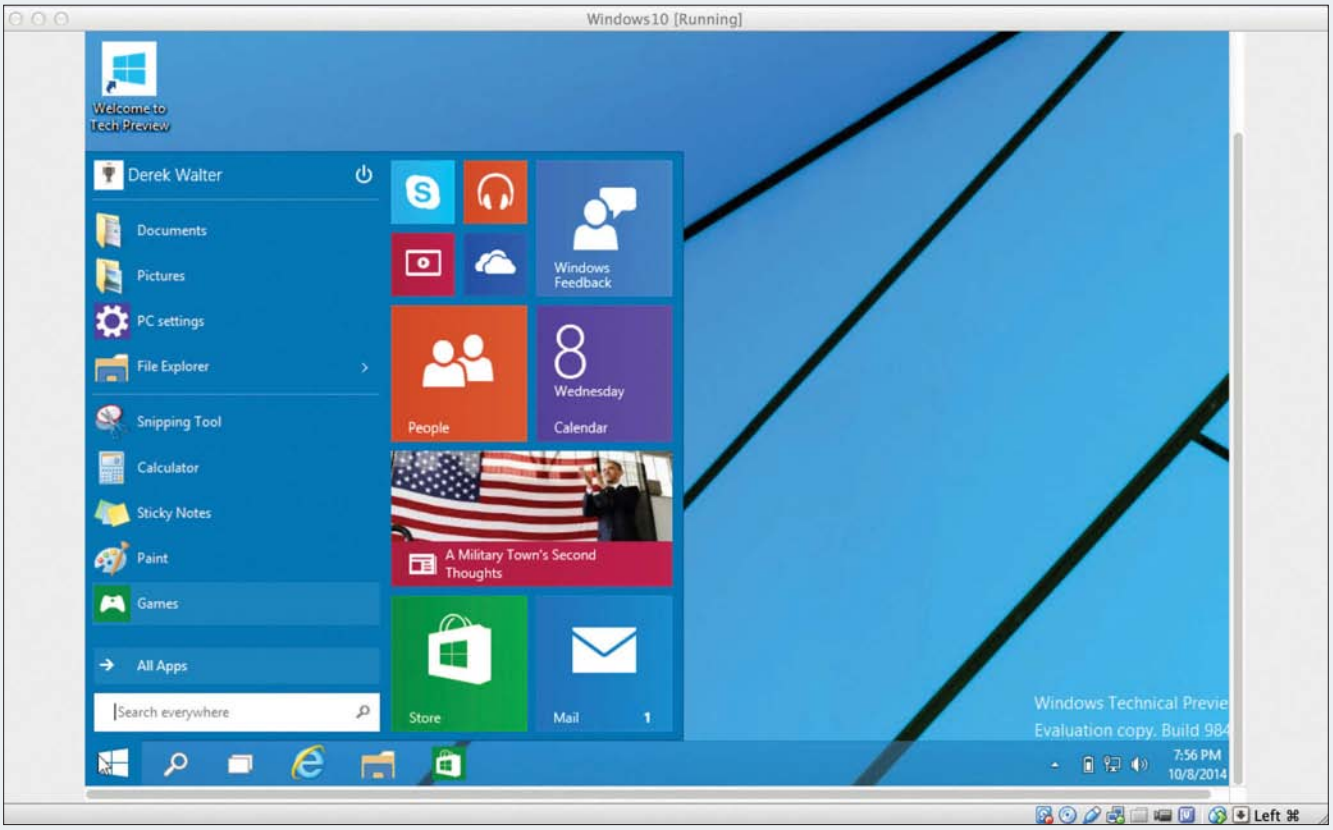
As with any pre-release software, one person's experience may vary with another's. Ours was pretty issue-free: we installed Windows 10 on a late 2014 MacBook Pro with a 2.6GHz i5 processor and 8GB of RAM. Any Mac released in recent memory should be able to run Windows 10 just fine.

Whatever you do, back up your Mac's data first (tinyurl.com/aLuroch). Didn't you hear the part about the Windows 10 Technical Preview being very early experimental software? You don't want to lose all your valuable documents and family videos if Microsoft's operating system hiccups.

Download the ISO

Done backing up? Good. First we'll head to the Windows 10 download site (tinyurl.com/pbh8gmn) to download the Technical Preview. You'll have to sign up for the Windows Insider Program by giving Microsoft your email address.

After registering – note all the warnings about this being prerelease software, and Microsoft's stern warnings about backing up your data – select the version of Windows 10 that's right for your particular system. If you're running a relatively recent Mac with an Intel processor, opt for the 64-bit version.



It's nearly 4GB, so get comfy – the download may take a while. Jot down the product key, too; we didn't need it in our testing but it's a good thing to keep in your back pocket just in case.

Install Windows 10 in VirtualBox

Let's explain how to get Windows 10 running in a virtual machine first. Head to the Oracle VM downloads page (tinyurl.com/5vgw4mp) and select the VirtualBox version built for OS X hosts. Launch the download, dragging the icon into the Applications folder. Included is a 300-page PDF if you want a thorough set of instructions – although you can skip those and keep reading this if you don't have time or desire to brush up on VirtualBox's most arcane secrets.

At the VirtualBox launch screen, you'll be asked to choose which operating system to install. We chose 'Windows 8.1' from the menu, as it's the most recent version of Windows. Windows 8 should probably work out as well – just be sure to select the appropriate 64- or 32-bit option based on the version of Windows 10 you downloaded. VirtualBox will then ask you how much RAM to allocate to running the virtual machine. You can go with the default of 2048MB if you're concerned about system resources, but Windows 10's performance will increase if you can dedicate more – you are running another operating system simultaneously, after all. If you can bump it up to 4GB without starving OS X's own resources, that would be perfect.

Next you'll be asked to create a virtual hard drive for Windows 10. Unless you're planning on doing extensive work or installing more software, you can safely choose the default of 25GB. Select the VirtualBox Disk Image option on the next screen and continue.

The next choice is to select a dynamically allocated hard drive or fixed one. As you can probably figure out from the context, the former grows as you add space, and it's a better choice if you're short on space and don't plan on adding that much to your Windows mock computer. The fixed drive, on the other hand, will give you faster performance as long as you can spare the room.

When all that's done, highlight the Windows 10 VM in the VirtualBox dashboard and select the green 'Start' arrow. You'll be prompted to point the VM toward the Windows 10 ISO file. You'll see the Windows logo with a black background. You're on your way.

The Windows sign-up screen will appear next. Pick a language and hit Install now. Then you'll have two choices: a custom or upgrade installation. Select custom, then choose a specific location on the hard drive for installing Windows. Just leave this as it is – it's installing to the virtual drive created by VirtualBox.

Now it's time to install Windows and plug in your Microsoft account credentials. If you don't have an existing account, you'll need to put in an email address to satisfy the Windows gatekeepers. This enables you to save and sync settings across multiple Windows devices. And there you go. You're running Windows 10 on your Mac.

Running a virtual machine is a slightly different experience to running an operating system on a hard drive. Things may move a little slower and appear broken. But it works fine for getting basic work done, or just plain playing around with Windows 10.

When you're done, just close the VM's window as you would anything else. You'll be prompted either to save the machine's state as-is or power it off.

Using Boot Camp with Windows 10

If you want the full Windows Technical Preview experience, you can use Apple's Boot Camp tool to install Windows 10 straight to your hard drive and boot directly into Windows. (You did remember to back up your data first, right?)

For this, you'll need a USB drive with at least 4GB of free space. Boot Camp will take the Windows ISO file and create a boot disk that can be used to install Windows on your Mac.

Assuming you already have the Windows 10 ISO downloaded, launch Boot Camp. Tick all the boxes and proceed. Insert your flash drive and then select the ISO file's location. Boot Camp will then download all the necessary drivers to run Windows and transform

your USB drive into a boot disk. This step takes a while, so be patient.

You'll then be asked to partition your hard drive. This is a critical step, as you can't expand or shrink the storage later on. Instead, you'll have to wipe that part of the drive and start from scratch.

It's recommended you select at least 20GB, but 30GB or more is best, as Windows 10 itself will take up a sizable chunk. Consider how much you will be using it: is it just for casually tinkering or do you want to install Office and do some serious work? If you want to play PC games, definitely bump up the free space you devote to Windows.

When you're done, click Install to start (you guessed it) installing Windows 10. Windows will next restart a couple of times. The longest wait will be when it hits the 'We're getting our apps ready' screen. It does, however, cycle through some pretty colours for your viewing pleasure.

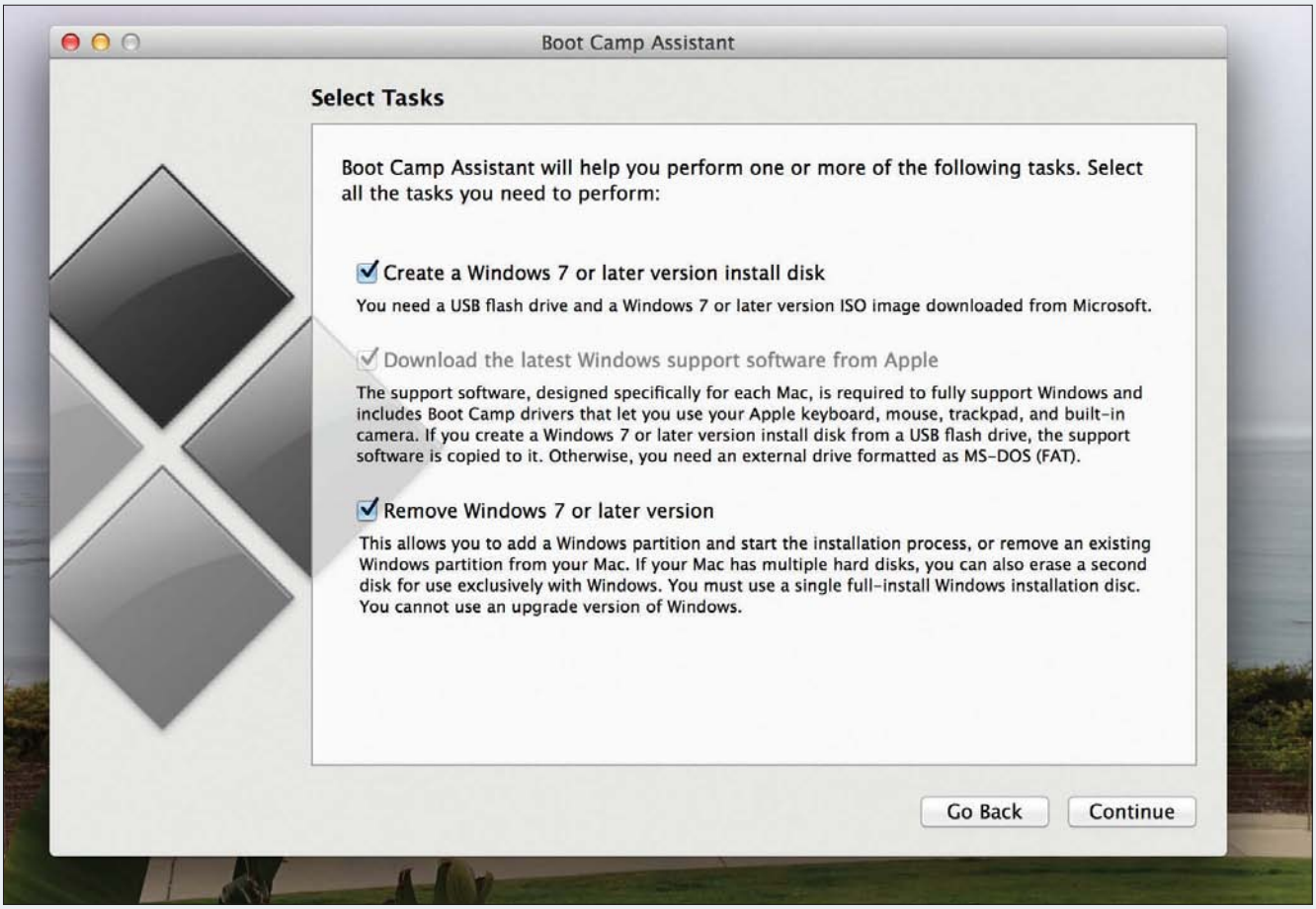
If for some reason your computer boots back to OS X, reboot and hold the Alt key. This brings up a menu where you can select which operating system to launch.

A few impressions

Overall, Windows 10's performance on the Mac seems good. Scrolling with the trackpad works great with native Windows apps, such as File Explorer or Start menu, but it's a little janky with browsers (we tried it with Chrome and Internet Explorer). We found ourselves reverting to clicking and holding the toolbar to scroll through a web page. Windows doesn't have as many trackpad gestures as OS X either, so using a mouse may be a good idea.

The brightness was a little inconsistent, fluctuating between too bright or too dark. The backlit keyboard was also confusing: trying to reduce its brightness didn't work at all until the next-to-lowest setting, which then plunged the keyboard into near-darkness.

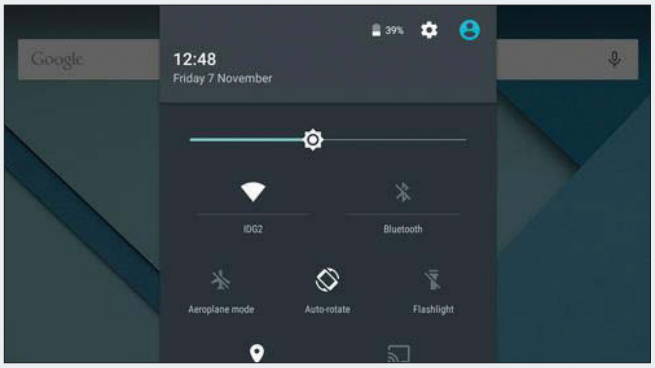
Such inconsistencies are to be expected with a pre-release OS, however. If you run into trouble or want to check system requirements, both Microsoft (tinyurl.com/L2p6t69) and Apple (tinyurl.com/mk4yh8u) offer support pages on their websites. And if you want to return to Apple's warm embrace, just hold down the Alt key during a reboot and select OS X as your chosen OS. ☒



Set up restricted users in Android

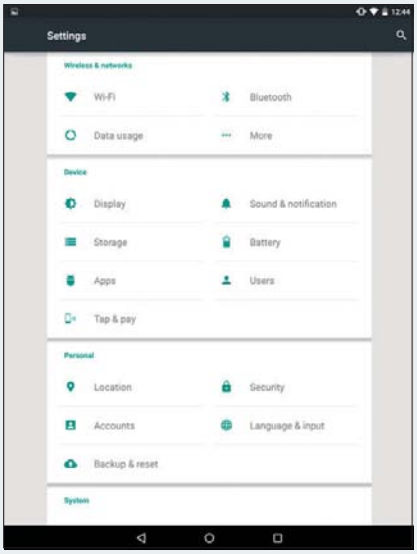
If you're concerned what your kids are accessing on their Android smartphone, Lollipop lets you limit what they can see. Martyn Casserly reports

Tablets designed for children have become increasingly common over the past couple of years, but the same isn't true of smartphones. While our tutorial here applies to tablets running Android Lollipop (the screenshots were taken on a Nexus 9), it's also a new feature for smartphones running Android Lollipop.

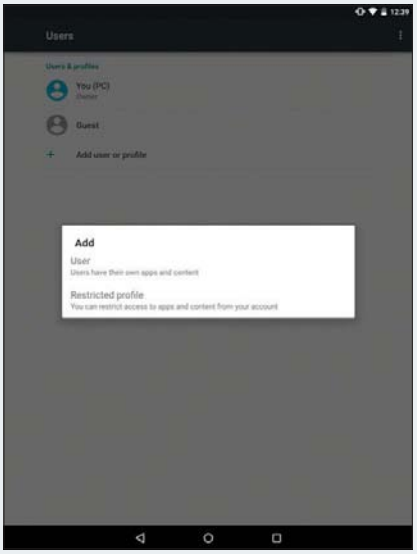


START To create a more child friendly profile on the latest version of Android (Lollipop), you'll first need to go to Settings. The fastest method is to drag down twice from the top of the screen and tap on the cog-shaped icon in the top-right corner.

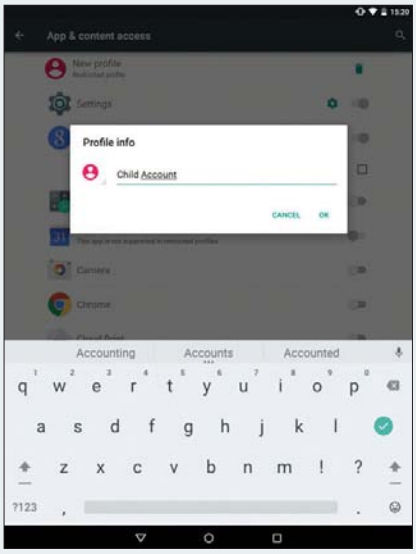
2 Now you'll be presented with a large menu of options. Look for Users in the Device section and tap on this.

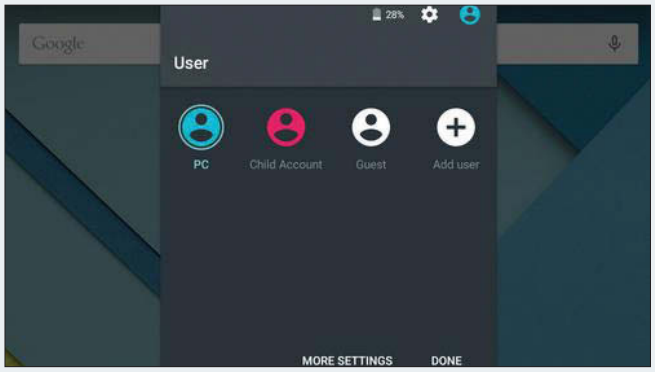


3 You'll see a list of the current Users, which includes Guest, a default account introduced by Google in Lollipop and designed for handing your device to friends without them having access to your data. Tap on the option 'Add user or profile'. You'll be asked which type of User account this should be. For children select the Restricted Profile option. You'll be prompted to create a passcode here, too.



4 Once you've entered the passcode you'll be shown the various settings you can apply to the new account. To change the name, tap on the round icon next to 'New Profile' and type in your preferred title. Take your time to look through the list, turning off any features that you don't want you child to be able to access.





5 When you're happy with the settings, you can go back to the home screen and now when you drag down the menu from the top and tap on the User icon you'll see the freshly created profile in the list. To switch between profiles just tap on the icon. ☒

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BullGuard Internet Security 15

FULL PROGRAM (THREE-MONTH LICENCE) AVAILABLE ONLY ON THE DISC+

Installation details

Go to My Computer, right-click the DVD icon and open the disc. Select Files 236\ BullGuard Internet Security 15 and open the install file.

Online registration required: Follow the instructions within the program by 16 April 2015

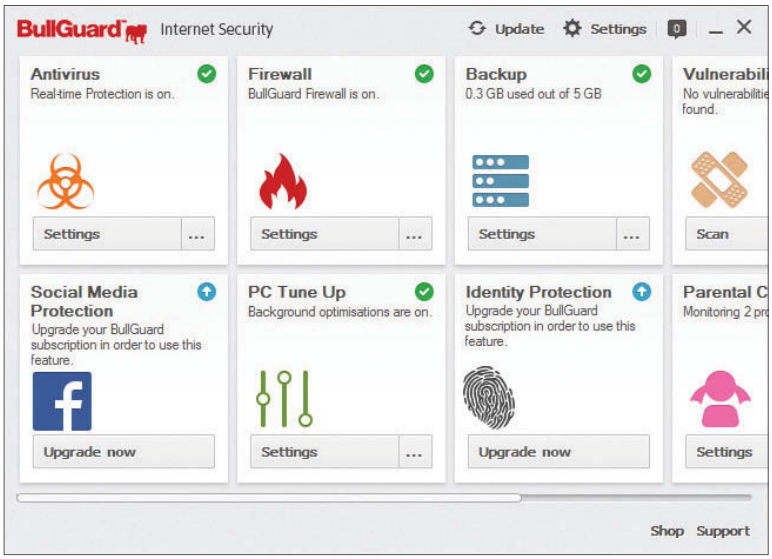
System requirements

Windows XP/Vista/7/8; 850MB drive space; 1GB RAM; Internet Explorer 6.0 or later

Thanks to BullGuard's Internet Security 15 managing your PC's security couldn't be easier. Each of the software's features has its own module panel – simply click the option you want. Handily, all the modules are on one page, so you can see at-a-glance your system's security status. And if you want to go a little deeper, one click will take you to the relevant area.

Whatever you do online, you can trust BullGuard to protect you, your family and your computers from online threats such as identity theft, credit card fraud, hackers, spam, viruses and spyware. The program will warn you about potential phishing websites when you are using Facebook, and will secure your personal data, including logins, passwords and credit card details. And if you have children who like to surf, play and chat online, the Parental Control facility allows you to increase protection and limit access where you need to.

BullGuard inspects your PC prior to installation, removes any active malware and adapts to your system specifications. This process ends with a check to ensure the very latest virus definitions are installed. In no time, the software is running in the background, ensuring that your system is healthy and safe against any threats, computer crashes, damage and theft.



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1-abc.net Drive Space Organizer 6

ONLINE REGISTRATION REQUIRED

FULL PROGRAM AVAILABLE ONLY ON THE DISC+

Installation details

Go to My Computer. Right-click the disc icon and open the disc. Select Files 236\1-abc.net Drive Space Organizer 6.

Online registration required: Follow the instructions here tinyurl.com/o2j4rfb before 16 April 2015

System requirements
Windows XP/Vista/7/8

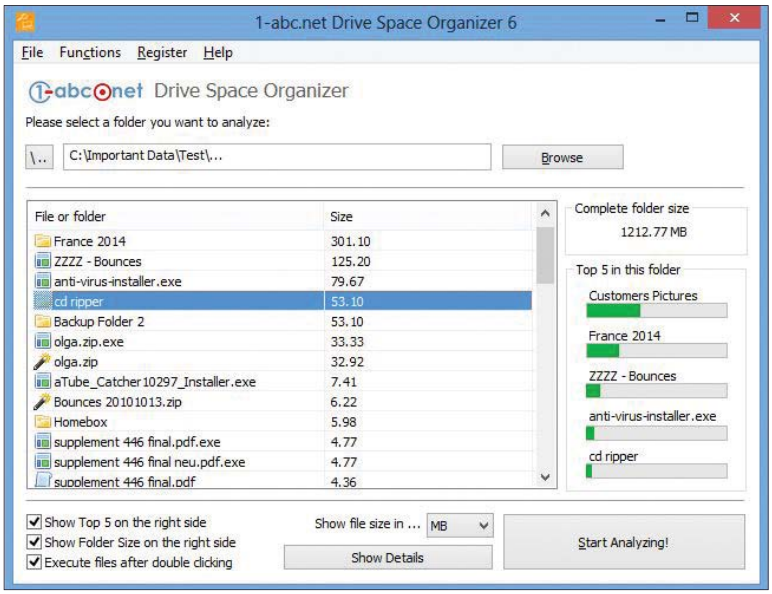
Masses of programs, files and other data is saved on hard drives, CDs, DVDs, USB sticks, camera cards and network drives – and it always seems that there's never is enough space for it all. Precious disk space seems to be wasted all the time and it does not take long until the size limit is reached.

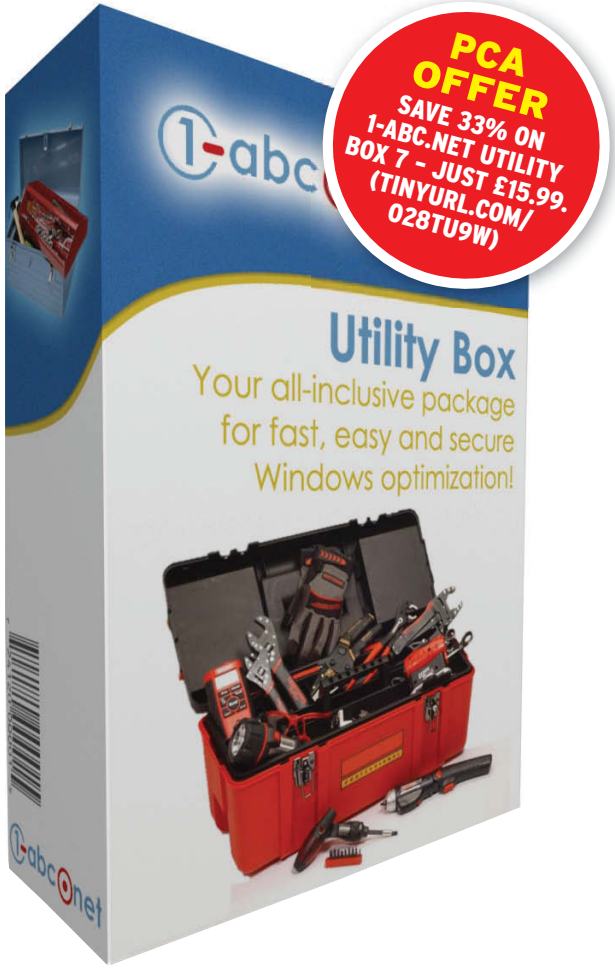
But what files, folders or subfolders are using this? Where has all your drive space gone? Does it make sense to remove old documents or are there other ways to recover drive space by deleting files you never thought about?

1-abc.net's Drive Space Organizer knows the answers to all these questions. This handy application finds out the location of your biggest files as well as which folders take up the most disk space consuming data; and then helps you to get space back from places you may not have heard about before.

Working with Drive Space Organizer is as easy since all its features can be started directly from the main screen. The program quickly analyses your PC's hard drive, and sorts everything automatically so you don't have to.

You can choose whether you want sizes shown in KB, MB or GB; and switch between folders and subfolders by double-clicking them. Discovered files can be executed from the program directly. In addition, the five most disk-space consuming items in any folder you are analysing can be shown with a percentage bar so you can see what's using up valuable space on your PC.





Zoner Photo Studio 17 Pro

ONLINE REGISTRATION REQUIRED

FULL PROGRAM (THREE-MONTH LICENCE) AVAILABLE ONLY ON THE DISC+

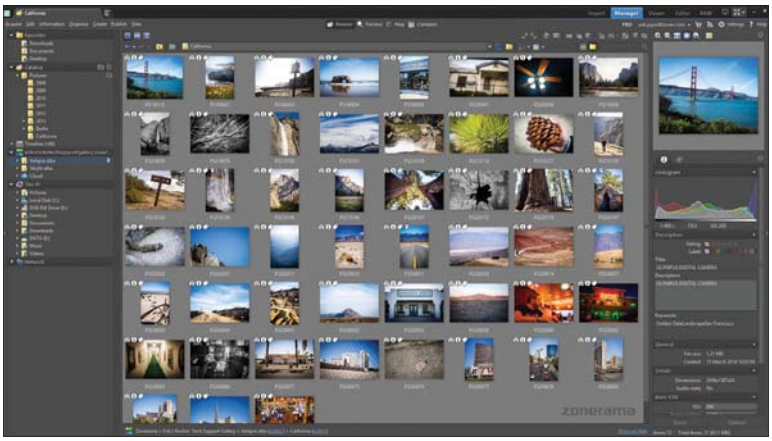
Installation details

Go to My Computer. Right-click the DVD icon, and open the disc. Select Files 236\Zoner Photo Studio 17 Pro and open the install file.

System requirements

Windows XP/Vista/7/8; 850MB drive space; 1GB RAM

Zoner Photo Studio 17 Pro unites every feature you need in a single package. From importing pictures on to your PC and organising a photo archive, to editing images and sharing them. Plus, it allows you to work on batches of pictures. So, for example, you can give 1000 holiday shots a frame or resize them.



Importing: When you're downloading pictures on to your PC, you can tag them, rotate them to match camera rotation (EXIF), back them up, and more.

Managing: The software allows you to give photos a rating from one to five, add coloured labels, and more. You can also drag-and-drop them on to an integrated Google Map to GPS-tag them, so you'll know exactly where your photos were taken. Any image you need can be found in seconds, even among thousands of others, plus there's a new unique duplicate photo finder.

Editing: There are dozens of photo editing and retouching features such as cropping, resizing, straightening, local edits, exposure and colour fixes, and more. A Quick Edits panel helps you fix a picture in moments using just a few sliders. The Editor also offers dozens of creative Quick Filters and other creative tools including HDR, Tone Mapping, 3D, panoramas, cartoon and lens flare.

Sharing: Share straight from Zoner to Facebook, Flickr, and more, including Zoner's own Zonerama: the first truly unlimited gallery. ☒

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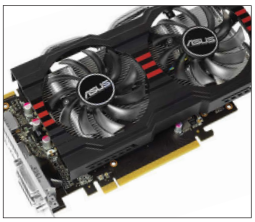
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Flat-panel displays

Index

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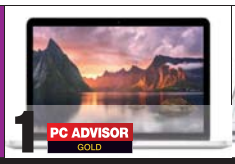

	Apple MacBook Pro 13in Retina	Apple MacBook Air 13in	HP Spectre 13-3010ea	Toshiba Kira-101	MSI GS60 2PE Ghost Pro
Price	**£1,399 inc VAT**	**£849 inc VAT**	**£999 inc VAT**	**£1299 inc VAT**	**£1,317 inc VAT**
Website	Apple.com/uk	Apple.com/uk	Hp.com/uk	Toshiba.co.uk	Uk.msi.com
Launch date	July 14	Apr 14	Sep 14	Aug 14	Oct 14
Build rating	★★★★★	★★★★½	★★★★½	★★★★½	★★★½☆
Features rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★★☆	★★★½☆	★★★★☆	★★★★☆
Value rating	★★★★☆	★★★★½	★★★★☆	★★★½☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Processor	2.8GHz Intel Core i5	1.4GHz Intel Core i5	1.6GHz Intel Core i5-4200U	1.8GHz Intel Core i7-4500U	2.4GHz Intel Core i7-4700HQ
RAM	8GB DDR3L	4GB DDR3L	8GB DDR3	8GB DDR3	8GB DDR3
Storage	512GB SSD	128GB SSD	256GB SSD	256GB SSD	2x 128GB SSD, 1TB HDD
Screen size	13.3in glossy (anti-glare)	13.3in glossy (anti-glare)	13.3in glossy	13.3in glossy	15.6in matt
Screen resolution	2560x1600	1440x900	1920x1080	2560x1440	1920x1080
Graphics	Intel Iris Graphics	Intel HD Graphics 5000	Intel HD Graphics 4400	Intel HD Graphics 4400	nVidia GeForce GTX 870M
Video memory	N/A	N/A	N/A	N/A	3GB
Wireless	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11b/g/n/ac	802.11a/b/g/n/ac
Ethernet	Optional	Optional	None	None	None (mini)
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	2x USB 3.0	2x USB 3.0	3x USB 3.0	3x USB 3.0
FireWire	×	×	×	×	×
Thunderbolt	2x	✓	×	×	×
DisplayPort	×	✓	✓	×	✓ (mini)
HDMI	✓	×	✓	✓	✓
DVI	×	×	×	×	×
VGA	×	×	×	×	×
eSATA	×	×	×	×	×
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	N/A	N/A	N/A	N/A
Extras	FaceTime HD webcam	HD webcam, multitouch trackpad, backlit keyboard	1080p webcam	720p webcam	720p webcam
Operating system	Mac OS X 10.10 Yosemite	Mac OS X 10.10 Yosemite	Windows 8.1 64-bit	Windows 8.1 Pro 64-bit	Windows 8.1 64-bit
Bundled software	iLife 11	iLife 11	None	None	None
Fear (Max detail)	Not tested	Not tested	31fps in Stalker (720p)	17fps (1080p)	45fps Batman: Arkham City
Battery	71.8Wh lithium-polymer	54Wh lithium-polymer	51Wh lithium-ion	52Wh lithium-polymer	52Wh lithium-polymer
Battery life	9 hrs 55 mins	12 hrs 57 mins	7 hrs 30 mins	7 hrs 10 mins	1 hr 59 mins
PC Mark 7 score	Not tested	4602	5006	5100	5655
Dimensions	314x219x18mm	325x227x4-17.5mm	324x220x15mm	316x207x19.8mm	390x266x19mm
Weight	1.57kg	1.35kg	1.52kg	1.26kg	1.9kg
Warranty	1 year return-to-base	1-year return-to-base	2 year return-to-base	2-year onsite	2-year onsite
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	Dell Chromebook 11	Lenovo B50-30	HP Chromebook 14	Asus X102BA	Toshiba CB30-102
Price	**£239 inc VAT**	**£200 inc VAT**	**£259 inc VAT**	**£280 inc VAT**	**£230 inc VAT**
Website	Dell.co.uk	Lenovo.com	Hp.com/uk	Asus.com/uk	Toshiba.co.uk
Launch date	Dec 14	Dec 14	Dec 14	May 14	Jun 14
Build rating	★★★★☆	★★★☆☆	★★★★☆	★★★☆☆	★★★½☆
Features rating	★★★★☆	★★★½☆	★★★★☆	★★★½☆	★★★½☆
Performance rating	★★★★☆	★★½☆☆	★★★★☆	★★☆☆☆	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★☆	★★★½☆	★★★★☆	★★★★☆	★★★★☆
Processor	1.4GHz Intel Celeron 2955U	2.16GHz Intel Celeron N2830	1.4GHz Intel Celeron 2955U	1GHz AMD A4-1200	1.4GHz Intel Celeron 2955U
RAM	4GB DDR3	4GB DDR3	4GB DDR3	4GB DDR3L	2GB DDR3
Storage	16GB SSD	320GB HDD	16GB SSD	500GB HDD	16GB SSD
Screen size	11.6in glossy	15.6in matt	14in glossy	10.1in glossy touchscreen	13.3in glossy
Screen resolution	1366x768	1366x768	1366x768	1366x768	1366x768
Graphics	Intel HD Graphics	Intel HD Graphics	Intel HD Graphics	AMD Radeon HD 8180	Intel HD Graphics
Video memory	N/A	N/A	N/A	N/A	N/A
Wireless	802.11a/b/g/n	802.11b/g/n	802.11a/b/g/n	802.11b/g/n	802.11a/g/n
Ethernet	Gigabit	Gigabit	Gigabit	10/100	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	2x USB 3.0	1x USB 3.0, 2x USB 2.0	2x USB 3.0, 1x USB 2.0	1x USB 3.0, 2x USB 2.0	2x USB 3.0
FireWire	×	×	×	×	×
Thunderbolt	×	×	×	×	×
DisplayPort	×	×	×	×	×
HDMI	×	✓	×	✓	✓
DVI	×	×	×	×	×
VGA	×	✓	×	✓	×
eSATA	×	×	×	×	×
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone minijack	Headphone jack, mic	Headphone minijack	Headphone jack, mic	Headphone jack, mic
Optical drive	None	N/A	None	None	None
Extras	Webcam	Webcam	Webcam	Webcam	Webcam
Operating system	Google Chrome OS	Windows 8.1 with Bing	Google Chrome OS	Windows 8 64-bit	Google Chrome OS
Bundled software	None	None	None	MS Office Home & Student	None
Battery	Lithium	45Wh lithium	Lithium	33Wh lithium-ion	Lithium-polymer
Battery life	7 hrs 17 mins	4 hrs 51 mins	7 hrs 50 mins	4 hrs 20 mins	7 hrs 25 mins
PC Mark 7 score	N/A	1663	N/A	1100	N/A
Stalker (Low/High)	N/A	N/A	N/A	N/A	N/A
Dimensions	295x201x24mm	380x260x26.5-32.5mm	345x239x20.5mm	266x185x29mm	454x268x56mm
Weight	1.3kg	2.2kg	1.7kg	1.1kg	1.5kg
Warranty	1-year depot	1-year return-to-base	1-year return-to-base	1-year return-to-base	1-year return-to-base
FULL REVIEW	TINYURL.COM/M3D3QJ4	TINYURL.COM/OQ94SKB	TINYURL.COM/PPS4F9G	TINYURL.COM/PLAUQCG	TINYURL.COM/LQEBYPA

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£501-£1,000 laptops

	1 PC ADVISOR RECOMMENDED	2	3	4 PC ADVISOR RECOMMENDED	5
	Scan 3XS Graphite LG156	Dell Inspiron 17-7737	Chillblast Defiant 2 Mini	HP Pavilion TouchSmart 15	Chillblast Helium
Price	**£899 inc VAT**	**£800 inc VAT**	**£899 inc VAT**	**£530 inc VAT**	**£899 inc VAT**
Website	3xs.scan.co.uk	Dell.co.uk	Chillblast.com	Hp.com/uk	Chillblast.com
Launch date	Jul 14	Jul 14	Jul 14	May 14	Jul 14
Build rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★½☆
Features rating	★★★★☆	★★★★☆	★★★★☆	★★★½☆	★★★½☆
Performance rating	★★★★☆	★★★★☆	★★★★☆	★★★½☆	★★★★☆
Value rating	★★★★½	★★★★☆	★★★★½	★★★★☆	★★★★☆
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	2.5GHz Intel Core i7-4710MQ	2GHz Intel Core i7-4510U	2.5GHz Intel Core i7-4710MQ	1.6GHz Intel Core i5-4200U	1.8GHz Intel Core i7-4500U
RAM	8GB DDR3	16GB DDR3	8GB DDR3	8GB DDR3	16GB DDR3
Storage	1TB SSHD	500GB HDD + 8GB NAND	1TB SSHD	750GB HDD	500GB HDD + 120GB SSD
Screen size	15.6in matt	17.3in glossy	13.3in non-reflective	15.6in glossy touchscreen	14in
Screen resolution	1920x1080	1920x1080	1920x1080	1366x768	1600x900
Graphics	GTX 860M/Intel HD 4600	GT 750M/Intel HD 4400	GTX 860M/Intel HD 4600	GT 740M/Intel HD 4400	Intel HD Graphics 4400
Video memory	2GB	2GB	2GB	N/A	N/A
Wireless	802.11a/b/g/n/ac	802.11a/b/g/n	802.11a/b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	10/100	Gigabit
Bluetooth	✓	✓	✓	✓	✓
USB	3x USB 3.0, 1x USB 2.0	4x USB 3.0	2x USB 3.0	2x USB 3.0, 1x USB 2.0	2x USB 3.0
FireWire	×	×	×	×	×
Thunderbolt	×	×	×	×	×
DisplayPort	×	×	×	×	×
HDMI	✓	✓	✓	✓	✓
DVI	×	×	×	×	×
VGA	✓	✓	✓	✓	✓
eSATA	✓ (shared USB 3.0)	×	×	×	×
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	8x DVD±RW	N/A
Extras	1080p webcam	720p webcam	1080p webcam	Webcam	720p webcam
Operating system	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8 64-bit	Windows 8.1 64-bit
Bundled software	None	None	None	None	None
Stalker (720p/1080p)	178/102fps	104/63fps	180/100fps	60fps (720)	29fps (720p)
Battery	77Wh lithium-ion	58Wh lithium-ion	62.2Wh lithium-ion	41Wh lithium-ion	44.6Wh lithium-ion
Battery life	4 hours	5 hrs	5 hrs 33 mins	5 hrs 45 mins	5 hrs 20 mins
PCMark 7 score	4846	4260	4456	2860	5100
Dimensions	374x250x43mm	412x269x28mm	330x227x32mm	386x258x25mm	337x236x21mm
Weight	2.7kg	3.3kg	2.1kg	2.6kg	2.1kg
Warranty	2-year return-to-base	1-year NBD	2-year collect-and-return	1-year return-to-base	1-year return-to-base
FULL REVIEW	TINYURL.COM/MYTG9X5	TINYURL.COM/N6828JG	TINYURL.COM/NNDFZRR	TINYURL.COM/L2JAXH7	TINYURL.COM/P7U28WQ

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£1,001+ laptops	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3	4	5
	Aorus X7 v2	Chillblast Helix	MSI GE70 2PE Apache Pro	Schenker XMG P304	Dell XPS 15
Price	£1,729 inc VAT	£1,250 inc VAT	£1,126 inc VAT	£1,100 inc VAT	£1,449 inc VAT
Website	Aorus.com	Chillblast.com	UK.msi.com	Mysn.co.uk	Dell.co.uk
Launch date	Sep 14	Sep 14	Sep 14	Jul 14	Sep 14
Build rating	★★★★☆	★★★★☆	★★★½☆	★★★★☆	★★★★½
Features rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Performance rating	★★★★½	★★★★½	★★★★☆	★★★★½	★★★★½
Value rating	★★★½☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Processor	2.4GHz Intel Core i7-4860HQ	2.5GHz Intel Core i7-4710HQ	2.5GHz Intel Core i7-4710HQ	2.2GHz Intel Core i7-4702MQ	2.3GHz Intel Core i7-4712HQ
RAM	16GB DDR3	4GB DDR3	16GB DDR3	8GB DDR3	16GB DDR3
Storage	1TB HDD, 3x 128GB SSD	1TB HDD, 120GB SSD	1TB HDD, 2x 128GB SSD	250GB SSD	512GB SSD
Screen size	17.3in matt	17.3in matt	17.3in matt	13.3in matt	15.6in gloss
Screen resolution	1920x1080	1920x1080	1920x1080	1920x1080	3200x1800
Graphics	2x nVidia GeForce GTX 860M	nVidia GeForce GTX 870M	nVidia GeForce GTX 860M	nVidia GeForce GTX 860M	nVidia GeForce GT 750M
Video memory	8GB	2GB	2GB	2GB	2GB
Wireless	802.11a/b/g/n/ac	802.11b/g/n/ac	802.11b/g/n/ac	802.11b/g/n/ac	802.11b/g/n/ac
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	×
Bluetooth	✓	✓	✓	✓	✓
USB	3x USB 3.0, 2x USB 2.0	4x USB 3.0	2x USB 3.0, 2x USB 2.0	3x USB 3.0, 1x USB 2.0	3x USB 3.0, 1x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	×	×	×	×	×
DisplayPort	✓	✓	×	×	✓
HDMI	✓	✓	✓	✓	✓
DVI	×	×	×	×	×
VGA	✓	×	✓	×	✓
eSATA	×	×	×	✓	×
Media card slot	✓	✓	✓	✓	✓
Audio	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic	Headphone jack, mic
Optical drive	N/A	N/A	N/A	None	N/A
Extras	HD webcam	HD webcam	HD webcam	720p webcam	720p webcam
Operating system	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit
Bundled software	None	None	None	None	None
Stalker (720p/1080p)	189 /157fps in Tomb Raider	142fps in Batman (1080p)	120fps in Batman (1080p)	115fps (1080p)	68fps (1080)
Battery	74.7Wh lithium-polymer	60Wh lithium-ion	49Wh lithium-ion	62Wh lithium-ion	91Wh lithium-ion
Battery life	1 hr 48 mins	3 hrs 45 mins	2 hrs	5 hrs 5 mins	5 hrs
PCMark7 score	6304	5710	6241	5500	5833
Dimensions	425x303x24.5mm	419x287x21.8mm	418x269x39mm	374x250x37mm	372x254x18mm
Weight	3.24kg	2.66kg	3kg	2kg	2kg
Warranty	2-year return-to-base	2-year collect-and-return	2-year return-to-base	2-year collect-and-return	1-year next day in-home
FULL REVIEW	TINYURL.COM/KLUXLGE	TINYURL.COM/Q8U7CUP	TINYURL.COM/PU5L5GK	TINYURL.COM/Q4JWVSM	TINYURL.COM/N9GRT4U

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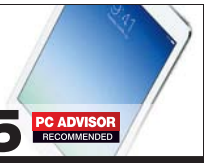
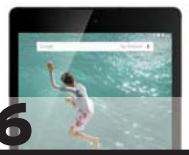
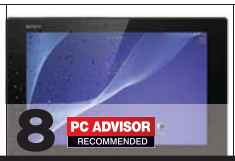
Tablets

	1	2	3	4	5
					
	Google Nexus 7 (2013)	Apple iPad Air 2	Samsung Galaxy Tab S 8.4	Apple iPad mini 2	Apple iPad Air
Price	**£199 inc VAT**	**£399 inc VAT**	**£319 inc VAT**	**£239 inc VAT**	**£319 inc VAT**
Website	Play.google.com	Apple.com/uk	Samsung.com/uk	Apple.com/uk	Apple.com/uk
Launch date	Jul 13	Oct 14	Aug 14	Oct 13	Oct 13
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★☆
Platform	Android 4.3 Jelly Bean	Apple iOS 8.1	Android 4.4.2 KitKat	Apple iOS 8.1	Apple iOS 8.1
Screen size/resolution	7in/1280x800	9.7in/2048x1536	8.4in/2560x1600	7.9in/2048x1536	9.7in/2048x1536
Storage/media card slot	16GB/none	16GB/none	16GB/32GB	16GB/none	16GB/none
Connectivity	802.11b/g/n, Bluetooth 4	802.11a/b/g/n/ac, Bluetooth 4	802.11a/b/g/n/ac, Bluetooth 4	802.11a/b/g/n, Bluetooth 4	802.11a/b/g/n, Bluetooth 4
Processor	1.5GHz Snapdragon S4 Pro	Apple A8X	Exynos 5	Apple A7	Apple A7
RAM	2GB	1GB	3GB	3GB	1GB
Claimed battery life	9 hrs	10 hrs	12 hrs	Not specified	10 hrs
Cameras (front/rear)	1.2/5Mp	1.28Mp	2.1/8Mp	1.2/85Mp	1.2/5Mp
Dimensions	114x200x8.7mm	240x169.5x6.1mm	126x213x6.6mm	200x134.7x7.5mm	169x240x7.5mm
Weight	299g	437g	294g	331g	469g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/QYUDY5C	TINYURL.COM/QEYQXYM	TINYURL.COM/KL6G9FJ	TINYURL.COM/MZDXBGQ	TINYURL.COM/LSB84EE

Tablets

	6	7	8		10
					
	Google Nexus 9	Samsung Galaxy Tab S 10.5	Sony Xperia Z2 Tablet	Tesco Hudl 2	Google Nexus 10 by Samsung
Price	**£300 inc VAT**	**£399 inc VAT**	**£399 inc VAT**	**£132 inc VAT**	**£319 inc VAT**
Website	Play.google.com	Samsung.com/uk	Sony.co.uk	Tesco.com	Play.google.com
Launch date	Nov 14	Aug 14	Apr 14	Oct 14	Nov 12
Overall rating	★★★★☆	★★★★½	★★★★½	★★★★½	★★★★½
Platform	Android 5.0 Lollipop	Android 4.4.2 KitKat	Android 4.4.2 KitKat	Android 4.4 KitKat	Android 4.4 KitKat
Screen size/resolution	8.9in/2048x1536	10.5in/2560x1600	10.1in/1920x1200	8.3in/1920x1200	10.1in/2560x1600
Storage/media card slot	16GB/32GB	16GB/32GB	16GB/none	16GB/microSD	16GB/none
Connectivity	802.11b/g/n/ac, Bluetooth 4.1	802.11b/g/n/ac, Bluetooth 4	802.11b/g/n/ac, Bluetooth 4	802.11a/b/g/n, Bluetooth 4	802.11b/g/n, Bluetooth 4, NFC
Processor	2.3GHz nVidia Tegra K1	Exynos 5420	2.3GHz Snapdragon 801	1.8GHz Intel Atom	1.7GHz Cortex A-15
RAM	2GB	3GB	3GB	2GB	2GB
Claimed battery life	Not specified	Not specified	Not specified	8 hrs	9 hrs
Cameras (front/rear)	1.6/8Mp	2.1/8Mp	2.2/8.1Mp	1.2/5Mp	1.9/5Mp
Dimensions	228x153x7.95mm	247x177x6.6mm	266x172x6.4mm	128x224x9mm	178x264x8.9mm
Weight	425g	465g	439g	401g	603g
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/NQ6K77Y	TINYURL.COM/OESDFZQ	TINYURL.COM/M8BZZUN	TINYURL.COM/NE5W9U9	TINYURL.COM/ARL2KDG

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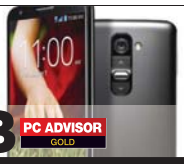
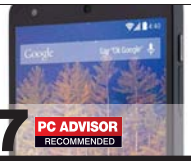
Smartphones

	1 PC ADVISOR GOLD	2 PC ADVISOR GOLD	3 PC ADVISOR GOLD	4 PC ADVISOR RECOMMENDED	5
					
	LG G3	**Sony Xperia Z3 Compact**	**LG G2**	**HTC One (M8)**	**Samsung Galaxy Note 4**
Price	**£499 inc VAT**	**£365 inc VAT**	**£279 inc VAT**	**£550 inc VAT**	**£599 inc VAT**
Website	Lg.com/uk	Sonymobile.com	Lg.com/uk	Htc.com/uk	Samsung.com/uk
Launch date	Jun 14	Nov 14	Sep 13	Apr 14	Nov 14
Overall rating	★★★★½	★★★★½	★★★★½	★★★★½	★★★★☆
Platform	Android 4.4.2 KitKat	Android 4.4 KitKat	Android 4.2 Jelly Bean	Android 4.4 KitKat	Android 4.4.4 KitKat
Processor	2.5GHz Snapdragon 801	2.5GHz Qualcomm	2.26GHz Snapdragon 800	2.3GHz Snapdragon 801	2.7GHz Qualcomm
Storage/media card slot	16GB/none	16GB/microSD	16GB/none	16GB/microSD	32GB/none
Screen size/resolution	5.2in/1440x2560	4.6in/1280x720	5.2in/1920x1080	5in/1920x1080	5.7in/2560x1440
Screen type	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch
Connectivity	4G, HSPA+, Bluetooth, Wi-Fi	4G, HSPA+, Bluetooth, Wi-Fi	4G, HSPA+, Bluetooth, Wi-Fi	Bluetooth, NFC, Wi-Fi ac	4G, NFC, Bluetooth, Wi-Fi
Claimed battery life	Not specified	Not specified	Not specified	Not specified	Not specified
Cameras (front/rear)	13Mp, 1080p video	20.7Mp, 1080p video	13Mp, 1080p video	5Mp, 1080p video	8Mp, 1080p video
GPS	A-GPS	A-GPS	A-GPS	A-GPS, Glonass	A-GPS
Dimensions, weight	75x146x8.9mm, 149g	127x64.9x8.6mm, 129g	71x139x9.4mm, 143g	146.4x70.6x9.4mm, 160g	79x154x8.7mm, 175g
Warranty	1 year	1 year	1 year	2 years	Not specified
FULL REVIEW	TINYURL.COM/MQ8DHUU	TINYURL.COM/O6PVRER	TINYURL.COM/PAFK4SZ	TINYURL.COM/NGBWXY9	TINYURL.COM/MRVCQKG

Smartphones

	6 PC ADVISOR RECOMMENDED	7 PC ADVISOR RECOMMENDED	8 PC ADVISOR RECOMMENDED	9 PC ADVISOR GOLD	10 PC ADVISOR RECOMMENDED
					
	Huawei Honor 6	**Google Nexus 5**	**Sony Xperia Z3**	**OnePlus One**	**HTC Desire Eye**
Price	**£249 inc VAT**	**£299 inc VAT**	**£539 inc VAT**	**£229 inc VAT**	**£350 inc VAT**
Website	Huawei.com/uk	Play.google.com	Sonymobile.com	Oneplus.net/uk	Htc.com/uk
Launch date	Nov 14	Oct 13	Nov 14	Jul 14	Nov 14
Overall rating	★★★★½	★★★★☆	★★★★½	★★★★½	★★★★☆
Platform	Android 4.4 KitKat	Android 4.4 KitKat	Android 4.4.4 KitKat	CyanogenMod 11S	Android 4.4.4 KitKat
Processor	1.7GHz Cortex-A15	2.3GHz Snapdragon 800	2.5GHz Qualcomm	2.5GHz Qualcomm	2.3GHz Qualcomm
Storage/media card slot	16GB/32GB	16GB/none	16GB/microSD	16GB/none	16GB/microSD
Screen size/resolution	5in/1920x1080	4.95in/1920x1080	5.2in/1920x1080	5.5in/1920x1080	5.2in/1920x1080
Screen type	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch	Capacitive multitouch
Connectivity	4G, NFC, Bluetooth, Wi-Fi	HSPA+, Bluetooth, Wi-Fi ac	4G, NFC, Bluetooth, Wi-Fi	4G, NFC, Bluetooth, Wi-Fi	4G, NFC, Bluetooth, Wi-Fi
Claimed battery life	Not specified	17 hrs/300 hrs	Not specified	Not specified	Not specified
Cameras (front/rear)	13Mp, 1080p video	8Mp, 1080p video	20.7Mp, 1080p video	13Mp, 720p video	13Mp, 1080p video
GPS	A-GPS	A-GPS	A-GPS	Glonass	A-GPS
Dimensions, weight	70x140x7.5mm, 130g	69x138x8.9mm, 130g	72x146x7.3mm, 152g	152.9x75.9x8.9mm, 162g	152x74x8.5mm, 154g
Warranty	1 year	1 year	1 year	Not specified	2 years
FULL REVIEW	TINYURL.COM/OYBQJVA	TINYURL.COM/PAFK4SZ	TINYURL.COM/K5S4KXD	TINYURL.COM/KYW977U	TINYURL.COM/NVMMBUF

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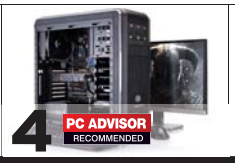
Gaming PCs



	Chillblast Fusion Probe	Chillblast Fusion Ranger	Gladiator Firestorm OC	CyberPower Infinity Perseus XT	Computer Planet GX 760
Price	**£1,299 inc VAT**	**£1,249 inc VAT**	**£695 inc VAT**	**£1,499 inc VAT**	**£983 inc VAT**
Website	Chillblast.com	Chillblast.com	Gladiatorpc.co.uk	Cyberpowersystem.co.uk	Computerplanet.co.uk
Launch date	Feb 14	Jul 14	Mar 14	Feb 14	Mar 14
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★½
Features rating	★★★★½	★★★★☆	★★★½☆	★★★★★	★★★½☆
Performance rating	★★★★½	★★★★½	★★★★☆	★★★★½	★★★★☆
Value rating	★★★★☆	★★★★☆	★★★★½	★★★½☆	★★★½☆
Overall rating	★★★★½	★★★★☆	★★★★½	★★★★½	★★★★☆
Processor	3.4GHz Intel Core i5-4670K (OC 4.4GHz)	3.4GHz Intel Core i5-4670K (OC 4.2GHz)	3.4GHz Intel Core i5-4670K (OC 4.2GHz)	3.4GHz Intel Core i5-4670K (OC 4.4GHz)	3.4GHz Intel Core i5-4670K
CPU cooler	Corsair H55 Liquid Cooler	Corsair H60 Liquid Cooler	Be Quiet Dark Rock 3	Cooler Master Seldon 120mm	Corsair H60 Hydro
Memory	16GB DDR3	16GB DDR3	8GB DDR3	16GB DDR3	8GB DDR3
Storage	120GB SSD + 2TB HDD	120GB SSD + 2TB HDD	2TB HDD	256GB SSD + 2TB HDD	120GB SSD + 2TB HDD
Power supply	750W Corsair	750W Corsair	500W Corsair	750W Corsair	450W Corsair
Motherboard	Gigabyte GA-Z87N-Wi-Fi	Asus Maximus VII Ranger	MSI Z87M Gaming	Gigabyte GA-Z87-HD3	Gigabyte GA-Z87N-Wi-Fi
Operating system	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit
Screen	23.6in Iiyama X2377HDS	None supplied	None supplied	23in AOC i2367fh	None supplied
Graphics	Palit Jetstream GeForce GTX 780, 3GB VRAM	PowerColor AMD Radeon R9 290 OC, 4GB VRAM	MSI nVidia GeForce GTX 750 Ti Gaming, 2GB VRAM	Powercolor AMD R9 290, 4GB VRAM	Zotac GeForce GTX 760, 2GB VRAM
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Connectivity	Gigabit ethernet, 802.11n	Gigabit ethernet	Low-lag ethernet	Gigabit ethernet	2x gigabit ethernet, 802.11n
Ports	6x USB 3.0, 4x USB 2.0	6x USB 3.0, 2x USB 2.0, 2x DVI, HDMI, DP	8x USB 3.0, 4x USB 2.0, 2x eSATA	6x USB 3.0, 4x USB 2.0	6x USB 3.0, 2x USB 2.0
Optical drive	DVD±RW (Blu-ray optional)	24x DVD±RW	24x DVD±RW	DVD±RW, BD-ROM	None supplied
Case	Aerocool Dead Silence Gaming Cube	Corsair Graphite 230T	Aerocool Dead Silence Cube Window Red	Cooler Master Dominator 690 III	Fractal Design Node 304
Keyboard & mouse	Gigabyte M6800 mouse, Force K3 keyboard	None	None	Gigabyte M6900 mouse, Force K3 keyboard	None
Other	Optional family pack	None	None	None	None
PC Mark 7 score	6965	6852	5124	6731	5508
Alien vs Predator score (720p/1080p)	169/93fps	173/97	103/54fps	172/96fps	103/54fps
Final Fantasy XIV (720p/1080p)	218/96fps	N/A	N/A	167/87fps	N/A
Sniper Elite V2 (Low/High/Ultra)	308/187/49fps	321/164/42	194/81.6/18.6fps	352/155/39fps	261/119/29fps
Power Consumption	52/407W	67W/386W	70W/166W	68/484W	53W/271W
Warranty	2-year collect-and-return	2-year collect-and-return	4-year return-to-base	3-year RTB (2 years parts, 3 years labour)	3-year return-to-base
FULL REVIEW	TINYURL.COM/OWQ24QQ	TINYURL.COM/MEGK9O9	TINYURL.COM/PKDV2NG	TINYURL.COM/NKWN7V4	TINYURL.COM/MJZKS7G

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Mini PCs

	Yoyotech Warbird RS4.0	Chillblast Fusion Xcalibur	Mesh Elite Mini Gaming OC	Dino PC Microraptor GTX 770	Quiet PC Serenity Nano
Price	**£999 inc VAT**	**£849 inc VAT**	**£1,499 inc VAT**	**£999 inc VAT**	**£1,238 inc VAT**
Website	yoyotech.co.uk	chillblast.com	meshcomputers.com	dinopc.com	quietpc.co.uk
Launch date	Mar 14	Mar 14	Mar 14	Mar 14	Mar 14
Build rating	★★★½☆	★★★☆☆	★★★★☆	★★★½☆	★★★½☆
Features rating	★★★★½	★★★★☆	★★★★½	★★★★☆	★★★★☆
Performance rating	★★★★☆	★★★½☆	★★★★★	★★★★☆	★★★★☆
Value rating	★★★½☆	★★★★☆	★★★☆☆	★★★½☆	★★★☆☆
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Processor	3.4GHz Intel Core i5-4670K	3.2GHz Intel Core i5-4570	3.5GHz Intel Core i7-4770K (4.3GHz OC)	3.4GHz Intel Core i5-4670K (4.3GHz OC)	3.4GHz Intel Core i5-4670K (3.8GHz OC)
CPU cooler	Noctua L9i low-profile cooler	Scythe Shuriken low-profile cooler	Corsair Hydro Series H60 liquid cooler	Corsair Hydro Series H80 liquid cooler	Noctua L9i low-profile cooler
RAM	8GB DDR3 1600MHz	8GB DDR3 1600MHz	16GB DDR3 2133MHz	16GB DDR3 1600MHz	16GB DDR3 1600MHz
Storage	128GB SSD, 2TB HDD	120GB SSD, 1TB HDD	240GB SSD, 2TB HDD	128GB SSD, 1TB HDD	120GB SSD, 2TB HDD
Power supply	Seasonic Evo 520W Bronze-rated	450W Silverstone SFX	750W Cooler Master GX RS-750	600W Corsair Builder Series CX600	FSP Aurum 750W modular PSU
Motherboard	Asus Z871-Pro	Asus H811-PLUS	MSI Z871 Gaming AC	Gigabyte GA-Z87N-WIFI	Gigabyte H87N-WIFI
Operating system	Windows 8.1	Windows 8.1/7 Home Premium	Windows 8.1	Windows 8.1	Windows 8.1
Graphics	Asus GTX 770 (2GB)	EVGA GTX 760 (2GB)	AMD Radeon R9 290X (4GB)	Zotac nVidia GeForce GTX 770 (2GB)	Palit GTX 770 Jetstream (2GB)
Networking	Gigabit ethernet, 802.11n Wi-Fi	Gigabit ethernet, 802.11n Wi-Fi	Gigabit ethernet, 802.11n Wi-Fi	2x gigabit ethernet, 802.11n Wi-Fi	Gigabit ethernet, 802.11n Wi-Fi
USB ports	6x USB 3.0, 4x USB 2.0	4x USB 3.0, 4x USB 2.0	6x USB 3.0, 2x USB 2.0	6x USB 3.0, 3x USB 2.0	5x USB 3.0, 4x USB 2.0
Other ports	3x DVI (2x DVI-I), 2x HDMI, 2x DisplayPort	2x DVI, HDMI, DisplayPort	3x DVI, 2x HDMI, 2x DisplayPort, eSATA	1x DVI, 2x HDMI, 1x PS/2	2x DVI, HDMI, DisplayPort
Optical drive	Pioneer BDR-S07XLT Blu-ray writer	Optional	External Blu-ray drive	LiteOn iHAS122 DVD writer	Optional
Case	Cooler Master Elite 130	Silverstone RVZ01	Fractal Design Node 304	Cooler Master Elite 130	Cooler Master Elite 130
Keyboard & mouse	None	Logitech MK520	None	None	None
PCMark 8 score	6403	6334	6678	6861	6403
Alien vs Predator score (720p/1080p)	127/68	104/56	186/104	121/65	127/68
Sniper V2 Elite score (Low/High/Ultra)	303/161/40	263/124/31	387/169/43	313/150/38	303/161/40
Games score (Final Fantasy XIV)	200/76	155/63	183/94	220/81	200/76
Power consumption (idle/max)	49/330W	39/278W	54/548W	71/384W	49/330W
Warranty	3-year Silver (1-year parts, 3-year labour)	2-year collect-and-return (5-year labour)	3-year collect-and-return (2-year parts, 3-year labour)	3-year return-to-base (1-year parts, 3-year labour)	2-year collect-and-return
FULL REVIEW	TINYURL.COM/MQ8POPQ	TINYURL.COM/NFQ6EGO	TINYURL.COM/PWCACV2	TINYURL.COM/MXMJ6QT	TINYURL.COM/O4QDH7Y

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All-in-one PCs

	Dell XPS 2720	Apple iMac 27in (Late 2012)	Medion Akoya P2002	Chillblast Fusion AIO Ultima	MSI Wind Top AE2712G
Price	**£1,749 inc VAT**	**£1,699 inc VAT**	**£449 inc VAT**	**£1,199 inc VAT**	**£1,199 inc VAT**
Website	Dell.co.uk	Apple.com/uk	Medion.com/gb	Chillblast.com	Uk.msi.com
Launch date	Sep 13	Sep 13	Sep 13	Sep 13	Sep 13
Build rating	★★★★½	★★★★★	★★★★☆	★★★½☆	★★★★☆
Features rating	★★★★½	★★★★½	★★★½☆	★★★★☆	★★★★☆
Performance rating	★★★★½	★★★★☆	★★½☆☆	★★★½☆	★★½☆☆
Value rating	★★★½☆	★★★★☆	★★★★★	★★★½☆	★★★½☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★½☆	★★★½☆
Processor	3.1GHz Intel Core i7-4770S	3.2GHz Intel Core i5-3470	3.3GHz Intel Core i3-3220	3.1GHz Intel Core i7-3770S	2.9GHz Intel Core i5-3470S
RAM	16GB DDR3	8GB DDR3	4GB DDR3	16GB DDR3	4GB DDR3
Storage	2TB HDD + 32GB SSD	1TB HDD	1TB HDD	1TB HDD + 120GB SSD	1TB HDD
Screen	27in IPS touchscreen	27in IPS	23.6in TN	21.5in IPS touchscreen	27in TN touchscreen
Screen resolution	2560x1440	2560x1440	1920x1080	1920x1080	1920x1080
Graphics card	nVidia GeForce GT 750M	nVidia GeForce GTX 675MX	Intel HD Graphics 2500	Intel HD Graphics 4000	nVidia GeForce GT 630M
Video memory	2GB	1GB	N/A	N/A	2GB
Wireless	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n	802.11b/g/n
Ethernet	Gigabit	Gigabit	Gigabit	Gigabit	Gigabit
Bluetooth	✓	✓	×	✓	✓
USB	6x USB 3.0	4x USB 3.0	2x USB 3.0, 4x USB 2.0	4x USB 3.0, 2x USB 2.0	2x USB 3.0, 4x USB 2.0
FireWire	×	×	×	×	×
Thunderbolt	✓	✓	×	×	×
HDMI	✓	×	✓	✓	✓
Media card slot	✓	✓	✓	✓	✓
Optical drive	Blu-ray combo drive	None	DVD drive	Blu-ray combo drive	Blu-ray combo drive
Other	2.1Mp webcam, wireless keyboard and mouse, dual digital microphone array	1.3Mp webcam, wireless keyboard and mouse	Wireless keyboard and mouse, CyberLink software, Kaspersky Internet Security	Webcam, Microsoft Wireless Desktop 3000	2Mp webcam, DVB-T TV tuner, wireless keyboard and mouse, CyberLink software
Operating system	Windows 8	Mac OS X 10.9 Mavericks	Windows 8	Windows 8	Windows 8
Power consumption (idle/max)	54/84/220W	53/84/243W	34/42/92W	32/40/119W	44/53/110W
Sniper V2 Elite (Low/High/Ultra)	6/25/94fps	12/54/197fps	5/5/16fps	5/7/28fps	5/6/17fps
PCMark 7 score	6091	4141	3298	5195	3138
Dimensions	492x664x72mm	650x203x516mm	580x196x430-460mm	338x541x61mm	672x483x66mm
Weight	16kg	9.5kg	10.3kg	9kg	13kg
Warranty	1-year next-day in-home	1-year return-to-base	1-year return-to-base	2-year collect-and-return	2-year collect-and-return
FULL REVIEW	TINYURL.COM/KWZ4KLL	TINYURL.COM/A95Q9VY	TINYURL.COM/MEVSJ9D	TINYURL.COM/LQ4U8FW	TINYURL.COM/MUGFKQ7

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Business PCs

	Aria Gladiator Logic N200-3220M	Chillblast Fusion Opal	Wired2Fire Business Accelerate	Dino PC Synergy 4430	Eclipse Precision A856F85
Price	**£509 inc VAT**	**£549 inc VAT**	**£689 inc VAT**	**£569 inc VAT**	**£519 inc VAT**
Website	Aria.co.uk	Chillblast.com	Wired2fire.co.uk	Dinopc.com	Eclipsecomputers.com
Launch date	Aug 13	Aug 13	Aug 13	Aug 13	Aug 13
Build rating	★★★★½	★★★★☆	★★★½☆	★★★★☆	★★★☆☆
Features rating	★★★½☆	★★★½☆	★★★★½	★★★½☆	★★★½☆
Performance rating	★★★½☆	★★★★☆	★★★★½	★★★½☆	★★½☆☆
Value rating	★★★★☆	★★★½☆	★★★☆☆	★★★½☆	★★★½☆
Overall rating	★★★★☆	★★★½☆	★★★½☆	★★★½☆	★★★½☆
Processor	3.3GHz Intel Core i3-3220 (dual-core)	3.2GHz Intel Core i5-4570 (quad-core)	3.4GHz Intel Core i5-4670 (quad-core)	3GHz Intel Core i5-4430 (quad-core)	3.6GHz AMD Trinity A8-5600K (quad-core)
RAM	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3	8GB DDR3
Storage	500GB HDD + 80GB SSD	1TB HDD	120GB SSD	1TB HDD	1TB HDD
Motherboard	Gigabyte GA-B75M-D3H	Asus B85M-G	ASRock B85M-HDS	Gigabyte GA-H87M-HD3	Asus F2A85-M LE
CPU cooler	Arctic Cooling Alpine 11 GT Quiet	Standard Intel cooler	Standard Intel cooler	Standard Intel cooler	Standard AMD cooler
Power supply	Corsair 430W	CiT 500W	Xigmatek 400W	CiT 500W	Alpine 600W
Screen	21.5in AOC E2260SWDA	23.6in Iiyama X2377	2x 21.5in AOC E2260SWDA	23in Iiyama XB2380HS-B1	23in AOC i2369Vm
Screen resolution	1920x1080	1920x1080	1920x1080	1920x1080	1920x1080
Graphics	Intel HD Graphics 2500	Intel HD Graphics 4600	Intel HD Graphics 4600	Intel HD Graphics 4600	Integrated
Video memory	N/A	N/A	N/A	N/A	N/A
USB	2x USB 3.0, 4x USB 2.0	3x USB 3.0, 6x USB 2.0	2x USB 3.0, 8x USB 2.0	4x USB 3.0, 4x USB 2.0	4x USB 3.0, 4x USB 2.0
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	Not specified	Not specified	Not specified	Not specified	Not specified
Case	Cooler Master N200	CiT Fortress	In-Win Em040	CiT Templar	K2 Gamer
Keyboard	Microsoft Desktop 400 keyboard and mouse (wired)	Cherry J82-16001 keyboard, M-5450 mouse (wired)	Gigabyte K6800 keyboard, M6800 mouse (wired)	Logitech K120 keyboard, B110 mouse (wired)	Microsoft Optical Desktop 800 (wired)
Optical drive	24x DVD±RW	24x DVD±RW	DVD±RW	Samsung DVD±RW	Samsung DVD±RW
Operating system	Windows 7 Home Premium 64-bit	Windows 8 Professional	Windows 7 Professional 64-bit	Windows 7 Home Premium 64-bit	Windows 8 Professional
Bundled software	None	None	None	None	None
PCMark 7 overall score	3524	4257	5667	3458	2349
PCMark 7 Productivity score	4056	2685	5929	2529	1883
PCMark 7 Computational score	3321	21490	13651	9377	3899
Power consumption (idle/max)	27/69W	47/124W	37/135W	37/115W	34/145W
Warranty	1-year return-to-base, phone support	2-year collect-and-return, phone support	2-year return-to-base, phone support	3-year return-to-base, phone support	1-year return-to-base, phone support
FULL REVIEW	TINYURL.COM/OSW55A8	TINYURL.COM/KGGE98T	TINYURL.COM/PCSKWVS	TINYURL.COM/PF8LUXD	TINYURL.COM/MQFWJ3R

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Family PCs

	1 PC ADVISOR BEST BUY	2	3	4	5
					
	Chillblast Fusion Commando	**Wired2Fire Diablo Reactor**	**Mesh Elite 4670-PCA**	**Dino PC Raging Lizard V2**	**Arbico Family i3 4185**
Price	**£799 inc VAT**	**£668 inc VAT**	**£799 inc VAT**	**£780 inc VAT**	**£675 inc VAT**
Website	Chillblast.com	Wired2fire.co.uk	Meshcomputers.com	Dinopc.com	Arbico.co.uk
Launch date	Jul 13	May 14	May 14	May 14	May 14
Build rating	★★★★☆	★★★★☆	★★★★☆	★★★½☆	★★★☆☆
Features rating	★★★★☆	★★★½☆	★★★★½	★★★½☆	★★★☆☆
Performance rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★☆☆
Value rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★★☆
Overall rating	★★★★½	★★★★½	★★★★☆	★★★★☆	★★★★☆
Processor	3.2GHz Intel Core i5-4570	3.4GHz Intel Core i5-4670	3.4GHz Intel Core i5-4670	3.5GHz Intel Core i5-4690	3.4GHz Intel Core i3-4130
RAM	16GB DDR3	8GB DDR3 1600MHz	16GB DDR3 1600MHz	8GB DDR3 1600MHz	8GB DDR3 1600MHz
Storage	1TB HDD + 120GB SSD	1TB HDD	2TB HDD + 120GB SSD	1TB HDD + 128GB SSD	1TB HDD + 120GB SSD
Motherboard	Asus B85M-G	Asus B85M-G	MSI B85M-E45	Gigabyte H97M-D3H	MSI B85M-E45
CPU cooler	Arctic Cooling Freezer 7 Pro	Standard Intel Cooler	Standard Intel Cooler	Standard Intel Cooler	Arctic Cooling Freezer 7 Pro
Power supply	600W CiT	500W FSP	500W FSP	500W CIT	650W Arctic Red
Screen	23in Iiyama X2377	24in AOC E2495Sh	24in Iiyama E2483HS-B1	24in Iiyama E2483HS-B1	23.6in AOC E2470SWHE
Screen resolution	1920x1080	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels
Graphics	Zotac nVidia GeForce GTX 650 Ti	AMD Radeon R7 265	nVidia GeForce GTX 750 Ti	nVidia GeForce GTX 750 Ti	MSI AMD Radeon R7 250
Video memory	N/A	2GB	2GB	2GB	2GB
Connectivity	802.11b/g/n, gigabit ethernet	Gigabit ethernet	Gigabit ethernet	Gigabit ethernet, 802.11b/g/n	Gigabit ethernet
USB	3x USB 3.0, 6x USB 2.0	3x USB 3.0, 6x USB 2.0, 2x HDMI, VGA	4x USB 3.0, 8x USB 2.0, HDMI, VGA, DVI-D, DVI, DP	5x USB 3.0, 3x USB 2.0, 2x HDMI (1x e-Mini), VGA, 2x DVI	2x USB 3.0, 6x USB 2.0, HDMI, VGA, DVI-D
Media card slot	None	None	None	None	None
Sound	Onboard	Onboard	Onboard	Onboard	Onboard
Speakers	2x Logitech LS220	None	None	None	None
Case	Cooler Master Force 500	Zalman Z3 Plus	Zalman Z3 Plus	Fractal Design Core 1000 USB3	CIT Templar
Keyboard	Logitech MK260	Octigen Wireless combo	Logitech MK270 (wireless combo)	Gigabyte KM6150 (wired combo)	Logitech MK120
Optical drive	LG BD-ROM/DVD±RW	LiteOn DVD RW	24x DVD RW	None	Samsung DVD RW
Operating system	Windows 8 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit	Windows 8.1 64-bit
Bundled software	None	None	None	None	Ahead Nero, CyberLink PowerDVD
Sniper V2 Elite score (Low/High/Ultra)	147/59/14fps	240/76/18fps	195/68/16fps	196/83/20fps	62/22/5fps
Alien vs Predator score (720p/1080p)	52/27fps	83/44fps	71/37fps	102/53fps	22/11fps
PCMark 7 score	6177	3938	7304	6431	4800
Warranty	2-year collect-and-return	2-year return-to-base	3-years labour (2-year parts, 3-months free C&R)	3-year labour (2-year parts)	2-year return-to-base
FULL REVIEW	TINYURL.COM/KF6G3T7	TINYURL.COM/OA8UKDP	TINYURL.COM/OZCSHYU	TINYURL.COM/PFA55F7	TINYURL.COM/NU7FSGB

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Sub-£150 printers

	Samsung Xpress M2070W	Canon Pixma MG5550	Samsung Xpress M2022W	Canon Pixma MX535	Brother MFC-J870DW
Price	**£100 inc VAT**	**£60 inc VAT**	**£70 inc VAT**	**£70 inc VAT**	**£137 inc VAT**
Website	Samsung.com/uk	Canon.co.uk	Samsung.com/uk	Canon.co.uk	Brother.co.uk
Launch date	Mar 14	Apr 14	Aug 14	Jul 14	Jul 14
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Technology	Mono laser	Colour inkjet	Mono laser	Colour inkjet	Colour inkjet
Max print resolution	1200x1200	4800x1200dpi	1200x1200dpi	4800x1200dpi	6000x1200dpi
Actual print speed	B=17.1ppm	B=11.8ppm C=8.7ppm	B=18ppm	B=9.7ppm C=3.8ppm	B=18ppm C=11ppm
Scan/fax facilities	1200x1200 scans	1200x2400 scans	None	1200x2400 scans/fax	1200x2400 scans
Supported interfaces	USB 2.0, 802.11b/g/n, NFC	USB 2.0, 802.11b/g/n	USB 2.0, 802.11b/g/n	USB 2.0, 802.11b/g/n, AirPrint	USB 2.0, 802.11b/g/n, NFC
Cost per page	B=3.8p	B=2.4p C=4.8p	B=5p	B=2.7p C=4.8p	B=3.9p C=2.5p
Media card/auto duplex	××	×✓	××	×✓	✓✓
Input capacity	150 sheets	100 sheets	150 sheets	100 sheets + 30-sheet ADF	150 sheets + 20 ADF
Dimensions	406x360x253mm	455x369x148mm	332x215x178mm	458x385x200mm	410x374x180mm
Weight	7.4kg	6.3kg	4kg	8.5kg	9.5kg
Warranty	1 year	1 year	1 year	1 year	1 year
FULL REVIEW	TINYURL.COM/OYZKJKE	TINYURL.COM/LKWLJDE	TINYURL.COM/NFJHDOR	TINYURL.COM/N9LXVN7	TINYURL.COM/M52V29R

£151+ printers

	Canon i-Sensys MF6180dw	Brother HL-L9200CDWT	HP OfficeJet Pro X551dw	Kyocera Ecosys P6030cdn	Lexmark CS410dn
Price	**£260 inc VAT**	**£550 inc VAT**	**£360 inc VAT**	**£546 inc VAT**	**£195 inc VAT**
Website	Canon.co.uk	Brother.co.uk	Hp.com/uk	Kyoceradocumentsolutions.co.uk	Lexmark.co.uk
Launch date	May 14	Aug 14	Aug 13	Jul 14	Jul 14
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★☆
Technology	Mono laser	Colour laser	Colour inkjet	Colour laser	Colour laser
Max print resolution	1200x600dpi	2400x600dpi	2400x2400	9600x600dpi	1200x1200dpi
Actual print speed	B=24ppm	B=30ppm C=30ppm	B=42.9ppm C=15.8ppm	B=27ppm C=27ppm	B=23.1ppm C=13.6ppm
Scan/fax facilities	600dpi scanner, 33.6Kbps fax	None	None	None	None
Supported interfaces	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet, 802.11b/g/n	USB 2.0, ethernet, 802.11b/g/n	USB 2.0	USB 2.0, ethernet
Cost per page	B=1.5p	B=1p C=5.9p	B=1p C=4.3p	B=1.2p C=1.7p	B=1.8p C=9.5p
Media card/auto duplex	×✓	×✓	×✓	×✓	×✓
Input capacity	250 + 50 sheet + 50 ADF	750 sheets + 50 sheet	500 + 50 sheet	500 sheets + 150 (2150 max)	250 + 1 sheets
Dimensions	390x473x431mm	410x495x445mm	517x399x414mm	345x518x480mm	291x442x407mm
Weight	19.1kg	28.3kg	17.1kg	29.5kg	20.5kg
Warranty	1 year	1 year	1 year	2 years	1 year
FULL REVIEW	TINYURL.COM/LE9WA5N	TINYURL.COM/PT52MH6	TINYURL.COM/CZO5P65	TINYURL.COM/N4MCYLF	TINYURL.COM/MJG33UL

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Blu-ray drives

	1	2	3 PC ADVISOR RECOMMENDED	4	5
	Pioneer BDR-209EBK Retail	**Pioneer BDR-209DBK OEM**	**LG LN48919**	**LG BP40NS20**	**Lite-On IHES112-115**
Price	**£59 inc VAT**	**£54 inc VAT**	**£60 inc VAT**	**£90 inc VAT**	**£54 inc VAT**
Website	Pioneer.eu/uk	Pioneer.eu/uk	Uk.lge.com	Uk.lge.com	Liteonit.eu
Launch date	Nov 13	Nov 13	May 12	Jan 13	Oct 12
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★½☆
Blu-ray speeds	16x -R, 14x -R DL, 2x -RE, 12x -ROM	16x -R, 14x -R DL, 2x -RE, 12x -ROM	16x -R, 12x -R DL, 12x -RE, 12x -ROM	6x -R, 6x -R DL, 2x -RE, 6x -ROM	12x -ROM
DVD speeds	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 16x -ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 16x -ROM	16x ±R, 8x ±R DL, 6x -RW, 8x +RW, 12x -RAM, 16x -ROM	8x ±R, 6x ±R DL, 6x -RW, 8x +RW, 5x -RAM, 8x -ROM	8x ±R, 8x ±R DL, 6x -RW, 8x +RW, 8x -ROM
Max storage	128GB	50GB	50GB	100GB	8.5GB
Interface type	SATA (internal)	SATA (internal)	SATA (internal)	USB 2.0 (external)	SATA (internal)
Label technology	None	None	LightScribe	None	None
Software	ArcSoft TotalMedia Extreme	None	CyberLink Blu-ray Suite	PowerDVD, PowerProducer	None
Dimensions	148x180x42mm	148x180x42mm	146x170x41mm	160x153x22mm	158x145x22mm
Weight	740g	740g	749g	380g	700g
Warranty	1 year	1 year	1 year	1 year	2 years
FULL REVIEW	TINYURL.COM/LD47X7K	TINYURL.COM/LD47X7K	TINYURL.COM/8YTUJEF	TINYURL.COM/BS8UAFF	TINYURL.COM/8SYECMW

Wireless routers

	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3 PC ADVISOR RECOMMENDED	4 PC ADVISOR RECOMMENDED	5 PC ADVISOR RECOMMENDED
	Apple AirPort Extreme	**Netgear Nighthawk R7000**	**D-Link DIR 880L**	**TP-Link Archer C7**	**Asus RT-AC68U AC1900**
Price	**£169 inc VAT**	**£170 inc VAT**	**£110 inc VAT**	**£90 inc VAT**	**£160 inc VAT**
Website	Apple.com/uk	Netgear.co.uk	Dlink.com	Tp-link.com	Uk.asus.com
Launch date	Jan 14	Sep 14	Sep 14	Jan 14	Jan 14
Overall rating	★★★★☆	★★★★½	★★★★☆	★★★★☆	★★★★☆
Standards supported	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac	802.11a/b/g/n/ac
Frequency modes	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)	2.4GHz/5GHz (concurrent)
Antennas	6x internal	3x external	3x external	3x external, 3x internal	3x external, 3x internal
Built-in modem	×	×	×	×	×
Manufacturer's rating	1300/450Mb/s	1300/600Mb/s	1300/600Mb/s	1300/450Mb/s	1300/600Mb/s
WPS	×	✓	✓	✓	✓
Ports	Gigabit WAN, 3x gigabit LAN, USB	Gigabit WAN, 1x USB 3.0, 1x USB 2.0	Gigabit WAN, 1x USB 3.0, 1x USB 2.0	Gigabit WAN, 4x gigabit LAN, 2x USB 2.0	Gigabit WAN, 4x gigabit LAN, 2x USB 2.0
Average power use	8W	9W	10W	N/A	N/A
Max speed (11n/11ac)	171/572Mb/s	171/592Mb/s	171/625Mb/s	110/505Mb/s	98/610Mb/s
Dimensions, weight	98x168x98mm, 945g	285x186x45mm, 750g	247x190x47mm, 745g	32.5x243x160mm, 508g	160x83x220mm, 640g
Warranty	1 year	N/S	N/S	3 years	2 years
FULL REVIEW	TINYURL.COM/MFDLLSC	TINYURL.COM/Q2NR8Q	TINYURL.COM/OZ5G7KG	TINYURL.COM/KKJMPCE	TINYURL.COM/K4ZATKV

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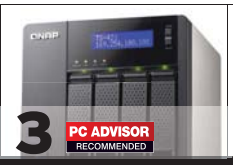
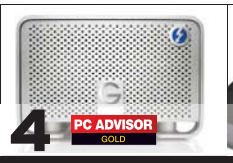
NAS drives



	Synology DS413j	Qnap HS-210	Qnap TS-421	Synology DS1813+	Asustor AS-604T
Price	**£260 inc VAT (diskless)**	**£240 inc VAT (diskless)**	**£366 inc VAT (diskless)**	**£760 inc VAT (diskless)**	**£435 inc VAT (diskless)**
Website	Synology.com	Qnap.com	Qnap.com	Synology.com	Asustor.com
Launch date	Oct 13	Oct 14	Mar 14	Jan 14	May 14
Overall rating	★★★★☆	★★★★½	★★★★☆	★★★★½	★★★★☆
Drive bays	4	2	4	8	4
Processor	1.6GHz Marvell mv6282	1.6GHz Marvell single-core	2GHz Marvell single-core ARM	2.13GHz Intel Atom D2700 dc	2.13GHz Intel Atom
Memory	512MB DDR3	512MB DDR3	1GB DDR3	2GB DDR3	1GB DDR3
Remote access	✓	✓	✓	✓	✓
eSATA	×	×	✓	✓	✓
USB port	2x USB 2.0	2x USB 3.0, 2x USB 2.0	2x USB 3.0, 2x USB 2.0	2x USB 3.0, 4x USB 2.0	2x USB 3.0, 4x USB 2.0
Raid options	0/1/5/6/10/JBOD	0/1/JBOD	0/1/5/6/10/JBOD	0/1/5/6/10/JBOD	0/1/5/6/10/JBOD
Software	DSM 4.1	HD Station	Backup Station	DSM 4.3	Asustor utilities, App Central
Dimensions	184x168x230mm	302x220x41mm	177x180x235mm	175x340x233mm	230x170x185mm
Weight	2kg	1.5kg	3kg	5.2kg	3.5kg
Warranty	2 years	2 years	2 years	3 years	2 years
FULL REVIEW	TINYURL.COM/PL8XM8S	TINYURL.COM/OEXRYNY	TINYURL.COM/MCYWUB8	TINYURL.COM/PWO4M6J	TINYURL.COM/NX5QO8M

USB drives



	G-Technology Professional	WD My Passport Pro 4TB	LaCie Little Big Disk	G-Technology Thunderbolt	Toshiba Stor.E Basics
Price	**£250 inc VAT**	**£350 inc VAT**	**£760 inc VAT**	**£599 inc VAT**	**£80 inc VAT**
Website	G-technology.com	Wdc.com/en	Lacie.com/uk	G-technology.com	Toshiba.co.uk
Launch date	Sep 13	Aug 14	Feb 14	Aug 12	Nov 13
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★½	★★★★☆
Capacity tested	4TB	4- to 8TB	1TB	8TB	2TB
Capacity range	2TB to 4TB	2- to 4TB	512GB to 2TB	4TB to 8TB	320GB to 2TB
Disk size	3.5in	2.5in	2.5in	3.5in	2.5in
Spin speed	7200rpm	7200rpm	5400rpm	7200rpm	5400rpm
Transfer speed	N/A	230MB/s	635MB/s	329MB/s	94MB/s (USB 3.0)
Encryption	None	None	None	None	None
Other interfaces	FireWire 800	None	None	None	None
Software	None	None	LaCie Backup Assistant	None	None
Dimensions	235x130x46mm	88x143x44mm	40x140x85mm	235x130x85mm	119x79x21mm
Weight	1.35kg	700g	650g	2.3kg	215g
Warranty	3 years	3 years	1 year	3 years	1 year
FULL REVIEW	TINYURL.COM/NV7F32F	TINYURL.COM/QAGQEUG	TINYURL.COM//KRCL3VZ	TINYURL.COM/CXEF6MH	TINYURL.COM/LBHC8EL

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SSDs

	Crucial M550	OCZ Vector 150	Crucial M500	Samsung 840 EVO	Seagate 600 SSD
Price	**£334 inc VAT**	**£131 inc VAT**	**£169 inc VAT**	**£320 inc VAT**	**£202 inc VAT**
Website	Crucial.com/uk	Ocz.com	Crucial.com/uk	Samsung.com/uk	Seagate.com/gb
Launch date	May 14	May 14	Aug 13	Nov 13	May 14
Overall rating	★★★★½	★★★★☆	★★★★½	★★★★½	★★★★☆
Capacity tested	1TB	240GB	480GB	750GB	480GB
Price per GB	33p	55p	35p	43p	43p
Memory cache	1GB LP DDR2	512MB	512MB DDR3	1GB LPDDR2	N/A
Controller	Marvell 88SS9189	Indilinx Barefoot 3 M00	Marvell 88SS9187	Samsung MEX (3-core ARM)	Link A Media Device
Encryption	AES 256-bit	AES 256-bit	AES 256-bit	AES 256-bit	None
Flash	Micron 20nm MLC NAND	Toshiba 19nm MLC	Micron 20nm MLC NAND	Samsung 19nm Toggle NAND	Toshiba 19nm MLC
Firmware updated via	Bootable CD	OCZ Toolbox, bootable	ISO boot disc	SSD Magician for Windows	Seagate Firmware, bootable
ATTO peak sequential	R: 563MB/s; W: 514MB/s	R: 557MB/s; W: 534MB/s	R: 539MB/s; W: 433MB/s	R: 554MB/s; W: 537MB/s	R: 555MB/s; W: 474MB/s
CDM peak IOPS	100 / 91.7	92.9 / 94.7	89.8k (read)	104K (read)	96.8 / 88.6
CDM 4kB rnd	30/99	25/97	N/A	N/A	28/78
Warranty	3 years	5 years or 91TB writes	3 years	5 years	3 years
FULL REVIEW	TINYURL.COM/MSWD98Z	TINYURL.COM/KBED2W6	TINYURL.COM/M2NCSMJ	TINYURL.COM/L5EDQOY	TINYURL.COM/N58RB8G

Projectors

	BenQ W1300	Optoma W316	InFocus IN126STa	NEC M352WS	Optoma ML1500
Price	**£767 inc VAT**	**£463 inc VAT**	**£540 inc VAT**	**£778 inc VAT**	**£650 inc VAT**
Website	Benq.co.uk	Optoma.co.uk	Infocus.com	Nec-display-solutions.com	Optoma.co.uk
Launch date	Jun 14	Jul 14	Sep 14	Jul 14	Jul 14
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Projection technology	DLP	DLP	DLP	DLP	DLP
Resolution (pixels)	1920x1080	1280x800	1280x800	1280x800	1280x800
Brightness, Contrast	2000, 10,000:1	3400, 15,000:1	3300, 15,000:1	3500, 10,000:1	1500, 15000:1
Image size	300in	300in	300in	150in	100in
Supported aspect ratios	16:9 native	16:10, 16:9, 4:3	16:10, 16:9, 4:3	16:10	16:10, 16:9, 4:3
Noise levels (dB)	33 (30 eco)	29db	32db (30 eco)	33 (39 bright mode)	30db
Connections	VGA, 2x HDMI, USB, 3D	VGA, HDMI, Mini-USB, 3D	2x VGA, HDMI, USB, ethernet	2x VGA, 2x HDMI, USB	HDMI, 2x USB-A, SD
Lamp/lamp life	240W/6000 hrs	190W/10000 hrs	278W/3500 hrs	278W/8000 hrs	LED/20,000 hrs
Dimensions	330x257x128mm	315x223x102mm	292x220x108mm	368x268x97mm	270x170x48mm
Weight	3.4kg	2.5kg	3.7kg	3.6kg	1.4kg
Warranty	3 years	2 years	1 year	3 years	2 years
FULL REVIEW	TINYURL.COM/K4FA89Q	TINYURL.COM/OCWTHGW	TINYURL.COM/NHH3QPB	TINYURL.COM/Q6J2N6W	TINYURL.COM/QBFRYR7

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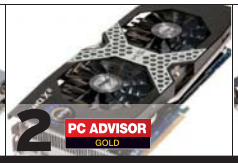
Sub-£150 graphics cards

	MSI Radeon R9 270	MSI R7 260X OC	Sapphire Radeon R7 265	Gigabyte GTX 750 Ti WindForce	XFX Radeon R7 240
Price	**£123 inc VAT**	**£87 inc VAT**	**£110 inc VAT**	**£115 inc VAT**	**£45 inc VAT**
Website	Uk.msi.com	Uk.msi.com	Sapphiretech.com	Uk.gigabyte.com	Xfxforce.com
Launch date	Jul 14	May 14	Sep 14	Aug 14	Jul 14
Overall rating	★★★★½	★★★½☆	★★★★☆	★★★½☆	★★★☆☆
Graphics processor	AMD Radeon R9 270	AMD Radeon R7 260X	AMD Radeon R7 265	nVidia GeForce GTX 750 Ti	AMD Radeon R7 240
Installed RAM	2GB GDDR5	2GB GDDR5	2GB GDDR5	2GB GDDR5	2GB GDDR3
Memory interface	256-bit	128-bit	256-bit	128-bit	128bit
Core clock/Boost	900MHz/975MHz	1175MHz/none	900MHz/925MHz	1033MHz/1111MHz	750MHz/780MHz
Memory clock/Effective	1.4GHz/5.6GHz	1625MHz/6.5GHz	1.4GHz/5.6GHz	1.35GHz/5.4GHz	400MHz/1.6GHz
Stream processors	1280	896	Varies	640	320
Texture units	80	56	64	40	20
Power connectors	1x 6-pin	1x 6-pin	1x 6-pin	N/A	N/A
DirectX	11.2	11.1	11	11.2	11.2
Digital interface	2x DVI, HDMI, DP	2x DVI, HDMI, MiniDisplayPort	2x DVI, 1x HDMI, 1x DP	2x DVI, 2x HDMI	1x DVI, 1x HDMI
Warranty	3 years	3 years	2 years	3 years	2 years
FULL REVIEW	TINYURL.COM/MCE7353	TINYURL.COM/OZ6WUYT	TINYURL.COM/LV69BEM	TINYURL.COM/Q7K4ESV	TINYURL.COM/LPYCHJB

£151+ graphics cards



	Gigabyte GeForce GTX 770 2GB	Sapphire Radeon R9 280X	XFX Radeon R9 290X	MSI Radeon R9 270X	MSI Radeon R9 295 X2
Price	**£200 inc VAT**	**£226 inc VAT**	**£300 inc VAT**	**£150 inc VAT**	**£700 inc VAT**
Website	Uk.gigabyte.com	Sapphiretech.com	Xfxforce.com	Uk.msi.com	Uk.msi.com
Launch date	Aug 13	Mar 14	Apr 14	Dec 13	May 14
Overall rating	★★★★½	★★★★½	★★★★½	★★★★☆	★★★★☆
Graphics processor	nVidia GeForce GTX 770	AMD Radeon R9 280X	AMD Radeon R9 290X	AMD Radeon R9 270X	AMD Radeon R9 295 X2
Installed RAM	2GB GDDR5	3GB GDDR5	4GB GDDR5	2GB GDDR5	8GB GDDR5
Memory interface	256-bit	384-bit	512-bit	256-bit	2x 512-bit
Core clock/boost	950MHz/1020MHz	950MHz/1070MHz	1GHz/1GHz	1030MHz/1120MHz	1018MHz/N/A
Memory clock/Effective	1.5GHz/6GHz	1.55GHz/6.2GHz	1.25GHz/5GHz	1.4GHz/5.6GHz	1.25GHz/5GHz
Stream processors	1536	2048	2816	1280	2x 2816
Texture units	128	128	176	80	2x 176
Power connectors	1x 6-pin, 1x 8-pin	2x 8-pin	8-pin, 6-pin	2x 6-pin	2x 8-pin
DirectX	11	11	11	11	11
Digital interface	2x DVI, HDMI, DisplayPort	DVI, HDMI, 2x Mini-DisplayPort	2x DVI, HDMI, DisplayPort	2x DVI, HDMI, DisplayPort	DVI, 4x Mini-DP
Warranty	3 years	2 years	3 years	2 years	3 years
FULL REVIEW	TINYURL.COM/OAG6277	TINYURL.COM/OWVAP37	TINYURL.COM/NPET8ER	TINYURL.COM/OYA2DFJ	TINYURL.COM/POTAOGZ

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Sub-£200 flat-panel displays

	1 PC ADVISOR BEST BUY	2 PC ADVISOR RECOMMENDED	3	4	5
	AOC i2369Vm	**Philips 234E5QHAW**	**NEC MultiSync E243WMi**	**BenQ EW2740L**	**BenQ GL2450**
Price	**£130 inc VAT**	**£130 inc VAT**	**£185 inc VAT**	**£178 inc VAT**	**£108 inc VAT**
Website	Aoc-europe.com/en	Philips.co.uk	Nec-display-solutions.com	Benq.co.uk	Benq.co.uk
Launch date	Jul 14	Jul 14	Jun 14	Aug 14	Jul 14
Overall rating	★★★★½	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Screen size	23in	23in	23.8in	27in	24in
Panel type	IPS matt	IPS matt	IPS matt	VA semi-matt	TN matt
Native resolution	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels	1920x1080 pixels
Pixel density	96ppi	96ppi	93ppi	82ppi	92ppi
Brightness	220cd/m²	187cd/m²	250cd/m²	300cd/m²	261cd/m²
Static contrast ratio	630:1	210:1	650:1	280:1	610:1
Response time	6ms	5ms	6ms	4ms	5ms
Ports	HDMI, HDMI/MHL, DP, VGA	2x HDMI (QHAB) or 1x HDMI (QDAB), VGA	DP, DVI-D, VGA	2x HDMI, VGA	DVI-D, VGA
Dimensions	531x204x398mm	532x213x414mm	558x214x380-490mm	623x191x451mm	579x179x436mm
Weight	3.75kg	3.5kg	6.3kg	4.2kg	4.1kg
Warranty	3 years	2 years	3 years	2 years	2 years
FULL REVIEW	TINYURL.COM/OOEFYPR	TINYURL.COM/KLYLW4V	TINYURL.COM/KNCGVOU	TINYURL.COM/OO6EC5L	TINYURL.COM/OOUPFUE

£201+ flat-panel displays

	1	2	3	4	5
	AOC Q2963PM	**LG 34UM95**	**Dell UltraSharp 32 Ultra**	**BenQ PG2401PT**	**ViewSonic VP2772**
Price	**£287 inc VAT**	**£851 inc VAT**	**£1,478 inc VAT**	**£855 inc VAT**	**£550 inc VAT**
Website	Aoc-europe.com/en	Lg.com/uk	Dell.co.uk	Benq.co.uk	Viewsoniceurope.com/uk
Launch date	Mar 14	Dec 14	Jun 14	Oct 14	Jun 14
Overall rating	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★½☆
Screen size	29in	34in 21:9	31.5in	24.1in	27in
Panel type	AH-IPS	IPS matt	IGZO	IPS	AH-IPS
Native resolution	2560x1080 (96ppi)	3440x1440	3840x2160 pixels	1920x1200 pixels	2560x1440 pixels
Pixel density	96ppi	110ppi	140ppi	94ppi	109ppi
Brightness	240cd/m²	320cd/m2	350cd/m²	317cd/m²	350cd/m²
Static contrast ratio	530:1	1000:1	550:1	540:1	560:1
Response time	5ms	5ms	8ms	5ms	6ms
Ports	HDMI, DVI, DP, VGA	HDMI, DP, Thunderbolt, USB 3.0	HDMI, DP, Mini-DP, 4x USB 3.0	DVI, DP, HDMI, VGA, 3x USB 3.0	HDMI, DVI, Mini-DP, 4x USB 3.0
Dimensions	714x214x388mm	830x83x380mm	750x214x483-572mm	543x254x555mm	643x348x470mm
Weight	6.9kg	6.7kg	9.2kg	7kg	8.5kg
Warranty	3 years	2 years	3 years	1 year	3 years
FULL REVIEW	TINYURL.COM/NXDAGMK	TINYURL.COM/QYKH6UM	TINYURL.COM/O4CTO3S	TINYURL.COM/PMV5L5V	TINYURL.COM/LLQRWTX

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ASHLEIGH ALLSOPP

YouTube vloggers taking over

YouTube has been steadily becoming a popular platform for people to voice their opinions, share their experiences and show off their latest purchases, through the growing trend of vlogging, which everyone seems to be talking about at the moment thanks to a particular YouTube star called Zoella.

I recently found myself surrounded by several vloggers (video bloggers) at a book-publishing event in London, and promptly became fascinated with the idea that YouTube has the potential to make you rich and famous from the comfort of your own home.

What really got me while talking to these vloggers, some of which have more than 100,000 subscribers, is that they really aren't all that different from you and me. I'd always thought of vloggers as people with exceptional confidence and years of acting experience. But in reality, they're sometimes insecure, they do have bad hair days and they simply took the brave step of picking up a camera one day and giving it a shot.

Some of them are never even seen on camera. There are plenty of gaming vloggers who can be heard giving commentary over the top of gameplay walkthroughs and more. In fact, the most popular YouTube channel in the world is that of PewDiePie, a Swedish gaming vlogger with a whopping 32 million subscribers.

Anyone with access to the web and a video camera (which we all have on our smartphones) can become a 'YouTuber,' no matter what their background is, where they come from, or what their career aspirations might be. They've got access to an enormous global audience, instantly.

It's not a new notion, of course, but over the past year several vloggers have been propelled into the spotlight, and even those that haven't reached the highest heights have found themselves making some extra cash simply by sharing their thoughts, experiences and stories on YouTube.

Big numbers

As a quick example of some of those (now arguably famous) vloggers and their success, Jim Chapman (j1mmyb0bba, almost 2 million subscribers) and Tanya Burr (pixi2woo, 2.6 million subscribers) have this year starred in a Mulberry campaign, BBC Radio 1 has a show hosted by YouTubers Dan (Danisnotonfire, 4.2 million subscribers) and Phil (AmazingPhil, 2.1 million subscribers), and Band Aid 30 starred Alfie Deyes (PointlessBlog, 3.3 million subscribers), Joe Sugg (ThatcherJoe, 3.2 million subscribers) and Zoe Sugg (Zoella, 6.5 million subscribers).

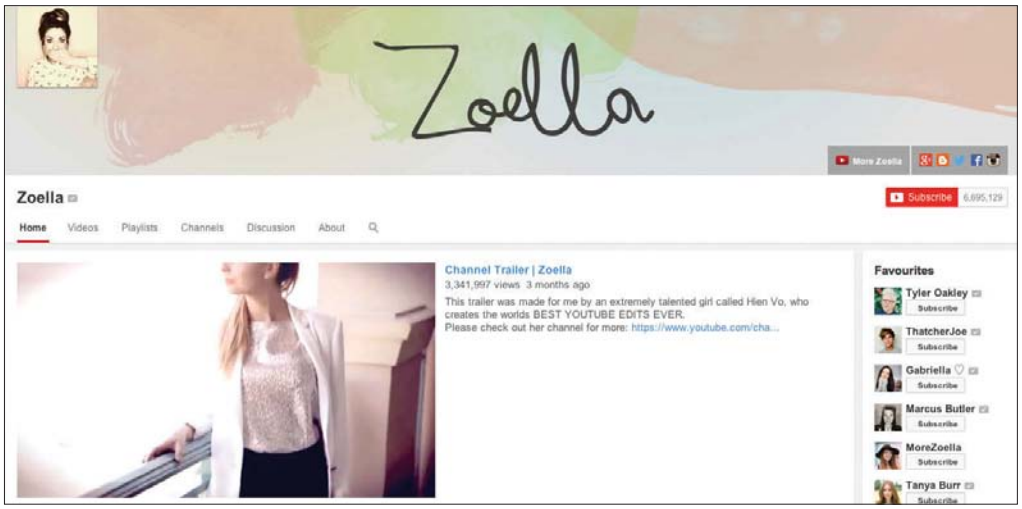
YouTubers are becoming so popular among 'millennials' that they've got the potential to completely change, well, a lot. Getting a product into the hands of a popular vlogger or partnering with one is marketing gold, so the way companies advertise and market their products is changing.

According to a report by Neilsen this year, YouTube reaches more 18- to 34-year-olds in the US than any TV network, so the way we consume content is changing, too.

They're also getting book deals and movie contracts, so we can expect to see a whole new breed of celebrities emerging thanks to the vlogging phenomenon.

I'm interested to see what the future holds for vlogging – it's a pretty exciting movement in my eyes, and another way that the internet is giving everyone a voice and making the world accessible to us all.

> **"In reality, they're sometimes insecure, they do have bad hair days and they simply took the brave step of picking up a camera one day and giving it a shot"**



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8.1 Windows Microsoft

Take a closer look at the new Windows

Some features require Windows 8.1 Update. For Windows 8 Devices, the update is available through Windows Store. For Windows 8.1 Devices, the update is available through Windows Update. Internet access required; fees may apply.

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