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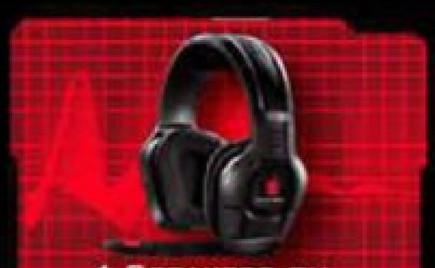

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BRAVE NEW WORLD

The future of gaming is coming, but are you ready?

The winds of change are blowing through the gaming world right now, and if you don't hang on to concrete facts, you may be swept up in the squall and fear for the PC's future. The looming cloud that is driving this shift could well change the gaming landscape forever, but what exactly do services such as Gaikai and OnLive mean to us PC users? We have a special report starting on page 84 that looks at this very question.

On a connected note, we also look at what's happening in the windswept land of download services. We've already seen the benefits (and downsides) that download services can bring to the PC platform; and the likes of Steam has already started branching out to offer other functionality, such as saving your game in the cloud.

Given the fact that we don't tend to play games exclusively on one machine any more, this can only be seen as a good thing. Steam is also promoting a much better answer to piracy than the archaic DRM systems that have plagued the PC for years. We've compared the best download services available on page 59. This round-up includes some services that you may have never heard of, but are certainly worth checking out if you're looking for a bargain, or simply want to pass on those games you've finished.

"Can laptops really compete with the desktop when it comes to pure gaming?"

The other big change on the PC gaming landscape is a renewed push to make the ultimate gaming notebook. We've all seen the promises in the past, but can laptops really compete with the desktop when it comes to pure gaming? We take eight of the best laptops available and put them through their paces. The outcome is hopeful at least, take a look at page 8 for more.

As ever, we've got a packed issue of reviews, games and tutorials as well, so let me welcome you another great issue. Enjoy!

Alan Dexter
Editor
alan.dexter@futurenet.com

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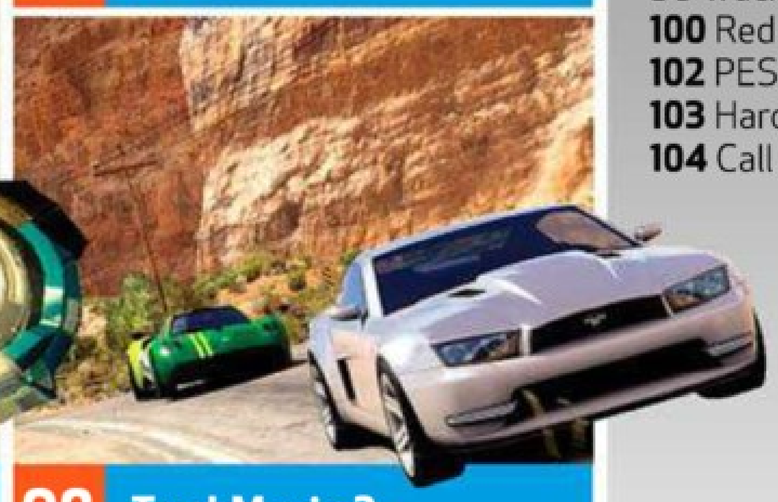

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Alan Dexter
Editor

It's a good job we don't update our pictures on this page as regularly as teenagers tweet their inner thoughts, because if we did you'd see I bear a striking resemblance to *Super Meat Boy*'s titular hero this month. Long story short: do take care when you're eating corn on the cob. Delicious as it was, I'm now one tooth down and left rather inconvenienced.

The *Battlefield 3* beta has proved gaming corn on the cob for me too. With no discernible tessellation on show, we're still left waiting to see what Frostbite 2 is really capable of.

Dave James
Deputy Editor

Another month rolls by, and the space on Dave's desk where a parcel containing AMD's Bulldozer chip should be simply gathers more dust. Dave is the very embodiment of sad face. And when that kind of anger builds up, all you can do is take it out on the Nazis, *Red Orchestra 2* style. He got 9 kills once.

Chris Thornett
Operations Editor

Chris has been enjoying his hols, but that hasn't stopped him gazing into the future. And according to the Science Museum, it's going to be well boring. In a chilling depiction of days to come, the Museum's 'future' hall is mostly empty. Great. Chris came back with a useful fact though: sinistrophobia is the fear of the left-handed. Yeah, that exists.

Phil Iwanuik
Technology Writer

Phil's *F1 2011* prowess once again earned him riches and fame this month. They all thought he was wasting his time playing driving games instead of eating, but who's got the *Little Big Planet 2* key ring of victory now?

Paul Blachford
Art Editor

Paul spilled the beans on the upcoming games he'd played at a recent expo. *BF3* = good. TOR = more controversially, also good. Biggest shocker though: Paul reckons Bethesda's *Skyrim* will play best with a 360 controller.

Stephen Hanlon
Designer

Steve's a Daddy! Not a sugar daddy, or 'your daddy' but an actual father. Congratulations to Steve, his family and new son Connor John. Good news for humanity as well, then. Let's all hope young Connor saves us from Skynet.

PCFormat #259/12.11

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Future Publishing Ltd.
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NEXT ISSUE ON SALE: 21 November 2011

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Printed in the UK by William Gibbons on behalf of Future
Distributed in the UK by Seymour Distribution Ltd.
2 East Poultry Avenue, London EC1A 9PT Tel:02074294000

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Future plc is a public company quoted on the London Stock Exchange (symbol: FUTR).

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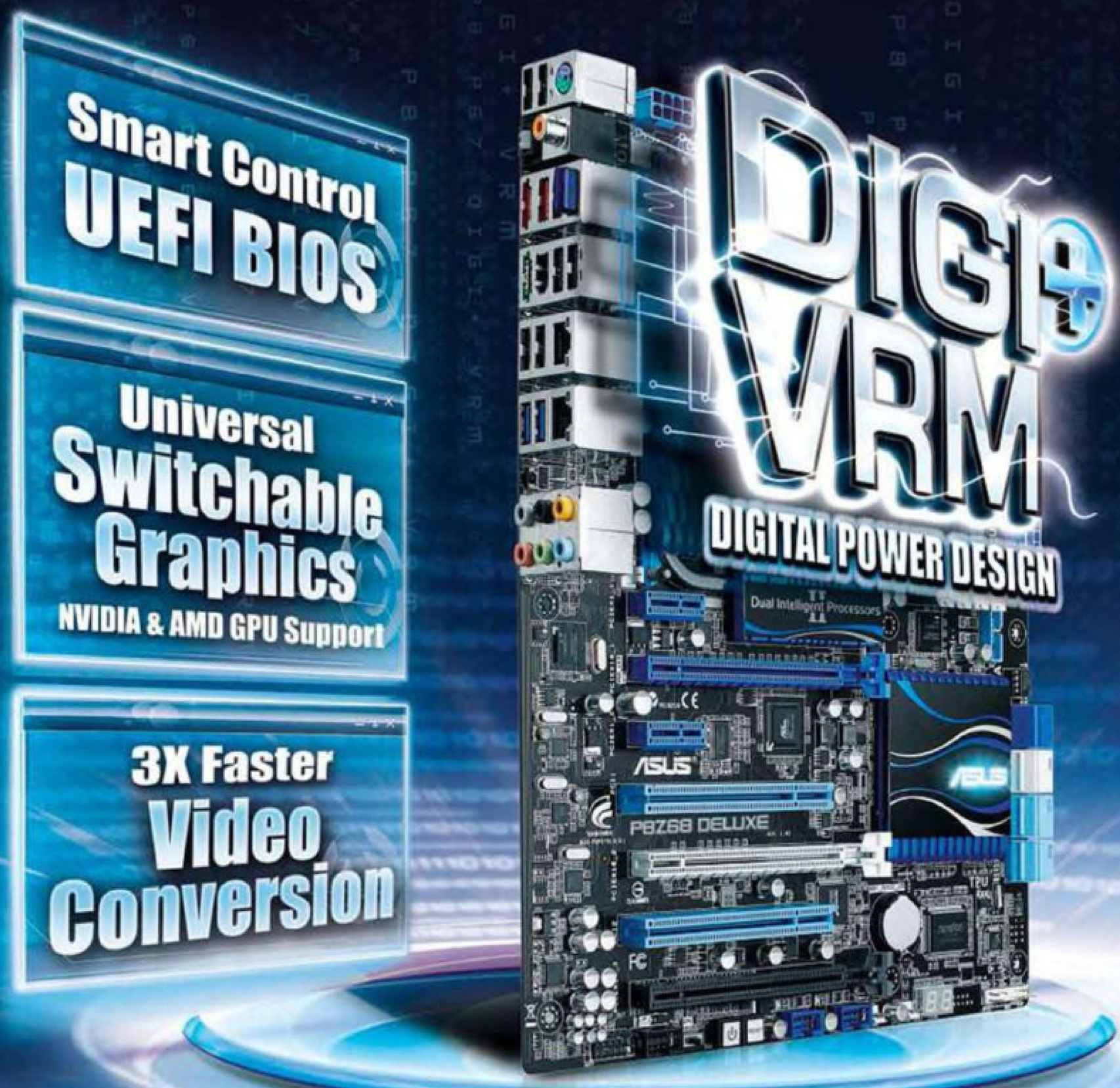

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Dual Intelligent Processors 2
DIGI+ VRM

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Series-Wide Fast Video Transcoding and Graphics Switching Support

With ASUS P8Z68 motherboards, you can tap into the best of both worlds. Thanks to LucidLogix Virtu™, models such as the P8Z68-V PRO enable both integrated and discrete graphics at once, alternating between them as needed. HD video uses integrated graphics without having to turn on the more energy-consuming discrete graphics card, while the newest PC games in 1080p or higher engage that graphics card for dedicated GPU output. This way, you can enjoy all the performance and even save energy!

Big Storage and Fast Solid State Speeds

Another new feature of the ASUS P8Z68 architecture is Intel's Smart Response Technology, which uses an installed SSD drive as a cache for frequently-accessed parts of the OS and other operations. This accelerates access speeds and reduces redundant drive spin to save energy and minimize long-term wear and tear. You get a much smoother system with less delay and shorter loading times, which is definitely a plus.

Exclusive ASUS features: Making the Right Choice into the Best Choice

The inclusion of the unique ASUS Dual Intelligent Processors 2 with DIGI+ VRM digital power design makes hardcore overclocking possible for the true die-hard PC power seeker. Better precision for power delivery and tuning means a greater overclocking range, improved stability and more confidence when tweaking the system. The digital voltage regulators lead to almost complete elimination of power loss and unmatched efficiency. There's also the exclusive ASUS UEFI BIOS, which renders old keyboard-only BIOS setups obsolete. This extensible firmware BIOS adds mouse controls and a smooth icon-based graphical interface, so even boot prioritisation is made easy with drag and drop, just like in Windows.

Final Word…

The P8Z68-V PRO and other new motherboards from ASUS do more than exploit the real power of 2nd generation Intel® Core™ processors and the Z68 Express chipset. With their outstanding overclocking abilities and energy saving features, they're the finest Z68 motherboards currently available.

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GAMING ON THE GO

What does it take to build the ultimate gaming notebook? As **Jeraemy Laird** discovers, it's all about graphics, graphics and graphics…

Is the golden era of laptop gaming a goner? Let's consider the past a second. Wind the clock way back to September 2005 and NVIDIA had just launched the GeForce 7800 GTX Go. It was a big, bad 24-pipe beast. What's more, the mobile and desktop iterations were absolutely identical, save for a small gap in clockspeeds. Finally, mobile machines could go toe to toe with their desk-bound buddies.

Sadly, it was but a temporary anomaly. NVIDIA did manage a follow up with the closely related 7900 series but since then, there hasn't been a pukka mobile graphics chip hewn from precisely the same silicon as the very fastest desktop GPU of the day. Ultimately, there's no getting round the constrained thermals, packaging and power capacity of a portable, even one with pizza-box proportions. That's especially true now that graphics chips are massively parallel monsters with hundreds of floating point processing units.

THE GRUNT GAP

The bottom line is, you're not going to be able to achieve true desktop performance with any machine that can truly be described as portable. Graphics performance is critical for gaming grunt and without access to the fastest video chips, laptops are always going to be second string.

But that doesn't mean gaming on the move is futile. Lordy, no. The best mobile graphics chips may not be as quick as the very finest desktop fare. But by any sane metric, they are incredibly complex bits of kit, capable of astonishing feats of 3D rendering.

The fact that PC graphics in terms of game engines has somewhat stagnated helps, too. Partly that's because prevailing games consoles tend to set a fixed target for cross-platform developers and current consoles are getting on a bit. More to the point, there are mobile graphics chips that thump seven shades out of any console.

But exclusive-for-PC titles haven't exactly raced ahead, either. Meanwhile, the old will-it-play-*Crysis* adage seems more irrelevant than ever.

All of which means you can have your portability pie and eat your gaming gateau. Take laptop gaming, simmer over a low heat and reduce to its core components. You'll be left with three things. Graphics, graphics and graphics. Okay, it is possible to spoil a mobile gaming rig by plopping in

GAMING LAPTOPS REVIEWED

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TOP TIPS

GRAPHICS, GRAPHICS, GRAPHICS

Being on a limited budget means trading off component specs. Spend every penny you can on the graphics chip: it's by far the most important component.

the wrong CPU or slapping on a shonky screen. But without a shadow of a doubt, the most critical single component is the graphics.

That may seem obvious. But there are shed loads of serious sexy looking multimedia laptops out there. It would be awfully tempting to gloss over the mediocre graphics in return for a shiny screen and a slick looking chassis. But trust us on this. That would be a monumental mistake.

The first rule of mobile gaming, then, involves discrete graphics. Put simply, you need a separate video chip. No ifs. No buts. Do not pass go. Do not collect £200. Just ensure any laptop you buy with a view to gaming has a discrete GPU.

INTEGRATED GRAPHICS

Admittedly, both Intel and AMD offer much better integrated graphics today than ever before. AMD in particular has upped its integrated game with the Llano APU, which packs no fewer than 400 stream shaders, making it massively more powerful than the 80 shaders of its past best. The problem is, even with 400 shaders Llano's performance is only on a par with a fairly lowly discrete graphics card. More importantly, the in-game experience with the latest and most demanding titles is miserable.

This isn't going to change any time soon and a big part of the reason why involves memory bandwidth. Good GPUs have super-wide memory buses of 256-bit or more. They also pack crazy-fast GDDR memory with effective data rates north of 5GHz.

Put the two together and you have a recipe for bandwidth bigness measured in hundreds of gigabytes per second. And before you ask, yes, even mobile graphics cards have pretty quick memory chips. The current state of the mobile graphics memory art is good for around 100GB/s of bandwidth.

Now consider a modern CPU with on-board, integrated graphics. AMD and Intel's mainstream processors have memory controllers with just two 64-bit channels. Even Intel's LGA 1366 beasties only have three 64-bit channels. Meanwhile, you'll be lucky to hit 2GHz data rates for main system memory. All in, an overall bandwidth result measuring 20-something-GB per second is a great result for a CPU.

In other words, discrete graphics chips have orders of magnitude more memory bandwidth. And don't forget, what little bandwidth is available for the CPU must be shared with the integrated graphics core. At low resolutions and detail settings or paying ancient games, the impact isn't too awful. But who wants to play old or ugly games?

Above Want to play the likes of *BF3* on the move? Make sure your get a good GPU

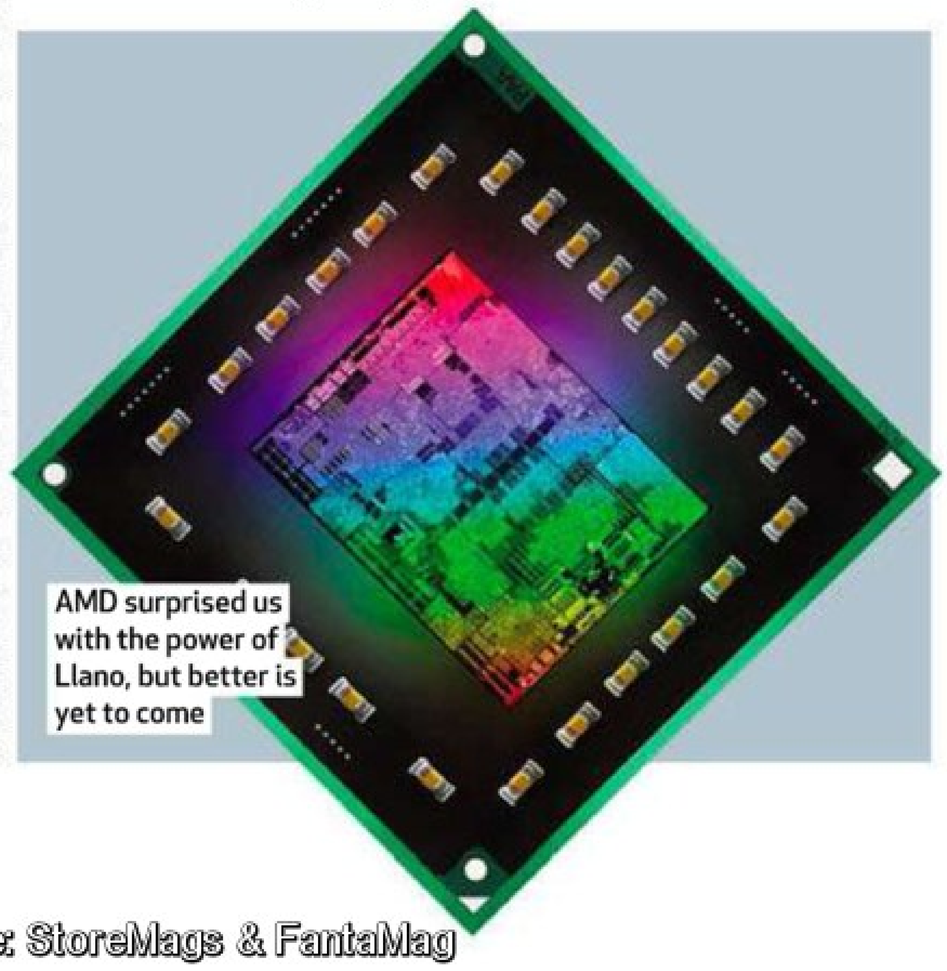
It almost doesn't matter how powerful AMD and Intel make their next generation integrated graphics cores. It's actually the memory interface they need to sort out first. Unless you're happy restricting yourself to five-year-old titles or jaggy pixel vision in newer games, then, the advice regarding integrated graphics remains the same. No touchy.

> "No ifs. No buts. Ensure any laptop you buy with a view to gaming has a discrete GPU"

So, now that you're convinced your gaming portable needs a proper graphics chip, the big question is which one. As it has been, is, and seemingly shall ever more be, it's the AMD-NVIDIA duopoly that owns performance laptop graphics. A quick browse of their product lists will throw up a lot of very familiar looking brands, monikers and product numbers. Simply a stick an 'M' for mobile on the end of any given desktop graphics chipset and you have its laptop equivalent.

PROCESSING POWER

Sadly, however, all is not quite what it seems. For instance, NVIDIA GeForce GTX 580M is not a 512 stream processor powerhouse like the GTX 580 desktop chip. Instead, it packs 384 processors. The same goes for AMD's top Radeon HD 6990M. Not only does



AMD surprised us with the power of Llano, but better is yet to come

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Ultrabook, ultra-light gaming?

The ultrabook is an idea cooked up by Intel that takes thin and light notebook computing to the next level with better performance, solid state storage and hugely extended battery life.

For a notebook to hit Intel's ultrabook target, it must be no thicker than 0.8 inches. Next up is a compulsory SSD, or at least an SSD cache for quick response times. Apart from some security-related guff, that's about it.

Intel is working on a software layer that will allow Ultrabooks to keep soaking up cloud and social networking updates while asleep. It's also working on super-fast resume times from sleep.

But it's really the upcoming Intel chips that will enable Ultrabooks to tickle our fancy.

Intel's next CPU family is known as Ivy Bridge and brings with it a significant increase in graphics performance thanks to an overhauled 3D architecture and an upgrade from 12 to 16 graphics cores.

Despite that, we doubt Ivy Bridge will have sufficient 3D chops for serious gaming. But that could very well change in early 2013 when Intel rolls out the Haswell family. It's an all-new processor architecture and promises to push power consumption for performance notebook processors down to just 10W (currently the reserve of weedy ultra-low voltage CPUs).

If Intel can deliver strong all round performance at 10W, then 2013 might just be the year when all-day wireless gaming arrives. Intriguing thought, eh?

Are ultrabooks the future? They certainly look better than most laptops

it not pack dual GPUs like the desktop 6990M, but the single GPU it does have is from a rung down in AMD's GPU hierarchy.

If that sounds confusing it's because it is. But once you get over the disappointment of the misleading product names, there is some consistency. For starters, both AMD and NVIDIA are up to exactly the same game. And as a general rule of thumb, and just like the examples above, mobile graphics chips are based on the GPU one below the desktop chipset of the same name.

From the very top and kicking off with NVIDIA, then, we get the aforementioned GeForce GTX 580M and its 384 stream processors, 64 texture units, 32 ROPs and 256-bit memory bus. Clearly, what we have here is the GPU known internally at NVIDIA as the GF114 and sold in desktop trim as the GeForce GTX 560Ti. While it may not be NVIDIA's top graphics chip, it still weighs in with a barely believable two billion transistors, making it massively more complex than the likes of a £800 six-core Intel CPU. As for clock speeds, the mobile GF114 loses around 25 per cent compared to its desktop sibling. The same goes for memory data rates.

Next up is the GTX 570M. Once again it's based on GF114 but with a few sectors disabled. The result is 336 processors, 56 textures, 24 ROPs and a 192-bit memory bus. Then there's the GTX 560M. As per the one-rung-down rule, this little beauty uses the chip formerly known as GF106. It's the GPU that powers the GeForce GTX 550 Ti on the desktop. Vital stats include 192 processors, 32 textures, 24 ROPs and a choice of 128-bit and 192-bit memory buses.

Jargon explained

Native resolution
LCD screens are made up of a fixed number of pixels and will only display crisp graphics in games at a single resolution, otherwise known as the native resolution.

ROPs
Render Output Units or ROPs are pretty much the final stage of the graphics pipeline. The more you have, the more pixels you can pump.

Below that, NVIDIA does have further discrete mobile graphics offerings. The GTX 555M is essentially a slightly hobbled 560M and worth a look if the price is right and you're on a tight budget. But we wouldn't go any lower than that. The 550M, for example, makes do with just 96 processors and under 30GB per second of memory bandwidth. We really wouldn't go there.

As for AMD, the Radeon HD 6990M takes pole position with 1,120 stream processors, 56 textures, 32 ROPs and a 256-bit memory bus. It is, in other words,

The best DX11 examples for DX11 are still tech demos, such as NVIDIA's Aliens vs Triangles

Nvidia chipsets

NVIDIA	NVIDIA GeForce GTX 580M	NVIDIA GeForce GTX 570M	NVIDIA GeForce GTX 560M	NVIDIA GeForce GTX 555M**
GPU	GF114	GF114	GF106	GF106
Stream processors	384	336	192	144
Textures	64	56	32	24
ROPs	32	24	24	24
Memory bus	256-bit	192-bit	128 or 192-bit	128 or 192-bit
Clockspeed	620MHz core, 1,240MHz shaders	575MHz core, 1,150MHz shaders	775MHz core, 1,550MHz shaders	775MHz core, 1,506MHz shaders
Memory clockspeed	3GHz	3GHz	2.5GHz	2.5GHz
Desktop equivalent?	NVIDIA GeForce GTX 560 Ti	NVIDIA GeForce GTX 560	NVIDIA GeForce GTX 550 Ti	No direct equivalent, but like a cut down 550 Ti
Perfect panel partner?	1,920 x 1,080 or 1,600 x 900	1,600 x 900	1,366 x 768 or 1,280 x 800	1,366 x 768 or 1,280 x 800

**** There are two configurations for the 555M. Avoid the cheaper one as it only has 96 cores and four ROPs. It's easily identified by its 128-bit memory bus.**

AMD chipsets

AMD	AMD Radeon HD 6990M	AMD Radeon HD 6970M / 6950M	AMD Radeon HD 6870M / 6850M / 6830M
GPU	Barts	Barts	Juniper
Stream processors	1,120	960	800
Textures	56	48	40
ROPs	32	32	16
Memory bus	256-bit	256-bit	128-bit
Clockspeed	715MHz	680MHz / 580MHz	675MHz / 625MHz / 575MHz
Memory clockspeed	3.6GHz	3.6GHz	4GHZ / 4GHz / 3.6GHz
Desktop equivalent?	AMD Radeon HD 6870	AMD Radeon HD 6870	AMD Radeon HD 6790
Perfect panel partner?	1,920 x 1,080 or 1,600 x 900	1,600 x 900 or 1,366 x 768	1,366 x 768 or 1,280 x 800

SLI and CrossFire

If neither AMD nor NVIDIA offer their very fastest graphics chips in mobile form, what do you do if you absolutely, positively have to have the best possible graphics performance? Well, there is one final option we haven't touched upon elsewhere. Yup, it's multi-GPU graphics in the form of SLI and CrossFire.

The enabling technology here is MXM, aka the Mobile PCI Express Graphics Module. Back in 2004, NVIDIA unveiled MXM and it seemed like the impossible goal of upgradeable laptop graphics might just become a reality. In the end, it didn't work out that way. Laptops designs simply vary too much to make universal compatibility possible.

But MXM lives on as the format of choice for seriously high mobile graphics. The best example of this comes from everyone's favourite whitebook maker, Clevo. The X7200 chassis has been around for a few years. And it remains a preposterously unportable 5.5kg beast. But thanks to MXM, it can support a pair of PCI Express graphics modules in either SLI or CrossFire trim. Slot in a pair of Radeon HD 6990Ms or GeForce GTX 580Ms and you'll have an ostensibly portable machine capable of socking it to the best single-GPU desktop cards.

Of course, when it comes to portable systems, SLI and CrossFire needn't be exclusively about big performance numbers. With Intel's latest mobile PC processors coming as standard with integrated graphics, the ideal graphics setup would involve a system that runs on the integrated GPU with battery power and the discrete graphics chip on the mains. And that's exactly what you get, including hot switching, with hybrid SLI and CrossFire. NVIDIA is so keen on the idea, it has ensured every one of its 500M series of mobile GPUs supports hybrid SLI.

none other than Barts, the chip found in the Radeon HD 6870 desktop GPU family. Remember, however, that AMD and NVIDIA's stream processors are far from equal. Despite what appears to be a massive advantage over the GTX 580M, the 6990M delivers very similar performance.

Drop a rung and you come to a pair of cut-down Barts GPUs with 960 processors, 48 textures and 32 ROPs each. The only difference between the HD 6790M and HD 6970M is a 100MHz core clockspeed advantage for the former.

Rounding out AMD's interesting mobile graphics line up are a trio of laptop chips based on the Juniper GPU: the HD 6870M, 6850M and 6830M. All sport 800 processors, 40 textures, 16 ROPs and a 128-bit memory bus.

Again, it's the clockspeeds that set them apart. What's more, just like NVIDIA, AMD does offer a number of more modest mobile GPUs. And once again, we wouldn't go there.

TOP TIPS

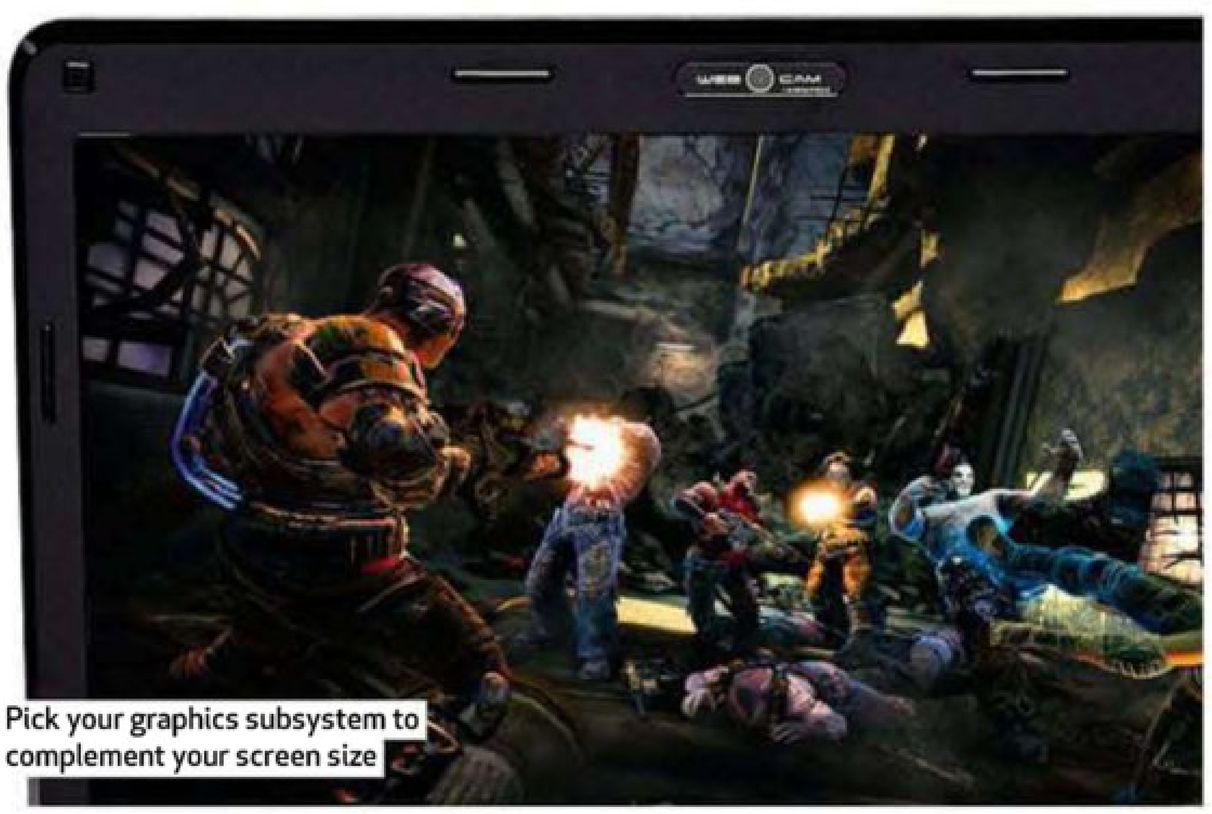
THE SCREENING PROCESS

Laptop screens have tighter pixel pitches than desktop monitors, so there's no need to go full HD. 1,600 x 900 is plenty for a gaming lappie.

PIXEL PUNCH

Matching screen resolution with GPU power is another crucial ingredient for mobile gaming. More pixels make for sharper, more dramatic visuals and, just maybe, more immersive gaming. But they also ratchet up the workload.

It's also worth remembering that even a monster 17-inch lappy has a much smaller screen than a modern desktop PC. And that means you don't need full-HD resolutions to have a nice tight pixel pitch.



Pick your graphics subsystem to complement your screen size

Explodes are always nice, especially on the move

We use *DiRT 3* to dish the dirt on the gaming potential of laptops...

3D with your laptop, sir? Of course it's an option

Want to know how your laptop handles tomorrows games? Heaven's the answer

Of course, you're probably going to be using your get-up-and-go gaming rig for more than merely fragging. So you don't want to go too low. Unless you're on a seriously stingy budget, we'd therefore avoid 1,280 x 720 or 1,366 x 768.

On the other hand, 1,920 x 1,080 is really too much for all but the most powerful mobile GPUs. In fact, if you want the best possible longevity of gaming grunt, we'd probably recommend you avoid 1,080p, period.

Instead, 1,600 x 900 is probably the best all round compromise between graphics workload, eye candy and desktop elbow room. Shame, then, that it's one of the more rarely offered resolutions.

> "If you want the best possible longevity of your gaming grunt, avoid 1,080p"

While we're on the subject of screens, it's sad to have to report that laptop LCD technology hasn't been doing anything interesting lately. A couple of years ago, the switch was made from 16:10 to the slightly wider and more HDTV-friendly 16:9 format. The same thing happened on the desktop at around the same time. For the most part, we'd prefer laptops had stuck with the slightly taller 16:10 standard. A PC is not an HDTV and whether you're on the desktop or in-game, the vertical pixels you lose with 16:9 are sorely missed.

PANEL TECHNOLOGY

Elsewhere, screen technology has stayed more or less static. The vast, vast, vast majority of laptops make do with TN panel technology. And not terribly good TN technology. If TN desktop monitors have mediocre contrast, colours and viewing angles, mobile TN screens are usually significantly worse. However, since we're talking about gaming lappies, TN does at least offer good pixel response. Mobile IPS screens, by comparison, usually offer serious sluggish response times.

The one exception to this litany of same-old screen technology is the wide adoption of LED backlighting. Problem is, almost all laptops have cheap white LEDs rather than pukka RGB LEDs, so the benefit in terms of colour depth is slim to none. However, LEDs are more power efficient than boggo CCFL LCD backlights, which is obviously handy for any portable PC. They also tend to last longer before losing brightness, which is nice.

Now, we mentioned earlier that gaming laptops are all about graphics. However, you do need to take a little care with your choice of CPU. As things stand, we're not too keen on AMD's notebook processors. The Athlon II and Turion II mobile processor cores we'd say forget about, they're just not up to snuff for gaming. And as we've already established, anything based on the Llano APU isn't going to be fully fit for gaming purpose.

BULLDOZING AHEAD

The Phenom II dual, triple and quad-core mobile processors are more interesting. But they're also pretty rare. If you can find one that perfectly suits your needs, they're worth a look. But we certainly wouldn't compromise on other specifications in order to secure a Phenom II. All things AMD are subject to change when Bulldozer-based chips arrive, of course.

In the meantime, your best bet is one of Intel's Core i3, i5 or i7 processors. Clock-for-clock, Intel's processor cores have been gruntier than AMD's for several years now. That's a critical issue in the context of mobile machines running at lower frequencies.

Jargon explained

Stream processors
Just like a desktop graphics chip, mobile GPUs are packed with tiny processor cores. Just remember that AMD and NVIDIA's cores are not comparable.

LED backlight
Until recently, laptops had compact CCFL backlights. Today, however, LED backlights are much more common and offer much better power management.

The best gaming laptops

Picking a gaming laptop isn't a simple task. Just like chosing a desktop rig, it's all about weighing up the benefits of the various components used. The big issue with laptops is cash, as the best gear comes at a sufficiently stunning price. Turn the page to get the low-down on the eight best gaming laptops money can buy. We've tested them all, pulled them apart and compared the specs to give you the final word on what you should be looking for.

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ACER ASPIRE ETHOS 8951G

VITAL STATISTICS

Price £1,499 **Web** www.acer.co.uk **Screen** 18.4-inch **Native resolution** 1,920 x 1,080 **CPU** Intel Core i7 2630QM **Graphics** NVIDIA GeForce GT 555M 2GB **Memory** 8GB **Storage** 2x 750GB, 7,200rpm

Above Almost but not quite – the Ethos is disappointing in its current form

This outsized Acer is all about the screen. Spanning an immense 18.4 inches, it's no surprise that it ponies up the full-HD pixel count of 1,920 x 1,080. It's about as big as laptop LCDs get. That makes the Ethos a very plausible desktop replacement system. With a panel this big, you won't feel constrained.

On the downside, it makes for a bonkers-big machine that stretches the concept of portability to snapping point. The biggest downer of all, however, is the quality of the panel itself. It just pips the Medion Erazer for the dubious accolade of worst on test this month.

In fact, we're surprised anyone is manufacturing panels this poor in what is a pretty rarefied size and form factor. It's the worst sort of old-school TN panel, complete with feeble contrast, washed out blacks and narrow viewing angles.

PCFormat Verdict

- Slick design and quality chassis
- All the CPU performance you'll ever need
- Shonky LCD screen
- Weak graphics performance

With a better LCD panel and a graphics upgrade, Acer would have a winner on its hands.

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And that's a shame, because in many regards this has plenty going for it. For starters, of our octet of silicon-powered slabs, this is probably the best looking beast. Acer has combined solid plastics with slices of bona fide brushed metal to deft overall effect.

There's some nice detailing in the Sony Vaio-esque hinge design, too, and the keyboard is top notch. The keys are generously proportioned and have decent throw, the keyboard bed is solid and you get the full numeric layout.

Then there's the intriguing feature set. Most unusual is the pop-out track pad that doubles as a wireless remote. Real effort has been expended here in the form of backlit icons that appear when using the pad in wireless mode and tie in neatly with Acer's home-brew clear-fi media application. The only snag: the pad doesn't support scrolling gestures.

Elsewhere, Acer has plumped for Intel's Core i7 2630QM processor. It's towards the bottom end of Intel's quad-core mobile line up, but it's a popular choice due to a really nice compromise between price and performance. With a baseclock of 2GHz, a top Turbo speed of 2.9GHz and support for up to eight simultaneous threads, it's all the CPU you're ever likely to need. You also get a pair of 7,200rpm hard disks and a BD-ROM drive.

Cut-down chip

Slightly less satisfactory is the NVIDIA GeForce GT 555M. Ostensibly, it's not too bad a graphics chip. But Acer has gone with the cut-down version with a 128-bit memory bus. Factor in sluggish 1.8GHz memory and the 144 stream shader count becomes rather academic. The bottom line is that only the Sony F Series and its pathetic GeForce GT 540M is slower in games.

> "A BONKERS-BIG MACHINE THAT STRETCHES THE CONCEPT OF PORTABILITY"

Ultimately, the Aspire Ethos needs a bit of a polish to make it ready for the prime time. With an improved LCD panel and a tweaked touchpad, it would be a fabulous multimedia notebook. Upgrade the GPU, too, and you'd have an all-round killer. As it is, gamers on the go should look elsewhere.

Storekeeper.com

£1,779/LAPTOP

ALIENWARE M14X

Proper gaming grunt in a portable package. Can it be done? If anyone can pull it off, it's Alienware – now backed by the might of Dell. Thanks to its 14.1-inch LCD, this is by far the most compact notebook here. At 2.9Kg, it's the lightest, too. However, at 38mm it's a chunky little customer.

Normally, that's undesirable. But we're talking gaming lappies here and we'll happily sacrifice some slim-line style in return for pixel-pumping prowess. Thanks to solid construction and backlit keyboard, it's a pretty desirable physical specimen, too. Well, if you can live with the slightly adolescent design vibe.

Alienware hasn't made too many compromises in return for that 14-inch form factor. The screen itself packs 1,600 x 900 pixels. In our view, that would be plenty for a 15- or even 17-inch gaming lappy. Squeezed into 14 inches, the result is a tight pixel pitch and sharp visuals.

That said, for nearly £1,800 the panel's TN technology and merely decent image quality are disappointing. We're not convinced Alienware's choice of a matte screen surface behind a clear plastic cover makes much sense, either. Because the screen itself is matte, you don't get the heightened contrast of a true glossy panel. But thanks to that plastic cover, you do get the reflections. It's the worst of both worlds.

We've no complaints, however, regarding the CPU. Four of Intel's Sandy Bridge-style cores in the form of the Core i7 2630QM is bang on target. Even better is the Samsung 256GB SSD. In our view, any laptop selling for significantly more than £1,000 ought to have an SSD on board. It makes such an enormous difference to real-world performance. That includes games, especially those that load or cache level data on the fly.

> "WE'LL HAPPILY SACRIFICE SOME SLIM-LINE STYLE FOR PIXEL-PUMPING PROWESS"

Gaming prowess

All of which brings us neatly to that most crucial of questions. What's it like in games? The sight of NVIDIA's GeForce GT 555M in device manager is not something that fills your heart with joy. However, Alienware has at least gone with the more upscale version of the 555M, which comes with a 192-bit memory bus.

That's pretty critical given the plodding 1.8GHz speed of the graphics memory. Still, with 3GB of the stuff, you won't ever suffer from texture swaps over the PCI Express bus. Pretty much any game will fit inside 3GB.

As for the frame rates, well, solid but not spectacular is about as generous as we're willing to be. Less demanding titles like *Dirt 3* run just fine, even at full native resolution with anti-aliasing enabled. But fire up *World in Conflict* and the 555M's limitations are all too obvious. A quick zap through the tessellation-heavy Heaven benchmark makes it clear that there's nothing left in the tank for the expected onslaught of geometry-soaked next-generation games, either.

VITAL STATISTICS

Price £1,799 **Web** www.alienware.co.uk
Screen 14.1-inch **Native resolution** 1,600 x 900 **CPU** Intel Core i7 2630QM **Graphics** NVIDIA GeForce GT 555M 3GB **Memory** 4GB **Storage** 256GB Samsung SSD

Above The M14X is a properly portable gaming rig

PCFormat Verdict

- Properly portable
- Super spec includes SSD
- Mediocre graphics performance
- LCD screen is nothing special

It's an awesome concept. But Alienware needs to find a way to squeeze in a better GPU.

79

£799/LAPTOP

MEDION ERAZER X6811

VITAL STATISTICS

Price £799 **Web** www.medion.com/gb
Screen 15.6-inch **Native resolution** 1,366 x 768 **CPU** Intel Core i5 460M **Graphics** NVIDIA GeForce GTX 460M 1.5GB **Memory** 4GB **Storage** 640GB, 5,400rpm

Above Are there better gaming laptops out there? Yup. But they're much pricier

Despite a retail sticker roughly half the size of the next cheapest system here, the Erazer doesn't scrape the barrel in terms of graphics power. or system memory: 4GB is likewise perfectly sufficient. What's more, while the 1,366 x 768 native resolution of the Erazer's 15.6-inch LCD panel might seem stingy in an all-purpose multimedia portable, for gaming it makes sense. More pixels make for much higher workloads and chugtastic frame rates.

We don't even have an issue with the relatively pedestrian Intel Core i5 460M CPU. Okay, it's only got two cores, but they are Sandy Bridge. Anyway, few games can truly leverage the full performance of a multi-core processor: a couple of cores running at a fighting fit 2.53GHz baseclock (2.8GHz Turbo) should be a solid basis for gaming.

PCFormat Verdict

- Half the price of other systems
- Decent 3D performance
- Cheap chassis
- Old school TN LCD panel

A solid small-budget option, this offers a lot of bang for a relatively small number of bucks.

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Of course, for well under £1,000, something has to give. Physically, there's no mistaking the Erazer's budget positioning. The plastic mouldings masquerading as brushed metal will fool absolutely nobody.

Cheap technology

Likewise, while we've no beef with the LCD panel's resolution nor the impressive fact that it boasts an LED backlight, there's no hiding the cheap TN technology that powers it.

Only Acer's Aspire delivers less vibrancy, contrast and colour accuracy.

"PHYSICALLY, THERE'S NO MISTAKING THE ERAZER'S BUDGET POSITIONING"

It's a dingy screen, plain and simple. So, the Erazer looks a bit cheap, the screen's not great, but the CPU is fit for gaming purpose. What about that graphics chip?

The GPU is NVIDIA's GeForce GTX 460M. It's straight out of NVIDIA's last generation GeForce 400M family. However, it's a couple of rungs from the top of the range. That means you get 192 stream shaders and a 192-bit memory bus compared with the nearly 400 shaders and a 256-bit bus of GTX 580M.

Still, the graphics memory is clocked up at 2.5GHz and the relatively low-res LCD looks a good match for the 460M's modest rendering grunt.

And so it proves to be in *Dirt 3* where the Erazer scores an average of 67 frames per second at native resolution and with anti-aliasing enabled. Even better, the minimum frame rate is fully 55. Buttery smooth, in other words.

The more demanding *World in Conflict* test is perhaps a little more indicative of cutting edge PC gamery today and here the average of 37 frames per second at native resolution with anti-aliasing looks solid. However, a minimum of just six frames per second tells another story. Occasional chugging in-game is definitely part of the Erazer experience.

The Heaven tessellation benchmark is pretty marginal, too, averaging 25 frames per second at native resolution but with anti-aliasing disabled.

Put it all together and you have a laptop with decent rendering chops in current games but very little margin left for more demanding future titles.

Storekeeper.com

£1,497/LAPTOP

MSI GT780DX

Someone's put some thought into the GT780DX. For starters, this isn't a badge engineering job using a commodity-sped whitebook as a starting point: MSI has commissioned a unique design. The result isn't going to have Apple rethinking its approach to laptop chassis quality but there is at least a frisson of flair in the multi-coloured (and user configurable) keyboard backlighting, slices of genuine brushed aluminium and bevelled chassis edges.

That keyboard is the result of an alliance with peripherals specialist SteelSeries and is probably the most tactile and satisfying of all our gaming group. Unlike the slightly rattle-prone and spongey boards offered by, for instance, Rock and Medion, this one is solid of base and slick in action.

Speaking of partnerships, MSI has also teamed up with Dynaudio to sort out the sound. The idea is to project it carefully to the user, creating more depth and immersion. Put simply, it works. Although the sheer volume on offer is fairly modest, there's a richness and expansiveness to the soundstage none of the other laptops on test can match.

Another nice touch is the trackpad disable button. If you're serious about serving up some online devastation, you'll be using an external mouse. The last thing you want is accidental trackpad inputs. With the trackpad turned off, that's not going to happen.

If the bits MSI is responsible for are best on test, what about the off-the-shelf components? As TN LCD panels for laptops go, the 17.3-inch display is decent enough. Thanks to an LED backlight, whites are clean and bright. As TN screens go, the colours and viewing angles are far from shabby, too. Likewise, we've no beef with its responsiveness or the 1,920 x 1,080 native resolution.

The only problem is the existence of the Sony F Series and its drop-dead gorgeous screen. What's been seen cannot be unseen and unfortunately the GT780DX's LCD looks positively pedestrian by comparison.

Performance

Still, we've no such complaints about the gaming performance on offer. The quad-core Intel Core i7 2630QM and NVIDIA GeForce GTX 570M are choice components. Okay, we'd rather have a GTX 580M or AMD Radeon HD 6990M pumping the pixels. But with 336 shaders, 3GHz memory and a 192-bit bus, the GT780DX has genuine gaming chops.

It certainly makes absolute mincemeat of *Dirt 3*, even at 1080p and with 4x anti-aliasing. An average of 38 frames per second at the same settings in *World in Conflict* is very decent, too. Only the GPU-wilting Heaven benchmark really gets the better of it.

As an overall package, this MSI has got to be the best balanced and most desirable notebook here. It's not the fastest, it hasn't got the best screen, but it is the best conceived laptop of the lot.

> "THIS MSI HAS GOT TO BE THE BEST BALANCED AND MOST DESIRABLE NOTEBOOK HERE"

VITAL STATISTICS

Price £1,497 **Web** uk.msi.com **Screen** 17.3-inch **Native resolution** 1,920 x 1,080 **CPU** Intel Core i7 2630QM **Graphics** NVIDIA GeForce GTX 570M 1.5GB **Memory** 16GB **Storage** 1TB RAID 0 array (magnetic HDD)

Above The MSI GT780DX makes mincemeat of *Dirt 3*

PCFormat Verdict

- Properly conceived gaming system
- Great keyboard and sound
- Even the battery life ain't bad
- Second tier graphics chip

Other notebooks are faster and gave better screens. But only MSI has nailed the gaming remit.

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ROCK XTREME 786

VITAL STATISTICS

Price £1,799 **Web** www.rockdirect.com/ **Screen** 17.3-inch **Native resolution** 1,920 x 1,080 **CPU** Intel Core i7 2630QM **Graphics** NVIDIA GeForce GTX 485M 2GB **Memory** 6GB **Storage** 1TB RAID 0 array (magnetic HDD)

Above A huge laptop with a 1080p LCD panel and 3D Vision

On no account should you consider the Rock Xtreme 786 a routinely luggable lappie. This is an unapologetically heavyweight beast that clocks the scales at nearly four kilos and offers 17.3 inches of liquid crystal goodness.

Chuck in a power brick that lives up to the name and you have an ensemble few would want to drag around daily. Better, then, to think of the Xtreme 786 as transportable rather than portable. The sort of rig that's perfect to take up to uni at the beginning of term or to haul to a friend's house for a special occasion. Just don't imagine you'll be whipping it out for five minutes on the tube.

Of course, Rock isn't entirely responsible for the Xtreme 786's gigantism. The chassis itself hails from none other than everyone's favourite whitebook maker, Clevo.

For Clevo aficionados, what we have here is the P170HM model with a few added extras. As tested, the headline specification is very impressive. Intel's Core i7 2630QM CPU is responsible for general computing duties. And very fit for purpose it is thanks to four cores, eight threads and an appetite to tear holes in computational conundrums.

Good as it gets

Next up is NVIDIA's GeForce GTX 485M mobile GPU, complete with 2GB of memory. It's pretty much the same chip as the supposedly new GeForce GTX 580M, so in raw performance terms it's about as good as it currently gets in laptop graphics. Rounding out the digital paraphernalia are a pair of conventional 500GB magnetic hard disks paired up in a performance-enhancing RAID 0 array, 6GB of system memory, a pair of USB 3.0 ports and, well, plenty more.

But what really marks out the Xtreme 786 is support for NVIDIA's 3D Vision gubbins. That includes an IR emitter built into the chassis and a pair of 3D Vision active-shutter goggles in USB rather than wireless trim. Combined with the large, 1080p LCD panel, the result is a gaming spectacle that pretty much defines what is currently possible with a single-GPU mobile(ish) machine.

OK, the big LCD screen relies on TN technology. So, it's several galactic clusters away from the Sony F Series in terms of colour saturation and contrast. But as TN goes, it's a pretty nice panel and serves the stereoscopic 3D remit well with its fast responses.

How much of an attraction 3D Vision is, on the other hand, is down to personal preference. We're not convinced by any stereoscopic tech that requires glasses. But as far as 3D Vision goes, it works well enough in all but the most demanding games thanks to the ample performance of the GTX 485M (remember, enabling 3D Vision effectively cuts your in-game frame rates in half).

The only slight snag is that the Windows desktop isn't as silky smooth as it should be when running at 3D Vision's preferred 120Hz, which is a shame.

"PRETTY MUCH DEFINES WHAT IS CURRENTLY POSSIBLE WITH A SINGLE-GPU LAPTOP"

PCFormat Verdict

- Great GPU and CPU performance
- Good match for 3D Vision tech
- Realistically, not a portable proposition
- Chassis looks a bit cheap

It's not pretty. It ain't very portable. But it is a pixel pumping powerhouse capable of 3D.

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Store4gg.com

£1,649/LAPTOP

ROCK XTREME 685

See something familiar? That's right, the Rock Xtreme 685 is yet another rebadged Clevo whitebook. On the downside, that means the styling is about as exciting as a Conservative Party Conference speech delivered by the Undersecretary of Dullness.

For a 15.6-inch notebook, the 685 is a big old thing, too, with a hefty power supply. Put the two together and you have a dreary looking lump that's also a pretty unpleasant package in terms of portability. Appearances, however, are deceptive. This thing shifts.

Partly, that's because it's got the most powerful processor in this month's group. The Intel Core i7 2820QM is not only clocked a little higher than the quad-core competition with a 2.3GHz nominal clockspeed and 3.4GHz Turbo. It also packs 8MB of cache memory where the Core i7 2630QM makes do with 6MB. All in, it makes the 2820QM about 15 per cent faster than the 2630QM.

In store

Rock has also made an effort regards storage performance in the form of a pair of conventional magnetic 500GB hard drives in RAID 0. We'd rather have a smallish SSD and a large conventional drive, frankly. But as spinning magnetic platters in laptops go, Rock's RAID'ed effort is about as good as it gets.

However, the real weapon in the Xtreme 685's armoury is the AMD Radeon HD 6990M. It isn't just the fastest mobile graphics chip in this group. It's the fastest on the planet. Just get a load of these stats: 1,120 shaders, 56 texture units, 32 ROPs and a 256-bit memory bus. No wonder the rendering and gaming performance is epic. The HD 6990M tears *Dirt 3* a new one, even running in full HD. But more impressive are the results in *World of Conflict*.

"IT ISN'T JUST THE FASTEST MOBILE GRAPHICS CHIP IN THIS GROUP, BUT ON THE PLANET"

It's a great title for getting an idea of overall gaming performance thanks to heavily loading both the CPU and GPU. Get the balance of components in a laptop wrong and the result can be a system that spits out decent average frame rates in the *WiC* benchmark but scrapes the barrel in terms of the minimum frame rate.

But not the Xtreme 685. Running at 1,920 x 1,080 and with 4x anti-aliasing enabled, it cranks out an average 51fps and a minimum of 32fps. The latter, critically, is above 30 and that means smooth gaming at all times.

Of course, all of the above applies to current titles. Scope out the frame rates in the Heaven benchmark and it's clear any future games heavy in tessellation effects aren't exactly going to fly. And like nearly every laptop, upgrading the graphics card is a non-starter.

Finally, a word on the LCD panel. Thanks to the 15.6-inch diagonal and full-HD 1,920 x 1,080 native resolution, the image quality is super sharp. However, the panel is of the TN variety and it's never going to match a VA or IPS for colours, viewing angles or contrast.

VITAL STATISTICS

Price £1,649 **Web** www.rockdirect.com/
Screen 15.6-inch
Native resolution 1,920 x 1,080 **CPU** Intel Core i7 2820QM
Graphics AMD Radeon HD 6990M 2GB
Memory 6GB **Storage** 1TB RAID0 array (magnetic HDD)

Above Packing an HD 6990M but let down by the TN screen

PCFormat Verdict

- HD 6990M is the fastest mobile GPU
- Awesome CPU grunt, too
- Cheap looking chassis
- Mediocre TN LCD screen

Has all the features you need for a fully fledged HTPC system built on a compact motherboard.

80

Storek.ee.com

£1,589/LAPTOP

SONY VPCF21Z1E/BI

VITAL STATISTICS

Price £1,589 **Web** www.sony.co.uk **Screen** 16-inch **Native resolution** 1,920 x 1,080 **CPU** Intel Core i7 2630QM **Graphics** NVIDIA GeForce GT 540M 1GB **Memory** 8GB **Storage** 640GB, 7,200rpm

Above There's a lackluster lappie hiding behind its beautiful screen

There's a spoiler in every group test. This time round, the prize goes to the Sony F Series. We wish we hadn't seen it. Actually, we're pretty peeved that Sony ever sent us the damned thing. The problem, you see, is the F Series' screen. More specifically, it's the optional Premium LCD, yours for roughly £150.

At 16 inches in diagonal, it's nothing special in terms of size. The 1,920 x 1,080 native resolution is nothing out of the ordinary, either. But the quality of the panel is positively to die for. Sony in its wisdom doesn't deign to define the precise technology used. Our money is that it's some kind of funky VA panel.

Whatever, it clearly isn't TN and it clearly is one of, if not the, most delightful laptop screens it has ever been our pleasure to behold. The colours are massively more vibrant and saturated than the others. Similarly, it generates the sort of deep, inky blacks you normally only see on a high end desktop monitor. The viewing angles are outstanding, too.

Unfortunately, that's as far as the good news goes. While the detail design of the F Series is pleasing, overall the chassis is thick and lumpen. We'd be willing to overlook that if it was the result of a preposterously powerful processor and GPU encased therein. But the CPU is the same Intel Core i7 2630QM quad we've seen elsewhere. Worse, graphics come courtesy of NVIDIA's GeForce GT 540M. That's easily the weakest GPU here and makes do with just 96 shader cores, lowly clockspeeds and a mere 1GB of video memory connected via a 128-bit bus. With all that in mind, what should you make of the stereoscopic 3D ability of the VPCF21Z1E/BI version of the F Series, as tested here?

Firstly, forget playing games in 3D. Running games in stereoscopic 3D means sending a different image to each eye. That in turn demands double the frame rate of a 2D gaming rig to achieve the same rendering smoothness. Problem is, the GeForce GT 540M isn't even capable of smooth rendering in 2D mode. Doubling up is out of the question.

3D movies

That's a shame, not only because of that gorgeous screen, but also because Sony bundles some decent wireless 3D goggles instead of the fiddly USB items offered by Rock and Toshiba. Of course, thanks to the Blu-ray drive, 3D movies are supported. As current 3D technology goes, it look great on the F Series. Meanwhile, conventional HD video content looks absolutely stupendous on that LCD screen. Hell, even the Windows desktop looks superb.

We'd love to be able to accept the F Series is no gaming rig and recommend it for more general purpose multimedia duties. But even then, the awkward chassis, poor battery life (we only got one hour and 31 minutes) and steep pricing probably add up to a deal breaker. Not even one of the best laptop screens we've ever seen can fix that.

"IT'S ONE OF – IF NOT THE – MOST DELIGHTFUL LAPTOP SCREENS WE'VE EVER SEEN"

PCFormat Verdict

- Maybe the greatest laptop screen ever
- 3D bundle includes wireless goggles
- Feeble graphics performance
- Weak battery life

The screen just isn't enough to make up for weak graphics, pricing and an ungainly chassis.

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TOSHIBA QOSMIO X770-107

Dell's Alienware sub-brand aside, the big boys don't normally go after the gaming dollar. Put simply, you chaps are very hard to please and it's typically judged not worth the bother. Hats off to Toshiba, therefore, for having a crack at it.

As it happens, we'd been hoping the X770 would mark a return to form for Toshiba. Five or six years ago, it made some of our favourite desktop replacement systems, you see: quality items with fantastic screens, gorgeous chassis and top notch performance.

Enter the X770, therefore, with its 17.3-inch form factor and totally in-your-face styling. For starters the keyboard is backlit in a moody shade of red. Then there's the liquid-metal effect chassis. Like it or loathe it, it certainly isn't dull.

The key specs are tasty, too. The familiar Intel Core i7 2630QM quad-core processor makes another appearance, backed up by 8GB of RAM and a pair of 500GB, 7,200rpm hard drives. The optical drive is Blu-ray write capable, too. Oh, and the whole shebang is ready to pump out stereoscopic 3D in games and movies thanks to a pair of NVIDIA 3D vision goggles in USB trim and 120Hz refresh support.

If that all bodes well, prepare to be underwhelmed by the NVIDIA GeForce GTX 560M GPU. Okay, it's far from the worst mobile graphics chip you can buy. It packs a not inconsequential 192 shader cores, 32 ROPs and in this case a 192-bit memory bus. It wasn't that long ago that 128 shaders was good enough for NVIDIA's top desktop GPU.

But things move fast in PC graphics and the best mobile GPUs are roughly three times as powerful as the 560M. More to the point, this a £1,500 luxury laptop and for that price you've every right to expect the best.

> "TOSHIBA HAS MIS-SPECIFIED THE X770 AND CREATED A £1,500 IRRELEVANCE"

Mediocre performance

As it is, what you get is mediocre games performance. Even in *Dirt 3*, which is far from the most demanding PC game out there, the minimum frame rate running at native resolution and with anti-aliasing enabled drops to just 12 frames per second. Things are even worse in *World in Conflict* where the minimum frame rate at all tested resolutions is below 25. Flick over to the tessellation-heavy Heaven bench and the numbers are uglier again.

And all those results were running in standard 2D mode. Enable 3D and you can effectively cut those numbers in half. Not nice and enough to have us wonder what, exactly, is the point of creating a gaming laptop with 3D support and then dropping in a mid-range mobile GPU that's simply not up to the task?

With that in mind, the fact the 17.3-inch TN LCD screen is nothing special, despite a glossy coating and full-HD 1,920 x 1,080 pixel grid, hardly matters. Toshiba has horribly mis-specified the Qosmio X770 and in the process created a £1,500 irrelevance. If this is the best the big boys can manage, maybe it's better they stayed away from gaming after all.

PCFormat Verdict

- Funky chassis and keyboard
- Stereoscopic 3D support
- GPU can't handle the 3D heat
- Very poor battery life

Sorry Toshiba, but the X770 is an object lesson in how important graphics is in a gaming laptop.

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VITAL STATISTICS

Price £1,499 **Web** www.toshiba.co.uk
Screen 17.3-inch **Native resolution** 1,920 x 1,080 **CPU** Intel Core i7 2630QM **Graphics** NVIDIA GeForce GT 560M 1.5GB **Memory** 8GB **Storage** 2x 500GB, 7,200rpm

Above A Tosh that is a little too tosh on the performance side

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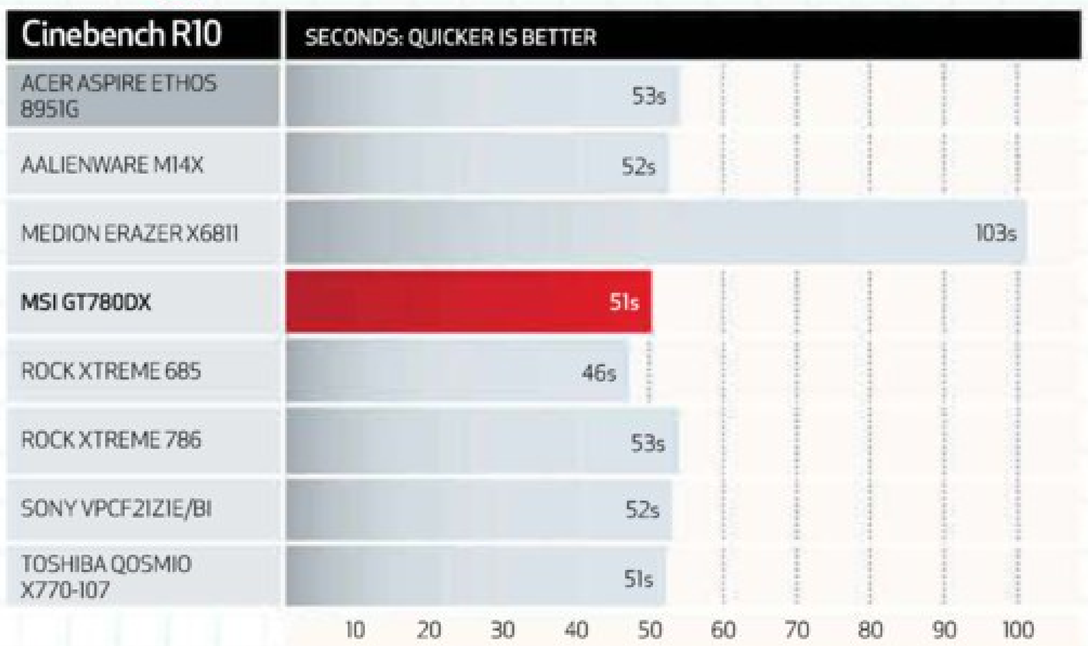
Bench analysis
Making sense of an awful lot of numbers

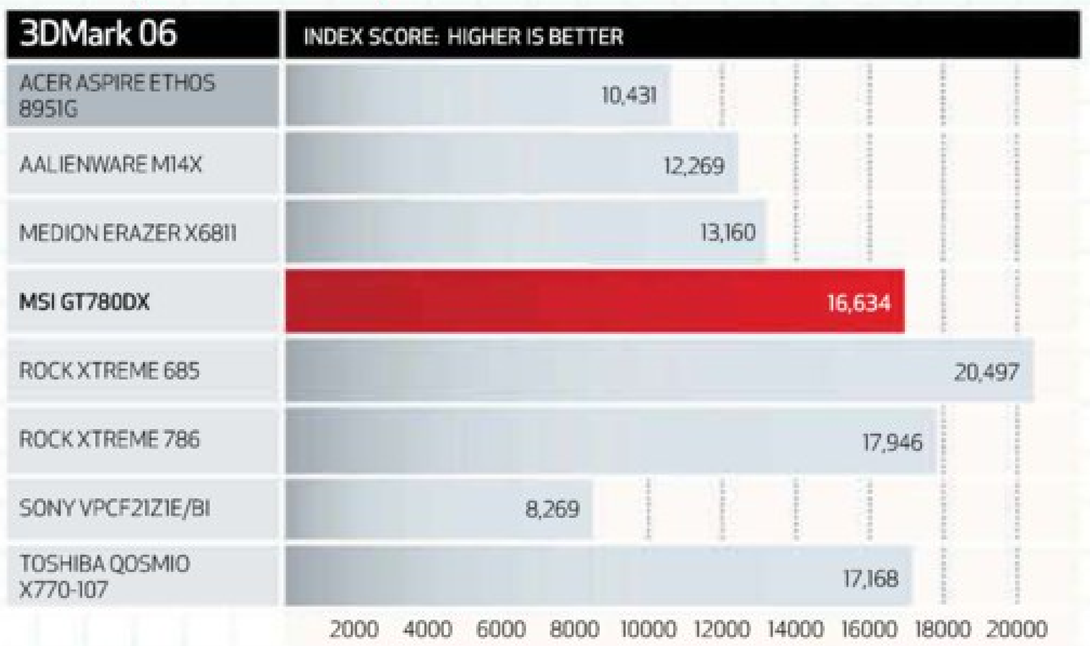
PC games come in a wide range of flavours. So we've run each laptop through a few, the better to get a broad picture of performance. *Dirt 3* is a console-port game with middling graphics quality. It serves as a baseline for any PC. If it can't handle *Dirt 3*, you're in trouble. *World in Conflict* ups the ante and throws in some CPU load for good measure. Meanwhile, the Heaven benchmark gives a glimpse of the future and 3DMark 06 puts these laptops into historical context. Finally, the Cinebench R10 test gives a snapshot of general CPU performance and we've tested battery life while playing back 1080p video.

Dirt 3 is the baseline for our tests and *World in Conflict* ups the ante

Rendering performance

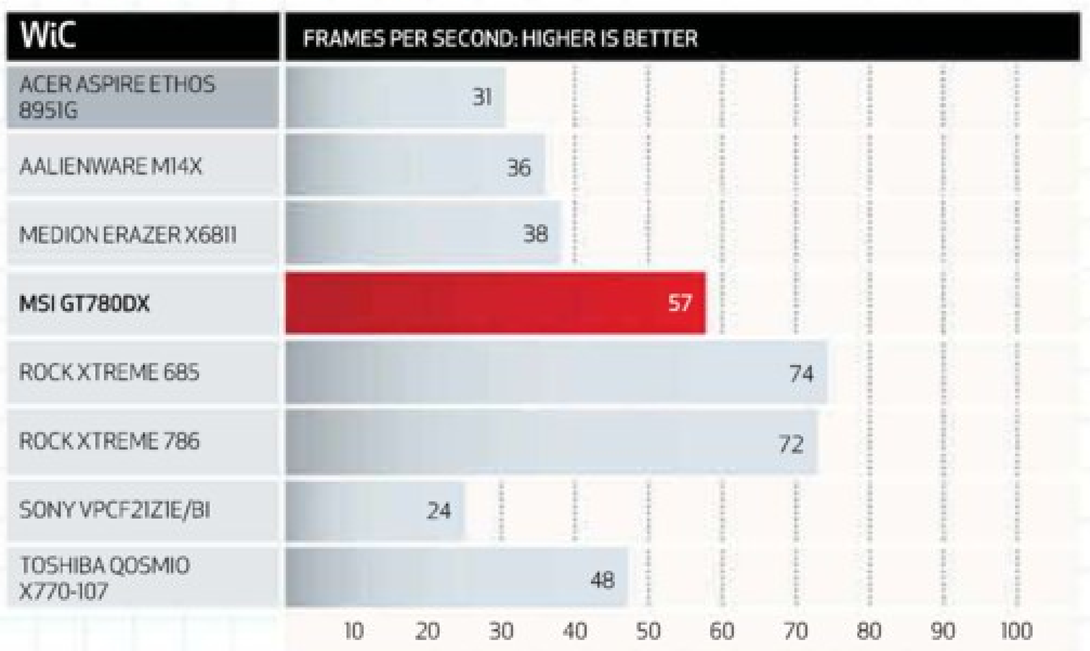


Industry standard 3D performance

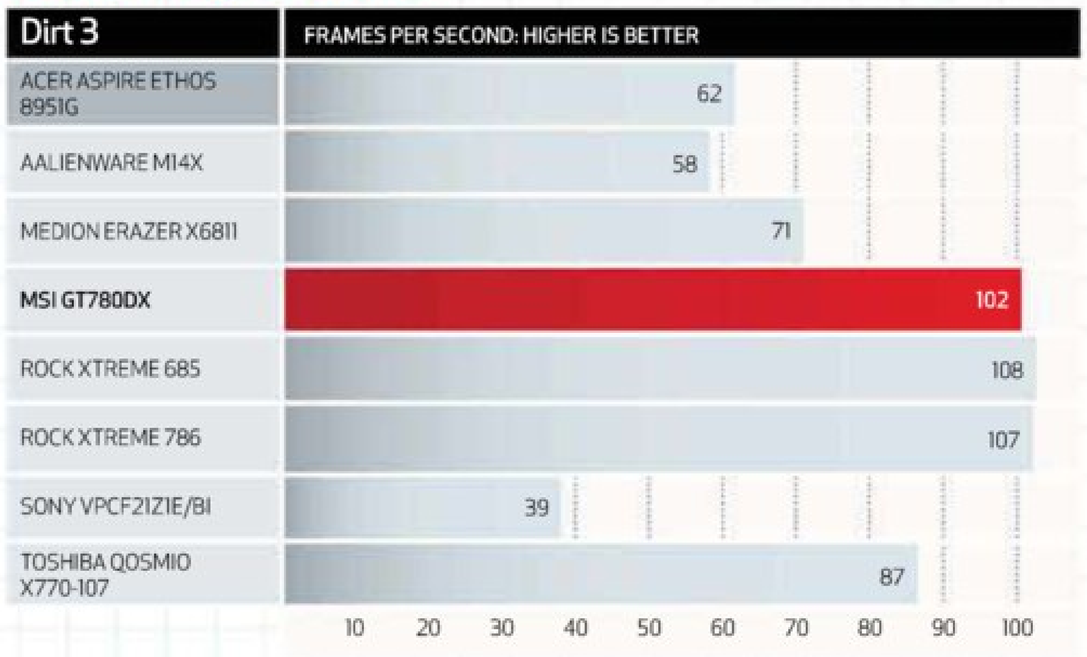


Battery life performance

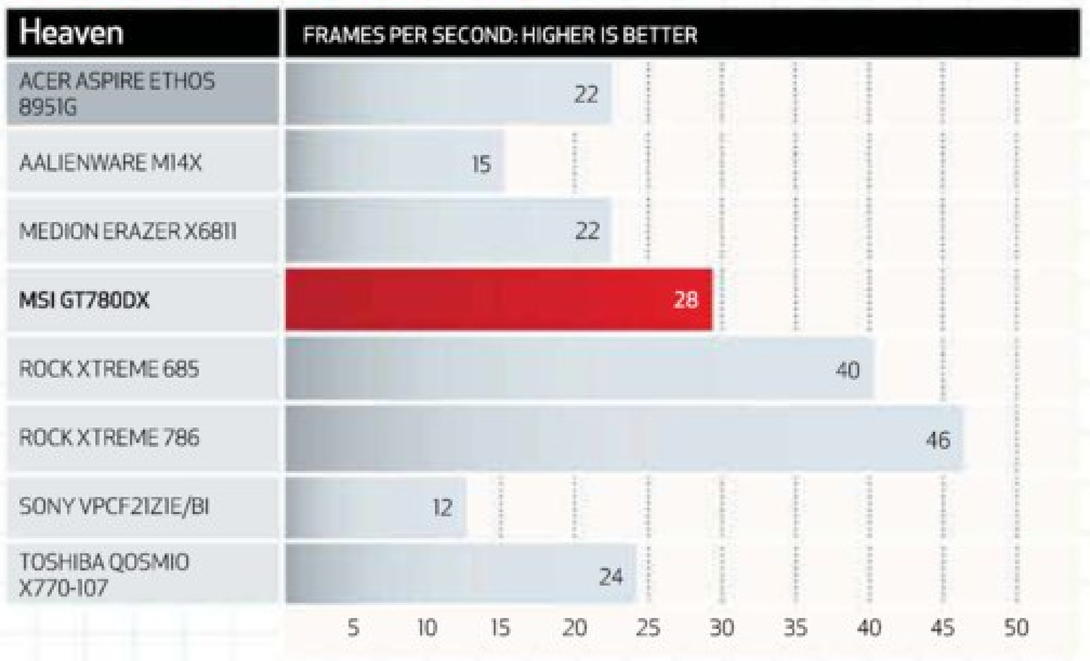
DX10 gaming performance (1,280x720, 4x AA)



DX11 gaming performance (1,280x720, 4x AA)



Tessellation gaming performance (1,280 x 720, 4x AA)



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Spec analysis The fine details for you fine people

Specifications	Acer Aspire Ethos 8951G	Alienware M14x	Medion Erazer X6811	MSI GT780DX
Price	£1,499	£1,779	£799	**£1,497**
Screen size	18.4-inch	14.1-inch	15.6-inch	**17.3-inch**
Native resolution	1,920 x 1,080	1,600 x 900	1,366 x 768	**1,920 x 1,080**
CPU	Intel Core i7 2630QM	Intel Core i7 2630QM	Intel Core i5 460M	**Intel Core i7 2630QM**
CPU cores and clocks	4 cores, 2.0GHz (2.9GHz Turbo)	4 cores, 2.0GHz (2.9GHz Turbo)	2 cores, 2.53GHz (2.8GHz)	**4 cores, 2.0GHz (2.9GHz Turbo)**
System memory	8GB	4GB	4GB	**16GB**
Graphics	NVIDIA GeForce GT 555M	NVIDIA GeForce GT 555M	NVIDIA GeForce GTX 460M	**NVIDIA GeForce GTX 570M**
Graphics memory	2GB	3GB	1.5GB	**1.5GB**
Stream shaders	144	144	192	**336**
Graphics clockspeed	590MHz core, 1,180MHz shaders	590MHz core, 1,180MHz shaders	708MHz core, 1,417MHz shaders	**575MHz core, 1,150MHz shaders**
Graphics memory clockspeed	1.8GHz	1.8GHz	2.5GHz	**3GHz**
Graphics memory bus	128-bit	192-bit	192-bit	**192-bit**
Hard drive	2x 750GB, 7,200rpm	256GB SSD	640GB, 5,400rpm	**2x 500GB, RAID0**
Optical drive	BD-ROM	DVD burner	DVD burner	**BD-ROM**
Video out	HDMI, VGA	HDMI, Mini DisplayPort, VGA	HDMI, VGA	**HDMI, VGA**
Ports	4x USB 2.0, LAN, FireWire, eSATA	2x USB 3.0, 1x USB 2.0, LAN	2x USB 2.0, 2x USB 3.0, LAN, eSATA,	**3x USB 2.0, 2x USB 3.0, LAN, eSATA**
Dimensions	440mm x 295mm x 38mm	337mm x 258mm x 38mm	390mm x 270mm x 40mm	**428mm x 288mm x 55mm**
Weight	3.9Kg	2.9Kg	4.2Kg	**3.9Kg**

Specifications	Rock Xtreme 685	Rock Xtreme 78[illegible]	Sony VPCZ1[illegible]/BI	Toshiba Qosmio X770-107
Price	£1,649	£1,799	£1,589	£1,499
Screen size	15.6-inch	17.3-inch	16-inch	17.3-inch
Native resolution	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080	1,920 x 1,080
CPU	Intel Core i7 2820QM	Intel Core i7 2630QM	Intel Core i7 2630QM	Intel Core i7 2630QM
CPU cores and clocks	4 cores, 2.3GHz (3.4GHz Turbo)	4 cores, 2.0GHz (2.9GHz Turbo)	4 cores, 2.0GHz (2.9GHz Turbo)	4 cores, 2.0GHz (2.9GHz Turbo)
System memory	6GB	6GB	8GB	8GB
Graphics	AMD Radeon HD 6990M	NVIDIA GeForce GTX 485M	NVIDIA GeForce GT 540M	NVIDIA GeForce GTX 560M
Graphics memory	2GB	2GB	1GB	1.5GB
Stream shaders	1,120	384	96	192
Graphics clockspeed	715MHz	575MHz core, 1,150MHz shaders	672MHz core, 1,344MHz shaders	775MHz core, 1,550MHz shaders
Graphics memory clockspeed	1.8GHz	3GHz	1.8GHz	2.5GHz
Graphics memory bus	256-bit	256-bit	128-bit	192-bit
Hard drive	750GB, 7,500rpm	2x 500GB, RAID0	640GB, 7,200rpm	2x 500GB, 7,200rpm
Optical drive	BD-ROM	BD-ROM	BD-RE	BD-RE
Video out	HDMI, DVI, VGA	HDMI, DVI, VGA	HDMI, VGA	HDMI, VGA
Ports	2x USB 2.0, 2x USB 3.0, LAN, eSATA	2x USB 2.0, 2x USB 3.0, LAN, eSATA	2x USB 3.0, 1x USB 2.0, FireWire, LAN	3x USB 2.0, 1x USB 3.0, LAN
Dimensions	376mm x 256mm x 43mm	412mm x276mm x 45mm	398mm x 271mm x 45mm	414mm x 274mm x 44mm
Weight	3.1Kg	3.9Kg	3.1Kg	3.4Kg

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AND THE WINNER IS…
MSI GT780DX

We all began with the assertion that graphics is the single most important element in any gaming laptop. That's very nearly how it turned out. If anything, in the context of laptops with stereoscopic 3D support, good graphics is even more critical than we thought.

The key offender here is the Toshiba Qosmio X770. Unlike the Sony F Series, which is also 3D enabled, the Qosmio styles itself as an out-and-out gaming rig. In many ways, it's bang on target. But by slotting in the mid-range NVIDIA GeForce GTX 560M GPU instead of a high-end 3D chip, Toshiba has ended up with a laptop that makes no sense at all. As a gamer, you'd be bonkers to spend £1,500 on such an imbalanced rig.

Wondrous screen

The Sony F Series is next to fall. Sony doesn't pretend that it's a full-on gaming machine. And we'll have a hard time forgetting that wondrous screen. But there's little else to recommend it. As for the Acer Aspire Ethos, there are lots of interesting ideas going on, such as the pop-out track pad. The chassis is nicely designed, too. But thanks to an awful screen and weak graphics performance, it's not one we can recommend.

From here on in, things get a lot tighter. The idea of a compact, ultraportable gaming rig is right up our alley. Alienware's M14x mostly delivers on that promise. At nearly £1,800, however, it's painfully expensive. For that price, we'd want a much better screen and a more powerful GPU. As it is, you'd need money to burn to buy the M14x.

> "IT GOES THE EXTRA MILE TO GIVE GAMERS A BETTER EXPERIENCE"

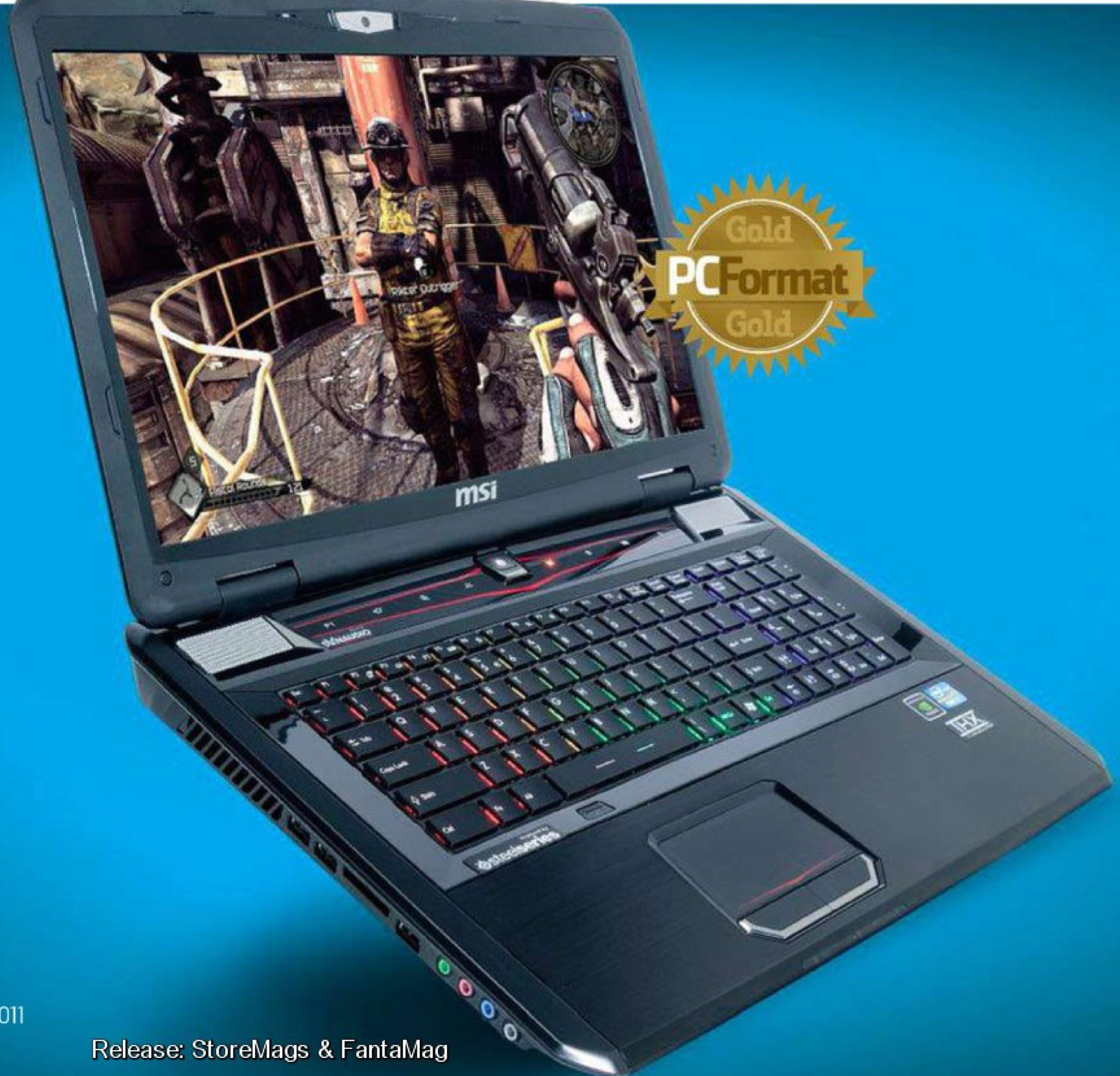
Excellent value

Next up is the Medion Erazer. In absolute terms, the screen is poor, the CPU a little second rate and the graphics performance middling at best. But when you factor in a retail sticker that's nearly half the price of every other laptop here, it starts to look like darned good value.

Rock's Xtreme 786, on the other hand, is hardly what you'd call cost effective at nearly £1,800 on the nose. However, it is a monstrously powerful system with one of the fastest mobile graphics chips you can buy, a huge screen and stereoscopic 3D support. With a better chassis, it would have scored even higher.

The same goes for Rock's Xtreme 685. Thanks to AMD Radeon HD 6990M graphics, it's clearly the fastest gaming laptop on test. If maximum performance matters to you most, don't bother with the rest. But if you factor in other metrics including cost, design, value and sheer desirability, there can be only one winner.

It's not the fastest system. It doesn't have the best screen or the most powerful graphics chip. It doesn't even support stereoscopic 3D or have an SSD. But it is the best overall package. It's the only laptop here with a design that goes the extra mile to give gamers a better experience. And it's a very worthy winner. Give it up for MSI's GT780DX.



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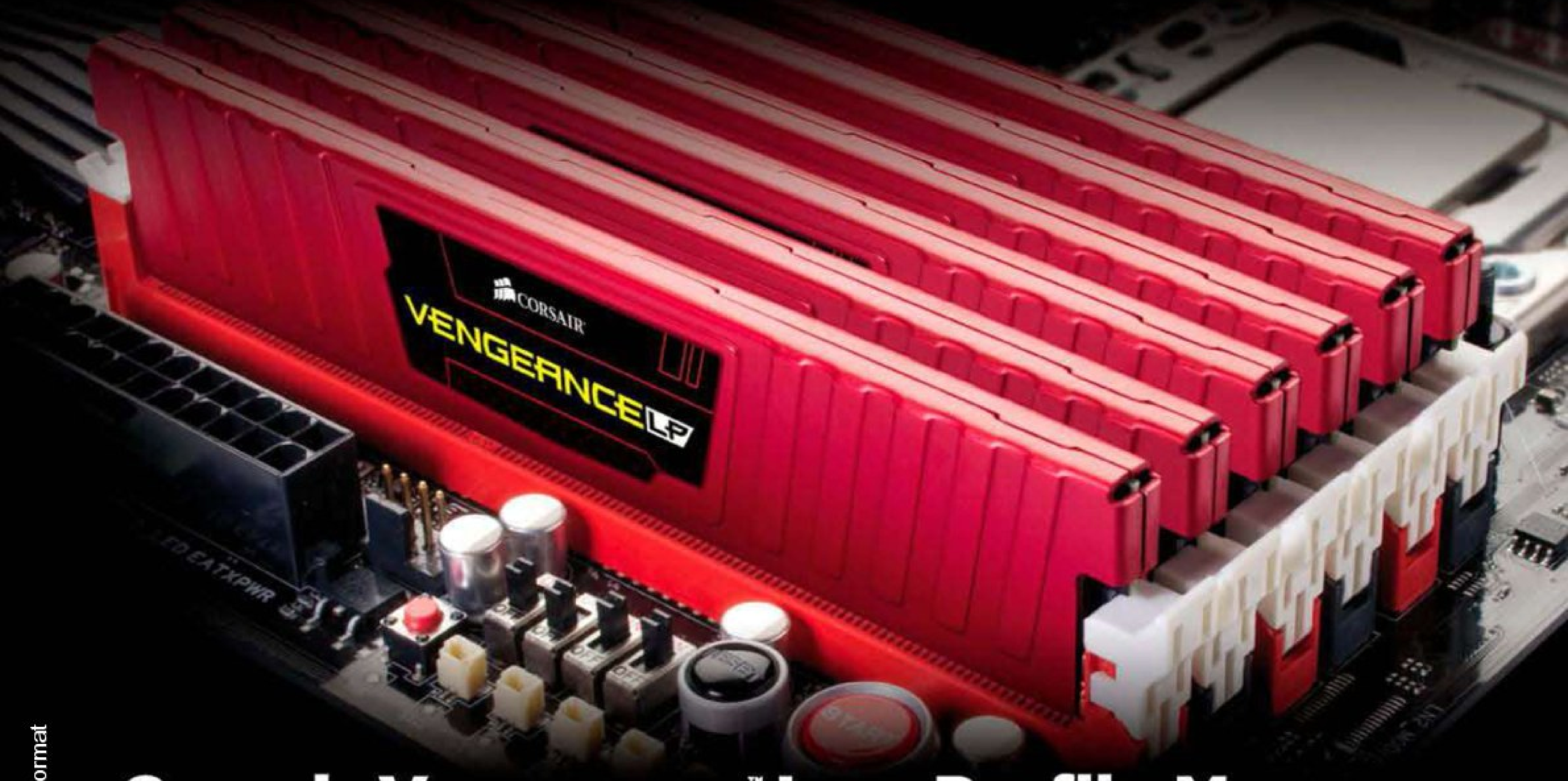

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Hardware

Performance gear, uncompromising verdicts

WHAT ARE YOU DOING, DAVE?

"It feels very much like the ginger stepchild of Intel's future products"

Dave James has been globe-trotting again of late, this time hitting San Francisco for the Intel Developer Forum. Sadly, he didn't come back with flowers in his hair, just a creeping sense that he really is a very stupid human being in comparison with Intel's engineers. But then, the same applies to an awful lot of us.

There's a fight brewing. With AMD finally releasing its Bulldozer processors, Intel set to launch its Sandy Bridge E platform next month and the 22nm Ivy Bridge in March/April, things are hotting up in the CPU space.

Granted, the battle between the AMD FX and the Sandy Bridge E chips is going to be a little one-sided, with the cheapest of Intel's new processors being well over £200 and the top-end, eight core FX-8150 Bulldozer chip coming out around £180.

Still, it looks like AMD's new chip architecture is going to push Intel a bit more than the previous generation managed, especially given the potential overclocking power of Bulldozer. While I was out in San Francisco with Intel, AMD took the opportunity to try and spoil the tech party with an announcement of its own. Guinness actually agreed to let AMD have the World Record for highest CPU frequency as it hit 8.429GHz with a production model of its newest processor.

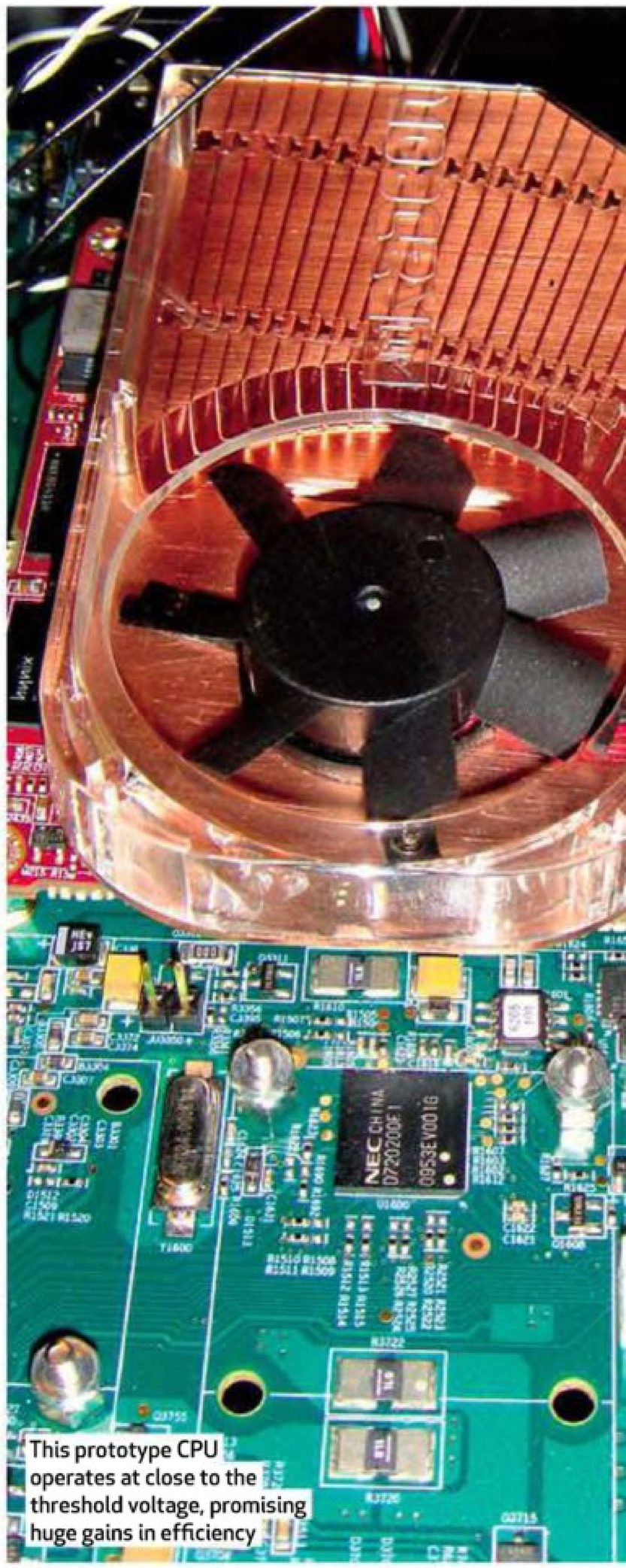
We'd have been more impressed, though, to see what AMD's tame overclocker, Sammi Makkinen, could do overclocking the chip with a standard air-cooler, but then that would have taken the fun out of doing the review ourselves. You can check out how we did next issue. Sandy Bridge E, on the other hand, is a different beast altogether. We've seen it running and we should be getting our very own chips anytime from now, but it seems to be an increasingly irrelevant release. There was no talk about it beyond the closed doors meeting we had with Intel engineers, while the show was awash with information and overwhelming hype about the Ivy Bridge processors we'll see next Spring.

It feels very much like the ginger stepchild of Intel's future products. No one wants to talk about it, the release is looking rather quiet and everybody just seems to want to wait for Ivy Bridge instead. Apart from the memory manufacturers who think people forking out for quad-channel memory might be a decent idea…

P56 INTEL'S IVY BRIDGE UNMASKED

What we can say about Sandy Bridge E is there will be three processors coming out around launch, all tooled for the new LGA 2011 socket of the X79 chipset, and none of them will be cheap. In fact there will be $1,000 and $600 processors along with the $300 chip, and thanks to the vagaries of the translation to proper money, the Sterling price is unlikely to be hugely different. And despite us all thinking the 'E' in the name stood for 'Extreme' there will only be one hex-core Extreme CPU, yes that $1,000 one. There will also be a K series hex-core chip with the unlocked multipliers that the overclockers do love, and a vanilla quad core that doesn't sound particularly extreme at all. No, we still don't know what the 'E' stands for, and no one seemed to want to tell us either.

Realistically big, power-hungry, expensive chips have probably had their day in any consumer-facing sense, and that's likely why Sandy Bridge E is still locked in the cupboard, subsisting on stale bread and definitely not getting any pudding.



This prototype CPU operates at close to the threshold voltage, promising huge gains in efficiency

The fruit of Intel's SSD labour

Intel reckons its next consumer SSD, Cherryville, will be the fastest on the market when it launches this autumn. Intel hasn't announced the controller yet, but it looks unlikely to be its own tech. It could then be a Marvell controller like the 510-series, or Intel might even jump in bed with SandForce for its performance SSD range.

Gold Award

This is the ultimate badge of hardware excellence. Only truly outstanding gear gets this coveted award. Oh, and there are no prizes for runners-up here.

Our Hardware Manifesto

Would we buy it and should you buy it? That's all you want to know and it's all we care about. Performance and value for money are the two key pillars supporting the mighty *PC Format* Gold Award on its lofty pinnacle.

PASS NOTES: ULTRABOOK

WTF?
The Ultrabook is Intel's response to the MacBook Air. The idea is that it creates a basic spec for the Ultrabook and with its $300m investment fund encourages laptop manufacturers to create devices based around it.

Hell, for a couple of million I'd make an Ultrabook!
Yes, but can you make sure of all-day battery-life (about eight hours), a chassis no thicker than 21.5mm with Intel chips, and hardware-based ID protection as standard? And all for a mainstream price?

What's a mainstream price?
The first slew of Sandy Bridge-based Ultrabooks will all sit around the $1,000 mark pre-Christmas.

Do I want one?
If you want a responsive, long-lasting, secure, thin and light

laptop then yes. Just wait until the Ivy Bridge versions are here next Spring if you want the best option. Or just buy a MacBook Air…

EDITOR'S ONE TO WATCH

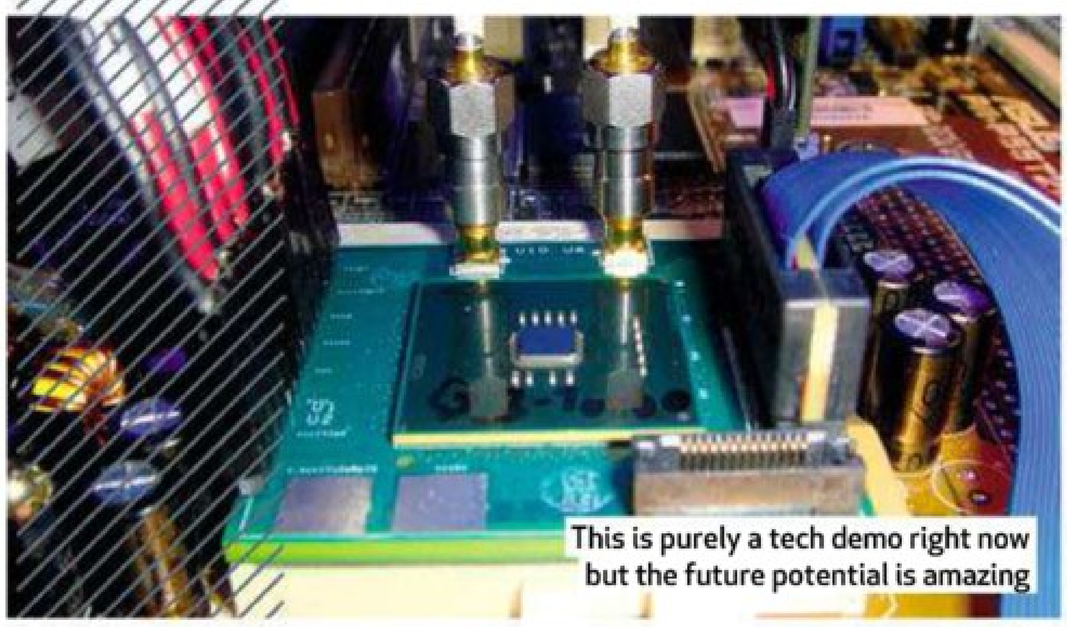
Intel's solar-powered CPU prototype

Justin Rattner, Intel Chief Technical Office, displayed a prototype CPU at IDF with such a low power rating that it can run from a solar cell the size of a postage stamp.

Codenamed Claremont, the Pentium-class processor is capable of operating at less than 10mW and will still run operating systems such as Linux or Windows. The power saving has been made possible by operating the transistors at near their threshold voltage (the voltage at which the transistor turns on). Today's processors operate at several times the threshold voltage in order to up the performance. If you run the transistors at closer to the threshold voltage you can make huge gains in efficiency.

With a genuine Pentium core the gains are impressive, but this is purely a tech demo right now and processors designed from the ground up to run this way would be far more efficient.

Still, one of the benefits of operating that close to the threshold voltage is that it gives a wide, dynamic range to the operating frequency. That means while it can run lower than 10mW in an OS you can also ramp up the power to improve performance when needed. ¤



This is purely a tech demo right now but the future potential is amazing

AMD's holy Trinity is alive

As usual AMD was prowling around the outskirts of IDF hoping to lure journalists away from the breezy environs of the Moscone convention centre in San Francisco into its own hotel suites. To be fair, though, it did actually have some goodies worth walking a couple of blocks for, including the first 28nm GPU around.

That was interesting, but not quite as interesting as a certain APU we found in a laptop, namely that which is set to come after Bulldozer.

AMD had a pre-production notebook with the next-gen Trinity APU humming away inside it, and it looked pretty darned stable. It's based on the enhanced version of Bulldozer out next year, codenamed Piledriver, and because it's an APU it also comes with a proper DX11 GPU jammed in alongside the Piledriver modules.

AMD wouldn't be drawn on whether the 28nm graphics were part of the Trinity APU, but it would certainly make sense to pair the two up.

HIGHLIGHTS THIS MONTH

28 Palicomp Phoenix Inferno

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44 Roccat Isku

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PHOENIX INFERNO REDLINE

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VITAL STATISTICS

Price £4,200 **Manufacturer** Palicomp **Web** www.palicomp.co.uk **CPU** Core i7 2600K @4.9GHz **Motherboard** Gigabyte Z68X-UD7 B3 **GPU** 2x Gigabyte GTX 590 **RAM** 16GB Corsair DDR3 @1,866MHz **Storage** OCZ Vertex 3 240GB SSD, 2x Hitachi 2TB HDD **OS** Windows 7 64-bit **Display** Samsung 27-inch **Price check** www.palicomp.co.uk

The phrase 'quad-SLI' ought to be enough to give you an idea just how much of a gaming monster Palicomp's latest machine is. With a pair of Gigabyte-branded NVIDIA GTX 590s lashed together the Pheonix Inferno Redline is capable of producing the sort of frame rate numbers we've never before seen.

Palicomp has gone to great lengths to ensure this is the ultimate gaming machine on the market, and to be fair it comes pretty darned close to being the ultimate machine full stop.

It's an insanely over-specced rig. With those twin, multi-GPU graphics cards, a top-end Z68 motherboard, 16GB of speedy DDR3, OCZ's 240GB Vertex 3 and 4TB of standard hard disk storage the overclocked Sandy Bridge CPU is actually the weakest part. That may sound strange calling a Core i7 2600K running at 4.9GHz a weak component but that is the only part of the rig that doesn't count as top of the line.

Granted it is the most advanced Core architecture around at the moment, but it's still lacks the core count of its hexcore, X58-based brethren. Chips like the i7 990X come with the full six core count, rocking a full 12 threads of processing power and are able to take advantage of the triple channel memory the X58 platform offers.

But there's a trade-off, and that's price. Dropping one of the Gulftown, hexcore CPUs into the equation would have knocked the price up closer to £5,000 and realistically would have given barely noticeable improvements to performance.

A hex on you

There's also the fact the X58 platform is now practically dead. We ought to see its replacement, Sandy Bridge E, in the next few months sporting an advanced hex-core architecture and access to quad-channel DDR3 memory support. Again though we're talking about crazily-priced, $1,000 CPUs.

So while it's not necessarily the highest-spec processor around, the Core i7 2600K is still the chip of choice for any top-end PC build today. The Z68 motherboard sitting inside the Pheonix Inferno Redline ought to be ready and waiting for the next spin of the Core architecture – Ivy Bridge. When that turns up early next year you should be able to drop it into most Z68 boards with little more than a BIOS flash.

Importantly, the i7 2600K is the best gaming CPU currently available. It supports the multitude of graphics processors on those twin cards perfectly, freeing them up to really hit the maximum of what they're technology allows.

The impressive cooling array set up to look after both those hot ol' graphics cards and the seriously overclocked CPU means that the extreme performance the Pheonix Inferno Redline is capable of doesn't come at the cost of reliability or longevity.

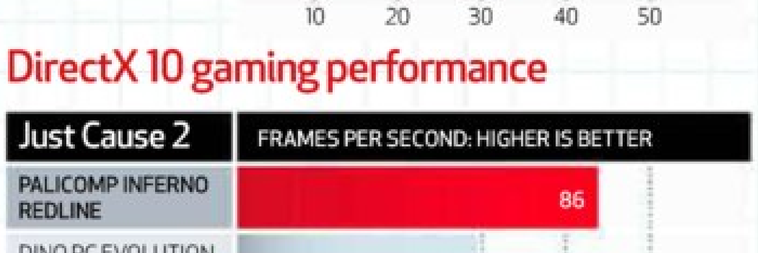
Even under continuous full load the CPU rarely gets north of 46°C with the twin graphics cards generally staying well below 60°C. The only slight issue here is the fact that it's a single-loop water-cooling setup, with the CPU getting the cooled liquid first then one graphics card after the other. The result is the graphics cards don't get the full benefit of liquid cooling, with the second card inevitably running noticeably hotter than the first when under full load.

Still, running well under worrying temperatures is what this cooling setup is designed for, as well as keeping the chunky CPU overclock in place. And in

Technical analysis

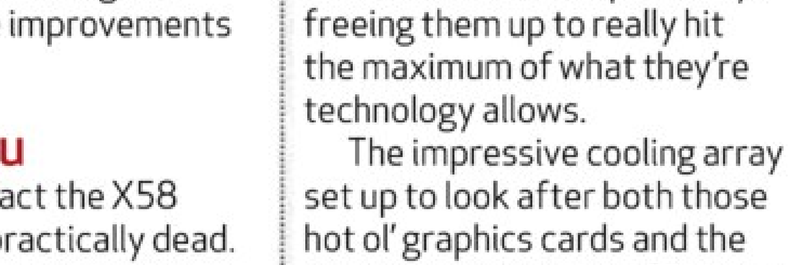
Essentially, the £1,800 Dino PC is the same as the Inferno, albeit missing the second GTX 590 and it's in-game where the extra money shows. The gaming figures are at 2,560 x 1,600, but the bundled screen will only run 1,920 x 1,080 - so in Heaven you're looking at over 100fps.

CPU rendering performance

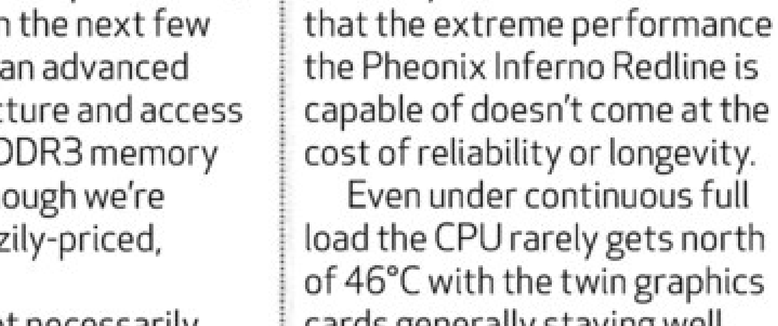


CPU encoding performance

DirectX 11 tessellation performance



DirectX 10 gaming performance



INSIDE THE FIERY PHOENIX
WHEN YOU'VE GOT MONEY TO BURN

1 Hot to the touch
The water-cooling loop runs from CPU through both GPUs, with the liquid gaining heat as it goes through. In an ideal world CPU and GPU would be on separate cooling loops, but the Redline still manages to keep things fairly chilled.

2 GPU joy
Your best bet for gaming nirvana right now is a quad-SLI setup with a pair of GTX 590s. You don't need a whole new PSU as you might with a quad-SLI GTX 580 setup of four cards and the drivers are a little more reliable than AMD's CrossFire.

3 Not memory, MEMORY
Things have certainly not been done by halves here. The huge amount of RAM on offer, combined with the 4TB of storage with a 240GB SATA 6Gbps SSD boot drive means that the machine is about as responsive as it is possible to be right now.

both those scenarios this serious cooling setup works well.

Three figures

So, what does all this expensive tech mean for your games? Essentially it means you can run any game on the market today with no concerns about running it maxed-out at your chosen resolution of choice.

And with the accompanying Samsung 27-inch monitor sporting a native resolution of just 1,920 x 1,080 then you're rather likely to be hitting triple digits when it comes to average frame rates in a lot of titles. Hell, we even saw three figures at 2,560 x 1,600 in *DiRT 3*.

That's some serious gaming pedigree right there and should offer a real stab at future-proofing your PC gaming for the next few years at least.

We do at some point have to talk about the price though. As fast as this machine is if your raison d'etre is more gaming than creation you could happily spend half the price and still get incredible performance in all modern titles.

But you could do practically anything PC-related with this machine. The Z68 platform gives you access to the onboard GPU goodness of the Sandy Bridge chip and so the QuickSync video goodness is ready and waiting for the content-creation faithful. The huge amount of memory and storage means that for any other productivity task you give it, the Phoenix will excel as well.

The only real weakness with the bundle then is that Samsung screen. It's actually a rather weak panel and the 1,920 x 1,080 native resolution hardly does justice to the twin GTX 590s housed within. For a machine that's trying to be the ultimate PC you'd want it paired with a higher-res screen.

It's not a huge issue as you can knock the panel off the bundle which brings the price down below the £4,000 mark. And if you're happy to spend this much money on a single PC then you're likely to be just as happy dropping serious cash on a large monitor.

Case in point

There is something else which has polarised opinion in the office and that's the chassis. Personally I'm a big fan of the function-over-form stylings of the Cooler Master HAF X. With the large fans on top of the case it's perfect for a large water-cooling radiator. Others feel it doesn't necessarily make it look like a £4,000 PC. But when it's throwing polygons around this quickly, rendering 3D scenes in a trice and encoding HD video faster than you can say that Welsh town name with more syllables than people, you're not going to be looking at the chassis.

Obviously this is pretty much as high-end a base unit as is feasible right now without stretching into the professional workstation space. It may be costly, but for a PC practically capable of anything it's not a bad price. Though if you're a purist PC gamer with little interest in things productivity-based then it's simply overkill.

There will be much speedier machines available in a month based on the X79 platform, but for an equivalent machine you'll be looking closer to the £5,000 mark. And anyway, if you sit there waiting for the next, fastest thing to tip up, you'll always be waiting. But right now this is as fast as it reasonably gets. ¤ **Dave James**

ESSENTIALY IT MEANS YOU CAN RUN ANY GAME ON THE MARKET TODAY

PCFormat Verdict

- Insane performance
- Crazy high specification
- Crazy high price
- Weak screen companion

This PC holds more performance in its tower than we've seen of any commercial PC.

85

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CORSAIR FORCE GT 120GB

Can Corsair's fastest offer the best RAID pairing?

VITAL STATISTICS

Price £179 **Manufacturer** Corsair **Web** www.corsair.com **Capacity** 120GB **Type** MLC synchronous NAND **Controller** SandForce SF-2281 **Peak read/write** 555MB/515MB/s **Max** IOPS 85,000 **Price check** www.ebuyer.com

The quest for flawless SSD performance: will it ever succeed? One thing's for sure, intriguing but frustrating new problems seem to bubble up just as fast as existing issues are flattened out. The question is, therefore, how big a step in the right direction is the new Corsair Force GT 120GB?

On paper, it's state of the art. For starters, it packs 120GB of synchronous flash memory. More expensive than the asynchronous alternative, one of its main supposed advantages involves performance in incompressible data transfers.

We'll come to the details presently, but the key factoid here is that incompressible data is perhaps the greatest weakness of what might just be the best SSD controller on the planet, the SandForce SF-2281. And that just so happens to be the controller found in the Corsair Force GT 120GB. So that's one problem sorted. Well, maybe.

As it happens, the SF-2281 has a few other foibles. But like we said, despite several years of progress and honing, flawless SSD performance remains an ambition, not a reality. Like most current SSDs, the Corsair Force GT supports the Windows 7 TRIM command and therefore shouldn't suffer from chronic performance degradation over time. Another performance hurdle ostensibly vaulted, then.

It also packs the SATA 6Gbps I/O interface. That matters because SSD performance is now outstripping the bandwidth provided by SATA 3Gbps. The Corsair Force GT's 555MB/s peak read and 515MB/s peak write performance is certainly way beyond the theoretical capacity of SATA 3Gbps.

The only slight snag is that the Force GT is not alone. Several other drive makers, including OCZ, Patriot, Kingston and others offer similar SandForce-based, SATA 6Gbps-capable technology. Then there are several much-improved drives based on non-SandForce controllers, including Crucial's M4 drive. Much will thus depend on pricing and Corsair's fine-tuning efforts. Oh, and on a final note, Corsair sent a pair of drives, enabling us to test the Force GT in both single-drive and RAID 0 configuration, the latter promising 1GB/s performance. Let the bandwidth bonanza begin!

Synching sand

The new Corsair Force GT 120GB has plenty of competition and one of its most obvious foes is Corsair's own Force 3. After all, it too has the SandForce SF-2281 controller and 120GB of NAND flash memory. But it's over £40 cheaper. What gives?

It all comes down to a single missing letter 'a' for the Force GT. We speak of the great synchronous vs asynchronous memory debate. The simplest way to appreciate the differences between the two is to view them as SRAM and DDR RAM, the latter in both cases offering two data transfer per cycle to the former's one.

Synchronous NAND memory shifts data on both the rise and fall parts of the signal wave. You might think that double data rate makes synchronous flash twice as fast. Actually, in extreme cases it's better than that. Asychronous memory is limited to 50MB/s per channel compared to either 133MB/s or 200MB/s for the two most prevalent synchronous flash implementations.

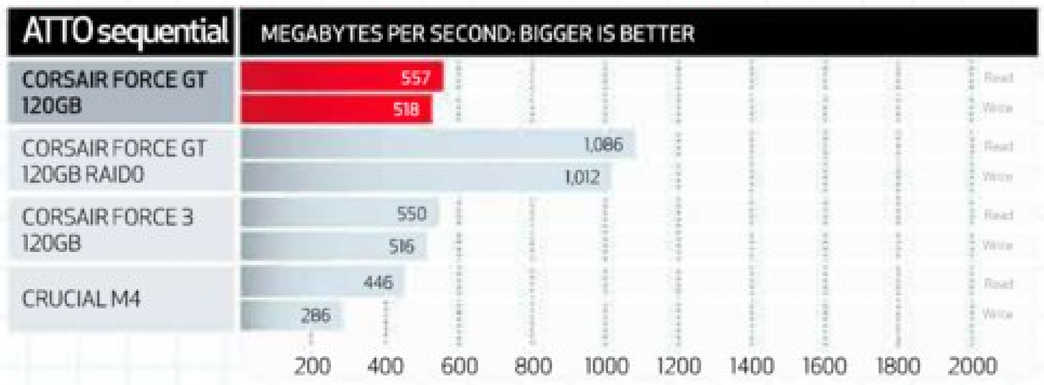
However, the real-world performance gap is rarely, if ever, that yawning. To understand why, it's worth taking a look at the SandForce SF-2281 controller. It packs eight memory channels and kicks out a maximum overall data transfer of 400MB/s with asynchronous memory.

However, the SF-2281's party trick involves compressing data long before it needs to be written

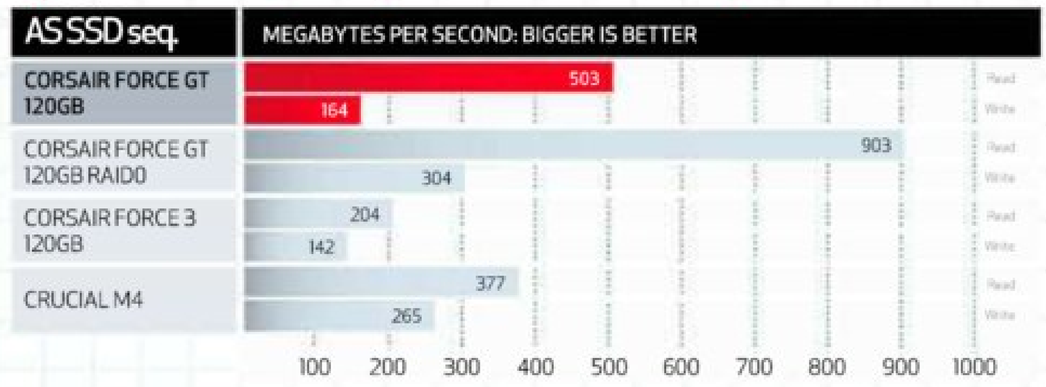
Technical analysis

Synthetic vs real world, compressible vs incompressible, peak vs random, if there's one thing we've learned about SSD performance, it's that there isn't any simple, one-shot performance metric. Still, for the Force GT the interesting test is the AS SSD incompressible data throughput compared with its Force 3 Corsair sibling. Just how much difference does that pricier synchronous memory make? It's also worth noting that a pair of SSDs in RAID0 doesn't always give double the performance.

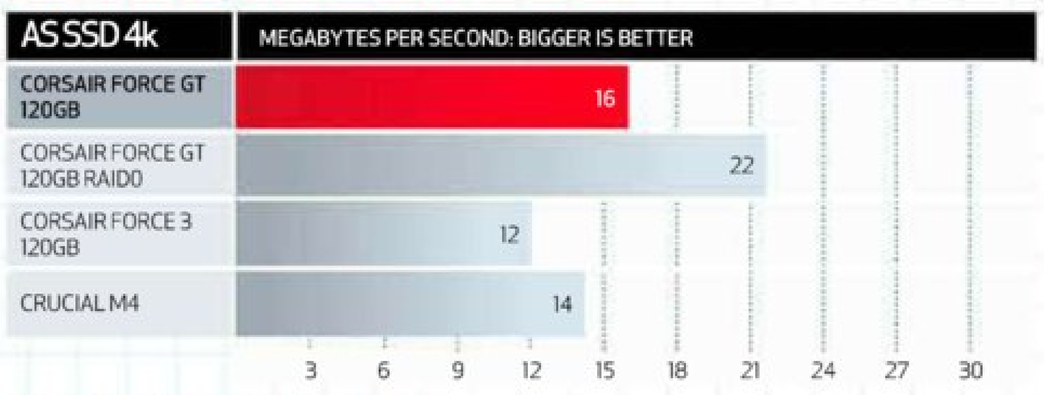
Synthetic read/write performance, compressible data



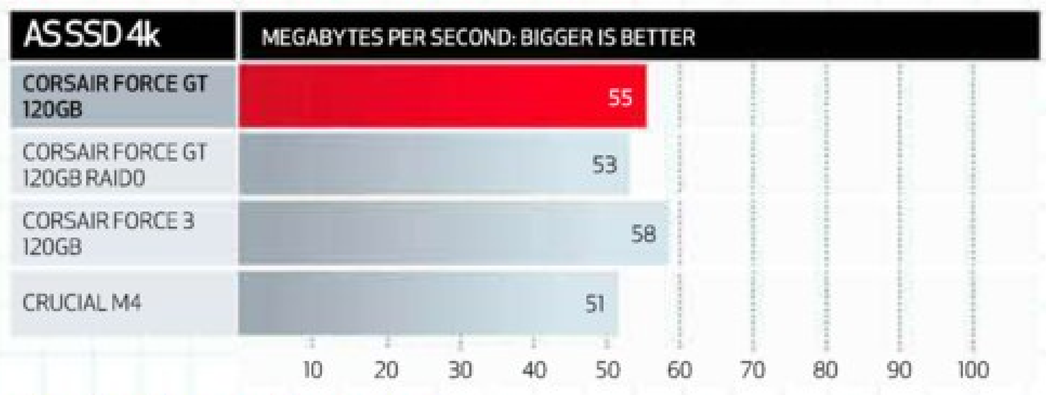
Synthetic read/write performance, incompressible data



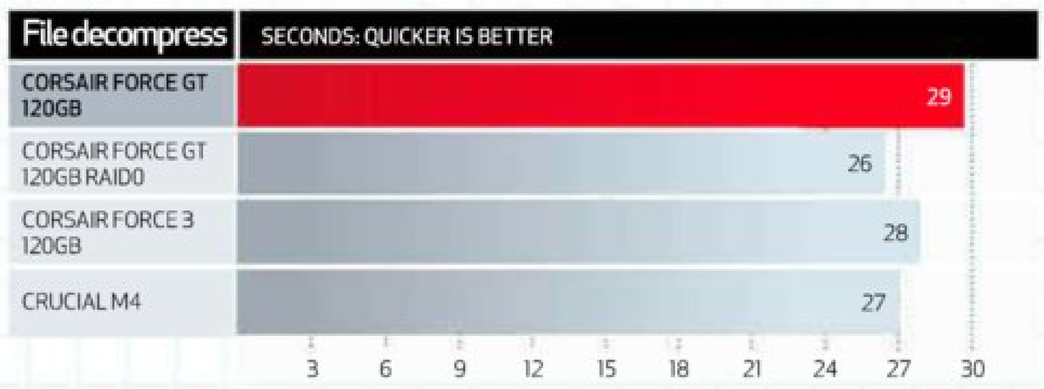
Synthetic random read performance



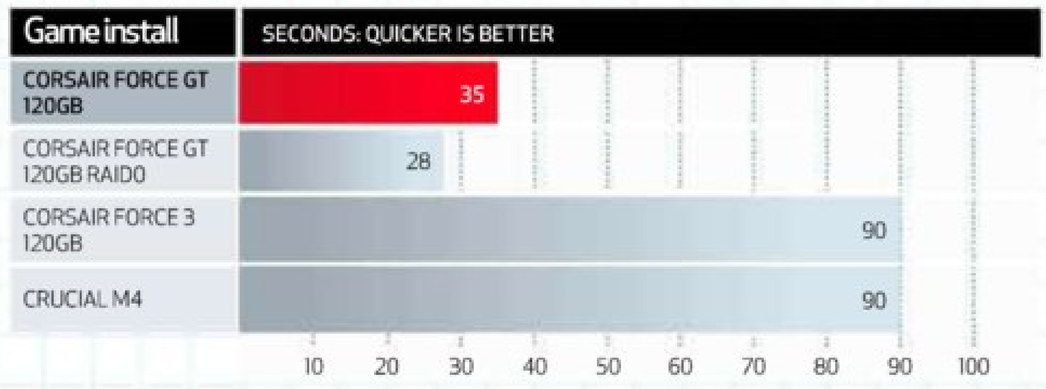
Synthetic random write performance



Application performance



Application performance



to the flash memory chips. And that means the 50MB/s limitation can be sidestepped. At this point, however, things get a bit complicated. Some data types are made of incompressible data.

In fact, many of the largest and most data-intensive files, such as music, images and video, are stored in pre-compressed – and therefore incompressible as far as the SSD controller is concerned – formats. All of which means the Force GT's synchronous memory ought to give it a performance advantage to justify the price premium.

Magic bullet?

Whatever SSD you go for, it ain't gonna be cheap. In the context of SandForce-powered drives, you could argue that there's no point in risking a false economy courtesy of a cheaper model with asynchronous memory. Better to spend that little bit more for the full synchronous treatment.

As our benchmarks demonstrate, the extra £40 or so for the Corsair Force GT over the mostly similar Force 3 does buy you more performance. Okay, the peak read and write scores of 557MB/s and 518MB/s aren't a huge step forward. But then we weren't expecting that.

No, much more dramatic is how the Force GT lifts performance in the AS SSD incompressible data read test from just 204MB/s to fully 503MB/s. Result, you might say.

However, things are slightly less salubrious in the incompressible data write benchmark. The Force GT does have the edge. But at 164MB/s to 142MB/s it's not a dramatic improvement. It's a similar story in the random access test. Again, the extra £40 doesn't buy you a big chunk of extra performance.

What's more, the competition in the form of drives powered by the Marvell 9174 controller, such as the Crucial M4, hose the Force GT when it comes to incompressible writes. They're pretty much in the same ballpark for random access, too. Still, what really matters is real-world throughput, not synthetic tests and the Force GT delivers some solid numbers in our application tests. It absolutely trashes the Force 3 and Crucial M4 in our game install benchmark.

But what about the performance of two Force GT's in striped RAID 0 config? Well, we're happy to report that the magic 1GB/s for both sequential reads and writes is attainable. You'll get close to 1GB/s for incompressible reads, too. What you won't get is all-round performance that reflects those massive peak numbers. On the synthetic side, the AS SSD benchmark reveals that 4k random access is barely boosted when you pair drives up. Similarly, app performance doesn't exactly explode.

So, are there any downsides? Well, the big problem is TRIM support for RAID setups. It's been addressed by Intel on the chipset side recently. But we're still waiting for an update for Windows 7. At this stage, we don't expect anything before Windows 8 appears and even then it might mean an upgrade to 8 rather than a patch for Windows 7.

The Corsair Force GT's SandForce SF-2281 is one of our favourites and here paired with synchronous memory and a SATA 6Gbps interface it's at its very best. Peak throughput is bonkers, while the incompressible read performance is much improved. At this price point – and bearing in mind a big premium over Corsair's Force 3 drive – we want perfection, and we're still not getting it. The incompressible write performance is still a bit shonky, for instance. Given the ongoing lack of full TRIM support for RAID, we're not convinced a pair of Corsair Force GTs makes sense either. ¤ **Jeremy Laird**

PCFormat Verdict

- Huge peak throughput
- Super application performance
- Big price premium
- Still no TRIM in RAID configurations

Pricey synchronous memory is only half a solution. Overall, very quick, but not perfect.

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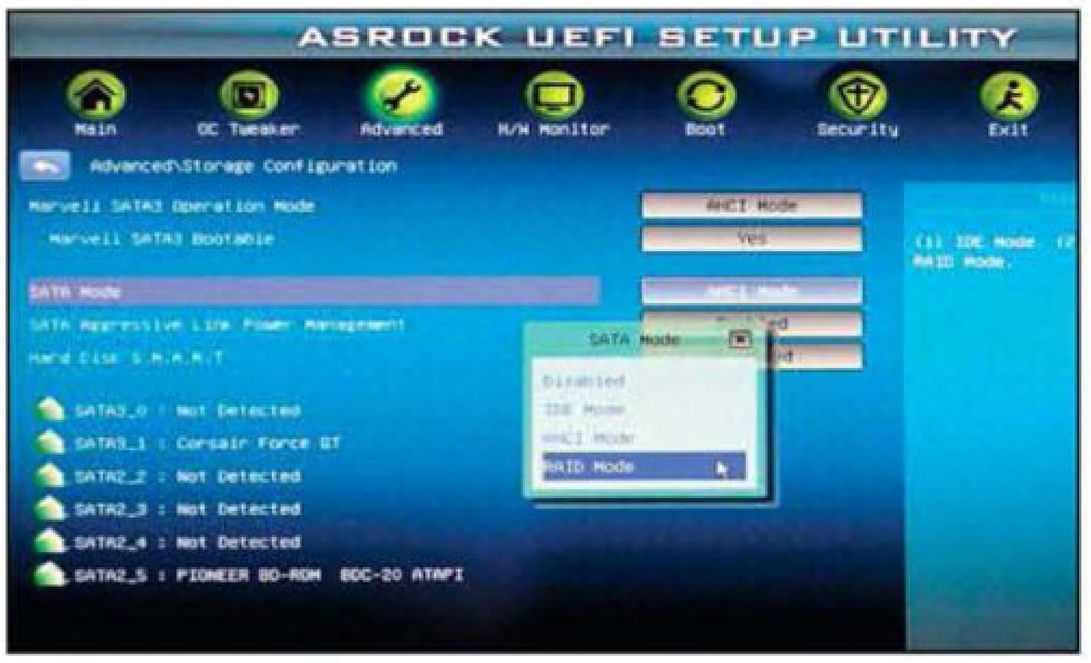
The power of two

How to tear a 1GB/s hole in space-time with a dual-drive SSD RAID array

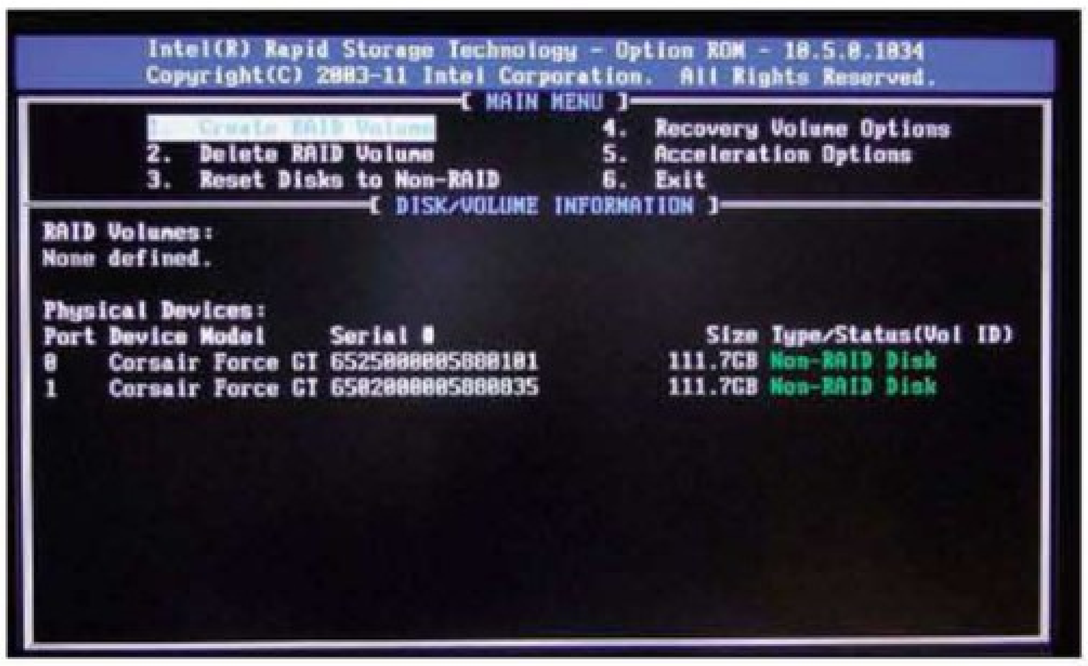
1 Bone up on boards

Before you even think about adding RAID to a pair of SSDs and carpet bombing the 1GB/s barrier, make sure your motherboard is up to the task. Most support RAID arrays, but unless it's fairly recent it probably doesn't have SATA 6Gbps support, which is essential for squeezing maximum performance from the latest and greatest SSDs.



2 Boot into thine BIOS

Motherboard checked, it's time to boot into your BIOS and set the storage controller to RAID mode. Depending whether you're using the motherboard chipset's native SATA controller or a controller, you'll find the setting either in the main chipset or peripheral controls. If possible, we say go native.

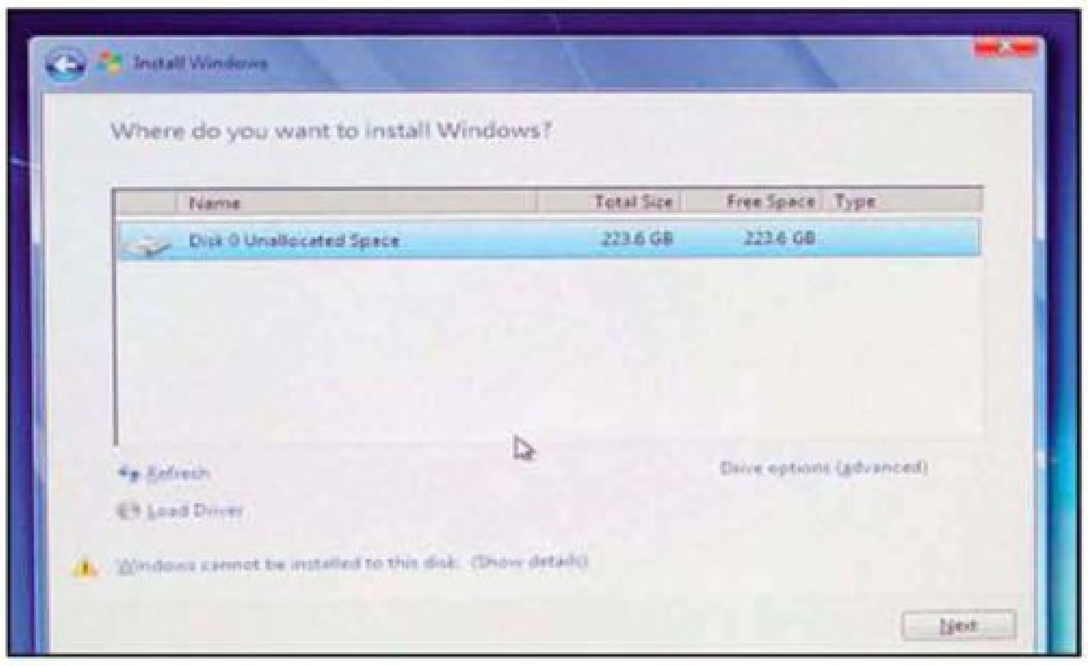


3 RAID on, baby

With the SATA controller set to RAID, reboot, hold down the [Ctrl] and start hammering the [I] key. That should get you into the RAID config screen. Hopefully you'll then be presented with a pair of drives ready for RAIDy goodness. A good bit of advice here is to make sure no additional drives are connected before you begin the process.

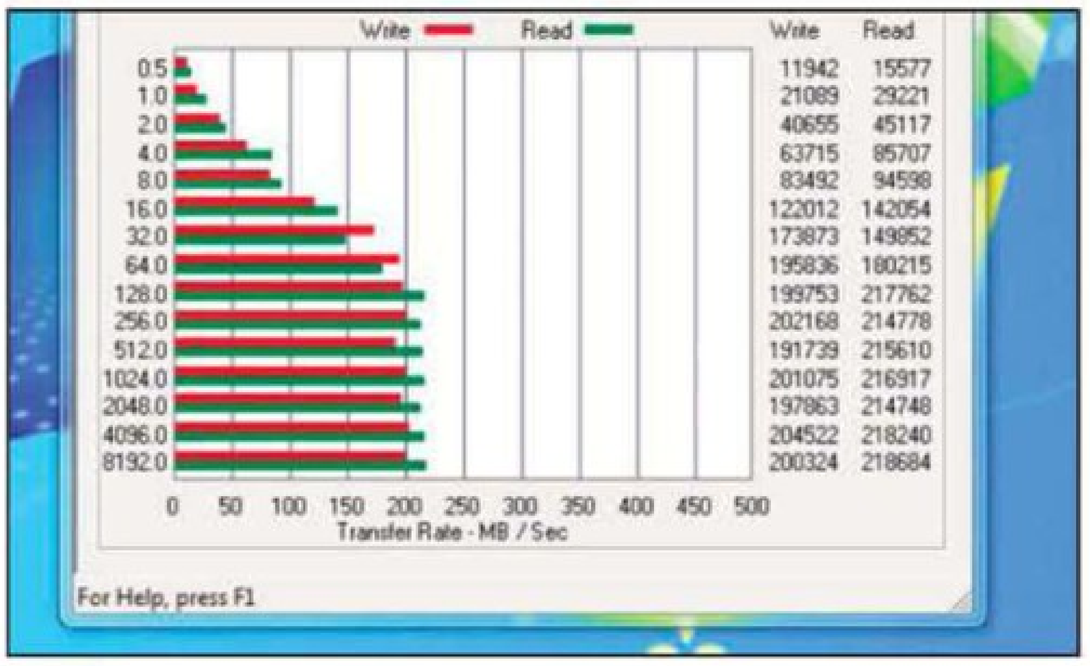
4 Stripes and sizes

Once you're into the RAID utility, select 'Create RAID volume'. You'll then be presented with a range of options. We're interested in speed here, so the RAID level you want is a striped RAID-0 volume. As for stripe size, there are many theories and much debate. Sticking with 128k is fine. Hit [Y] to create the volume.



5 Nice, clean Windows

With your RAID-0 volume created, use your Win7 installation disc to boot into the install utility in the normal fashion. If all is well you'll be presented with a single storage volume roughly the same size as the combined capacity of your two SSDs. Select and install again – with newish mobos, storage drivers are usually not required.



6 Say hello to serious speed

When the Win7 installation completes, boot to the desktop and begin enjoying that newfound speed. It's always a good idea to give the drives a quick benchmark to make sure you're getting the full performance. Also, because the Win7 TRIM command is not supported in RAID, give your SSDs a regular manual scrubbing.

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VITAL STATISTICS

Price £419 **Manufacturer** OCZ **Web** www.ocztechnology.com **Capacity** 240GB **Type** 32nm Toggle MLC **Controller** Sandforce SF-2281 **Peak read** 557MB/s **Peak write** 510 MB/s **Max IOPs** 85,000 **Price check** www.scan.uk

We had plenty of good things to say about the Vertex 3 when it stormed onto the SSD market earlier this year. You only have to look at its read/write figures to see why. Quite simply, the Vertex 3 managed to harness the power of the Sandforce SF-2281 controller to the greatest extent. Like any SF-2281 controlled SSD it did take time performing incompressible writes (write speeds reporting at less than half that of reads), but 4K random read performance and real-world tasks, such as Windows boot times had us singing high praise for the Vertex 3.

Benchmark figures and even observable desktop performance don't tell the whole story though. Along with other manufacturers who had issues with the latest SandForce controller, OCZ's Vertex 3 suffered from some reliability issues too. Mind you, OCZ estimates that only two thirds of a percent of Vertex 3s experienced reliability problems, specifically BSOD when running Windows 7, but any SSD bearing the marks of unreliability is going to be avoided.

After discovering some bizarre activities caused by a certain SATA command, OCZ and the controller's manufacturer SandForce released a firmware update that appears to have stamped out the issue. It slows down timings associated with that naughty SATA command, which means no more , but inevitably also slightly slower performance.

Now OCZ has resolved the problem, it's keen to build a dependable drive that gets near the vanilla Vertex 3's performances for everyone. Architecturally, the only difference is in the type of NAND used: the Vertex 3 uses Intel 25nm NAND, whereas this new Max IOPS edition employs Toshiba (Toggle) 32nm NAND. The difference between the two comes down to the capacity on each NAND die leading to more chips for the 8 channel SF-2281 controller to access per cycle.

More IOPs please

The performance advantage here is interleaving. With more NAND channels to access, the controller can send more read requests per cycle, increasing IOPS (inputs/outputs per second).

Random 4K write IOPS increase nominally from the original Vertex 3's 60K IOPS to 65K. However, 4K random reads weigh in at 55K IOPS, significantly more than the original Vertex 3's 40K.

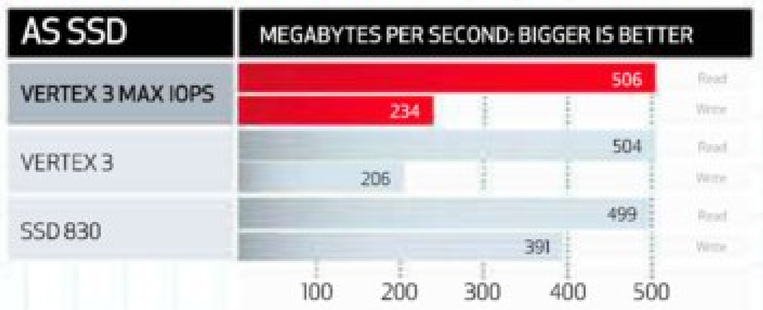
You're probably sick of large numbers and the acronym IOPS by now though, so what does it all mean? It means the Max IOPS deals with incompressible data better than its predecessor. Good. It doesn't match the Vertex 3's initial sequential performance. Fine. We doubt most users would notice the difference, and we're a lot more confident of the drive's reliability now. It's always difficult to measure reliability in an early review, but the fact OCZ is gearing design more for longevity than straight line performance is definitely encouraging.

For the extra cash you're spending on the new Max IOPs edition you don't really get a whole heap of extra speed, but the improvements to the incompressible performance and reliability could well be worth the extra outlay. A good choice for a reliable boot drive. ¤ **Phil Iwaniuk**

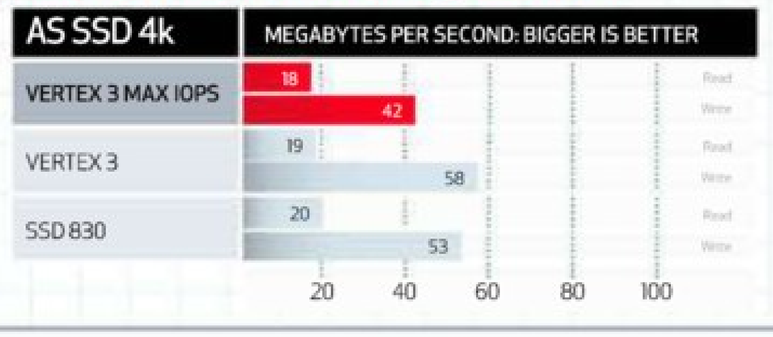
Technical analysis

There isn't one single benchmark that categorically asserts an SSD's merit, but a combination of sequential and random read/write operations gives us a good idea. The telling benchmark is AS SSD's 4K random read/write. That's where you'd expect a drive called the Max IOPS to shine, but it's outperformed by both the original Vertex 3 and Samsung's cheaper SSD 830.

Sequential read/write (incompressible)



Random read/write (compressible)



PCFormat Verdict

- Strong incompressible performance
- Learned from Vertex 3 reliability issues
- More IOPS than original Vertex 3
- No real extra bang for your buck

Trademark Vertex sequential figures, with Max IOPS living up to its name.

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£358/MONITOR

VIEWSONIC V3D245

A simple way to enjoy your games in the third dimension

VITAL STATISTICS

Price £358 **Manufacturer** ViewSonic **Web** www.viewsonic.com **Display size** 23.6-inch **Brightness** 300 cd/m² **Contrast** 1000:1 **Resolution** 1,920 x 1,080 **Response time** 2ms **Inputs** Dual Link DVI, VGA, HDMI **Price check** www.scan.co.uk

We want 3D to work. Really. We want to experience another life-changing moment like our first peek at *Doom* when suddenly everything changes and our eyes are left struggling to believe what they're seeing isn't a terrifying three-dimensional reality.

The problem for current 3D tech, such as 3D Vision, is that every single game since 1981's *Monster Maze* has been trying to create the illusion of multiple dimensions and depth of field through rendering techniques. From vertex shaders to ambient occlusion, it's all designed to trick your eyes. So when you don the 3D Vision glasses included with this V3D245 and play modern games in true 3D you get a headache, because all the graphical rendering techniques are pulling in one direction, and NVIDIA's stereoscopic vision is pulling in the other. Of course, it doesn't help that the glasses feel like sitting a furious scorpion across your eyes.

Attractive screen

While NVIDIA is still, it must be said, struggling to produce an attractive 3D experience, screen manufacturers are at least finding more attractive ways to incorporate the tech into their package. This ViewSonic screen's a good example. The IR emitter needed for stereoscopic 3D is built into this monitor's chassis, cutting out the extra cables and desk clutter you get with the standalone IR emitter.

The built-in emitter has another important advantage: because it's in a fixed position and never likely to be obscured or nudged by other peripherals, it creates a more consistent 3D experience. When you set the depth right, images really pop out of the screen and you don't need to adjust it as often as you would the standalone emitter.

The chassis is attractive in its simplicity, though the controls are a bit unresponsive and the monitor's on/off light could be clearer. We approve most highly of the dual-link DVI, VGA and HDMI inputs too.

Screens do make some sacrifices for 3D functionality. For instance, the super-quick 120Hz refresh rate needed to produce 3D images, only twisted nematic (TN) panels can be used. They're the nippiest in terms of response, but suffer from poor colour reproduction and limited viewing angle compared to a vertically aligned (VA) or in-plane switching (IPS) panel. There's an ace up ViewSonic's sleeve though: considering the V3D245 is built around a TN screen, the colour's remarkably good.

The blacks look inky and deep, the whites appear well-defined and true. The colour still loses a lot of ground to an IPS screen like last month's Dell UD2412, and in-depth analysis reveals over-saturation of whites and working in a dark room will reveal how shallow the black scale really is, but it's still one of the best TN screens we've pored over.

For £360, this ViewSonic screen offers a hassle-free 3D setup with glasses included, and a quality screen for good old-fashioned 2D viewing too. If you're searching for a screen with exceptional colour, Dell's slightly cheaper UD2412 is unbeatable, but if you're hell-bent on going cross-eyed and turning your favourite games into pop-up picture books, this V3D245 is a great way to do it. ¤ **Phil Iwaniuk**

PCFormat Verdict

- Built-in IR emitter
- 3D Vision glasses included
- Good colour quality for a TN screen...
- ...but still miles short of an IPS

Takes the hassle out of setting up 3D and sweetens the deal with a good quality screen.

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£236/MONITOR

ASUS PA238Q

The best PC monitor money can buy?

VITAL STATISTICS

Price £236 **Manufacturer** Asus **Web** uk.asus.com **Size** 23 inches **Panel type** IPS **Native resolution** 1,920 x 1,080 **Brightness** 250cd/m **Response** 6ms (g-to-g) **Inputs** HDMI, DVI, DisplayPort, VGA **Price check** www.morecomputers.com

Fed up with cheap and not-always-cheerful monitors based on TN panel technology? Then get a load of the new Asus PA238Q.

At around £235, it's pricier than your average 23-inch TN screen. But joy of joys, it's got an IPS panel.

IPS, of course, stands for in-plane switching and it just so happens to be the finest panel technology known to man or beast. That's why Apple, for instance, exclusively uses IPS in its iPhones and iPads. It's simply the best when it comes to colour accuracy and viewing angles.

As it happens, colour accuracy is a big part of the remit for the Asus PA238Q. It's pitched as a low-cost screen for the graphics professional.

However, Asus is also claiming 6ms response times, which is very impressive for a IPS screen and makes for a tantalising all-round package.

Could this affordable, colour-accurate screen also be killer in-game and at the movies? There's only one way to find out.

Open goal

We've been desperate for something, anything other than a TN screen at an affordable price. Few monitor makers have been willing to deliver. Admittedly, BenQ has given us a few cheap screens with VA panels. But its most recent effort, the BenQ EW2430, was seriously disappointing. There's an open goal waiting for Asus to slide home a winner.

On paper, the Asus PA238Q certainly looks like premier league material. Along with that all important IPS panel, you get an LED backlight and a huge colour gamut that captures 100 per cent of sRGB. Nice. You also get a full complement of inputs including HMDI, DVI, VGA and even DisplayPort. There's picture-in-picture support, too.

The Asus PA238Q is a fine physical specimen, too. The stand is fully adjustable in all directions and hewn from the right sort of plastics. It's sturdy stuff.

We also love the minimalist styling vibe. The overall effect is like an IBM laptop from the ThinkPad heyday. No nonsense quality, in other words.

It ain't easy picking holes in this classy screen, but one or two imperfections are visible. Our review sample had the slightest whiff of backlight bleed on the right hand edge and, like all IPS screens, there's a little backlight glow at some angles when viewing very dark tones. But that's about it.

Image quality

The real clincher, though, involves image quality. Asus claims every PA238Q is carefully colour calibrated at the factory and the result is indeed impressive. Rarely, if ever, have we seen a screen with such deft black, white and colour scales out of the box. The viewing angles are impeccable, too.

As for pixel response, it's very good news indeed. This is one of if not the snappiest IPS panels we've ever seen.

The panel. The backlight. The chassis. The colours. The input options. The price. Frankly, what's not to like?

All of our previous experience with cut-price VA and IPS panels had led us to expect some kind of downside, some visual nasties or obvious specification faux pas. But not here. ¤ **Jeremy Laird**

PCFormat Verdict

- Fabulous IPS panel
- Clean, bright LED backlight
- Affordable pricing
- Excellent factory settings

The (very nearly) perfect PC monitor has finally arrived. Buy at least one.

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SAPPHIRE PURE PLATINUM Z68

Another solid board from the Sapphire camp

VITAL STATISTICS

Price £125 **Manufacturer** Sapphire **Web** www.sapphiretech.com **Chipset** Intel Z68 **CPU compatibility** Intel Sandy Bridge **Expansion** 3x PCIe x16 (x16, x8, x4) **I/O** 4x SATA 6Gbps, 2x USB 3.0 **Price check** www.techradar.com

The latest motherboard using Intel's long awaited Z68 Express chipset is from AMD's biggest partner, Sapphire, in the shape of the Pure Platinum Z68.

The Z68 joins together the CPU core overclocking ability of the P67 chipset and the integrated graphics support of the H67 and throws a couple of added technologies into the mix.

Smart Response Technology and Lucid's Virtu graphics software are the two new additions in question and it has to be said that the jury is still out as to just how useful these two technologies are. But of the two Smart Response Technology probably wins out.

It allows a small SSD to be used as a fast cache drive in conjunction with a normal drive in a sort of hybrid RAID setup.

The Sapphire Pure Platinum Z68 follows very much the same design of PCB that Sapphire introduced with the Pure Black series of boards. Not that there's much wrong with that. However, there is a problem if you want to use two dual-cooled graphics cards in a Crossfire setup, because there simply isn't enough space between the two PCIe x16 slots to allow any real air flow between the cards.

This is due to the fact that the only thing keeping them apart is a single little PCI slot. There are another couple of PCI slots below the second PCIe connector and if they'd been kept between the graphics slots there would have been a lot more space for air circulation between dual-GPU setups. Still, multi-card machines are still in the minority so it's not a huge issue to be honest.

Performance-wise the Pure Platinum Z68 is just like pretty much any of the other Z68 motherboards we have tested straight out of the box, but when it comes to overclocking, the picture isn't quite as rosy.

Memory issues

We had a few problems getting our board to understand the memory we were using and after a good deal of cursing we eventually got it to run stably with an Intel 2600K at 4.4GHz. It would boot into Windows at 4.6GHz but froze during a benchmark run. It seems all it needs is a tweak in the memory timings section of the BIOS to smooth these problems out.

So there's a bit of concern over how the board reacts when pushed during overclocking, but on the plus side it generally re-booted to allow access to the BIOS without having to hit the board-mounted, clear CMOS button. There's a niggling thought that the problems stem from the memory timings in the BIOS but hopefully this will be sorted out with the next BIOS update.

You've got to love the serious support Sapphire has offered Intel's integrated graphics, with the number of display outputs on the board's back panel. That has meant there's precious little space for USB 3.0 slots, but there is another USB 3.0 header onboard.

Sapphire has done it again then, producing a decent Intel board despite its previous AMD leanings. Performance is nothing really to shout about, nor is it anything to concern yourself with. The only issue with a company which doesn't focus on board manufacturing is that its price is still rather high compared with the likes of ASRock and Gigabyte. ¤

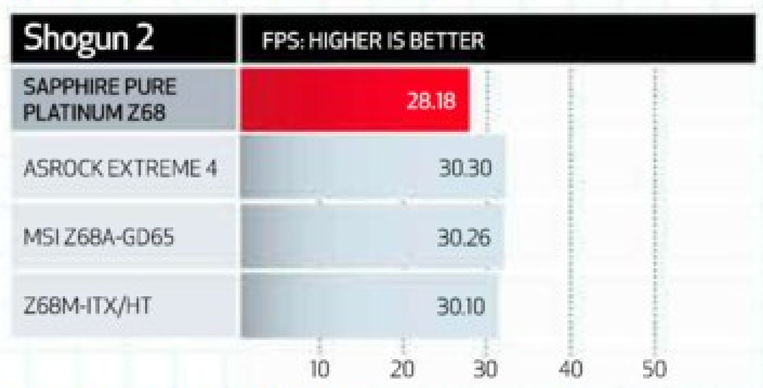
Simon Crisp

Technical analysis

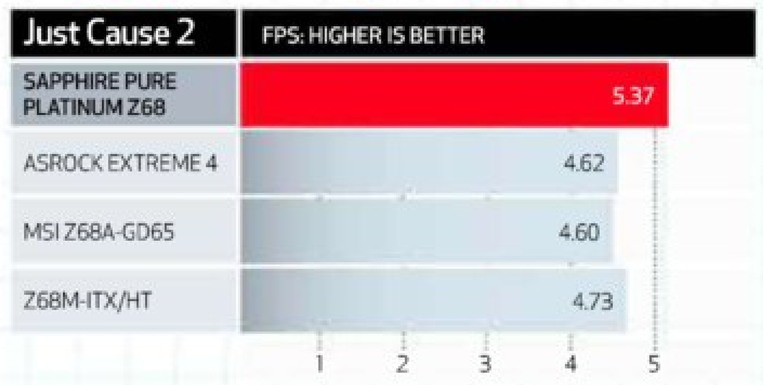
There isn't much to separate any of the Z68 boards we have tested. If anything the performance results shine a spotlight on just how good the SandyBridge chipsets and the Z68 in particular have been to the ITX format.

CPU rendering performance

CPU gaming performance



CPU graphics 1080P gaming performance



PCFormat Verdict

- Performance
- Decent feature set
- Connectivity
- BIOS is a bit temperamental

The Pure Platinum joins a growing band of boards marking Sapphire's return to the board business.

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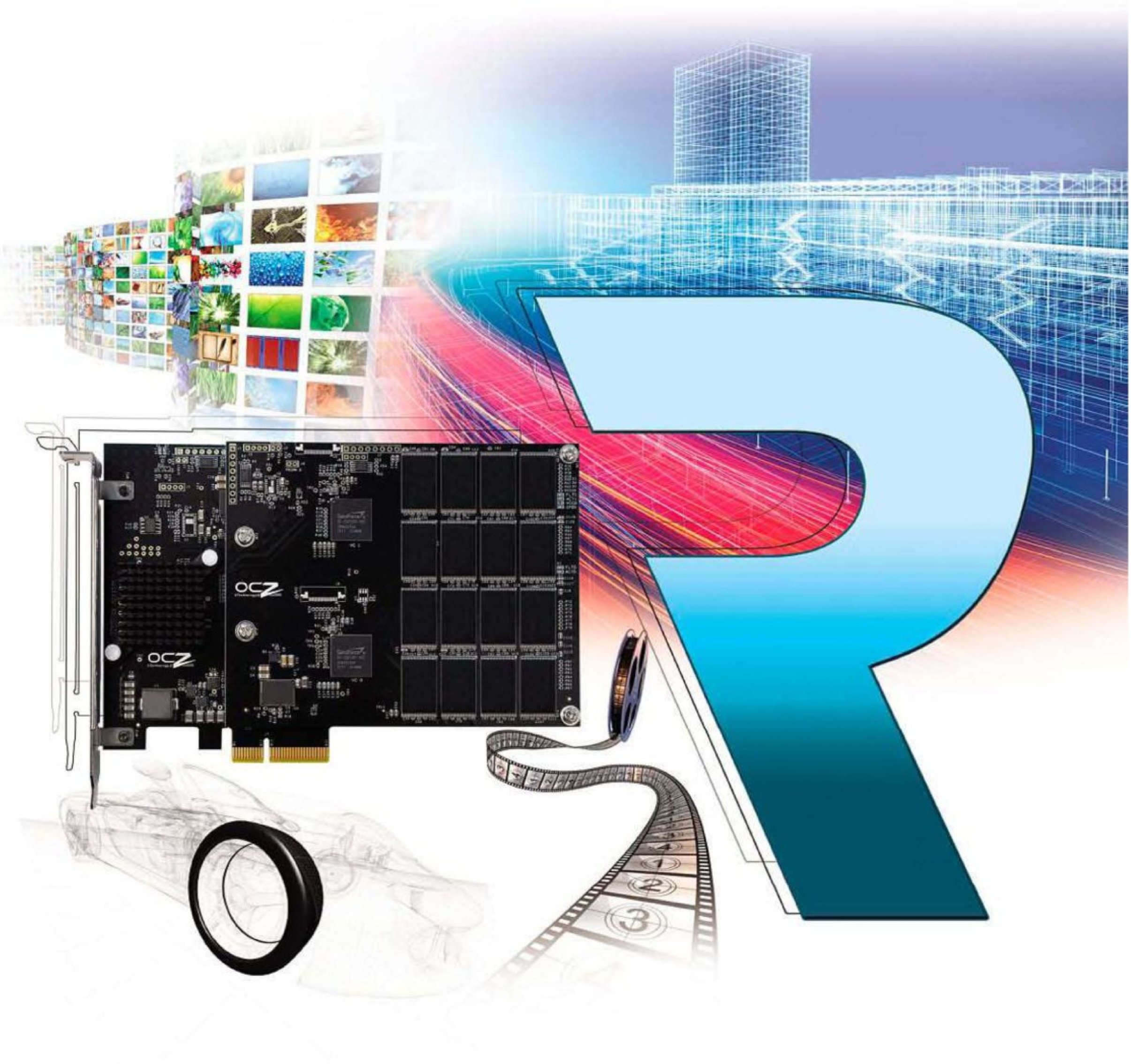

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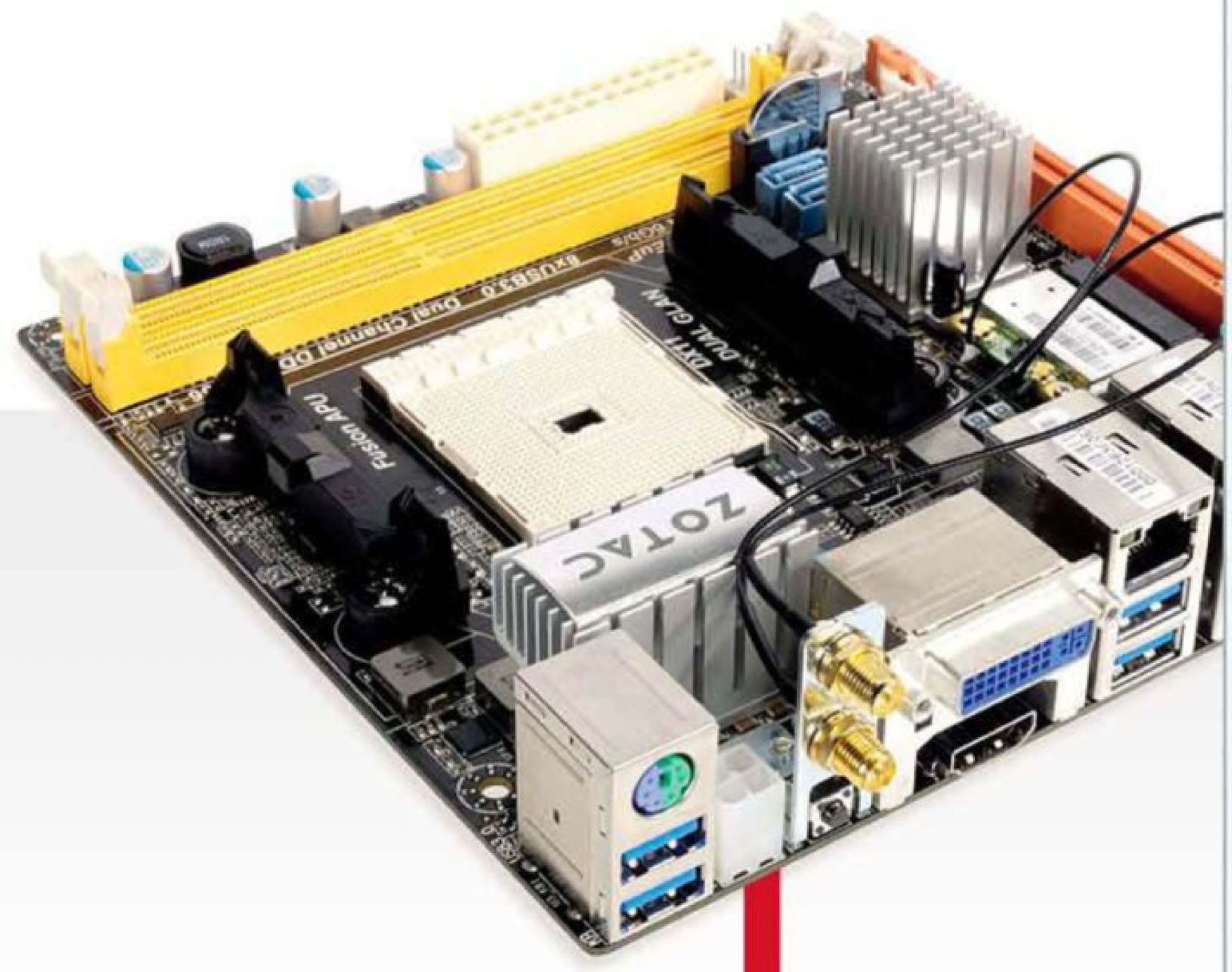

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ZOTAC A75-ITX WIFI

A little motherboard with big ideas

VITAL STATISTICS

Price £105 **Manufacturer** Zotac **Web** www.zotac.com **Chipset** AMD A75 **Socket** FM1 **CPU compatibility** AMD A-series **Memory** Dual-channel DDR3 **Expansion** PCIe x16 I/O 4x SATA 6Gbps, 6x USB 3.0 **Price check** techradar.com/reviews

Zotac is making a mark for itself as a motherboard manufacturer, especially in the small form factor arena, and this Zotac A75-ITX WiFi certainly looks to continue that trend.

We checked out the Z68-ITX WiFi a little while back and its combination of packed PCB and impressive performance made it an interesting prospect for a wee Intel Sandy Bridge machine.

More suited to the smaller PC, though, is AMD's Llano APU. In a form factor where space is at a premium, having decent graphics power on-chip makes for a well-rounded machine in a very tight space.

Intel's Sandy Bridge may also have integrated graphics but that hardly gives you much power beyond a little light media play and standard web-crawling.

The Llano APUs, though, have discrete-class graphics prowess – maybe not of the high-end calibre, but certainly far better than anything we've seen before.

Be discrete

That said, dropping in a small discrete card, such as a half-height AMD Radeon HD 6670, gives you a hell of a boost in graphical performance with Llano's Dual Graphics functionality. We notched up over 25fps in *DiRT 3* at 1,920x1,080 on the Ultra settings, and for a tiny PC sat beneath your HD telly, that wouldn't be bad at all. You'd need a rather chunkier GPU to be able to do that on an Intel platform.

But still performance does suffer. The straight line CPU scores are a way down compared with the sort of numbers we've been getting out of either ATX or micro-ATX desktop Llano boards. Looking at either Cinebench or the CPU score from *Shogun 2* and the performance of the Zotac A75-ITX is noticeably off the pace.

Thankfully that's only on the CPU side – if you look at the gaming performance of the Llano APU in the little Zotac board it stands toe-to-toe with the larger boards out there. And as you're unlikely to be doing any seriously processor-intensive tasks on such a small box, that's not a major problem either.

As such you wouldn't expect it to be much of an overclocking board either, despite the huge amount of processor head-room the A-series desktop Llano chips have. This seems to be where one of the main areas of compromise lies; there is no way to boost the performance of the APU.

In the BIOS there is an option which looks like it ought to up the multiplier, but as the A-series multipliers are locked down, à la Sandy Bridge, there's nothing happening in the performance stakes. It's a bit of a shame given what we've managed to squeeze out of the A-series chips before, but for an inexpensive little board serious CPU performance isn't a necessary requirement.

Being an inexpensive little board is, though. Unfortunately you're paying quite a premium for the size of the Zotac A75-ITX WiFi, even our favourite A75, the Asus F1A75-V Pro is well over a tenner cheaper and that does have the performance chops.

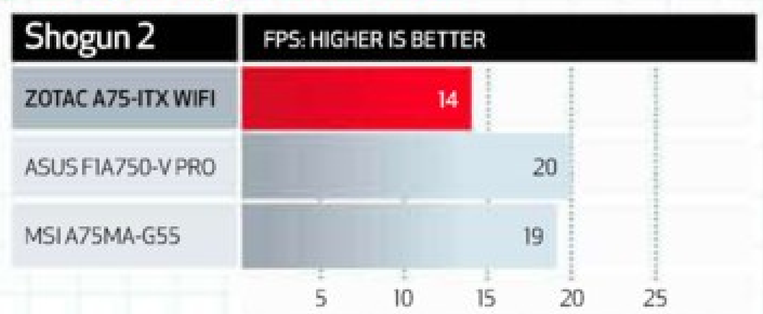
So if form factor is an issue for you, then you're going to have to pay a little more for it. But still, Zotac has crammed a huge amount onto this tiny slab of PCB and as the basis for a fully-functional Fusion mini PC it's hard to knock. ¤

Dave James

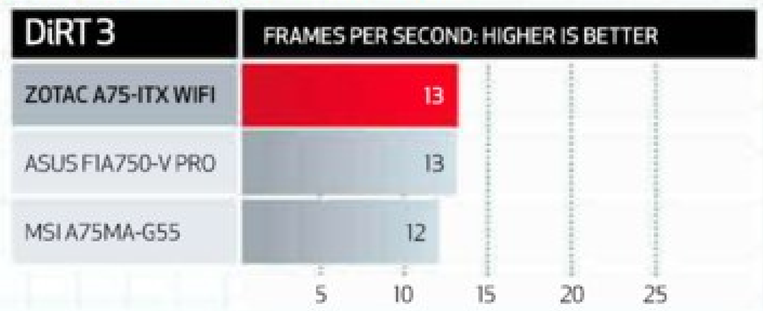
Technical analysis

As you can see, the CPU component of the Llano APU is being hobbled by the motherboard itself. In both the Asus ATX and MSI mATX boards the chips perform far better at straight, traditional CPU tasks. On the gaming side though there is no such compromise in performance; good news for the mini PC gamer.

CPU gaming performance



DX11 gaming performance



PCFormat Verdict

- Teeny-tiny
- Feature-packed
- Weak CPU performance
- Slightly expensive

This little motherboard is almost the ideal platform for the desktop Llano.

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ROCCAT ISKU

Not just any ol' board...

VITAL STATISTICS

Price £78 **Manufacturer** Roccat **Web** www.roccat.org **Cable length** 2m **Connection** USB **Keys** 123 **Backlight** Blue **Macro keys** 5 **Media keys** Yes **Price check** www.lambda-tek.com

The keyboard has long been the primary input device on the PC, so what can Roccat do to convince us the Isku is the finest example of button-pressing technology known to man? QWERTY boards were around long before the monolith was dropped on prehistoric man so its got quite a task on its hands in the innovation stakes, but, by Jove, I do believe it's managed it.

As well as being heavily laden with extra keys and media buttons there's also a little bonus feature for those of the Roccat faithful. It has recently released a piece of software called Roccat Talk, which enables different bits of its hardware to talk (clever name, eh?) to each other.

The perfect rodent partner for the Isku then is Roccat's own Kone[+] mouse. But what possible benefits could be had from having your mouse and board chatting away?

Shift unleashed

The key to this cross-peripheral chatter is the EasyShift[+] function it added to the Kone mouse a while ago. This is an alternative to spraying a gaming mouse with more buttons than even the great lord Cthulu could manage and means that by holding down a single button other functions can be assigned to each of the other buttons.

It's a simple solution, and works in the same way as the [Shift] key on a standard keyboard. The Isku also comes with EasyShift[+] functionality replacing the [Caps Lock] and gives secondary functions to all the keys in the 'EasyZone' of the keyboard. The EasyZone stretches across the numeric keys from 1 to 5 and the 15 keys directly below, and provides an extra 20 possible secondary functions surrounding the WSAD keys, which makes them easily within reach of your gaming claw of a hand. The EasyShift[+] button also transforms the five macro buttons down the left-hand side of the keyboard and the three 'Thumbster' buttons below the keyboard too.

That secondary functionality doesn't have to be another keypress; it can be a shortcut, a quicklaunch or a pre-recorded macro. To say the Isku is versatile really is doing it an injustice.

The real star of this setup though is that Roccat Talk software. Being able to have the EasyShift[+] button on either the Isku or an attached Kone mouse – controlling both devices – makes for even more versatility.

We opted to have the EasyShift[+] button controlled from the Kone mouse with the corresponding button on the keyboard turning on the EasyAim function. This instantly drops the DPI level to a pre-defined setting to allow for finer granularity when aiming in an FPS. There's also a ridiculously simple live macro recording button that guides you through the process vocally, even in-game. Though it does take a good long while to save those macros to memory. We had the keyboard playing *Trials 2*, aping our previous run with little success.

The versatility of the Isku means that for the online FPS guru and the MMO obsessive it's a great keyboard for both. It's also solidly built and responsive. The aesthetics may divide opinion, being rather angular and industrial, and the blue backlight isn't so easy on the eye in a bright office, but it's a board that pretty much has it all. ¤ **Dave James**

PCFormat Verdict

- Hugely versatile
- Easy to use
- Mouse connection
- Slightly dead key action

The Isku is excellent keyboard with some seriously innovative functionality.

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VITAL STATISTICS

Price £210 **Manufacturer** Creative **Web** uk.creative.com **Frequency range** 20Hz to 20KHz **Microphone** Noise-cancelling condenser **Interface** USB powered **Price check** uk.store.creative.com

A high-end gaming headset that works with a PC, Xbox 360 and PS3 is an attractive proposition, and Creative knows it. Taking the success of its *WoW* version and tweaking it substantially into the new Tactic 3D Omega headset, it's once again targeting the enthusiast gamer. With the Recon 3D sound and voice processor bundled into this package, we now have the luxury of gaming wirelessly and loading presets to them as well.

Though it looks like a particularly busy gaming mouse, the Recon 3D is actually the world's first quad-core sound processor. The upshot of that for the gamer is that it can handle THX TrueStudio sound with modified EQ and surround settings, separate your mic input stream and apply effects such as noise cancelling or voice warping without taxing your CPU.

Cos you're worth it?

When you consider the outlay for buying the headset or Recon 3D separately it's certainly a relief that the two can be purchased as a bundle for much less. At £180 the Tactic 3D Omega cans are Creative's priciest, and the Recon 3D alone is priced at £90.

The quality of the headset is undeniable and its price justified, but the generous bundle price gives the impression the Recon 3D is a bit overpriced on its own. Essentially, its value is determined by your demands. If you're into the cross-platform thing and likely to mess around with software sound settings, it's certainly a worthwhile addition.

We hinted at how damn good the headset is, so let's elaborate. Firstly, it's one of the most comfortable to have graced our ears. The leatherette ear contacts feel great, and despite its weight the Tactic 3D Omega treated our heads well through extended gaming sessions.

The surround effect is also very impressive. On one level, it's a nice extra layer of immersion to hear voices behind you, bullets flying past and a world of sound that exists not just at two points next to your ears, but all around you. On the next level, competitive gamers can turn that to their advantage using Scout Mode. Press this button on the Recon 3D, and it'll analyse every sound cue coming from the game engine and amplify those around you. In theory, that makes it trickier for people to sneak up on you and easier to track gunfire, though in our experience it wasn't the aural cheat code it might at first seem. In a competitive environment, you're best off leaving all settings vanilla. That's where we found the clearest sound that gave us the best spacial awareness.

Battery life is pretty good, too. Creative quotes about 10 hours at 50 per cent volume and we found nothing to the contrary. It's also physically sturdier than the *WoW* headset, this Omega revision replacing the plastic headband with a steel one.

Luxury cans

Across PS3, Xbox 360 and PC it's a luxurious package. An expensive package that appeals mainly to the enthusiast market. But there's plenty of hardware and software to play with for your money. We doubt the Recon 3D and its Scout Mode will make you a better gamer, but the surround effects and voice comm settings will immerse you in the soundscape and make you easie to understand. ¤ **Phil Iwaniuk**

PCFormat Verdict

- Comfy cans
- Great surround sound
- Enticing gaming features
- Enthusiast pricing

A great all-round wireless headset, allowing versatility and tweaking in abundance.

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£255/MINI PC

ZOTAC ZBOX NANO AD10 PLUS

As teenie tiny as the reason for its existence

VITAL STATISTICS

Price £255 **Manufacturer** Zotac **Web** www.zotac.com **CPU** AMD E-350 APU @ 1.6GHz **RAM** 2GB DDR3 **GPU** AMD Radeon HD 6310 **Storage** 320GB Samsung HDD **OS** None supplied **Price check** www.amazon.co.uk

Zotac has been the recent master of the small-form factor motherboard. We've seen H67 boards rocking the mini-ITX style, with the top-end Intel Z68 and AMD A75 chipsets getting the same sort of treatment. These boards all had something in common (aside from the scale); a surprising amount of serious functionality in a frankly silly size.

Now Zotac has turned its shrink ray on full devices and has created a PC with what has to be one of the smallest footprints ever. The Zbox is absolutely tiny. It's shorter than a Rubik's cube and smaller than a CD case. Ickle.

But in there you've got a full PC. Well, so long as your idea of a 'full PC' means something sans optical drive and you have no interest in doing anything beyond multimedia playback and some light web browsing.

The Zbox AD10 is a very basic machine, essentially with all the internal organs of a netbook, but without a screen. The archetypal 'nettop' then. But the nettop is largely becoming anachronistic in today's connected world. With more advanced media streamers hitting the market, capable of letting you browse the web and play online content, and TVs evolving with this functionality too, the low-powered mini PC doesn't really have a lot of tricks up its sleeve any more.

Granted this AMD Fusion-powered version is more capable than its Intel Atom-based brethren, but still the gulf in performance between the low-end chips and the proper desktop options is huge. And that gap doesn't shrink much with Fusion in the equation.

But if you're just talking about a small homework machine then the Zbox isn't a bad choice. That said a little netbook is going to give you more flexibility than something that has to be anchored to a desk and monitor full time.

Not a tiny price tag

There's also the fact that the £255 price tag is more like £325 when you factor in a functional OS. A Microsoft Windows installation is really your only option here – we tried getting Ubuntu to play nice but it would take many long, tiring, frustrating hours and a lot of command line tapping to get anywhere near a responsive machine.

When you're topping £300 you're straying into proper Windows 7 laptop prices. And if you're really interested in plugging it into your HDTV you'll be able to find one with a HDMI port I'm sure.

In short there's depressingly little to recommend the Zbox AD10 beyond the fact that it is a very, very small PC. It's not even particularly easy to set up either as the lack of optical drive makes installing Windows a little problematic. Especially seeing as you can't have anything plugged into the two USB 3.0 ports of the four ports that are available until there are Windows drivers installed. And as we've mentioned, Ubuntu despite coming happily on a USB stick, doesn't particularly like the hardware inside.

So as small as the Zbox undoubtedly is, functionally it's a little too late to the party. Your humble media streamer, and soon your TV, is going to be doing everything you'd realistically want this box to do. And will probably do it in a more intuitive way as well. ¤ **Dave James**

PCFormat Verdict

- So very small
- Fusion-powered
- Still very low-powered
- Lacks real functionality

For what it is it ain't bad, but sadly for Zotac we don't really need it any more.

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ANTEC KÜHLER H20 920

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VITAL STATISTICS

Price: £80 **Manufacturer** Antec **Web** store.antec.com **Socket** Intel LGA 775/1155/1156/1366, AMD AM2/ AM3/ AM2+/ AM3+ **Fans** 2x 120 mm **Fan speed** 700 – 2,400 RPM **Cooling** Solid copper base **Dimensions** 2x 120 mm x 25mm fans, 151 mm x 120 mm x 49 mm radiator **Price check** www.lambda-tek.com

Whether you're into your overclocking or simply determined to keep internal case temperatures to a minimum, we reckon a self-contained liquid cooling kit like this Antec offering is your best bet at the moment if you're prepared to pay a bit extra.

Or maybe a lot extra. The 920 is pricier than some like Antec's own £40 620, and the difference between this kit and entry-level liquid cooling is subtle. But that's often the way with enthusiast gear – some people will always be willing to pay top dollar for that extra one per cent.

That's not to say the difference is that slim between the 620 and 920. There are two 120mm fans to strap to the radiator, one keeping the aluminium corrugation cool before the hot liquid arrives, one on the other side to chuck it out of your case. These fans hook up to the pump, which hooks up to a spare USB controller on your motherboard. That lets you control the fan speeds via a software layer once you get to Windows.

Ready, set… blow!

It all sounds a bit like last month's Corsair H100, doesn't it? Well, there are some key differences. Corsair's radiator is twice as long, which makes it compatible with only certain cases, and rather than using a software layer, fan speed's adjusted by either pressing a button on the pump itself, or hooking it up to Corsair Link, which monitors temps all around your case. The two liquid cooling kits are roughly the same price, though we did manage to find the Corsair H100 for £76 at the time of writing.

It's not quite a straight performance standoff between the two, though. As the Corsair stands limber and ready to draw its pistols, the Kühler H20 920 struggles to get its six shooters out of its holsters. And by that opaque metaphor, we obviously mean that Antec's bracket design lets this kit down. Quite simply, it's a pain in the perineum to fit, especially in light of the H100's effortless bracket design.

After the swearing dies down and the H20 920 is fitted, the results are pretty agreeable. We're especially impressed by its low load temperature with the fans running at 100 per cent, and the swift load to idle recovery time of around 12 seconds.

However, the Corsair H100 is much more effective in reducing idle temps, as the benchmarks illustrate.

Fine tuning

The bundled software allows you to create and customise your own profiles, telling the cooler at which temperature you want it to hit a certain fan speed, allowing for some really fine tuning. The default profile has some problems, though. We found the load to idle temperature recovery time took… well it just never really recovered. We stopped counting after four minutes.

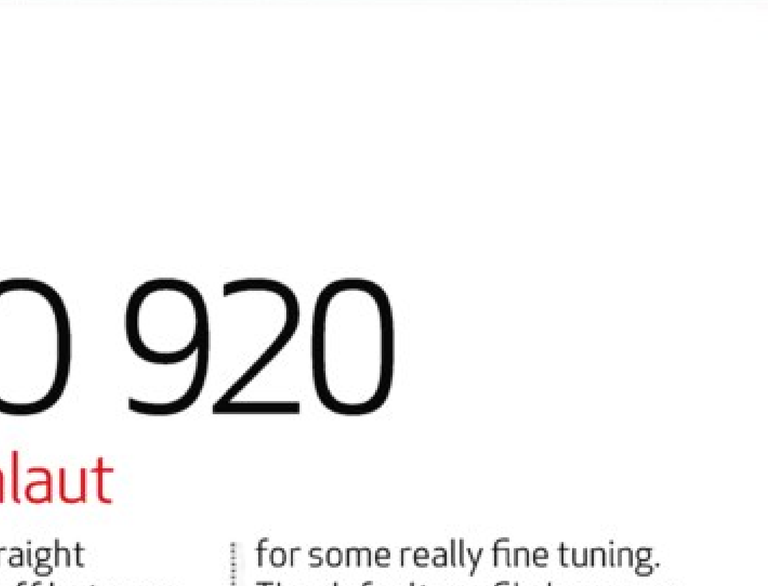
The H20 920 isn't nearly as effective at slower fan speeds, and bearing in mind there's a fairly deafening 54dB buzz when full blown, it's food for thought.

Once you've spent the time creating your perfect profile, the H20 920 is a very effective cooler, and if your chassis won't fit the Corsair H100's giant radiator, this setup from Antec will see you right. **Phil Iwaniuk**

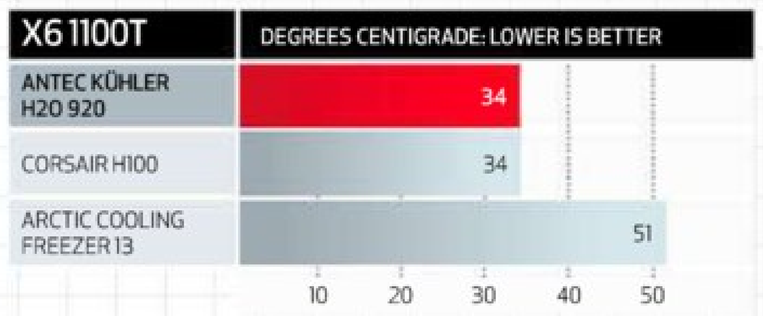
Technical analysis

Run the H20 920 as fast as it'll go and performance is to die for. Even at max settings though we couldn't push the Phenom II 1100T any further than with the H100. Its cooling against a classic air chiller, like the Freezer 13, shows off the advantage of a liquid cooling kit.

Idle temperature performance



Load temperature performance



PCFormat Verdict

- Great load temperatures
- Highly tweakable software
- Underwhelming idle temps
- Ungraceful fitting mechanism

Average idle temps can't undo good work in the load temp and tweaking departments.

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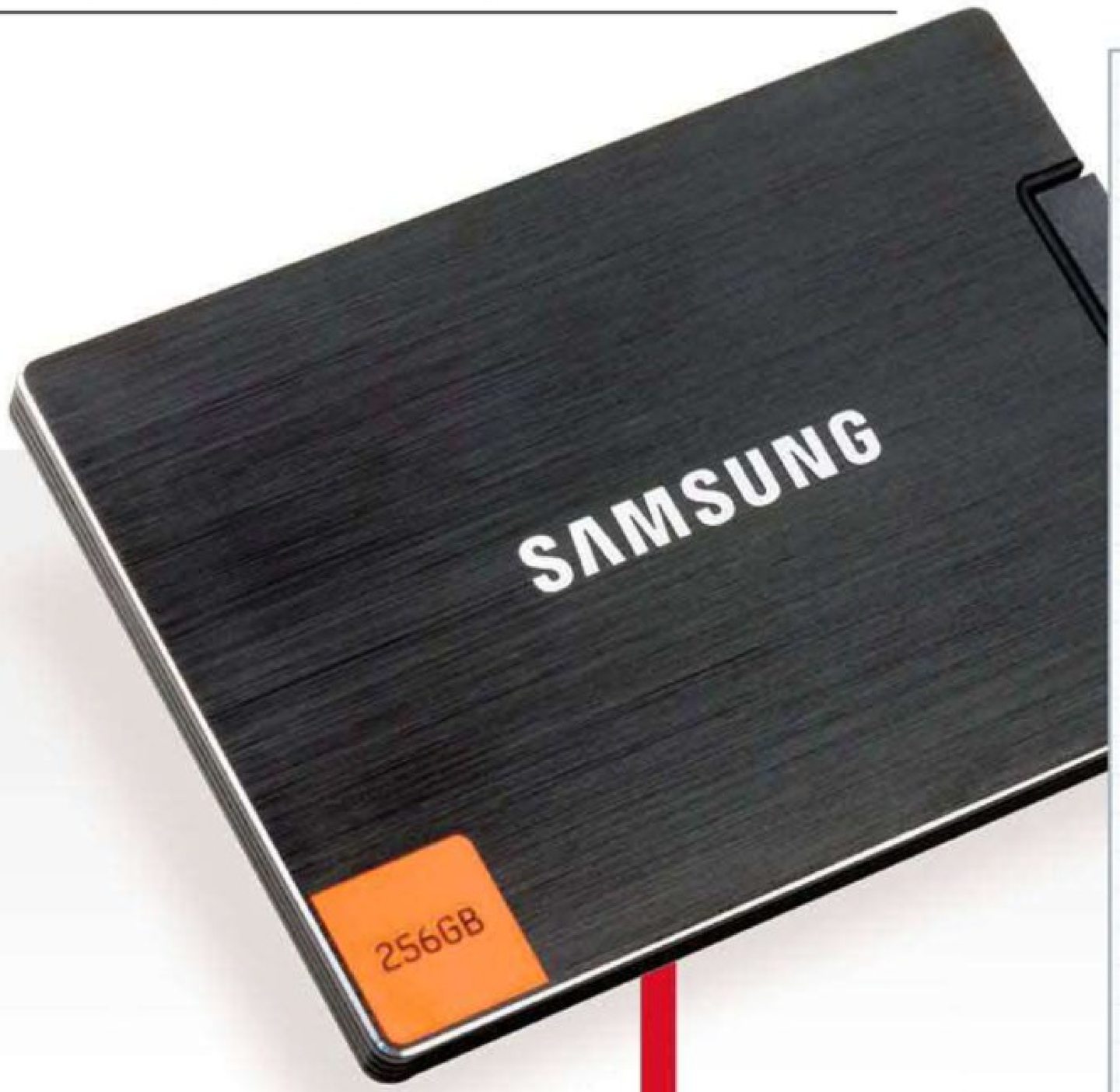


£350/SSD

SAMSUNG SSD 830

OEM reliability arrives for consumer-class drives

VITAL STATISTICS

Price £350 **Manufacturer** Samsung **Web** www.samsung.com **Capacity** 256 GB **Type** 25nm Toggle MLC **Controller** ARM9 MCX **Peak read/write** 549 MB/s/407 MB/s write **Price check** www.techradar.com/reviews

Samsung is overshadowed a bit by the likes of Corsair, OCZ and Kingston in the high performance SSD market. The latter companies opted for the SandForce controller in their drives and have hit perpetually impressive sequential read/write performance levels with each new generation, which makes them the go-to guys right now for enthusiast storage.

It's not like Samsung is a newcomer to the market, far from it. Its OEM dealings with industry giant Apple contribute to a 26 per cent market share in SSDs across consumer and OEM sectors. The Korean powerhouse was also heavily involved in the early days of the SSD, providing reference designs which others have built their drives around.

Unlike the competition, the SSD 830's controller, DRAM and NAND are all designed and built by Samsung itself. That's surely advantageous when writing the firmware – if each component is built to get along with the others from the initial design phase, firmware can really zero in on performance and reliability.

It's the latter that Samsung is emphasising with this drive. Performance levels in the benchmarks we ran fell short of leading drives, but were impressive when dealing with incompressible data, which we'll cover later. Without reliability though, these performance levels don't mean much.

SSD reliability is also the toughest aspect to get to grips with in a review. It's something that can be judged over months and years, not weeks. Samsung's own test results show a 64-year lifespan for the SSD 830 with 10GB written onto it each day, or 16 years with a rather improbable 40GB daily write. Those are really encouraging figures, and it's relieving to see reliability emphasized so heavily in a product type that hasn't always enjoyed the best track record.

Media mover

The drive's firmware, which can be kept up to date by Samsung's Magician software, employs some nifty wear-levelling to avoid wearing out blocks by writing to the same areas over and over. The firmware also runs a Sudden Power Off Recovery algorithm to prevent data loss if there's a power cut.

Sadly, we won't be able to see the fruits of these features until after a few months of heavy use, but early signs look encouraging and Samsung's pedigree in enterprise drives and extended OEM relationship with super-fussy Apple are good to keep in mind if you're looking for a dependable drive.

What we can talk about is performance. Read speeds of 549MB/s for compressible data just about keeps up with the quickest drives on the market, but the write speed of 407MB/s falls back considerably.

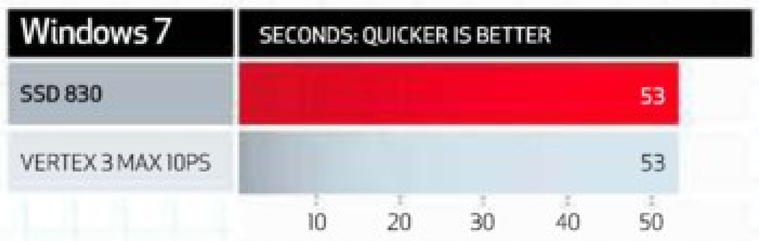
However, the SSD 830 shines when dealing with incompressible (already compressed) data like media files. It's the Achilles heel of the SandForce controller, but not Samsung's three core ARM9 controller which hits almost double the incompressible write speeds of competitors.

The SSD 830 isn't the quickest drive all round, but deals well with incompressible data, boasts high IOPS and random read/write performance, and it's well priced. If it's as reliable as it looks, this is a fine drive. ¤ **Phil Iwaniuk**

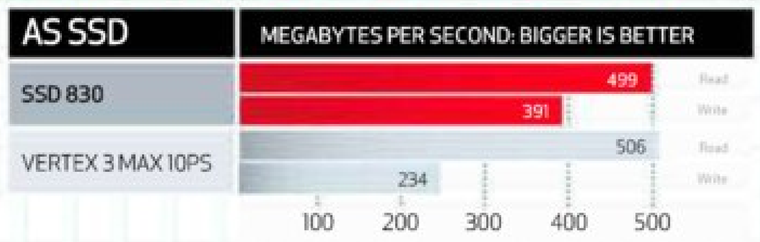
Technical analysis

Industry leaders like OCZ's Vertex 3 make mincemeat of the SSD 830 in read performance and compressible writes, but if you move tons of media files around, you'll notice the SSD 830's superior incompressible writes. The triple-core ARM9 controller is also a pro at multithreaded 4K random write performance.

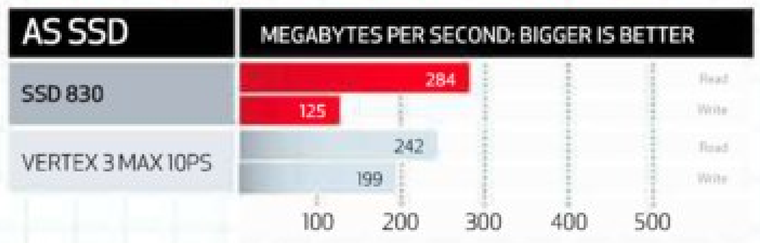
Boot time performance



Sequential read/write (incompressible)



Multi-threaded 4K random read/write



PCFormat Verdict

- Reliability emphasised
- Great incompressible writes
- Sleek design
- Down on performance vs competitors

A strong consumer-level effort from Samsung, but not the quickest drive around.

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This is one well-built keyboard. Mionix says it's 'rage proof', but we say forget the puny hands of frustrated gamers – the Zibal 60 looks like it could survive an assault from an angry freight vehicle.

It has an impressive spec too. Keyboard geeks will be familiar with the high travel and satisfying clickiness of black Cherry MX key switches. We're not sure if it would make the difference between pwning and being pwned, but it sure feels purty on the fingers.

Illuminating

Each key is individually illuminated, which we prefer to backlighting and the strange feeling it gives us of a creepy glowing realm hidden just behind the keys. Maybe *PCF* has just watched Poltergeist one too many times. Actually, that probably explains why we NEVER LET CHILDREN AND TVs IN THE SAME ROOM EVER. You can cycle between lighting just the WSAD keys and the full keyboard, too.

Extruding from the magnificent girth of the Zibal 60's braided cable are two USB connectors: audio in and mic in, which let you connect a gaming headset to your keyboard rather than trail it round to your case, and stick a USB drive in there too, for laughs. This isn't an innovation, but we certainly expect this box ticked for a keyboard this expensive and some boards use a USB 1.1 hub instead of the 2.0 hub here.

Using the same Mionix 'action key' you can also access media and volume controls. It keeps the keyboard neat and compact, and at least part of its appeal to us is that at first glance it looks not unlike a bog-standard Dell workstation keyboard – it's the subtlety that impresses.

Our only gripe is the flimsy palm rest – ours arrived a bit broken and it doesn't look as 'rage proof' as the board itself. Other than that, it's the board of champions. ¤ **Phil Iwaniuk**

PCFormat Verdict

- Solid build quality
- Cherry MX keyswitches
- Responsive
- Flimsy palm rest

A compact and well lit keyboard boasting great build quality, palm rest aside.

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£50/HEADSET

SONY DR-GA200

Price £50 **Manufacturer** Sony
Web www.sony.co.uk
Price check www.lambda-tek.com

Bearing a striking resemblance to a garment *Mass Effect*'s Shepherd might wear to keep his ears from getting nippy, this DR-GA200 gaming headset from Sony certainly makes a visual statement. Beauty is in the eye of the beholder, but we're pretty taken with the visual design.

It's a design we've seen before in the more expensive DR-GA500 package. In fact, it's the exact same headset as far as we can tell. The GA500 costs more because it comes with a sleek black box that allows Dolby Pro Logic setups for console users, and compresses audio feeds like the passive aggressive tones of American *Team Fortress 2* players, which is extremely welcome.

So the GA200 is just the headset, sans sleek black box, or 'digital surround processor' in Sony's parlance. On paper, a good idea. We thought the GA500 was a bit overpriced, and didn't cater for gamer's needs as well as its competitors.

Hard to justify

We also thought the headset was rather uncomfortable. Yes, the same headset we're talking about in this £50 package. It's fairly light but the discomfort comes down to the earphone material. It feels not unlike having your ears gently rubbed by a dry sponge. A softer fabric or even leatherette finish would help.

Mic quality is acceptable but the mic arm adjustments are limited on account of it being so tiny. The cheaper DR-GA100, priced at £30, has a more adjustable mic arm and its simple design makes for a more comfortable experience.

Not that you'll suffer any notable cranial malady; Sony simply made such a strong product with the DR-GA100 that this pricier model has a tough time justifying itself. ¤ **Phil Iwaniuk**

PCFormat Verdict 76

StoreKeeper.com

£67/GAMING MOUSE

STEELSERIES SENSEI

Price £67 **Manufacturer** SteelSeries
Web steelseries.com
Price check www.lambda-tek.com

Ambidextrous gaming mice are rare and precious things. Southpaws enjoy games just as much as real people, and they're often overlooked by mouse manufacturers as they are too busy welding a telephone keypad to the side of their latest MMO mouse. Not so SteelSeries. The Sensei loves lefties, and its symmetry makes it look less hideous than most gaming rodents.

One caveat of its sleek design is that there aren't a lot of buttons to play with, but we think the four-side buttons are enough for most shooters and strategy games. We're less enthusiastic about the lights. First, why put an LED display on the mouse's underside? You can import 128 x 32 bitmaps and have your mouse say 'boobs' on its underside if you so desire. The mouse wheel and palm motif lights can also be programmed to any RGB colour you like, but on a more practical level, you can adjust the polling rate and dpi, and set a low-sensitivity mode for each game, which is swappable by a button press.

There are plenty of pro gamer shots on the Sensei's packaging suggesting its audience, but we doubt many pros would be like the Sensei's weight and glide. It's comfortable, sure, but an aluminium chassis would have helped and even with all its customisation options, this doesn't feel like a £67 mouse. ¤ **Phil Iwaniuk**

PCFormat Verdict 74

£85/GAMING MOUSE

CYBORG R.A.T. 7 ALBINO ED

Price £85 **Manufacturer** Mad Catz **Web** www.madcatz.com
Price check www.gamingzap.com

The Cyborg range of gaming peripherals has had a chequered past. We've seen some ropey gaming keyboards, with action so dead you'd be forgiven for thinking you were prodding Alan Turing himself, and some finger-crampingly bad gaming mice too. Until the Cyborg R.A.T..

Looking less like the Microsoft Sidewinder/Vader's Codpiece and more like a deconstructed laboratory prototype, the R.A.T. is one of the most accomplished and comfortable mice we've ever clasped. Being able to manually adjust a surprising number of the R.A.T's constituent parts means you can tailor it to your hand. So long as you're right-handed, that is.

Along with the new colour scheme there's a new sensor which will go up to 6,400dpi compared to the 5,600dpi limit of the standard R.A.T.

So it's still the same great mouse we previously loved, only with an increased dpi limit and a funky new skin. And as aesthetically-pleasing as the white seems, those buttons are going to get grubby after a few intense gaming sessions.

But if you want a great mouse spawned by GLaDOS, then the Albino Edition might be worth the £85 to you. For anyone with a standard R.A.T feeling a twinge of jealousy though, remember you can pick up Tipp-Ex for a quid. ¤ **DJ**

PCFormat Verdict 85

More dots

This latest version of the R.A.T. the Albino Edition, comes in a rather pleasing white with black and grey detailing. It's not just a change in colour scheme, which is just as well considering you can pick up the vanilla R.A.T. 7 for £15 less.

£95/CHASSIS

ANTEC SOLO II

Price £95 **Manufacturer** Antec
Web www.antec.com
Price check www.ginger6.com

Antec has a strong pedigree in low to mid-range, no-nonsense cases but as price tags increase in the case market, competition gets fierce. CoolerMaster, Corsair, Lian Li et al offer all kinds of fanciful cases brimming with extras and lurid gaming trim to the enthusiast with a hundred quid or more in their eager hand.

That's not to say cases like Antec's LAN Boy Air don't cut it with other high- end cases, it's just that traditionally its speciality lies with quiet home PC, workstation or entry level gaming cases. The Solo II jumps through all these hoops: it is indeed quiet, visually sombre enough to stick in an office and capacious enough to fit a meaty gaming graphics card. But hold on… £95?

It looks like a £50 case, to be brutally honest. The front panel is a little wobbly, the PSU mounting's at the top of the case, and there's just one 120mm rear case fan. You know – like in 2005. Those wouldn't be major criticisms if the price wasn't as high as it is, but at the £100 mark, it's miles behind others such as Corsair's 600T and CoolerMaster's HAF X. Admittedly, the ground it loses is mostly in gaming and heat management terms. But these are the attributes that expensive cases justify their price tags by.

The Solo II's big enough to build a really high-spec PC inside and comes with a hole in the backplate for quickly swapping coolers, but that's where the enthusiast stuff ends. What's more, a beefy GTX 580 or the like is noisy enough to negate the sound dampening, so why would you choose this case over a thoroughbred gaming chassis? You wouldn't. And if you wanted a workstation or basic home PC case, you'd get one that didn't cost nearly a hundred quid and did all the same things as this. ¤ **Phil Iwaniuk**

PCFormat Verdict 59

Tech Porn

Performance kit laid bare

Jam-packed with techy goodness but pleasantly cable-free environment

PALICOMP PHEONIX INFERNO REDLINE

Palicomp has been working pretty hard to create the ultimate gaming PC, and with the Pheonix Inferno Redline it has done a mighty fine job. This £4,200 rig is possibly the fastest thing we've had tied down to our test bench. Tied down because it might just lift off with the number of cooling fans attached to this behemoth of gaming excellence. No corner has been cut in the makeup of the base unit and no punch pulled.

The key to the Palicomp machine's awesome gaming prowess is the pair of GTX 590s in SLI strapped together inside it's fairly unassuming chassis. This quad-GPU, quad-SLI setup is kept honest by an intricate water-cooling array. As well as chilling the various chips on display it also helps keep the noise down.

The classic Intel Core i7 2600K CPU is also very much in evidence, and accompanied by the Z68 motherboard is clocked at a healthy 4.9GHz. But that's not all: you've also got a massive 12GB DDR3 RAM, 4TB of HDD storage with a 240GB OCZ Vertex 3 SSD as a boot drive. There's also a handy temperature monitoring box on the front sitting pretty above a Blu-ray player and Blu-ray rewriter. And it's all finished in scorching red for that extreme feel… ¤ **Dave James**

pcformat.techradar.com/blog

STYLE POINTS

1 RAMMING SPEED!
Not content with having 6GB of GDDR5 graphics memory split between the pair of GTX 590s, Palicomp has also seen fit to jam a full 16GB of Corsair DDR3 memory in there, running at a speedy 1,866MHz.

2 COOLING OFF
The red tubes full of life-giving liquid may look all sci-fi, but they're more than just an aesthetic addtion. Having a pair of GTX 590s with air-cooling in the machine would've created more heat and noise than Concorde. Probably.

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Release: StoreMags & FantaMag

Palicomp Pheonix Inferno Redline

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Intel Ivy Bridge

The third generation of Intel's Core architecture is on its way. Dave James talks to the engineers to find out why you should care

The second generation processors, codenamed Sandy Bridge, were a pretty big step for Intel's Core architecture. It was the tock of Intel's infamous tick-tock development cycle, representing a brand new architecture on the same 32nm transistors as the Westmere microarchitecture.

Ivy Bridge, then, is the resulting tick, the die-shrink of that newer, more powerful technology. But Intel is not necessarily referring to Ivy Bridge as a tick, oh no, this time it's calling it a tick plus. So what is it about this new process and processor that's getting Intel all excited and creating yet more terms for its silicon?

What stays the same?

Well, it's still the same style of CPU and GPU combo that made Intel's Sandy Bridge such an impressive wee beastie in the first place.

"Sandy Bridge was a pretty major platform repartitioning with a lot of things integrated on die. We retained a lot of the goodness that Sandy Bridge brought forward," said Varghese George, chief architect for Ivy Bridge, at this year's Intel Developer Forum in San Francisco.

There will be a similar set of product offerings, along the same lines as Sandy Bridge, in terms of SKUs, so we can expect the same sort of processor line up in terms of i3, i5 and i7 variants. Not forgetting the only real overclockable chips, the K-series.

Ivy Bridge also retains the same Ring architecture that brings the CPU and GPU components together on die and unfortunately puts a limit on the overclocking side.

So it's still going to be a case of upping the multipliers and not the bus speed. And only then if you've got one of the unlocked K-series chips in the first place.

It's also retained the same socket configuration, making it backward compatible with the previous generation.

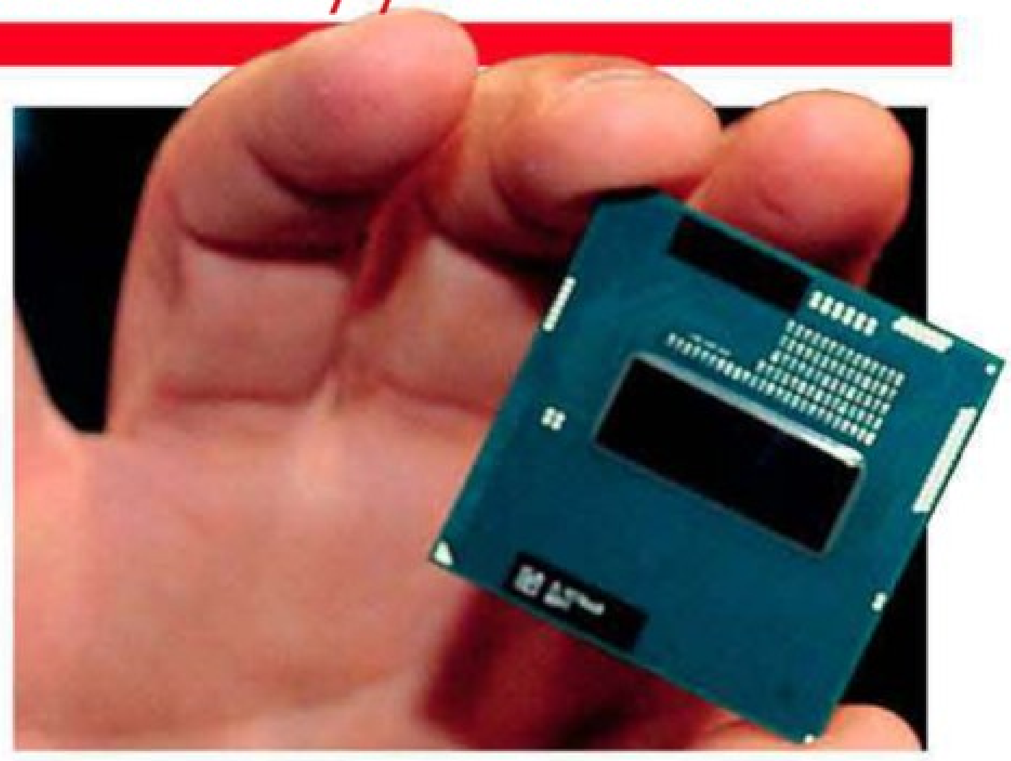
Ideally, that should mean any ol' Sandy Bridge mobo will be compatible with this new chip. That may not necessarily work in practice for all Intel 6-series motherboards, even with a firmware update, but that remains to be seen.

There have been rumours circulating that some UEFI boards will need to have their BIOS chips completely cleared, something you supposedly cannot do with boards sporting only a single BIOS chip. There will also be a new, high-end chipset to accompany Ivy Bridge, the Z77. Details about those boards are still scarce, though.

What gets changed?

Well, actually quite a lot. For a start the entire processor, including the GPU part, will be manufactured on the 22nm production process. That means higher performance and lower power.

Combined with the lower power coming from the tighter lithography, thanks mostly to those much-vaunted Tri-gate transistors, there's also a bunch of new power management goodies to go with it.



Big things are expected of Intel's next CPU family, big things indeed

The main crux of this is the scalable feature set, including a configurable Thermal Design Point (TDP) and Low Power Mode.

These two are mainly to help OEMs design more scalable systems around the same architecture.

For example they will be able to set a system up using three separate TDPs: 'TDP Up', Nominal and 'TDP Down'. If the machine in question has a lower thermal envelope, then using the chip in the lower power state will save on super-heated chips.

Interestingly Intel has also incorporated more overclocking goodness into Ivy Bridge. You still have the locked multiplier/K-series divide, but on the unlocked chips there is now

Playing catchup

Intel's looking to pass AMD's onboard graphics power within two years

When AMD released its Llano APU with a powerful DX11 graphics core built into the processor, it threw down the gauntlet to Intel. Sandy Bridge was Intel's riposte and improved hugely upon its previous integrated graphics. But it still had nowhere near the graphical grunt of its AMD rivals.

Tom Piazza, Senior Fellow at Intel and graphics guru, introduced the new modular system of the Ivy Bridge graphics component at IDF.

Compared to Sandy Bridge, it's a major shift. Not only has it upped the shader count noticeably, it's also coming out with DirectX 11 support including all the Compute Shader and Tessellation goodness that involves.

When asked what that meant regarding the gap in integrated graphics performance with its AMD Llano-shaped rivals, Piazza was bullish about Intel's chances. "We're going to keep our foot on the gas pedal," he said. "I expect that gap, from everything I've seen, is closing fast. I see no reason why it won't close all the way and maybe you'll be asking the other guys that question in a year or two. At least I hope so!"

Intel is definitely taking the graphics side of its chips far more seriously now, especially in terms of gaming.

It's admitted that it's spending more and more time interacting with games devs in the design process of its hardware.

"The vigour of that is going up," said Piazza.

Both Nvidia and AMD spend a lot of time with the games developers, now Intel is making sure it's not missing out on their expertise.

Store.kagg.com

14nm-based chips on their way for 2013?

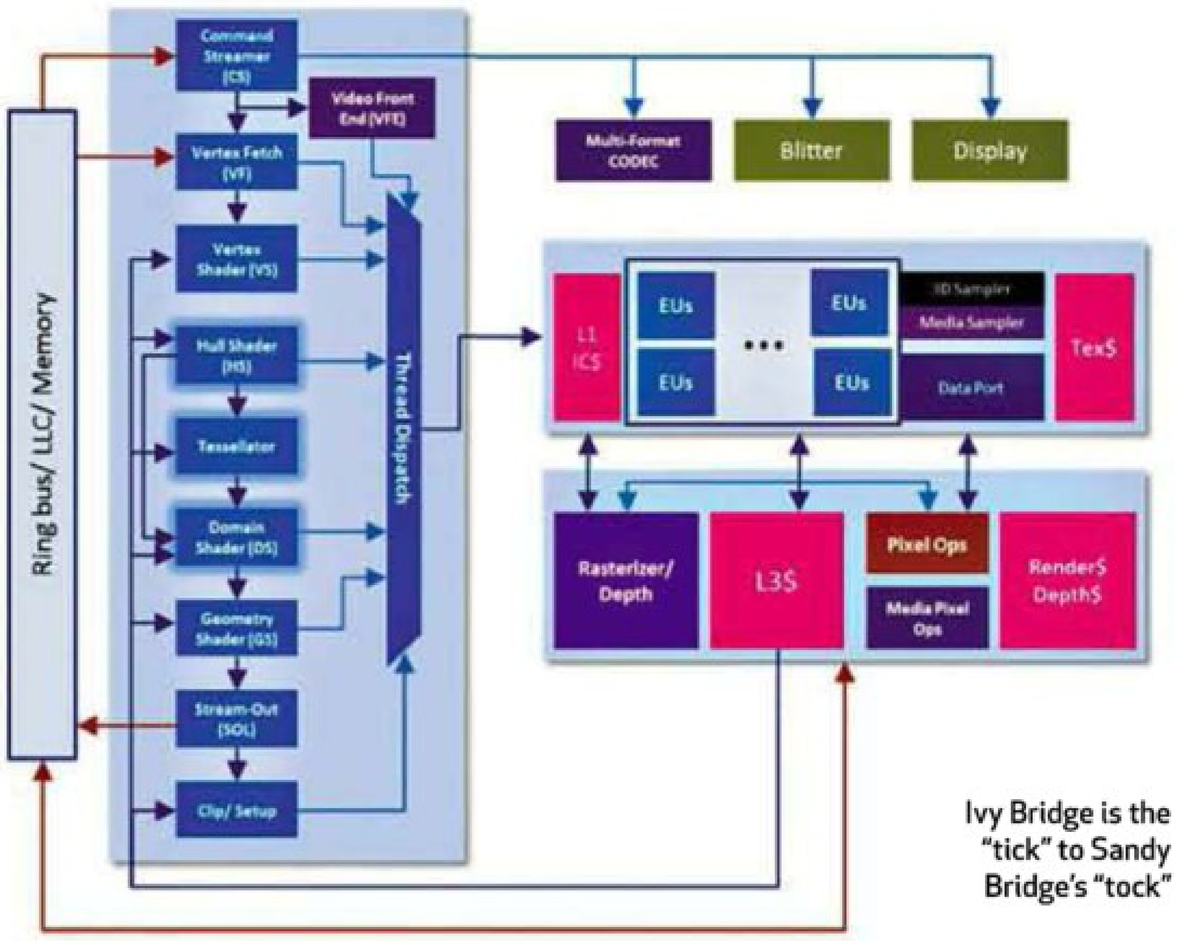
Intel is "well into development"

In 2012 we will see the launch of the Ivy Bridge platform. The Haswell platform will follow in 2013 using the same 22nm process. Haswell will be the successor to Ivy Bridge, the tock to Ivy Bridge's tick in Intel's infamous tick-tock processor development model.

Beyond this Paul Ottelini, Intel's CEO, was keen to point out that it was not sitting on its laurels and was committed to keeping Moore's Law continuing. "Moore's Law is not a scientific principle, rather it's an observation of the pace of human innovation," he said. "The world needs Moore's Law to continue."

"Intel is committed to make this happen. We already have line of sight to our 14nm technology. We are well into development of this technology and are beginning to build and tool our factories to support it."

If things continue as Intel expects we should see the die-shrink of the Haswell platform from 22nm to 14nm to happen sometime in the middle of 2013, and it's reported to be code-named Broadwell.



Ivy Bridge is the "tick" to Sandy Bridge's "tock"

The big change for Ivy Bridge, though, is in the graphics core on board. Where the CPU component follows perfectly on the tick tock Intel development model, with the simpler die-shrink tick following the more in-depth architectural revamp tock, the GPU part is being characterised as a 'tick plus'.

The new HD graphics in Ivy Bridge represents far more than just a die-shrink down to 22nm.

Because of the introduction of DirectX 11 support the whole GPU has effectively been redesigned. With the latest graphical API demands, Intel has had to incorporate both Tessellation engines and Compute shaders into the mix.

THE WHOLE GPU HAS BEEN REDESIGNED TO MEET THE LATEST GRAPHICAL DEMANDS

With this redesign comes a far more modular GPU design, allowing the HD graphics of Ivy Bridge to be far more closely tailored to the individual SKUs. With Sandy Bridge desktop part you had two options, either the HD 2000 in the standard chips or the HD 3000 in the K-series alone. That's changed now, with Intel assuring us there will be lower power Ivy Bridge processors with the high-end Ivy Bridge graphics core on board. So it will no longer purely be the domain of the top chips in the family.

On Sandy Bridge there was more of a disconnect with only the top-end K-series chips boasting the top-end graphics. Yes, those CPUs that will more than likely be paired with a discrete card anyway.

increased maximum ratio support, moving the bar from x57 up to x63.

It has also introduced more dynamic overclocking, allowing the ratio to be changed on the fly without the need to reboot the machine.

This lends itself perfectly then to the application-based overclocking tools over the good ol' BIOS.

Memory

On the memory side things have changed, with much more granularity involved in adjusting your DRAM's frequency. Where once you had to shift the speed of your memory in 266MHz increments you can now move in 200MHz jumps. That small change could mean a lot in OC terms.

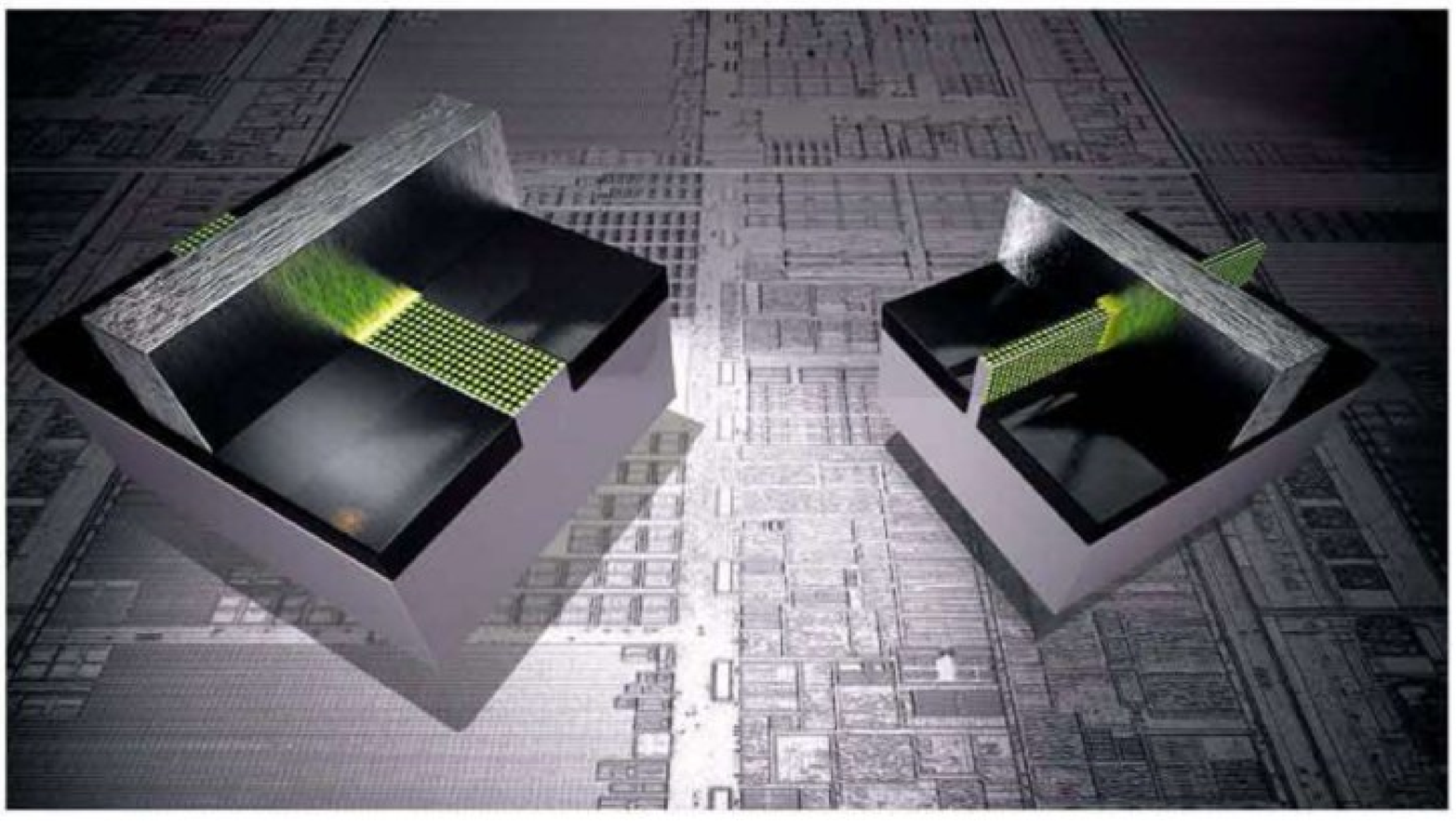
Cache in the bank

The Ivy Bridge GPU also comes with its own L3 cache. This means the graphics side of the processor will no longer have to keep calling on the shared cache of the CPU side.

But it's not just in the technicalities that things have changed on the graphics side: performance is apparently well up.

"Don't be surprised if the performance is significantly higher," said Intel Senior Fellow and grumpy graphics guru, Tom Piazza. Unfortunately Piazza wasn't able to talk numbers with the chip still six months or so away, but he did confirm to us that both the QuickSync video and 3D gaming performance were very much on the rise.

So things are looking impressive for Intel's next, next chip. After all, we've got the seriously high-performance Sandy Bridge Extreme parts coming in a month or two to whet our appetite.



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GAME DOWNLOAD SERVICES

Steam is dominating digital download distribution, but it's facing some increasingly tough competition. Can any of them measure up, asks Henry Winchester?

Ten years ago, the mere suggestion of downloading a game digitally would have left most PC gamers aghast. "What of my phone bill!?" "Won't the Boutique of Electronics close down as a result!?" "Who is this Horatio chap, and what does he want with my daughter?"

Fortunately, we soon got out of the early-millennial way of thinking and accepted digital downloads as the way forwards. As with all other shifts in the games industry, the PC led where others will surely follow. Digital distribution platforms, such as Steam, basically nabbed the iTunes model and applied it to gaming. Very successfully.

We've actually reached a point where physical media is becoming less and less relevant. Physical copies of recent games such as *Deus Ex: Human Revolution* and *Modern Warfare: Black Ops* have merely been containers for a Steam code and a bit of data, the rest of which is downloaded online. The opinion seems to be that the majority of PC gamers don't care about boxed goods, and would rather be able to play their games on the day they're released than have to wait around with a Gregg's pasty waiting for their local branch of GAME to open.

In turn, every other platform is getting in on the digital download malarkey. It seems that neither the PlayStation Network or the Xbox Live Arcade were quite ready for just how massive digital downloads would be, and the tiny file size limit (350mb on Xbox Live, last time we checked) has stopped console downloads being as big as the PC.

Rival providers

In the meantime, the PC is still the best platform for digital downloads, and there are a fair few contenders to Valve's crown. The most important is likely to be EA's Origin, which is playing host to the company's upcoming uber-blockbuster, *Battlefield 3*. In fact, the war game won't be enjoying a Steam release at all, although it will be available on a few other digital distribution platforms.

We've rounded up five of the biggest and most interesting platforms, and given them a run for their money in terms of download speeds, design, and content. We've left out more specialist services such as Good Old Games and Blizzard's Battle.net as the titles on these sites often aren't available anywhere else, which would hardly make for a fair comparison.

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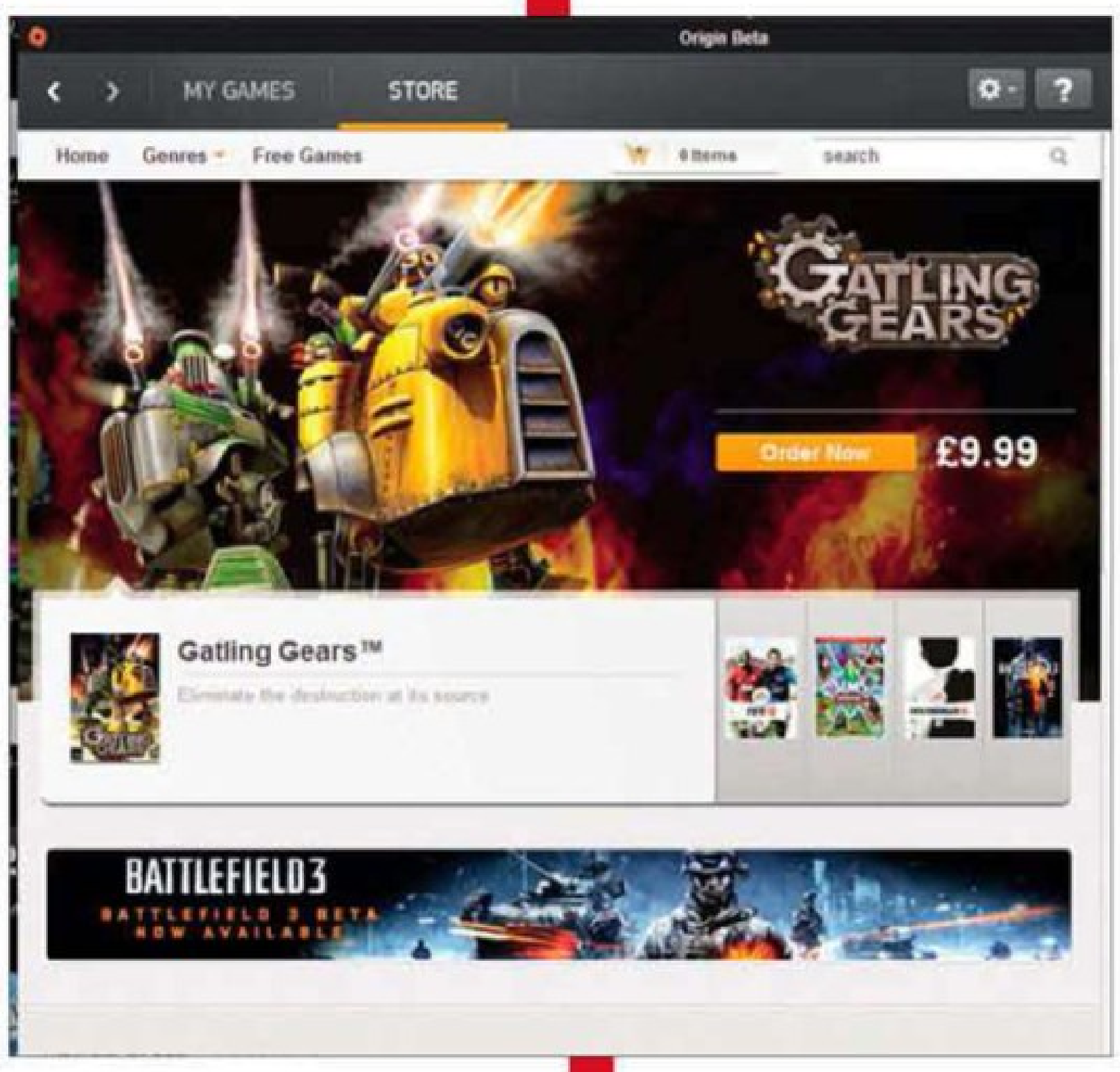
Software Roundup

FREE/EA



FREE/VALVE

Steam

store.steampowered.com

The original game download service, launched by Valve in 2004. The decision to release *Half-Life 2* on the service in 2005 saw PC gamers downloading Steam en masse, and subsequent releases saw it expand in popularity. Forbes estimates that 50-70 per cent of PC gaming's $4billion income comes through Steam.

It's not without its problems, though. If you haven't set Steam to offline mode, and find yourself without an internet connection, you won't be able to access any of your games. Plus it occupies a shady area of UK distance selling regulations, which state that you're allowed seven days to try out products bought online – Steam doesn't offer refunds.

With an apparent 70 percent cut for big publishers who get their games on Steam, it's an attractive option. DRM for Valve and some third-party titles is supplied via Steamworks, with publishers able to stick other forms of protection on top of their games. The latter can prove to be a bit of a nightmare, especially if it's *Fallout 3*'s Games for Windows Live or *GTA IV*'s Social Club.

Valve has absolutely nailed the user experience. Everyone who plays PC games has Steam, and its chat and social features are second-to-none. However, surprisingly, we found our download speeds lagged a little. There's also no incentive program to keep you coming back, and Steam keys can now be sold by third-party sites.

Steam has set the high water mark for PC game download services, and it has also sneaked onto the PlayStation 3 and Mac. It's also got a humongous catalogue of 3,710 games – but it's going to face some tough competition as other publishers cash in on digital revenue.

PCFormat Verdict

- Incredibly popular
- Strong features
- Lots of games
- A tad scary

The number one game download service, Steam ticks all the right boxes.

90

Origin

store.origin.com

EA's brand-spanking-new web store is rather like its old one, only with an original name. It's aiming to match its "leading competitor [read: Steam] by 2012", and it – somewhat unsurprisingly – only stocks EA titles. Even though it's still in its nascent stages, Origin is fairly fully formed.

But Origin has stirred controversy recently – particularly when it comes to its relationship with Steam.

The decision to make *Battlefield 3* an Origin-exclusive seemingly didn't go down too well with Valve, and *Crysis 2* has been pulled from Steam – although EA believes this to be a mere coincidence.

The plot thickens when you realise that Valve and EA have a mutually beneficial relationship – the manufacture and distribution of Valve's boxed products is silently handled by EA.

Easy to use

As a client, Origin is nicely laid-out and easy to use. The games seem generally cheaper than on Steam, too with *Dead Space 2* costing £19.99 on Steam and £14.99 on Origin. Download speeds are solidly impressive, and the fact that you don't have to go through the Origin layer to access your games is a boon to anyone who likes gaming on the move.

EA has big plans for Origin, such as an iPhone version and potential cross-compatibility across upcoming consoles. It's still got a long way to go before it can compete with Steam, but it's slick and smooth enough to be a serious contender.

Battlefield 3 will either define or sink it, and our money's firmly on the former – at the end of the day, most gamers aren't going to worry too much about where their game comes from, as long as they can play it.

PCFormat Verdict

- Slick
- Low prices
- Limited selection of games
- Dodgy Valve shenanigans

Still in its nascent stages, but it's the biggest threat Steam is likely to have.

85

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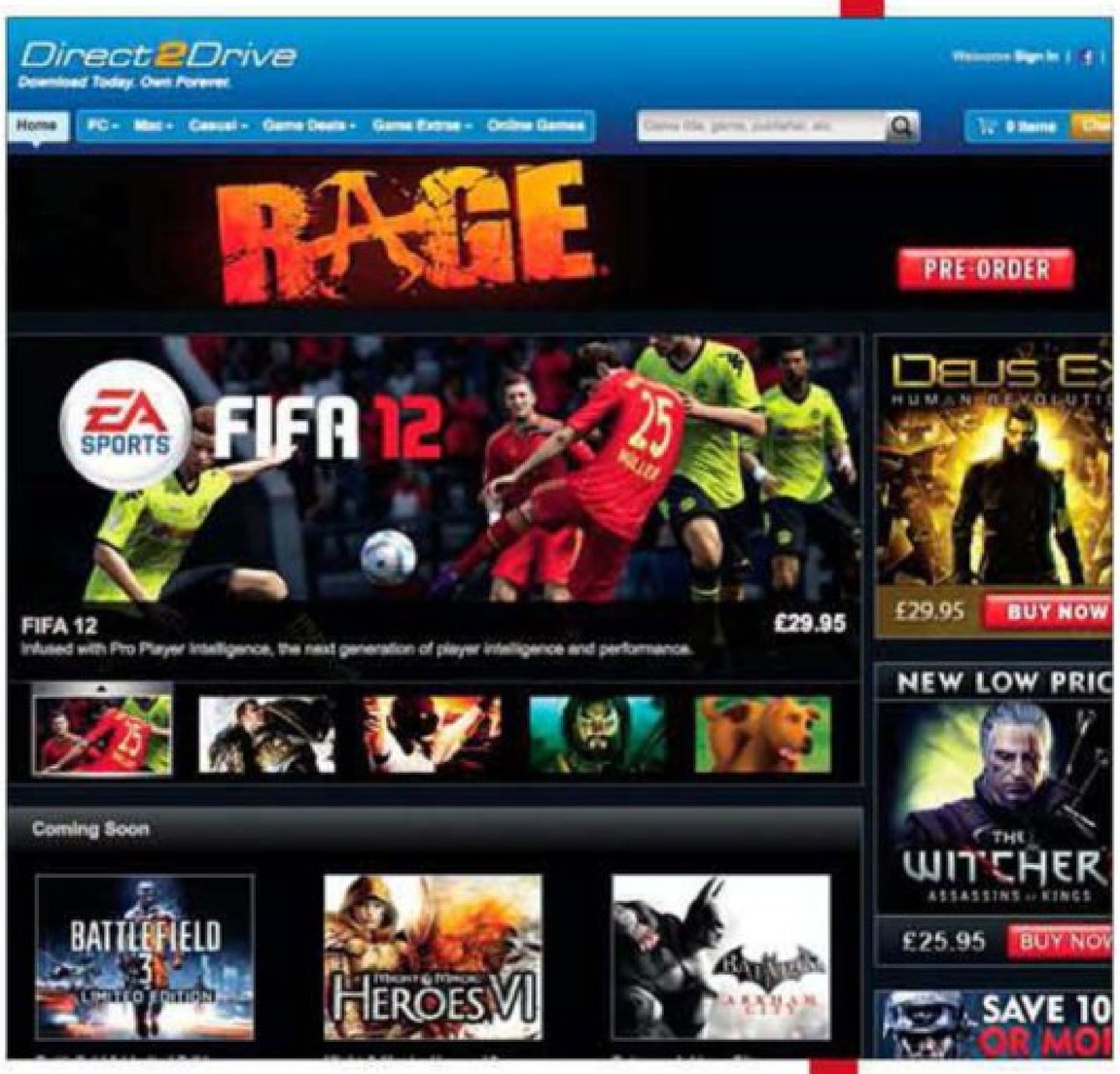
FREE/DIRECT2DRIVE



Direct2Drive

www.direct2drive.co.uk

Started originally by IGN, Direct2Drive has recently been purchased by US game rental service Gamefly. Gamefly itself is launching an online rental service soon, so Direct2Drive has been slightly neglected, but it's still an interesting online game shop.

Direct2Drive doesn't have a client as such, instead it installs a basic "shop" which redirects to the website, as well as GameSpy Comrade for online matchmaking and chats.

Hotchpotch

It's a slightly hotchpotch system, but it just about works. With over 1,500 titles, its catalogue isn't lacking, although we had problems getting a decent download speed.

Some titles – such as *Deus Ex: Human Revolution* – simply consist of a Steam key to get the game, which is a tad annoying. Unlike Steam, most games simply require a one-time activation to get them working, so there's no fretting about being offline. The downside is that many titles use the infamously draconian Securom DRM, but apparently the support team will send out more access codes if you run out.

There's some other goodness, too. Direct2Drive promises to price-match any game you've bought if you find it on a competitor's site for cheaper. It will also refund your game if you request your money back within a reasonable amount of time, and haven't activated the title.

Direct2Drive is definitely due an overhaul, though, and hopefully Gamefly's ownership will give it the lick of paint it so desperately needs. If Gamefly can also bring its rental program – which gives you unlimited games for a monthly fee – to the UK, it could be the unique selling point it needs to muscle in on Steam, Gaikai and Onlive.

PCFormat Verdict

- Many games
- Good support policies
- Poorly designed
- Securom

A bit behind the times, but Gamefly's ownership could breathe new life into it.

78

FREE/GREEN MAN GAMING

Green Man Gaming

www.greenmangaming.com

Probably the most interesting and innovative service in our round-up, Green Man Gaming is a British start-up. On the surface, it looks like any other download service, and to some extent it pretty much is. Where the Green Man stands out is in its trade-in policy.

Although a trade-in system may seem a tad odd on digital products, it does actually work. If a game gets the go-ahead from publishers, it's listed and sold through Green Man Gaming's site. You can download and play the game to your heart's content, but if you get bored, or just don't like it, you can trade it in for a certain value – usually about 25% of the price you paid for it. Bigger games don't feature the trade-in system, but you can still put your credits towards them.

Prices on Green Man Gaming fluctuate, and getting good prices is almost a game in itself – one user invested just 4p at the site's start, and now has £30 of credit for the site. Green Man Gaming reckons that, in essence, you're spending less money to get more games.

Although the range is currently a little sparse, it's an interesting paradigm for online gaming, especially in these days of wallet-watching credit crunches. Its Capsule software is a little clunky, and its slightly esoteric shopping system may go over the heads of some users.

Underdog

The site's success lies on people using it, and more trade-ins make it better for everyone. If it takes off, it could well prove to be an underdog challenger to Steam's throne – unless Steam decides to nab the trade-in system for itself.

PCFormat Verdict

- Utterly unique
- Great value for money
- Great for indie gaming
- Not many games

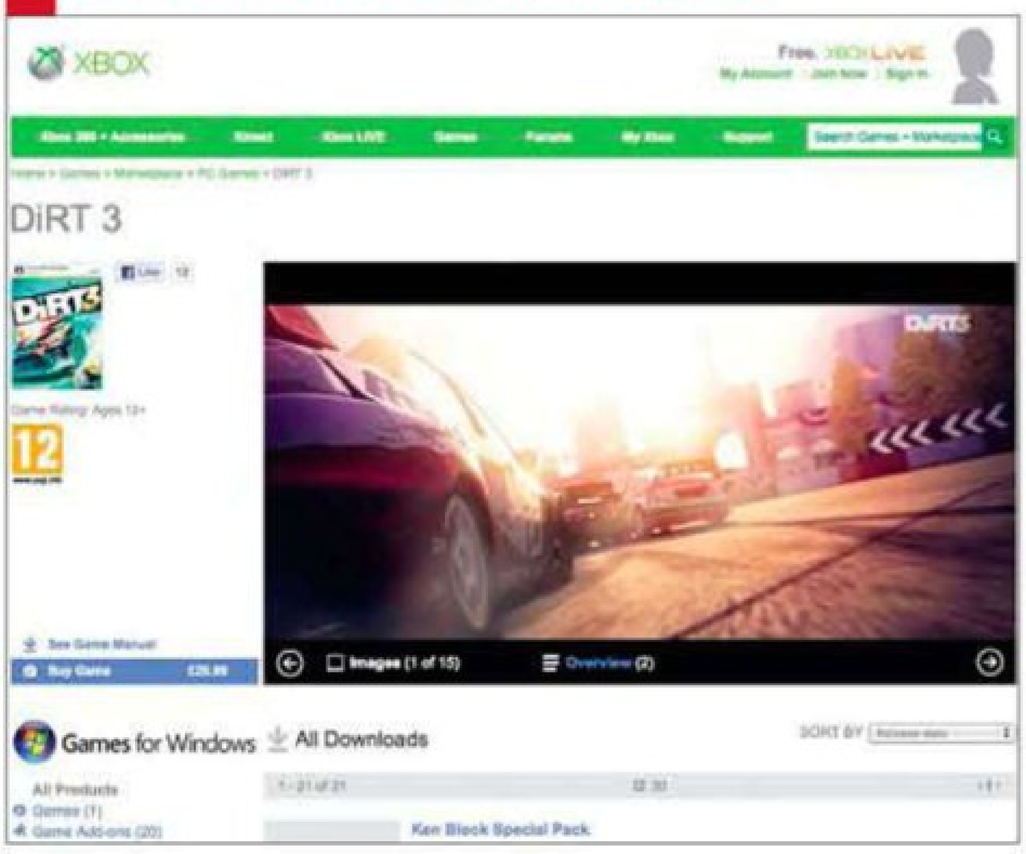
A site that aims to sell games differently, and it's great for trying those indie games.

89

FREE/MICROSOFT

GAMES FOR WINDOWS MARKETPLACE

www.xbox.com/Live/PC



Microsoft has beaten around the bush with its Games for Windows Live platform for ages now, and seems to have finally decided to integrate it with its Xbox portal. This could be part of some grand plan for the next Xbox console, but at the moment it's in a no-man's land of games services.

Like it or not, you've probably already got Games for Windows installed if you've got *Dirt 3* or *Dead Rising 2* – even if you bought them via Steam. It feels a tad sneaky, and the sheer number of hoops you've got to go through to get games running makes for some major ball-aches. DLC is similarly ineffective, and we still have nightmares about getting the add-ons for *Fallout 3* working.

Limited releases

The Games for Windows Marketplace catalogue currently stands at a pitiful 166 titles. Among these you'll find the triple-AAA likes of *Dirt 3* and *Bioshock 2*, but recent releases have been thin on the ground. It obviously works well enough for some publishers: Codemasters has released *F1 2011* via Games for Windows Marketplace. It makes sense for Microsoft's own games: *Fable 3* and *Age of Empires* are there too.

Microsoft clearly still has a vested interest in PC gaming, what with it owning that whole Windows thing. Games for Windows Live does look rather spiffing; the MSN-style messenger and wholly-cribbed-from-Xbox achievements system work well. However, right now it seems to be more of a promotion for the Xbox as a gaming platform than a fully-fledged service.

PCFormat Verdict

- Some nice features
- Unnecessarily complex
- Not at all PC-oriented
- Slightly neglected

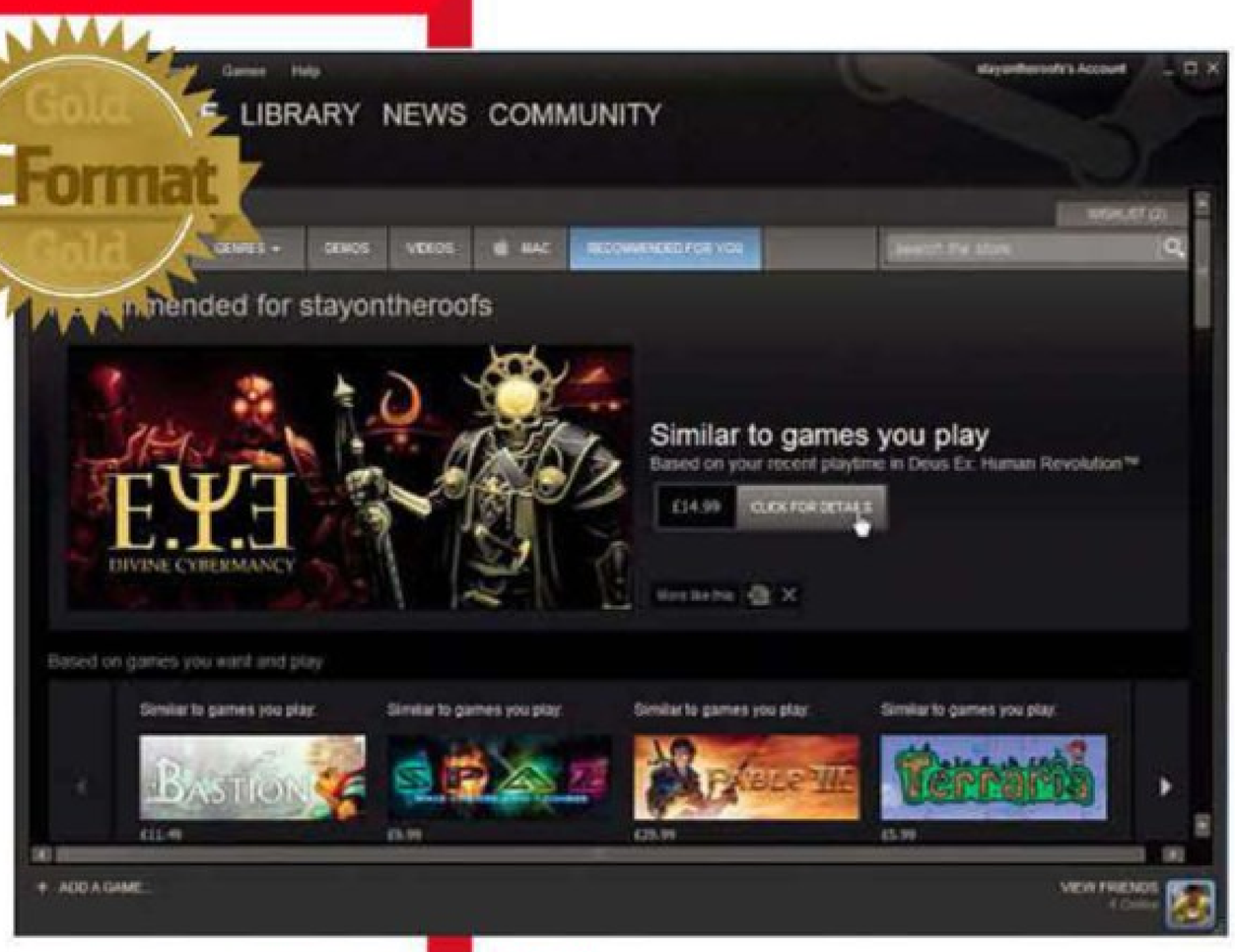
The Windows Vista of game download services. It'll be good once it's finished.

58

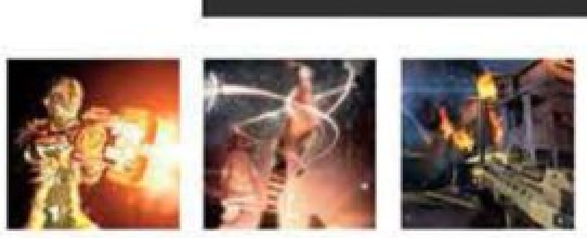
AND THE WINNER IS... STEAM

With Green Man Gaming coming a close second. On paper, Steam ticks all the right boxes, with decent download speeds, a huge catalogue of games, and a straightforward user interface. There's also the fact that just about every PC gamer on the planet uses it, and it's established itself in the very bedrock of gaming.

But Steam is only our number one for the moment. In the coming months, especially with the release of *Battlefield 3*, there could be some rather huge shifts in gaming clients, and the way we use them. Each service we looked at has its own unique selling point, from Origin's cross-platform mechanics to Games for Windows Live's apparent integration with the upcoming Windows 8. Steam might never be toppled, but it could see a sizable share of its user base migrate to other platforms.



Above Steam is our No.1 for now, but things may soon change



Game download service	Download speed (MB/sec)	Number of games	Price Dead Space 2	Price Fable 3	Price FEAR 3
Steam	1.35	3,710	£19.99	29.99	29.99
Origin	2.1	300+	£14.95	N/A	N/A
Direct2Drive	1.15	1,507	£14.95	£29.95	£29.95
Green Man Gaming	1.16	517	N/A	N/A	£24.99
Microsoft GFWL	1.16	166	N/A	£8.74	N/A

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RIG BUILDER

Whether you're upgrading your PC or starting anew, this is the best kit

One of the joys of owning a PC is that you can upgrade it as you go. Need higher frame rates in games? Drop in a newer graphics card. More power elsewhere? Grab a new processor or go for that old favourite: a memory boost. There's a wealth of upgrades that can transform your machine, and you can upgrade slowly over time to suit your budget, so you rarely have to suffer a sluggish rig for long. Every now and then the best possible upgrade is to throw your current rig out the window and start afresh; build a whole new machine from scratch.

What sort of machine should you build, though? Which items are important? Which work together well? How much should you be budgeting for? That's a lot of questions, and to get the right answers means having to go and research all the current trends in order to make the right decision. Before you do that though, take a look to the right. You'll discover that we've taken the hard work out of the equation and presented you with three machines that fit three different budgets.

Importantly, each one of these machines is DirectX 11 capable and, as such, will form the basis of a rig that will last you for years. The more you spend now, the longer it will last in terms of system requirements for tomorrow's games, but generally any of these machines will see you covered for a fair while. Happy building!

Dave James

BUDGET £444

When every pound counts, you need to spend it wisely

MOTHERBOARD £70
Asus M4A785TD-M Evo

AMD's 785G chipset is where the sensible money is at, and this ASUS mATX board ticks our boxes. DDR3 and AM3 support as standard make it a platform that's easy to upgrade too.

CPU £65
AMD Phenom II 550 BE

You could go quad-core, but you're better served by picking this speedy fella for gaming. Belting along at 3.1GHz, the two cores can handle serious computing.

MEMORY £17
Kingston 2x 1GB 1600 DDR3

Memory pricing has fallen enough to finally affect DDR3, making it a great time to pick up a pair of sticks. If you're going 64-bit, we'd recommend getting 4GB these days.

GRAPHICS CARD £118
XFX Radeon HD 6850

The fact that you can pick up a card this powerful for under £120 is testament to the stunning value that can be had right now. Such a card will last.

HARD DRIVE £30
Hitachi 320GB Deskstar

The more you spend on your hard drive, the more space you'll get. Simple really, but we'd suggest this is as small as you go. It's great value for money, and is a speedy little blighter too.

POWER SUPPLY £16
Storm 500W LPJ19-25

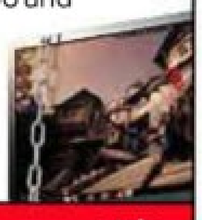
If you go down the DX10 route, you may get away with using the power supply in the CIT case, but otherwise you should grab one of these. If your budget will stretch to it, go for a big-name PSU.

CHASSIS £15
CIT 1010B Chassis

We'll admit this isn't the sexiest case ever, but it gets the job done and certainly doesn't look as cheap as it is. You get front-mounted USB ports and a PSU into the bargain as well.

SCREEN £99
BenQ G2220HD

This 21.5-inch panel has a native resolution of 1,920 x 1,080 and looks stunning on any desk and is an absolute bargain. It's just as good for gaming as it is at playing movies.



OPTICAL £14
LG GH22LS50 DVD-RW

It's hardly the sexiest component, but until games and OSes come on USB sticks, this is your best option to get your rig up and running.

CPU COOLER N/A
AMD Stock Cooler

Coolers make a big difference for tweaking the nuts off high-end CPUs, but the standard one that comes with the OEM processor is just fine for this rig.

HOW TO...
BUY A MOTHERBOARD

The motherboard is possibly one of the least sexy components in your PC. The processor you drop into it does all the serious number-crunching, while the graphics card is responsible for throwing all the pretties around your lovely, high-res monitor.

But it's the facilitator. Your motherboard is what enables your processor to do what it does best, and to its fullest capabilities. Likewise the graphics card can only throw polygons around so long as the slot it's plugged into can cope.

With so much of the traditional mobo tech going on-die with the CPU there is getting to be little difference in performance between the high and low-end boards. The difference then is generally in the feature set.

Does it have the latest in USB 3.0 or SATA 6Gbps I/O? Does it have multiple PCI-e slots? Can it make you breakfast in the morning? The real performance difference though comes from how well they cope with overclocking. The pricier the mobo the more solid its components will be and the more you can push your chosen chips.

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MAINSTREAM £915

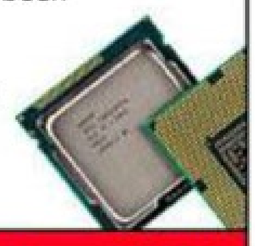
You don't have to spend a fortune to get a stunning rig

MOTHERBOARD £95
ASRock Z68 Pro3

You don't have to spend a fortune to pick up Intel's latest Z68 chipset. This ASRock may only have a single PCI-e slot, but it's got serious performance chops.

CPU £155
Intel Core i5 2500K

It may have only just been released, but Intel's Sandy Bridge has instantly impressed us. The Core i5, in particular, offers stunning value.



MEMORY £57
Corsair Vengeance 8GB

This pair of 4GB sticks will give you all the performance you could ever want at a price that's easy to swallow. It'll only take up two slots in the board allowing for future upgrades too.

GRAPHICS CARD £199
XFX Radeon HD 6950 2GB

The Radeon HD 6950 is a serious slice of gaming graphics prowess at a game-changing price. This is currently the card that all others are judged against.

STORAGE £82
OCZ Agility 3 60GB

Prices continue to tumble at this end of the SSD market, and less than a ton will get you a 60GB drive to play with. Grab a 1TB drive for £40 while you're at it.

POWER SUPPLY £47
OCZ ModXStream Pro

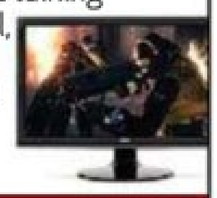
If you want to build a performance machine, you're going to need a powerful PSU. This 500W baby will power this rig with extra to spare. It's quiet, too.

CHASSIS £55
Cooler Master CM690

The CM690 eschews silly gimmicks in favour of producing a no-nonsense chassis that has plenty of cooling options for your mainstream rig. There's space aplenty inside and all at a reasonable price.

SCREEN £164
BenQ EW2420

When you're looking at sub-£200 24-inch monitors you're talking about a TN display. Well, no longer as BenQ's EW2420 delivers on all fronts with a VA Panel and LED backlighting.



KEYBOARD £37
Microsoft Sidewinder X6

The Sidewinder X6 looks great and is as good for gaming as it is typing. It has a detachable numpad, which can be affixed either side, and boasts live macro recording too.

CPU COOLER £24
Gelid Tranquillo

The Tranquillo offers everything we expect from a CPU cooler. It has power enough to keep your chip cool, while quiet enough not to annoy. It's also wonderfully affordable, which always helps.

HIGH-END £3,664

If you really want to treat yourself, this is how to do it

MOTHERBOARD £256
Asus Rampage III Extreme

Quite possibly overkill even for this high-end rig, the raw overclocking power and great feature list make this a mobo not to miss. It will give the six-core 990 plenty of space to impress.

CPU £775
Intel Core i7 990X

With twelve logical cores in total, Intel's fastest premium processor packs the sort of punch that would make server-level chips weep. This is what dreams are made of.

MEMORY £91
Corsair Vengeance 12GB

Corsair's recently launched series of memory modules is solid, reliable, capacious and above all rather well-priced. At 12GB it's all the RAM you'll need for a while.

GRAPHICS CARD £686
NVIDIA GTX 580 SLI

The fastest single-GPU graphics card in the world does lag behind new dualies, but grab a pair of em 580s and its simply the fastest thing on two GPUs.

HARD DRIVE £388
OCZ 240GB Vertex 3

OCZ was the first to hit us up with the uncompromising raw power of the SandForce 2281 SSD controller, and the Vertex 3 is still the top choice for us.

POWER SUPPLY £162
CM Silent Pro Gold 1000W

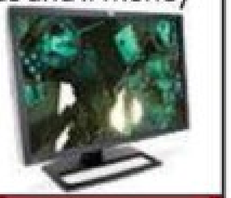
Cooler Master continues to impress with its power supply units, and this wonderful box of tricks recently scooped our gold award in our exacting test in *PCF*246.

CHASSIS £132
Coolermaster HAF X

The HAF X has blown us away this month. King of the High Air Flow series, this chassis has everything you could possibly want from a top-end gaming case.

SCREEN £1,015
HP ZR30W 30-inch

HP's 30-incher is exactly what high-end gaming means to us and if money really is no object, this is the screen to buy. You'll need those twin GTX 580s to power it, though.



KEYBOARD £104
Logitech G19

The G15 still stands out as one of the most important keyboards ever made, and its successor shifts everything up a notch. Yes, it's a lot of cash, but this is a lot of keyboard for your money.

CPU COOLER £55
Prolimatech Genesis

Prolimatech's latest cooler may seem like a backwards step in all its air-cooling glory, but with a funky design and space for extra fans it outperforms the rest.

Fileplanet.com

Storekaga.com

LOCK IT OR LOSE IT

21ST CENTURY SECURITY IS GETTING SERIOUS. IT'S TIME TO LOCK DOWN YOUR LAPTOP, YOUR GAMING ACCOUNTS AND YOUR WINDOWS LOG-IN WITH UNCRACKABLE PASSWORDS

Hacking is portrayed in movies and computer games as no more complex than hammering away at random on a Microsoft keyboard, clicking on a couple of glowing icons and checking the 'give me the highest level of security' checkbox. Of course, we know this isn't really how it's done. We know it's silly. Even so, the bitter truth is that accounts are regularly hacked, money is stolen and laptops are grabbed on a daily basis.

The reality is, much of this activity is less to do with hacking and more to do with stolen password credentials siphoned off by keyloggers or unprotected server logs. Couple this with lax security on behalf of the user and the ability of criminal gangs to reach around the world using the web, and you're looking at opportunistic attacks on people's accounts based on weak or guessable passwords.

Alongside basic social engineering that can trick people into installing malware, social networks are gold mines of valuable information that enable nasty types to sidestep authentication questions, such as your date of birth, mother's maiden name or favourite pet. Just as annoyingly, someone could physically just run off with your laptop.

Of course, we're not here to *Daily Mail* you into a state of terror such that you never turn on your PC again. It's not an apocalyptic task: there's simply a mix of human failings, a general feature creep associated with the internet, and a lagging of technology to keep up with.

What we'll show you here is how new password technologies promise to make internet accounts nearly unhackable, while encryption technologies can invisibly lock down local accounts and data.

So, even if someone has hacked your PC or stolen your laptop, the accounts you access online and the data stored on it will remain secure.

Many services you already use and many you don't are starting to either offer these new secure systems as an option, or are already moving people to them. Once you discover the extra security that is available out there, you'll start to demand such protection from all of your services. From online gaming and bank accounts to Windows log-on and general file storage, it's a lot easier than you think to be safe. Time to start locking down everything you have…

Illustration: **Paul Blachford**

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Protected gaming

SCUMBAGS ARE OUT TO HIJACK YOUR GAMING ACCOUNT – WE REVEAL THE BEST WAYS TO KEEP IT SAFE

Above Two-factor authentication can help protect your *WoW* account

Analogies are both useful and idiotic in equal measure, but they enable our feeble human brains to more easily conceptualise complex scenarios in a simplified sound-bite. Considering it's those same feeble human brains that cause half the security issues we're talking about, analogies away…

Imagine a world where people can easily copy your front door key, just by watching you use it a few times. Or where people only use a few base front-door keys, so someone trying to break into your house could just guess which key you happen to be using. On top of that, you're using the same front-door key for your car, to open your safe and to get into work. Why are you being so lax with your key? Protect it!

This is exactly what you're doing when you use the same passwords to log into *WoW*, Steam, Origin, Google, PayPal, your bank, Windows, that forum you can't talk about – the list goes on. Worst-case scenario is using 'password' as a password or the favourite – as revealed by surveys – '123456'.

There are tricks and tactics for making stronger static passwords, and we're going to look at those over the page. But no matter how long, how complex, how impossible to guess a password is, a static password is always vulnerable to many types of attack. Putting aside brute-force attacks and other hacks, there are still malware keyloggers, someone watching you, a social engineering attack or someone finding a post-it note that has the password written on it.

Adding factors

These types of regular breaches have made services – usually where money is involved – look at ways to strengthen the password, aka user authentication. This area of security is known as multi-factor, or more commonly two-factor, authentication and refers to the user having to prove who they are in two or more ways. The traditional static password is a single-factor system: enter your user name, prove who you are with a secret password and you're in. The glaringly obvious flaw is if an attacker can learn the password – through fair means or foul – they can gain unfettered access to the account.

A two-factor approach requires the usual user name and static password as the first factor, but then an additional authentication factor that is one of three things: something you have, like a device, something you are, such as a fingerprint, or something you know,

Steam Guard

Turn on Steam Guard, it won't hurt

Steam has beefed up its security around accounts and log-in procedures, but doesn't require any additional authentication devices. So how secure is that? We've talked a lot about one-time passwords and two-factor authentication: as it turns out Steam Guard is a two-factor system, but the second factor is your PC, which is something you have. Using a combination of hardware configuration, if Steam detects someone attempting to log into your account on an unauthorised system, a OTP is emailed to your nominated email account, which then must be entered before Steam allows access.

This enhances security as it requires the attacker to have additional information, including knowing what email account you use, plus the user name and password for that. As long as you're not using the same Steam and email password, security is enhanced though the reliance on a personal email to deliver any necessary OTP is the weakness in the system.

As with most of these systems, Steam Guard is entirely optional, at least at this stage. It can also be turned on or off and enables you to de-authorise all other computers than the one you're currently using. This does provide a good level of flexibility, as it's something you can enable when you know you'll be travelling away from home. Once you get back, just in case anyone was trying to hijack accounts, you're able to deliberately deauthorise all the systems you've used.

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Better *WoW*, that's protected

Secure your *WoW* account with an authenticator

1 Security upgrade

Quickly to Battle.net! You should see on the left an Account Security heading; click the Manage Security Options link. Blizzard offers two options: a paid-for key-fob or a free phone-based app. The latter supports Android, iPhone/iPad, BlackBerry and Windows Phone 7. So get downloading!

2 Be verified

Click Attach Authenticator and if it's not already you'll need to first verify your current email as being valid. At this point you'll need to turn to your phone and start setting the Battle.net app up correctly. It'll provide you with a key and a passcode that are entered into Battle.net.

3 Get gaming

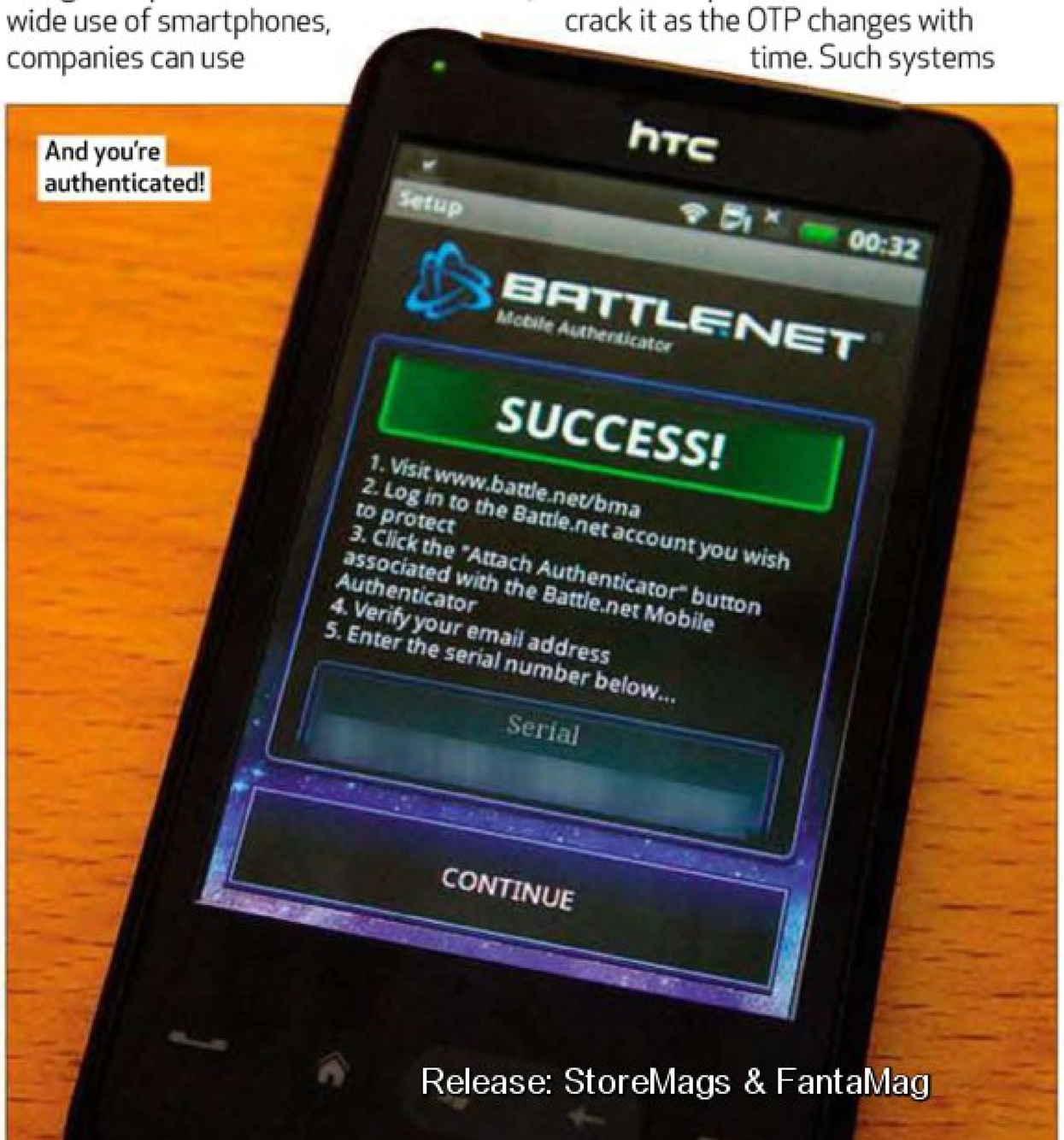
And you're done. The phone app and your account are now linked. The app produces time-based codes that correlate to when you have to log into your *WoW* account. Without the phone with the correct key, you won't be able to log into the account. So it's as safe as houses.

such as a further pin or other challenge response. The solution most companies are opting for is the first, something you have, and they use it to supply what is known as a one-time password (OTP). These are passwords that are used just the once. The whole system hinges on passwords being generated on the fly using a cryptographic algorithm; these can be time-based, part of a pseudo-random sequence or based on a supplied random code.

Smarten up

The genius part of this is that with the wide use of smartphones, companies can use your mobile as the second-factor, delivering the one-time password (OTP) via an SMS, email, push-message or a dedicated app. Generally this makes it easy for both you and the company to implement the OTP system. Setting up such a secure system is easy: you register, a secret key is sent to your phone and from then on only your phone will be able to generate the correct one-time password. As you can imagine, even if someone has your user name and standard password without the device they will never be able to log in. It's not even possible to brute-force crack it as the OTP changes with time. Such systems have already been rolled out by quite a number of high-profile online services – usually as an optional secure system but often with banks as a mandatory system – such as Google, Facebook, Blizzard with *World of Warcraft*, PayPal and HSBC, to name just a few.

Once in place, you'll always need the addition of the OTP supplied via your phone or whatever verification device has been supplied.



Jargon explained

Out-of-band
You might come across this term in security circles in conjunction with multi-factor authentication. It refers to using two distinct forms of communication to perform the authentication. So one band would be the internet, the other could be SMS and the mobile phone networks.

Downsides

Of course there are downsides to this. If you're stuck without your verification device then no access for you. In the case of your mobile phone this would be less likely as it's something you'll carry around with you. However if the OTP is delivered live and you're in an area with no signal, again no OTP for you. Many systems use a locally generated code so signal is not a problem. What is a problem is if your phone is stolen or lost. Systems are in place for dealing with that, but again these can weaken what would be otherwise a secure system. There are also middle-man attacks that use social manipulation to extract the OTP from the user, under the guise of a system test, for example.

Even so, the window of opportunity for an attacker to exploit vulnerabilities in the system are massively reduced, down to having to steal the authentication device, trick you into handing over a live OTP or subvert the recovery process that usually triggers a warning message being sent to your email account and authentication device.

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Windows and passwords

DON'T LET A WEAK PASSWORD BE THE WAY IN TO YOUR SYSTEM FOR THE BAD GUYS

The security benefits from a two-factor authentication system are unquestionable: for online accounts that can be attacked by anyone with internet access, the extra protection is making more and more sense. But what about your home PC? In a way that already has two factors, the first being the bricks and mortar that surround it. Before you can even log in, you have to get through the front door.

Even so, many people run their Windows installation with no log-in password or with a weak one for ease of use. Besides all of that it's easy enough for people to circumvent the whole process anyway, if they're really keen to get at your stuff.

So where does that leave your desktop? As we've been talking about one-time passwords (OTP) are these applicable to your desktop? Yes and no is the annoying reply. Online services require a zero-downtime server to be constantly available for when you request the OTP. Happen to have one of those spare? We didn't think so. Technically there's no reason you can't establish your own authentication server – a product like OpenOTP from www.rcdevs.com is a full enterprise-level solution that happens to be free for deployments of 25 or fewer users and if you have a lot of spare time on your hands.

If you're not an enterprise-level system administrator, true home-based OTP solutions are rare. One we've come across is the £23 Plurilock from www.plurilock.com. This uses a pseudo-random number generator and a key fob to enhance the standard Windows log-in with an OTP. This is locally generated on the PC and is matched by the key-fob.

Its necessity for an offline solution, however, leaves it vulnerable as a recovery master-code will still unlock the system, while the contents of the drive will remain vulnerable if that's what an attacker is after.

This is exactly what needs protecting

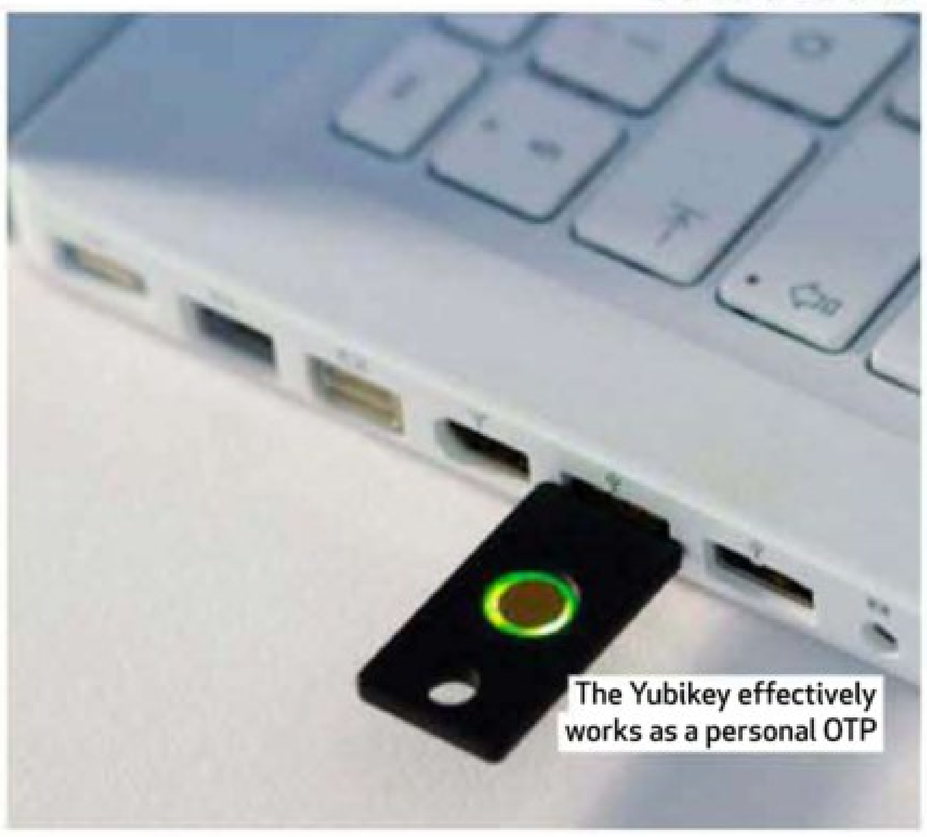
TOP TIPS

QUICK LOCK

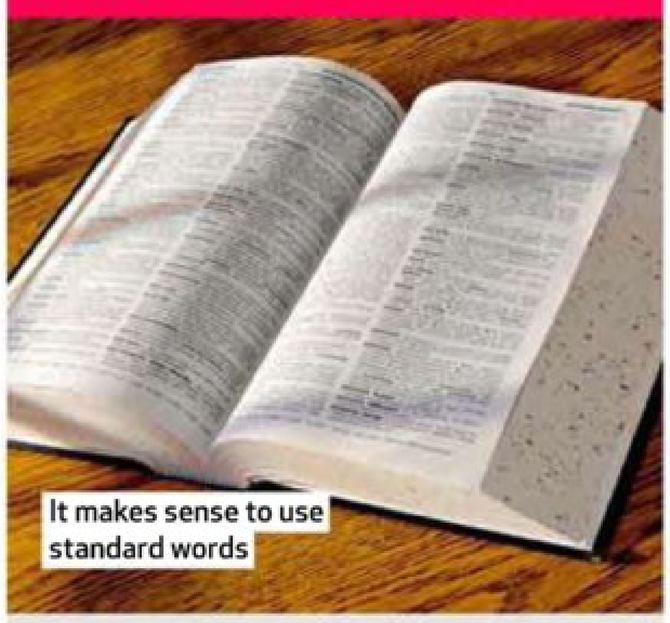
Each time you pop out of the room, log out or put Windows to sleep. It takes just seconds to wake up your computer and Windows will force you to securely log back in.

Key to safety

Another solution is from www.yubico.com with its Yubikey. It's an interesting product that supports a range of open standards and open source projects, such as OpenID, TrueCrypt, WordPress and the Windows log-in. While it can function at an enterprise level with its support for the Open Authentication standard, it also has a couple of personal-level features. It can function as a basic password key-fob that carries a static password, but more interestingly it works with a number of online password storage services such as LastPass and Passpack. This effectively turns it into a personal OTP for all the various applications and services that are supported. There is a


The Yubikey effectively works as a personal OTP

Size matters


It makes sense to use standard words

XKCD put it best in its 'Password Strength' cartoon (xkcd.com/936): 'Through 20 years of effort, we've successfully trained everyone to use passwords that are hard for humans to remember, but easy for computers to guess.' What it's saying is no matter how much L337-style number substitution you do to an English word, the password is still as easy for a brute-force attack to crack as a couple of standard English words.

For instance, 'Tr0ub4dor&3' is assigned a strength of 28-bits. It's a random English word taken from a dictionary of 65,536 or 16-bits, random caps adds one bit, random punctuation adds four bits, a random number adds three bits, plus standard letter substitutions go for three more bits, totalling the 28-bits of complexity or 268 million combinations.

The alternative method takes four randomly chosen English words 'correct horse battery staple' each from a 2,048 word dictionary, or 11-bits each for a total of 44-bits. The combined complexity is 17.5 trillion combinations.

Cracking time

Much is made of the first taking three days to crack and the latter 550 years, but a brute-force attack is highly unlikely except on very weak targets: we're talking 1,000 attempts per second. The important point here is a series of easy to remember English words can be far stronger than a short pseudo-gibberish word.

Let's apply this to another password recipe system: taking a site's name, adjusting it in some way such as making it all-caps or removing the vowels – let's assign that four bits. Adding a standard English word, for 11-bits, a four-number code for 13-bits and a random punctuation for four more bits totalling 32-bits of complexity. Better but still short of just using four standard English words.

Fantastic Mr Firefox

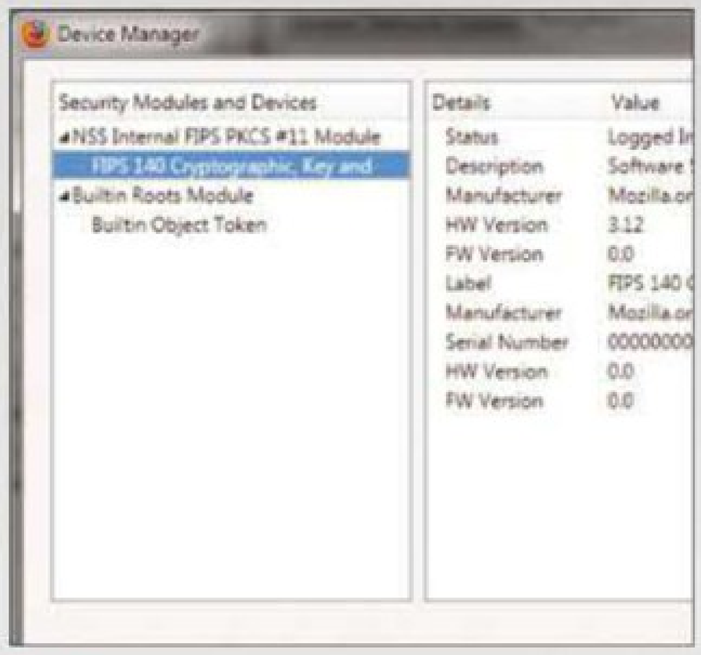
Strengthen your password protection

1 Meet the master

Letting your browser remember passwords weakens security. Anyone who manages to access your system can log into any shopping site, and possibly your bank and email. In Firefox, add a Master Password by selecting Firefox Menu > Options > Security and ticking Use a master password.

2 Out, damn spotter

There's a prompt to enter the password, click the Save Passwords... button and you're done. Normally you'd be able to browse all of your saved passwords but instead you're confronted by a security check. People can still use Firefox: this just blocks access to the automatic form filling.



3 Extra-strong flavour

A program called FireMaster can locally brute-force attack the encrypted Firefox password file. To boost security, enable the enhanced encryption scheme by selecting Firefox Menu > Options > Advanced > Encryption > Security Devices and clicking Enable FIPS.

minimal subscription fee attached to the service of £8 per year for LastPass, but when bought with the key this is reduced to just over £3 for two years. It's one of the few services we've seen that can provide cheap and simple personal one-time password protection.

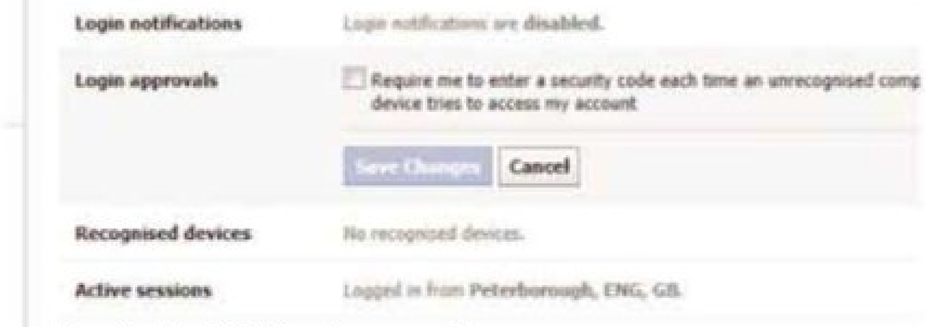
Safe browsing?

Less well-known are the security features built into Firefox, Internet Explorer and Chrome. You've probably noticed that they offer to store website login details and passwords. It's a handy feature but what happens if someone is wandering by and decides to start poking around with your soft and vulnerable internet sites? It doesn't matter how secure your passwords are if you've allowed a browser to store them with no protection. You're left doubly unprotected by having no Windows password, as an unattended PC will force the user to log back in but without a password, an intruder is straight in.

Firefox offers good protection in that it can store an encrypted password file on your hard drive, if you ask it nicely. This protects all the log-in user names and passwords with a master password. So if someone happens to be on your computer and fires up the browser, they'll have to enter your master password before the browser starts to automatically fill in all of your bank details without you.

For Internet Explorer there's no such direct replacement. There is a Content Advisor that's designed to block inappropriate content rather than block access to the browser and stored passwords. If you open Internet Options > Content and under Content Advisor click Enable, you'll be prompted to enter a password and hint. Initially this is massively annoying as it'll prompt you for every website. We suggest you set a homepage, so when the browser is first opened the password will be required and you can allow all the other sites. The alternative is to set up blocks just on sites that require passwords.

When it comes to Chrome, security is even more lax: there isn't any way to password protect access to the browser within Chrome itself. There is an extension called Secure Profile that goes some way to address this. It forces a password to be entered before access to the browser is allowed. However, as it's an extension it can be disabled by knowledgeable people and due to limits on Java it displays the password being entered. But it does block access and is better than nothing.



Facebook calls it Login approvals

Finger fun

Biometrics was something of a buzzword a while back. You may not hear about it so much these days, but it's still relevant. In a two-factor system it provides a clear 'something you are' factor, to back up the static user name and password. The most common solution is a fingerprint scanner and this can come as a standalone USB device, integrated into a keyboard or, ideally, integrated into a laptop.

Plug-in USB adaptors usually suffer the problem that, as they're only implemented at the log-in level, they're just used as a replacement for the existing password. The issue here is that if you remove the USB device it'll usually revert back to the original, after a password challenge. The far better option is if it's implemented at the BIOS level as part of a laptop. Here it can truly provide full end-to-end protection at a level that can't be easily circumvented.

Fingerprint scanning, as modelled by Phil

Protecting laptops

THEY'RE SMALL, LIGHT AND EASILY STOLEN, BUT AT LEAST YOU CAN PROTECT YOUR DATA

Most banks now insist on an OTP system

StoreMags.com

Ten years ago, a laptop was an expensive and specialist purchase, but today it's become an everyday item widely used as people's primary work device. That casualness breeds complacency and that leads to leaving a laptop on the train, unattended in a café or library and having it stolen (we do still have libraries don't we?). That's besides it being an easy target when someone manages to break into your home.

So what are the options for protecting your vulnerable laptop or netbook? We've looked at solid ways of bolstering the log-in password and ways to protect the sensitive services accessed through your web browser. But once a device is in the hands of a stranger, the defensive position has to change. One tactic that we'll get to is encryption from single files to full-drive encryption: it's a way you can lock-down sensitive information in a way that even the FBI can't crack.

The alternative approach is to go on the offensive. There are now a number of well known stories about people managing to get laptops recovered by the police using third-party remote access software. One of the more recent was Greg Martin, a UK-based security expert who used to work for both NASA and the FBI. He had his Mac Book Pro stolen during the London riots. He was running a rather excellent open source protection system called Prey, which can be downloaded from preyproject.com. Using this, he logged his laptop as missing within the Prey system; as soon as it came back online he was emailed a notification. From that point onwards, Greg's criminal friend was doomed. Able to watch him surf the web, taking webcam shots of him as he did, eventually he logged onto Facebook and that was his fate sealed. With a full breakdown of his name, age, secondary school, IP address, ISP, address and photos both from Facebook and the laptop's webcam, Greg simply supplied the details to the police and let them reclaim his property.

Jargon explained

Brute force
This refers to a technical attack on an encrypted target, usually a password or file. It's possible to be clever and try well known or common variations of passwords, but you can try every possible combination in turn. It takes a while but being able to attempt 100,000 combinations per second certainly helps.

The biggest potential stumbling block with this type of software is whether the perpetrator can figure out how to log onto the system intact or not. It's a good argument for leaving a Guest account active, so you can be assured the tracking software will always be accessed. Prey is a fabulous system that also has software that can cover your desktop and mobile phones.

The other common solution is Logmein.com for PC and Macs, which provides a basic free service. This is focused more on enabling remote log-ins to your system, rather than reclaiming stolen or lost devices. However there is a stealth mode available in Logmein.com, so if someone is using the system you're able to log in covertly, take a few screen grabs and

Preying on devices

Recover stolen hardware with Prey protection

1 Laptop protection

Prey works on a centralised service basis. It's installed on multiple devices and managed via its web control panel. There's an alternative mode but we'll choose this option. Download the laptop client from preyproject.com, install it, choose Prey + Control Panel and create a new user name with password.

2 Control Panel

Log into the preyproject.com website and you'll have access to the Control Panel. The opening page shows you all the devices you have registered. The free service has a limit of three, with 10 reports, but that's enough to provide security. Click the icon to configure this further.

3 You are the Quarry

The main page is where you can set all the juicy bits. Geo and Networking enables you to pin down a rough locality for the device; the Session section will take screenshots of activity and monitor files; while the webcam will grab images of the perp.

webcam shots, and watch them browse the internet.

For your eyes only

We've already touched on the issue that a solid password isn't much help, if an attacker can get their hands physically on the hard drive. Again, on a desktop system this may seem less of an issue, but with a laptop or netbook the likelihood of having a device stolen is far higher. Encryption is the answer and of course more passwords, probably. Both the Business and Ultimate editions of Windows 7 and Vista both come with file, folder and full-drive encryption options built in. Right-click on folder or file, select Properties > Advanced and click Encrypt contents to do just that. There are no passwords involved and it's locked to the system and user log-in details. This system generates a cypher key that needs to be backed up. Windows will prompt you to do so, as without it, if Windows needs to be reinstalled you won't be able to access any encrypted data.

The Ultimate and Business editions of Windows 7 and Vista both come with a full-drive encryption solution called BitLocker. This works slightly differently for the Windows boot partition and all other partitions. The big difference is that for all other partitions you're able to just use a password. For the primary boot partition, your hardware has to use a compatible Trusted Platform Module (TPM), more common on business-targeted desktops and laptops than home consumer systems.

The quickest way to check is to fire it up by opening the Start Menu, typing BitLocker and pressing return. If you click the Turn On BitLocker link for the Windows drive, marked with a Windows flag, you'll be given the good or bad news. Often the TPM will need to be switched on within the BIOS and then initialised using the TPM link from the BitLocker Control Panel that generates the secret key. Once initiated it'll begin encrypting the entire drive, which can take quite a while, so set aside a few hours of downtime if you plan this. BitLocker To Go extends the protection to removable devices.

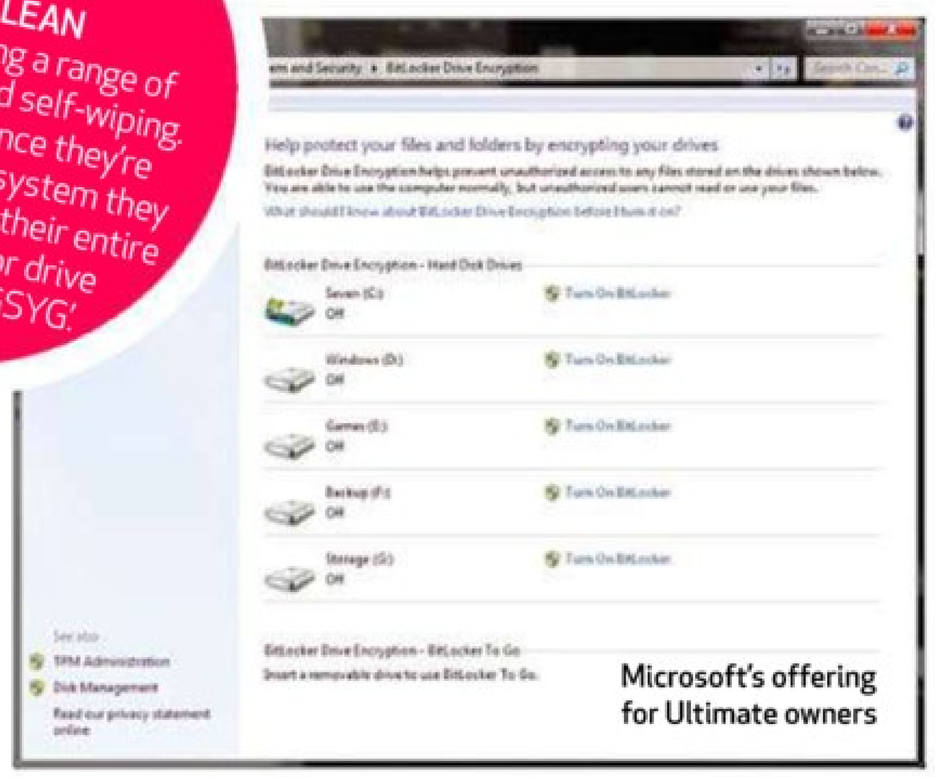
If you're not running a version of Windows that supports encryption worry not. The TrueCrypt open source system (www.truecrypt.org) is a long standing, well regarded and highly secure partition, full drive and virtual drive encryption solution. It'll happily encrypt a Windows boot partition, even on the fly as you continue to use it, along with handling the pre-boot environment. Other cool extras include its ability to create a file that's then mounted as an encrypted virtual partition, while 'hidden modes' enable you to enter an emergency encryption code that keeps the true partition hidden but reveals a working fake one.

If these all seem a little full-on then we'd also suggest AXCrypt from www.axantum.com/AxCrypt. This sweet little freeware program is right up to date, supporting 32-bit and 64-bit versions of Windows 7 and back to Windows 9x. Once installed it enables you to encrypt single files and folders with just a right click and the entry of a password. Job done, and that will be all of your stuff protected end-to-end – from on the internet to your home devices.

TOP TIPS

WIPED CLEAN

Toshiba is offering a range of self-encrypting and self-wiping 2.5-inch drives. Once they're plugged into a new system they automatically erase their entire contents. Look for drive models ending 'GSYG'.



Microsoft's offering for Ultimate owners

Toshiba's new auto-wipe HDD

4 It's gone

If a device is lost, setting the Missing switch to On will send an email to you the instant the Prey system detects the device is online and is in a state it has been able to run the client-side Prey app. The default setting sends updates every 20 minutes.

5 We've got one!

So how did it do? We initially had problems getting the webcam to work but it finally activated, was taking screengrabs and logging IP traces. It'd be better if it took targeted grabs and browser log-ins but it's certainly a very good step in the right direction.

6 Mobile protection

Prey works on more than just PCs, Macs or Linux: it also supports Android devices, including phones and tablets. A version for iOS devices, such as the iPhone, is apparently in the works. Phone devices are activated and controlled via SMS and it can play a loud sound if you've misplaced them!

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Get your clan talking

Open the lines of conversation with a dedicated voice server

Setting up voice chat needn't be expensive

When you're in the middle of a battle for the future of the universe (or at least, the next three minutes of a round), you don't have time to stop shooting and start typing messages to your team.

When a game doesn't have voice chat built in though – or if it does, but nobody really uses it, as with *World of Warcraft* – you may have to take matters into your own hands.

This doesn't have to be expensive, but it can be fiddly, especially if you're playing with a large team instead of just a couple of friends, or don't have a hefty internet connection.

Easy option

The easiest option is to use a VoIP program such as Skype (www.skype.com) to handle everything. Everyone downloads it, everyone sets up an account, everyone connects to a group chat, and finally everyone minimises the window and loads a game.

The downsides are that Skype is a resource-heavy service compared to others designed with gamers in mind, and awkward as a long-term solution.

Want to play a round of *Team Fortress 2*? Great. Need a central chatroom for your *World of Warcraft* guild to drop in and out of throughout the day? Not so great.

Not only is joining the conversation a pain, there are no real management options for when one group decides to split off and have a raid, private conversations, or other handy features you'll come to need, such as only transmitting your sound when you hit a certain noise level rather than passing on every pop, crack and Red Bull slurp you might make.

Free tools

Most groups favour one of two dedicated tools, Ventrilo (www.ventrilo.com) and TeamSpeak (www.teamspeak.com). Both are freely downloadable in server and client form, although there are restrictions on what kind of servers you're allowed for free.

The free TeamSpeak, for instance, allows you to create one TeamSpeak server with 32 'slots' for players without registering, which increases to 10 servers and 512 slots if they hand over their details.

On Ventrilo, you're restricted to eight people on one server. Both are firmly for non-commercial use only, unless you stump up the cash and pay for a proper licence.

There are some minor exemptions to this rule, such as if you use a web hosting provider that displays adverts you don't profit from yourself (on a hosted forum, for instance), but not very many.

There's also a third option, an open-source client/server duo called Mumble http://mumble.sourceforge.net), where you can do whatever like.

Running your own server isn't necessarily difficult, but it can be fiddly and resource-heavy.

Ventrilo focuses on direct console commands, with a default configuration that handles most of the details, while TeamSpeak gives you access to everything you need by connecting to the server from the client.

Bottleneck

On the resources side, the main bottleneck is your internet connection. One person speaking in a room with 10 slots, for instance, can easily demand around 250Kb/s, and that's not factoring in the bandwidth requirements of your actual game.

The main restriction, though, is that home ISPs offer incredibly asynchronous upload and download speeds, so you may simply not be able to push out enough data for a smooth connection. Even if you can, you could easily fall foul of those ever-nebulous

Jargon explained

VoIP
Voice over Internet Protocol – how programs like Skype work.

Client
The program every player has to talk to each other

Server
The program that handles the clients and passes everyone's words around

IRC
Internet Relay Chat, the original chatrooms

Below **Expect to pay about 20p per slot for a dedicated voice server, with five to 10 slots minimum**

PROJECT GOAL

IN-GAME CHAT

Create or simply rent a server for chatting with other players during games. It's not difficult to do, or as expensive as you might think.

WHAT'S NEEDED?

TeamSpeak 3

Download the free server and client from www.teamspeak.com

Powerful connection

If you want to host, you'll need one to stand a chance

Friends

Someone to talk to will help. Talking to yourself is a sign of madness

TOP TIPS

OH NO, NOT AGAIN...

Get used to people asking you for the server details. You could write 'MESSAGE OF THE DAY: GO HERE...' in the sky in mile high plumes of fire and still people would ask "So, do we have a Vent server?"

Storekeeper.com

Games like *Team Fortress 2* only come alive when you can actually talk to your team. Or shout at your team, perhaps

TOP TIPS

VOICE ETIQUETTE

Train your users in good voice etiquette. If a couple of people are monopolising a conversation for instance, politely invite them to get a room. Or possibly just switch channel. As the admin, it's your call.

'fair use' restrictions you signed up for, and probably won't want to leave your PC on all day for people to have a chat.

The easiest (and in all but the simplest cases, honestly the most advised) way to keep the talk flowing is to bite the bullet and let someone else do it for you.

Renting a server typically costs between 20p and 30p per slot per month, which becomes even cheaper when you remember that you don't necessarily need one per player in your group. If you have a guild of 200 players for instance, but only 50 are usually online, having 75 slots should cover you. If not, you can upgrade.

You don't get as much control over the server as you would by self-hosting, but you get about 99% of it. As administrator, you should alway have access to a control panel via your web browser, plus full admin rights over the server. The price should also be all-inclusive, with no extra charges for bandwidth, with the only real gotcha being that services start with a minimum number of slots – typically five to 25.

Licensed

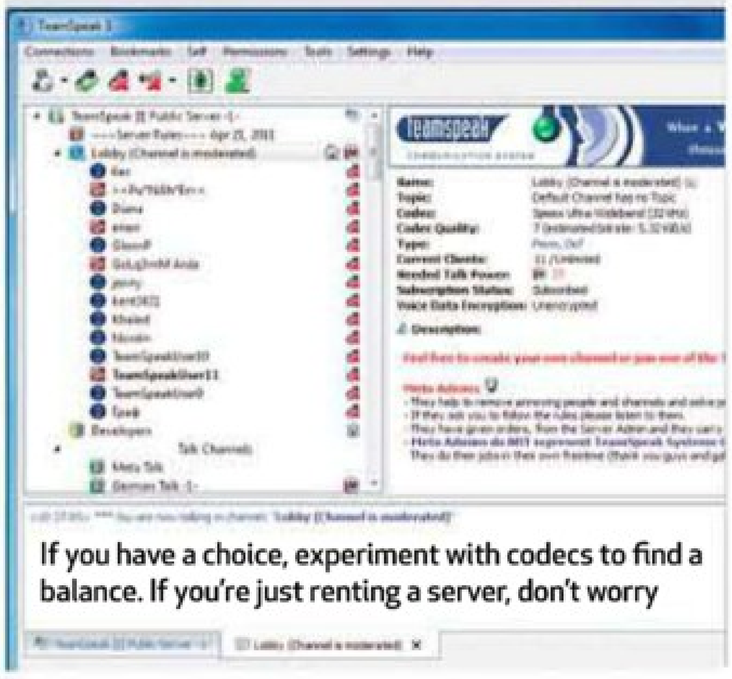
Both Ventrilo and TeamSpeak work on a licensed basis – if someone wants to run a server, they have to pay up. Both websites offer a dedicated section listing approved sellers and the option to find one in your local area.

As with all online services, the closer the better, especially if you primarily play low-latency reliant games. Picking one will be a gamble, since there's effectively no good way to tell how fast a network is without paying, but always do a quick Google search before paying.

Easing your bandwidth load

By default, all voice chat services offer what their creators think are reasonable settings. This still leaves room for tweaking though. In particular, look at the bit-rate of the chat, and the codec being used (which you may or may not be able to easily change for better performance. The lower the bit-rate, the less bandwidth it takes up, and the sound doesn't have to be CD quality.

On a home server, you may have little choice but to drop it, especially if you want more than a couple of people talking at once. Every tool's website includes some information on how much it expects to use, though it's only ever with one or two people talking at once. For a full, multi-channel system, home internet connections are very, very unlikely to cut it, no matter how much you pare things down.



If you have a choice, experiment with codecs to find a balance. If you're just renting a server, don't worry

PART1: Get ready for voice chat

Everything you need to keep the conversation flowing

1 KIT

First, a good pair of headphones and a microphone (Ideally, built into the 'phones). Look for one that's flexible and can be repositioned. Wired models are the most reliable, though the short distances between you and your PC means a good wireless pair should be fine these days. You'll pay a premium though, especially if you want a model that doesn't entirely stink. Take care of them: gaming headsets can be fragile.

2 BANDWIDTH

Bandwidth is the next biggest obstacle between you and good sound. Simply by playing online games, you should have decent downstream, but upstream is just as important for chat. Games typically have low demands on what your PC needs to send. Voice chat is another matter. Visit a site like www.speedtest.net to rate your connection, and be prepared to turn down the sound quality if you don't get a high number.

3 TOOLS

If you're lucky, you'll get to choose whether you use Ventrilo, TeamSpeak or one of the others. More likely though, the question will be 'what's everyone else using?' All the tools are free to download and set up in roughly the same way. You'll need a server to connect to and a password to log into your group's private chat room. These are usually listed on group/clan forums, or in a Message of the Day type post within the game itself.

PART2: Get started with TeamSpeak Server

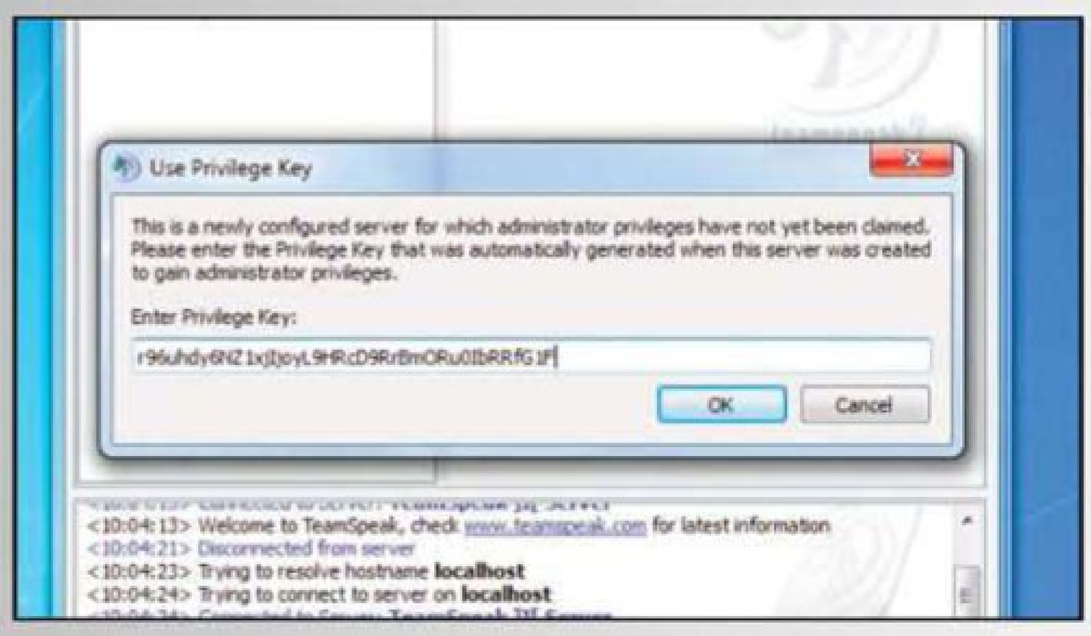
It's the easiest of the tools to get up and running your own

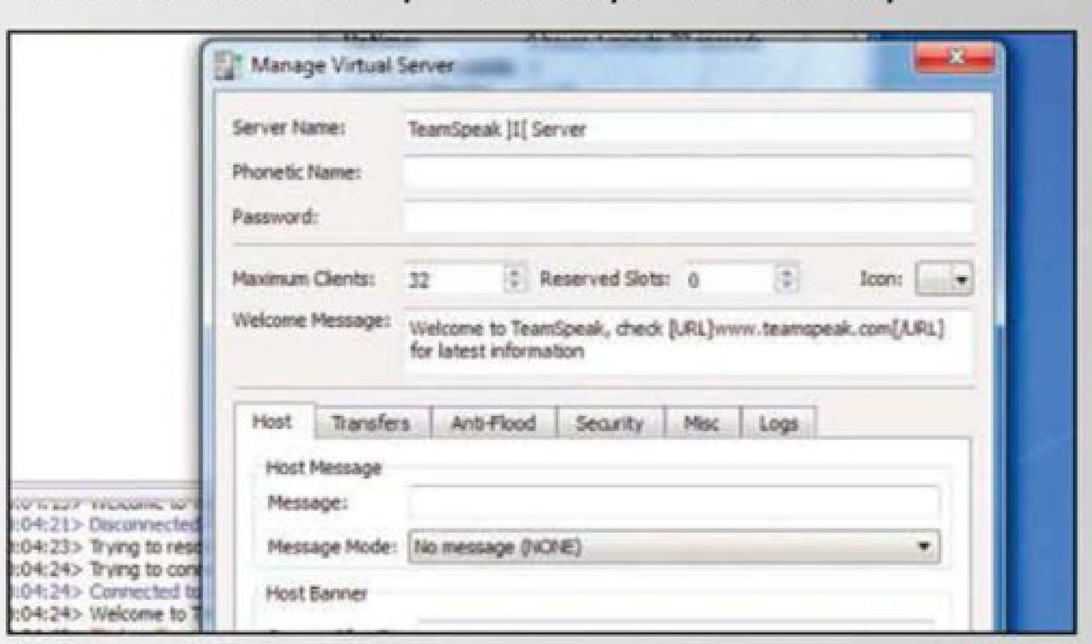
1 Download

Visit www.teamspeak.com to download the software. You'll need both the Client and the Server download, and if you're running 64-bit Windows, make sure to get the right version. (If you're not, why not? Consider doing something about that!) The client is provided as an executable you just install. The server comes in a .zip file. You can extract the files wherever you like, the server is self-contained.

2 Start the server

Start the server first. Run ts3server_w64 or w32 and you'll be given a screen with three bits of information – a Server Query username and password for advanced administration, and an access token that you'll use when the server asks who the boss of it is, to tell it that you are in fact that boss of it. Copy all three codes into a text file, and install the TeamSpeak client if you haven't already.



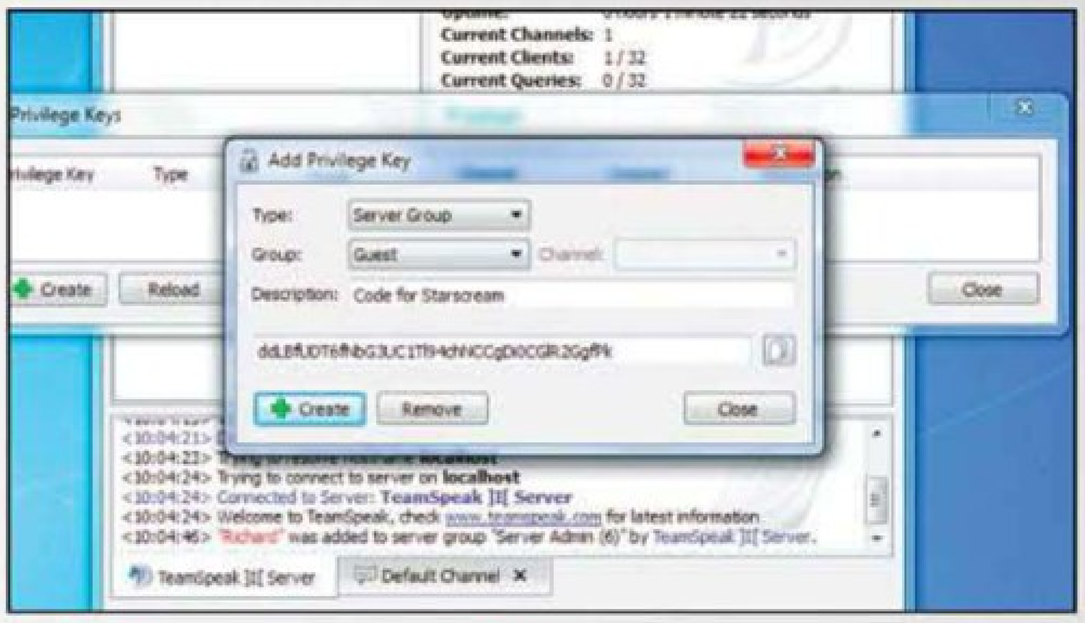


3 Start the client

Fire up the client, which is capable of handling almost all the server operations you'll need. Click Connections, then Connect. For Server Address, type 'localhost' (your own PC) for the moment. Enter the username you want to go by (not the Server Query one) but don't enter a password. Assuming everything goes well, as the first user to log in, you'll be asked to enter the access token to be made admin.

4 Choose password

A shield icon appears next to your username to show that you're the supreme ruler. Right-click on the server name and select 'Manage Virtual Server' to bring up the options only you can see. Here you can rename it, assign a password people will need to know to log in, add a welcome message, set the number of slots, and add security, like anti-flood (people posting lots of messages in the text chat).



5 IP address

To log into the server, people will need your IP address. Visit www.whatsmyip.org and copy it. If you don't have a static IP from your ISP, you'll have to purchase one, or update your group with the new number every time you start up the server. If people can't connect, your router may be blocking them. Open up port UDP9987 if you can. If not (as with some locked down ISP routers), it's time to upgrade it.

6 Share responsibilities

If you don't want to be the only admin, click the Permissions menu and 'Add Privilege Key'. You can split permissions between the full Server and specific Channels (for instance, a dedicated Raid thread). This generates a one-time use key, which you pass to them yourself. They can then log in like anyone else, visit Permissions, click 'Use Privilege Key' and be promoted instantly.

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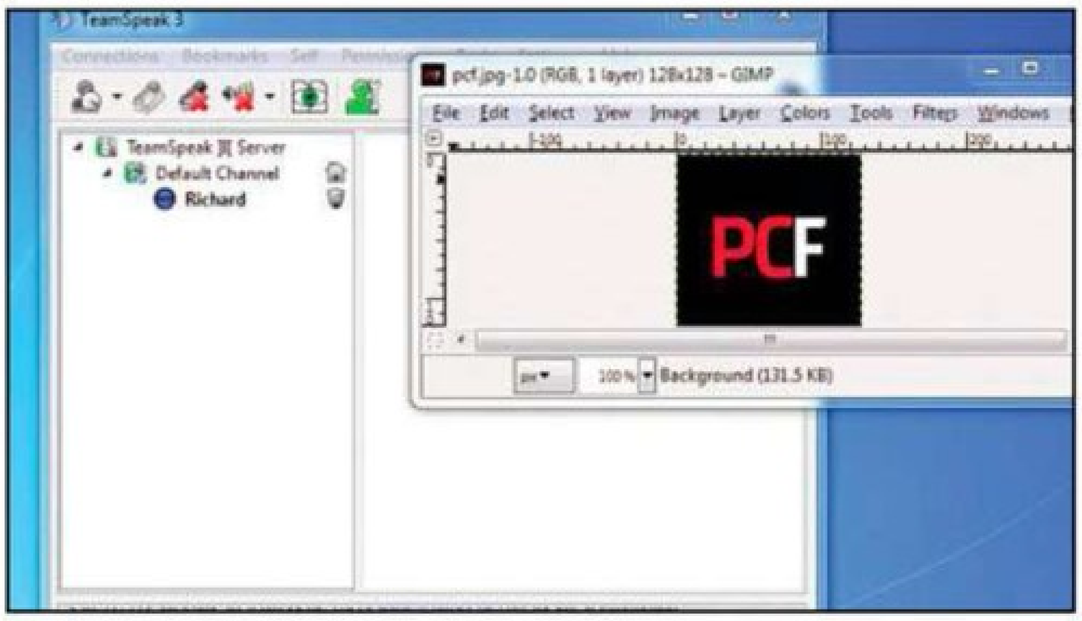
PART3: Fun Things In TeamSpeak 3

Whether you use them or not, they're entertaining to have

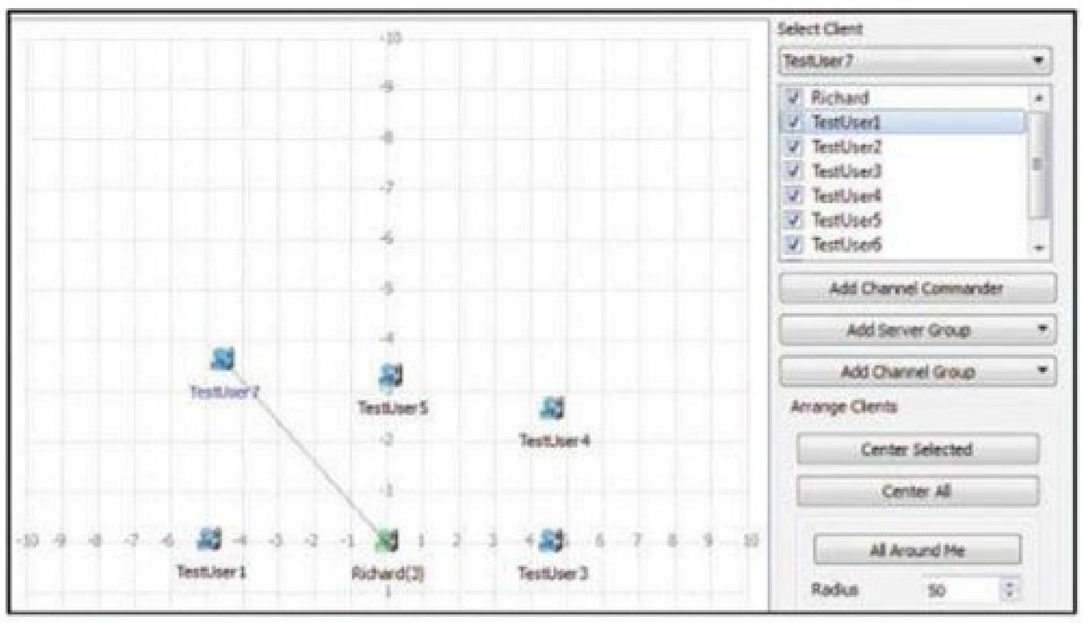


1 Host button

In Manage Virtual Server, check out the Host Button options. Fill in a name, give it a URL, and the URL of an icon file, and anyone who logs onto your server will see an icon in their client and taskbar that will spirit them straight to your website. This might be advertising if you allow a wider audience in, or just a convenient one-click way to get into your forums for your regular group.

2 Sound pack

Bored of a generic 'Connected' message every time you log in? Visit http://addons.teamspeak.com and download the Jon St. John sound pack. You know who he is? Duke Nukem. And that's just one of the packs available. You'll also find some plugins and administration tools if you're that way inclined, including dedicated server query tools and monitor apps for your phone.



3 Sound effects

If you've got more than a bog-standard stereo setup, you can open up the 3D sound effects window and position people in the chat anywhere around you. While potentially confusing in-game, where you'll see an avatar on the right but hear them on the left, this is handy for filtering out the cacophony of too many people talking at once – plus another reason to be glad you bought 3D headphones.

Conclusion

Here at *PC Format*, we're big fans of getting our hands dirty and doing things for ourselves. In this case though, we'd have to break with tradition and advise against it.

There's nothing stopping you from creating your own voice server, and it's perfectly doable if your needs are simple.

In most cases, though, the fiver you might end up paying per month – or more likely split amongst your group, since there's no reason that you should cover the cost personally – is a small enough price for not having to put up with the extra expense and hassle of poking around with configuration files when you just want to shoot someone in *Team Fortress 2* or get on with the Tuesday raid dungeon.

Even if you're dealing with too small a group to warrant that kind of cost, you're not necessarily out of luck. Much like IRC servers, there are public voice servers where you can find a room and settle in, and services like Skype or Steam's VoIP system can usually fill in at a pinch.

> "When every attempt to fire up the system leaves a lingering sense of sickness, upgrade"

As with much online stuff, you'll know you've reached the point where you should upgrade when every attempt to fire up the system leaves a lingering sense of sickness or dread.

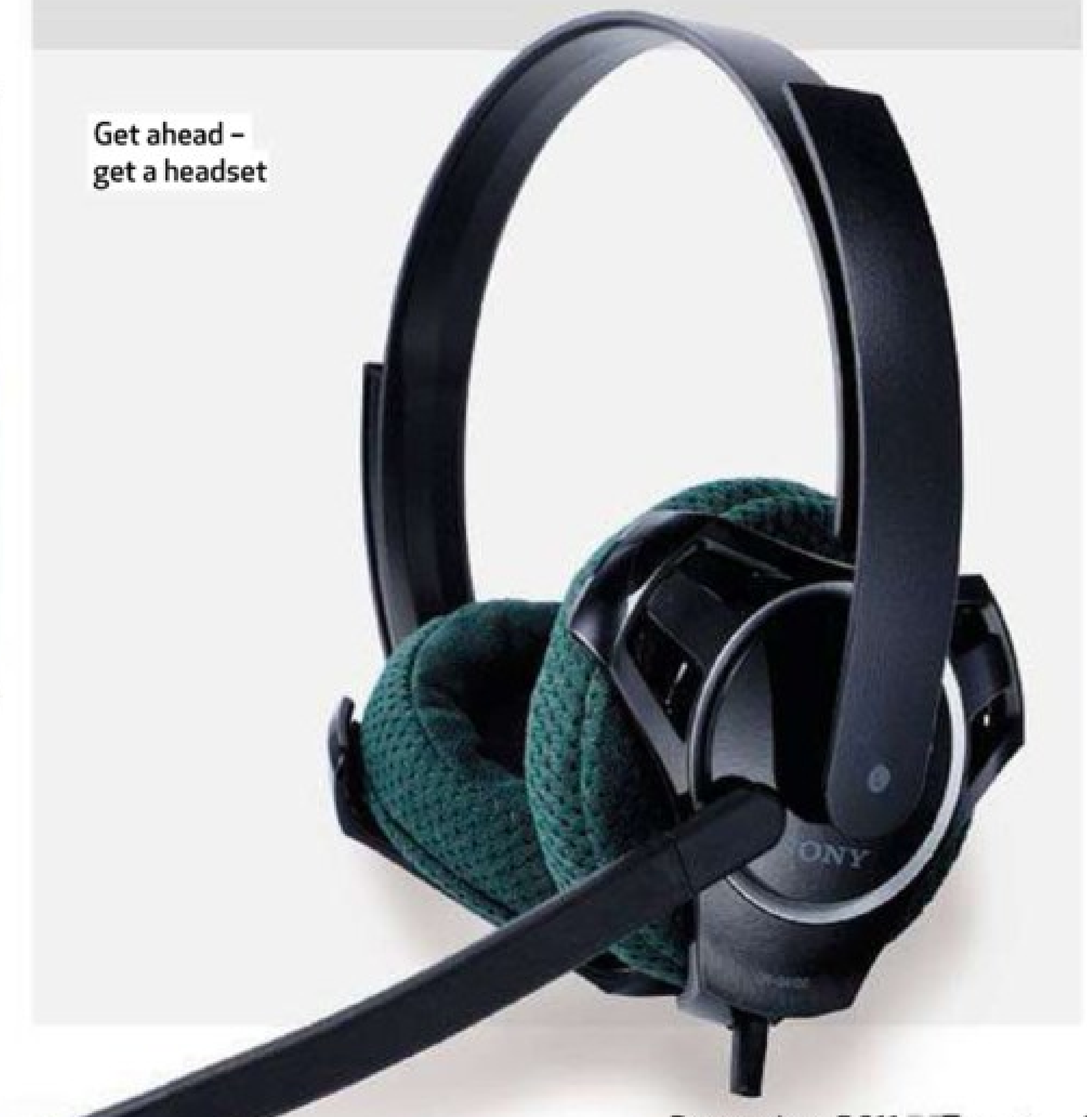
Game crashing too much? Unacceptable lag? An electricity bill delivered by forklift truck? Just move on.

That just leaves the question of which tool to use.

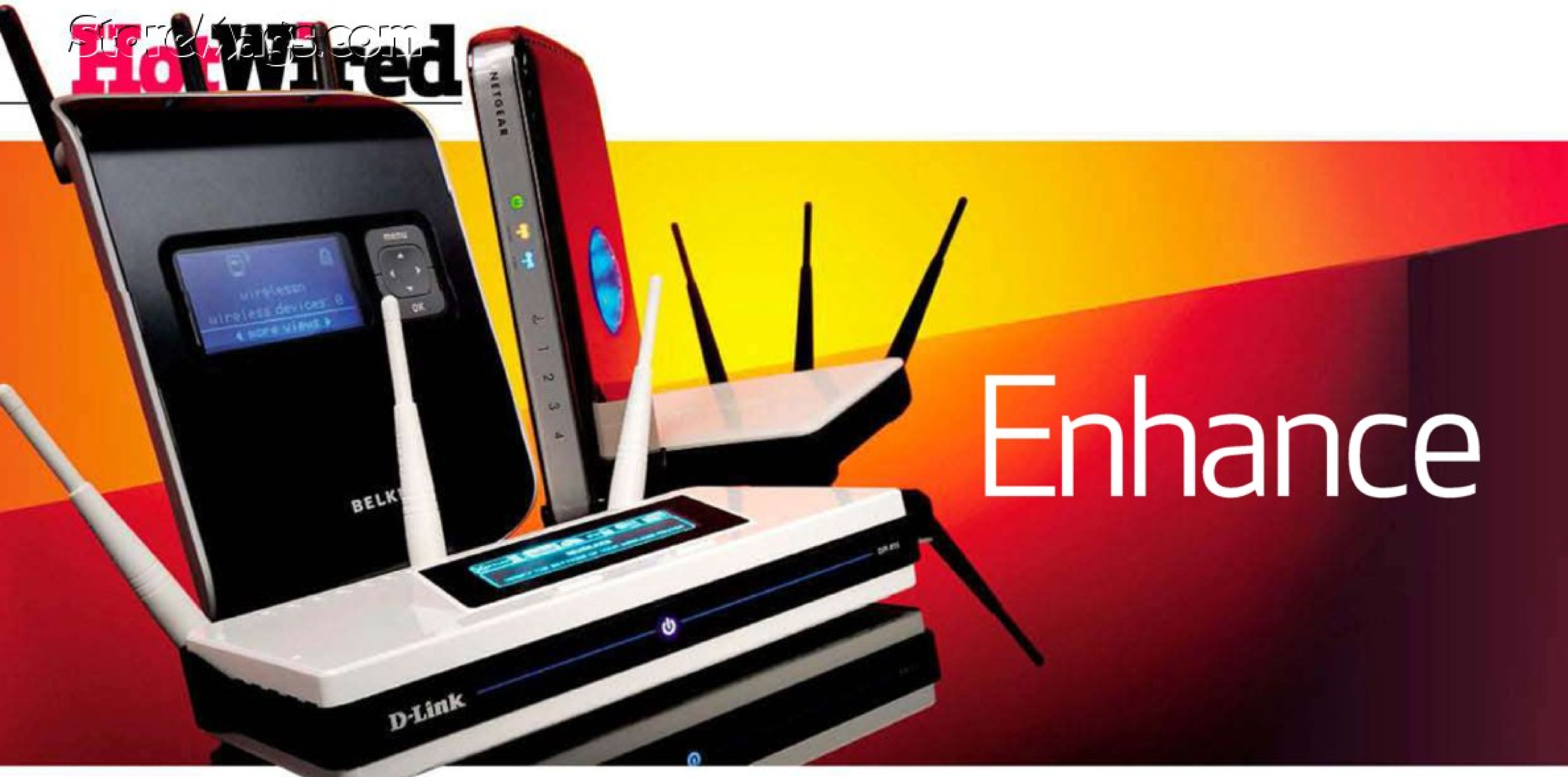
If your group already favours one, stick with it.

If not, simply go with the one you prefer – the slightly better interface of TeamSpeak, the open-source joy of Mumble, or good old Ventrilo.

They're all used across the web for a reason, and you won't go wrong putting your faith in any of them.



Get ahead – get a headset



Enhance

How you set up and use your Wi-Fi can have a huge impact on its efficiency. If you're constantly waiting for web pages in general to load, then before you complain that your ISP isn't supplying that promised 24Mbps connection, spare a thought for what happens when that signal hits the airwaves in your house.

How the magic works

We first need to understand what Wi-Fi actually is. Wi-Fi is also called wireless local area networking, or WLAN, in the management console of your base station or broadband router, and it uses a group of frequencies clustered around 2.4GHz to transmit and receive data between computers. To ensure that data gets through, it uses a protocol called 802.11.

If every network within range used the same frequency of 2.4GHz, the various devices would swamp each other's signals – a bit like two radio stations transmitting on the same frequency. To overcome this, the protocol allows devices to use 13 numbered channels, which all use slightly different frequencies to ensure that there's as little interference as possible.

Confusingly, there are a few versions of 802.11. The oldest, 802.11a, is now obsolete. This has been superseded by 802.11b, which has a maximum data transmission rate of 11Mb/s. 802.11g, which is the dominant version in the UK, can transmit at a healthier 54Mbps. The newer 802.11n can use two channels for a maximum of 300Mbps.

Securing the waves

Security is very important in Wi-Fi networks, and this has to do with both logging onto the network and how individual packets of data are encrypted. The oldest Wi-Fi security standard is WEP (Wireless Equivalent Protocol). This was part of the original 802.11 protocol and has been cracked, making it insecure.

This insecurity came about because if enough packets can be captured from the airwaves, software can be used to work out what that password is. Several open source packages now exist (AirCrack, for example) that will attempt to solve WEP passwords, thereby allowing people to log onto your network.

An updated security standard called WPA (Wi-Fi Protected Access) was introduced in 2003, with a newer version called WPA2 coming along in 2004. This is still secure and uses a government-strength encryption algorithm to keep your networks safe.

In some equipment, the security used is referred to as RSNA (Robust Security Network Association). This is really just another name for WPA2.

CSMA: traffic control

If every computer on your network transmitted at the same time, they'd jam each other's signals. To prevent this, every Wi-Fi network card sold (including the one in the base station) uses a technique called Carrier Sense Multiple Access (CSMA) to share the airwaves.

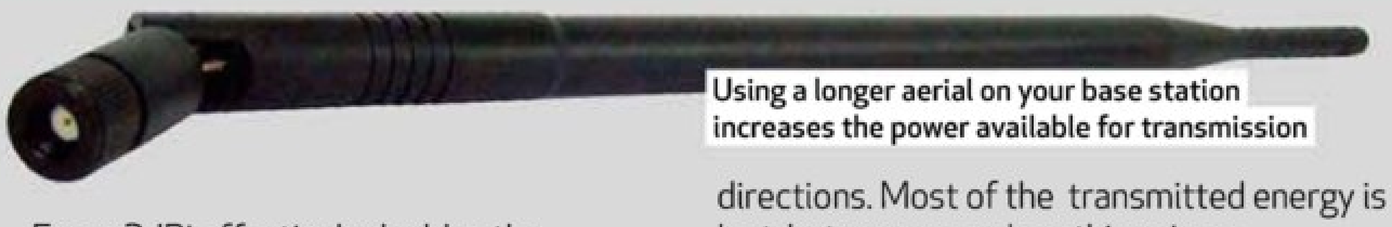
In CSMA, a situation called contention occurs when a Wi-Fi card

> "Spare a thought for what happens when that signal hits the airwaves"

Get a new aerial

The aerials on Wi-Fi base stations are omnidirectional antennas. The signal is transmitted with equal strength in a doughnut shape perpendicular to the aerial. This means that if the aerial is vertical, it sends Wi-Fi signals out across the room.

The antenna that came with your base station has a power transmission rating of about 2dBi. The higher this number, the more efficient the aerial is at transmitting the power passed through it.



Using a longer aerial on your base station increases the power available for transmission

Every 3dBi effectively doubles the transmitted power, so if you've increased your base station's power output to the maximum in its web management console and want more, you can increase it using an aerial with a higher dBi rating. The problem with these aerials is that they transmit in all directions. Most of the transmitted energy is lost, but you can reduce this using a directional aerial, which focuses the transmitted signal in one direction. This creates a long hotspot through your property and can be used to extend your Wi-Fi network to outbuildings without losing most of the signal. Prices start at around £20.

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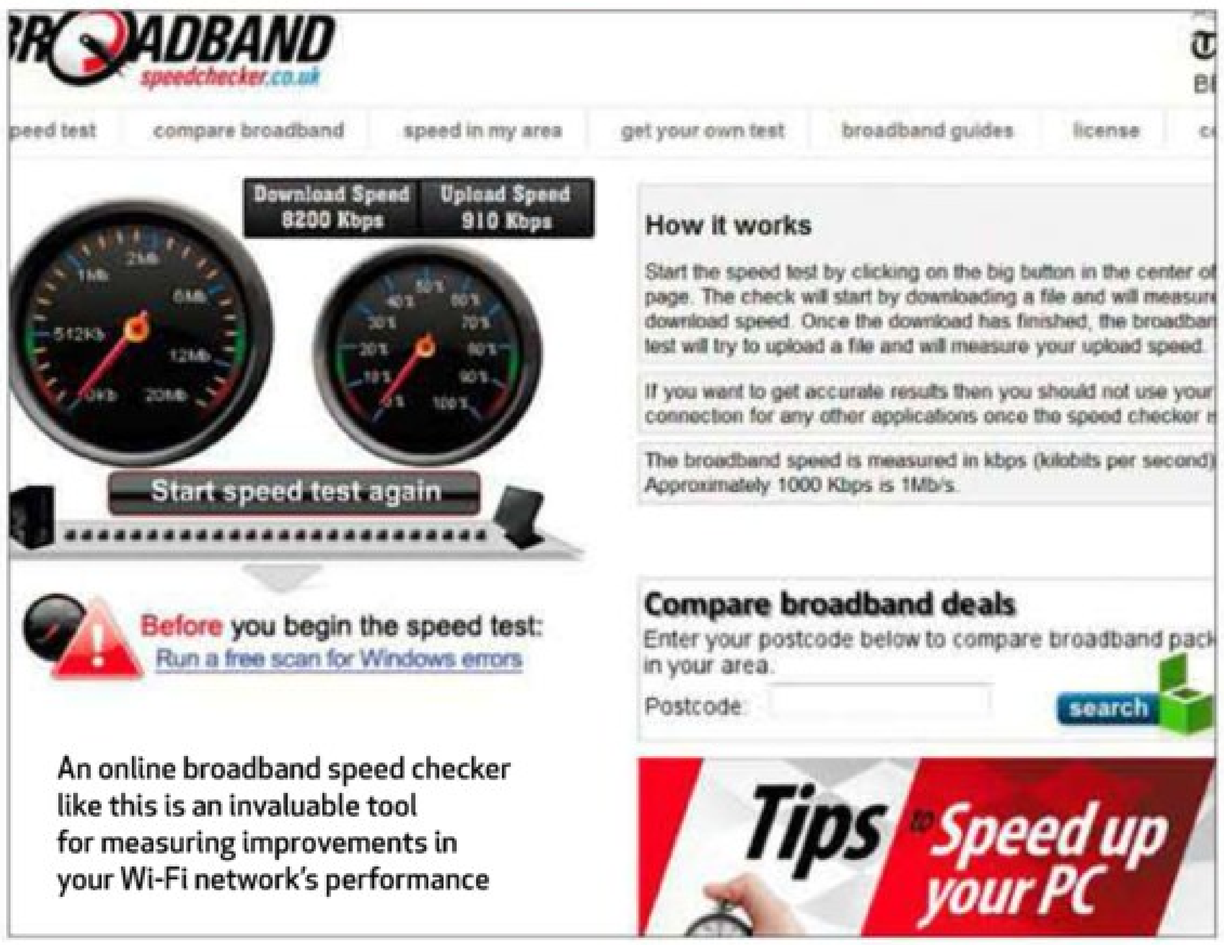
your wireless network

We show you how to dodge a broadband upgrade by getting the best from your Wi-Fi



An online broadband speed checker like this is an invaluable tool for measuring improvements in your Wi-Fi network's performance

wants to transmit a data packet, but hears that a packet is already being transmitted. It waits for a very short but randomly selected time before listening again. If the airwaves are clear at the end of that period, the card transmits its packet before listening again and subsequently transmitting the next packet if the airwaves are still clear. This 'first come, first served' scheme means that over time, all network cards get an equal opportunity to transmit all their packets. CSMA is also used in wired networks, and is a very efficient method of data transmission. This being the case, it's usually external influences that are to blame for adversely affecting Wi-Fi networks.

Before attempting to improve the performance of your Wi-Fi network, it's important to know what its performance is like before you start. Otherwise, how will you know for certain which measures work and which don't?

The easiest way of measuring current performance is to use an online broadband speed testing service. There are plenty available, and they all work in the same way. One such service is Broadband Speed Checker (bit.ly/K7UC).

Set a baseline

First, ensure that your entire network is quiet. Turn off all streaming services, such as Spotify (including killing the service in the system tray), all social media services, all Torrent services, and all email clients that automatically update themselves. Check to make sure that the WLAN light on your base station is not flashing to ensure that everything is turned off. From a Wi-Fi connected computer, click Start Speed Test and wait until the test completes.

Rather than just performing the test once, collect several results over a few days. Try to run the test at different times of the day to see when the local loop from the nearest telephone

Monitor the airways

InSSIDer2 is a free tool by MetaGeek that you can use to analyse Wi-Fi signal strengths and to ensure you pick an unused channel. You can download and install it from bit.ly/22nvUo. Once installed, run the program and it'll show any Wi-Fi networks in range. In the lower pane it also shows signal strength and channel number.

Click the 'Time graph' tab and select your network in the upper pane. If you're monitoring on a laptop, try moving a few centimetres in any direction. You'll notice that the signal strength changes – but why?

All electromagnetic waves have a wavelength, which is calculated by dividing the speed of light (about 300 million metres per second) by the frequency (2.4GHz). This gives a wavelength of roughly 12.5cm. What this means is that across the room, the signal is stronger at some points than others. You can use this technique to map the areas of your home that have the strongest signal.

Sneakily, you can also use dips in the strength of a Wi-Fi signal to tell when someone is between you and a base station. This is because people are mostly water, which absorbs radio waves. As long as the monitoring PC is in the same position, moving around will affect the signal in a predictable way.

InSSIDer2 is a free tool that will help you optimise your Wi-Fi network

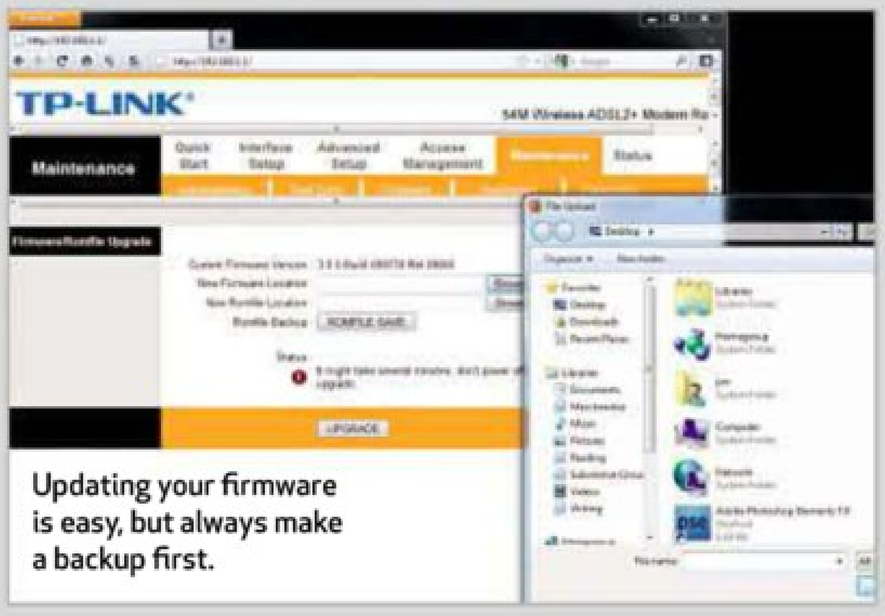
Update your firmware

Some ISPs automatically upgrade the firmware on Wi-Fi base stations they supply as part of their broadband packages, but if you bought your base station separately to use with an existing wired broadband connection, you'll have to upgrade it yourself. This is a simple process that can fix bugs and improve Wi-Fi performance.

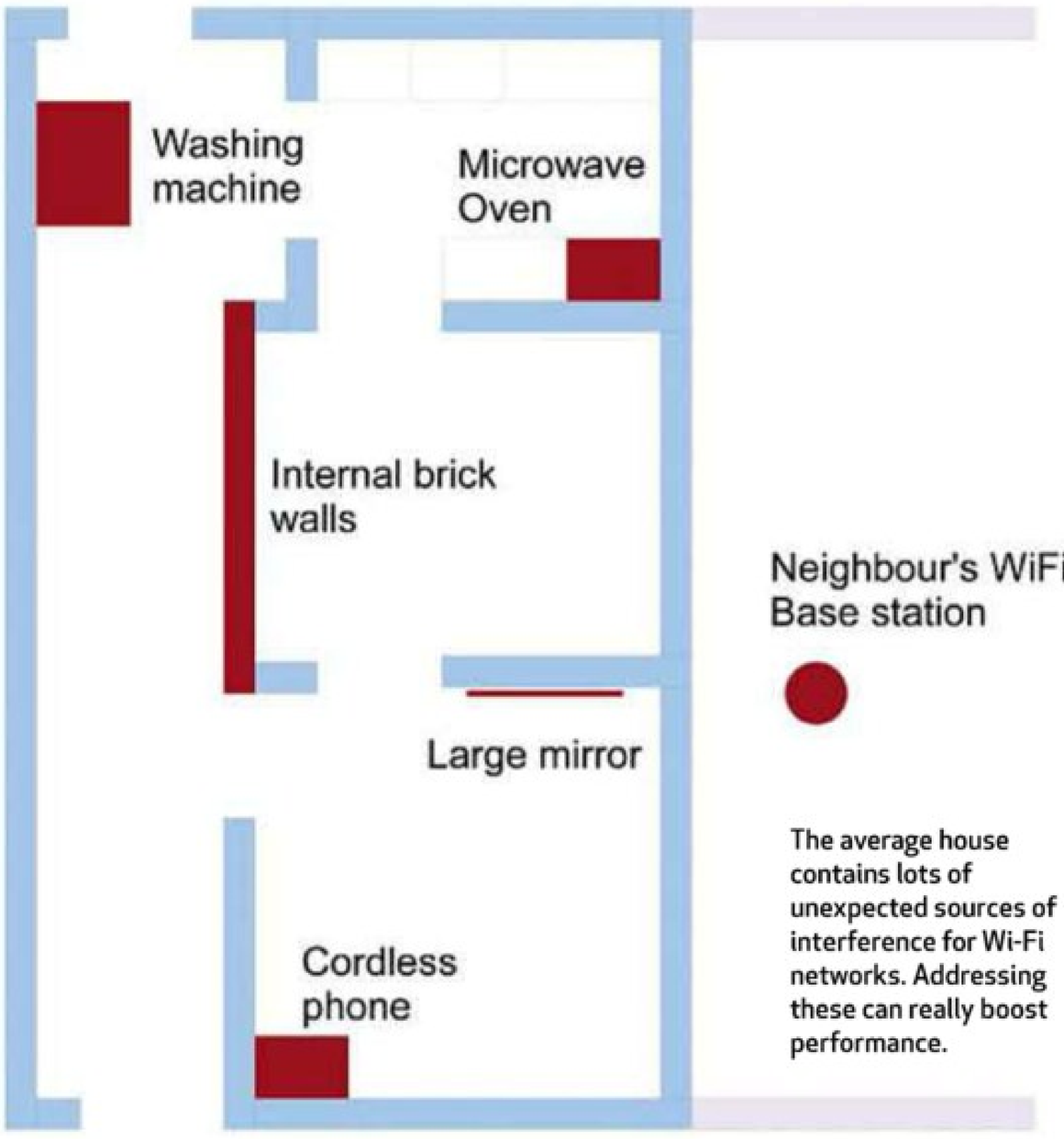
First, make sure you have a network cable at the ready in case the process wipes your current configuration and you need to access the web-based management console without Wi-Fi access. Next, go to your base station manufacturer's website.

Make sure you download the firmware for your exact hardware model – the details of your firmware can be found on a sticker on the bottom of the unit. Download the latest firmware and the latest user manual. This will tell you about any new useful features the firmware upgrade gives. Upgrading may make the base station lose its current configuration, so make sure you save your existing settings first. The terminology tends to vary here, so consult the user manual.

When you click the 'Upgrade' button in your base station's maintenance page, browse for the firmware file and click 'OK'. The process takes a few minutes, after which the unit will reboot. If necessary, reload the saved configuration and you're done.



Updating your firmware is easy, but always make a backup first.



The average house contains lots of unexpected sources of interference for Wi-Fi networks. Addressing these can really boost performance.

You may be surprised to find that some simple changes can help you resist an upgrade to what is supposed to be a faster connection.

Noisy neighbours

The 802.11 protocol family uses some very clever low-level encoding techniques to ensure that regardless of circumstances, the signal stands a chance of still being heard over other noise, but anything we can do to help the signal on its way will improve network performance. In some cases, such techniques can make quite a dramatic difference.

Everything would be fine if Wi-Fi network cards were the only things transmitting at 2.4GHz in our homes, but they're not. Unfortunately, there are plenty of overlooked sources of interference that can cause the network cards to have to wait multiple times before being able to transmit their packets.

Incredibly, one of the biggest sources of Wi-Fi interference is your domestic cordless phone. If you have one in the same room as a Wi-Fi device, you can expect network performance to noticeably degrade every time you make or receive a call.

Bluetooth devices also use the golden frequency of 2.4GHz to transmit and receive data, and therefore also tend to cause interference on Wi-Fi networks.

Microwave ovens are a domestic boon that we usually take for granted, but they're also a source of 2.4GHz interference. Despite remaining perfectly safe for humans (contrary to the tinfoil brigade) when cooking food, a microwave oven situated less than about 10 feet away from a Wi-Fi network card will degrade its performance. Don't forget that this 10-foot range can extend through walls into other rooms.

Added to these interference sources there are also less obvious ones. or the ones you try to ignore: your neighbour may be transmitting on the same channel, and have placed his base station right near your adjoining wall.

Mains wiring running through walls and floors, faulty household appliances containing electric motors, and physical

> "Everything would be fine if Wi-Fi network cards were the only things transmitting at 2.4GHz"

Weather report

Believe it or not, the weather can interfere with Wi-Fi signals. Water absorbs electromagnetic radiation – and Wi-Fi signals are just that. The damper the atmosphere and the further from the base station your computer is, the more signal degradation there will be.

exchange to the houses it serves is most congested. Keep the results of these tests on a spreadsheet and you'll be able to see the best time of day to perform large downloads. It's also a good idea to perform the same tests from a PC wired directly to the base station. This will give you a definitive measure of the difference in performance between wired and Wi-Fi connections.

Whenever you implement a change, re-test the Wi-Fi speed to see if there's any appreciable difference.

Some simple changes can boost your Wi-Fi, speeding up your gaming performance

obstacles like brick walls also play a part in degrading performance.

Location matters

Once you establish a baseline, think carefully about where you place your base station. The general advice from ISPs is to locate it at a central position in your property, but this overlooks several important factors.

The number of brick walls between the base station and the computer will affect the strength of the signal. Studded walls carrying cables or water pipes will do likewise, and a large aquarium in the way will also absorb some of the signal.

Try to site your base station high up to overcome as many obstacles as possible. On top of a bookcase is a good place, and will give the upper floor of your home a little more signal.

Metal surfaces reflect electro-magnetic radiation, and mirrors are no exception. A large mirror will shield the room behind it from Wi-Fi signals.

Try to find out where your immediate neighbours keep their base station. With a little co-operation to maximise the distance between them, you can both improve performance.

On a desktop or tower PC, the Wi-Fi network card's antenna may be internal. Because the metal parts of the case and internal frame are earthed, they act as a Faraday cage, helping shield the card from the outside world. Try turning the PC so that as little metal as possible stands between the Wi-Fi card and base station.

Other dense materials can also block Wi-Fi signals. Very large wooden wardrobes, full bookcases and so on can all contribute a small amount to the overall degradation of the signal.

At the base station

If your base station and Wi-Fi network cards all use 802.11g, there's no point occupying the airwaves by also transmitting over the older 802.11b. Transmitting both is called 'mixed mode'. To turn off 802.11b, you'll have to go into the web-based management interface on your base station. To do so, you'll need the admin password (which you changed from the factory default when you got it, right?).

The management software used in different manufacturer's base stations differs, but the terminology is usually the same. In the section for interface setup, select the Wireless or WLAN page. One of the general configuration parameters will determine whether you transmit 802.11b, 802.11g or 802.11b+g. For compatibility, the default is almost certainly 802.11b+g, meaning that you're transmitting both versions of the protocol. Change this to 802.11g and then save it.

If another network within range uses the same channel as you, there's a good chance that it'll interfere with your network's ability to transmit and receive packets. See 'Monitor the airwaves' on page 81, to discover if this is the case. Rather than hunt for an unused one as the new BT hubs do, most base stations default to channel one, which increases the dreaded network contention. To ensure the least interference from other networks, pick a channel as far away from the strongest signals as possible. When you save the configuration, the Wi-Fi network cards in your computers will all begin using the new channel.

Repeat yourself

If you still have problems after increasing the strength of your Wi-Fi signal and minimising interference, there's one last method to try. A Wi-Fi repeater simply retransmits any traffic it hears on your network, thereby increasing the signal's strength and extending the network's range.

A repeater can act as a relay to parts of the house that simply can't get a decent signal from the base station itself. If you're particularly security conscious, you can use multiple repeaters and run everything at the minimum transmission power so your signals are less visible beyond your property's borders.

Each repeater, again set to transmit at low power, can still serve the farthest reaches of the house.

TOP TIPS

DATA TRANSFER

The data transfer rate of your Wi-Fi network is measured in megabits per second, not megabytes. "Up to 20Mbps" means up to 2.56 megabytes per second, which should be plenty for domestic use.

A Wi-Fi repeater, like this Zyxel Nwa-1100, can extend coverage when all else fails

Extension cables

A long telephone extension cable can degrade the quality of the broadband signal leaving your BT wall socket. In some cases, a very long cable can seriously reduce useable bandwidth, so check your wiring before complaining to Ofcom about your ISP.

Switching off mixed mode on your base station can free up the airwaves and noticeably increase Wi-Fi performance

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CLOUD GAMING

ONLIVE & GAIKAI

Gaikai and OnLive could mean big things for the PC gamer, says Phil Iwaniuk. But exactly how will cloud gaming change the industry?

Here at PCF, we're not usually in the business of predicting the weather, metaphorical or otherwise. Lately though, the clouds over the current technological landscape have grabbed our attention. A few got drizzled on in the early days of cloud data storage – it had its teething problems like any new tech – but now most of us enjoy saved games backed up in Steam's cumulonimbus of information, and trust our most treasured documents within the altostratus of LiveDrive.

There are yet more strange shapes forming in the sky above PC gaming; namely Gaikai (pronounced guy-kai pop-pickers) and OnLive (pronounced on-live). They both offer gamers an ever-increasing library of PC games to play instantly on your PC, Mac or smart TV.

It might sound like Steam without the download time, but it's more far-reaching than that. These two cloud gaming services potentially enable you to play demanding PC titles at max visual settings on a machine well below minimum specification, or even cut out the PC entirely and play PC exclusives through your tablet or smart TV with a proprietary console. You're basically playing the game by remote control, sending your mouse and keyboard inputs back to a remote PC that deals with all the heavy-duty processing and rendering.

These services have the potential to let gamers play any game they like without worrying about system requirements, annual upgrades or even hard disk space. There's no need to

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overclock a system, no SLI setups. But if that potential comes to fruition, what of our twenty-year relationship with the home PC?

It becomes a media streaming box with mouse and keyboard inputs. Either that or it lies in the bin while we play on our TVs and iPads. Hardware manufacturers are left without direction, as there's no incentive in buying more powerful components. The industry takes a Wile E. Coyote glance around as it observes itself suspended above an infinite drop, and promptly plummets.

That was the rather lurid view shared by a few commentators as the first details of cloud gaming emerged. But in fact, OnLive and Gaikai could be really good for us – the PC gaming hardcore. Let's say the ease of cloud gaming turns a few console and casual gamers onto PC titles. The PC's revenue share increases. Title budgets increase. Publishers fund adventurous projects to create new franchises, so we get original games like *Outcast* and *Grim Fandango* again. Remotely accessed content poses a big problem for pirates, so digital theft figures drop and DRM becomes less draconic.

A renaissance for the PC, all thanks to cloud gaming.

Is it possible?

Illustration: Paul Blachford

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As cloud gaming gathers momentum, it's easy to look at Gaikai and OnLive as direct competitors. Furious adversaries like Henry Ford and Karl Benz, Mr Coke and Mr Pepsi, Al Capone and Kevin Costner, shaking their fists at each other from their respective headquarters on opposite sides of the street.

COMPETING CLOUDS

The reality's inevitably more complex. While the two can be compared in terms of the technology they employ and the experience they make possible, they have different ideas about how to make money from it and how they want you to use it. Also it was Eliot Ness who took down Al Capone. Don't believe Costner's lies.

Gaikai's service is fairly straightforward. Folk visit its site, and try its range of game demos straight from Gaikai's browser. Because the content of these demos is held remotely, users don't need to download anything, and developers don't have to create a separate build – they can just code in a time limit. You can add Gaikai to your site or blog easily enough to add an extra dimension to a game review or simply allow like-minded web folks to share a game demo you've enjoyed. If you're a big-league player, say a retailer or a game company yourself, you can use the browser demo as a game advertisement on literally any site. That's a pretty powerful marketing tool, and we'd be surprised if it didn't become widespread.

Offering a game in its entirety with a soft-coded time limit would be suicide under normal circumstances – that game would be de-limited and on pirate sites in the blink of an eye – but the nature of Gaikai's streaming services makes it a much safer proposition for the game company. Gaikai is about the renaissance of the game demo, and that's something all gamers can get behind.

Above Gaikai is concerned with using cloud gaming to market games with timed demos

LIVE GAME FEED

OnLive takes remotely accessed content and adds a dollop of Steam's digital distribution model. As with Valve's omni-store and EA's young upstart Origin, you can peruse OnLive's available games from your browser, but should a particular game tickle your glands you'll need to download the OnLive app to play it.

There are plenty of demos, again time-restricted rather than original content, but OnLive also allows you to buy games. That's right. Buy games that'll never make it to your hard disk. It's an idea that sits as comfortably as releasing a sequel to *World of Warcraft* as a *Sims 3* expansion pack with the seasoned PC gamer. OnLive does have a clever purchasing model to alleviate that though.

If you want a particular game forever, it's the usual £30 to £35. However, if you back yourself to finish a new title in one determined weekend, you can save yourself a lot of money by buying a three-day pass for around £3.99. There's a five-day pass if you fancy scouting around a bit more too.

Think about how many big-budget single player blockbusters you've played recently that were over in a matter of hours. If you could have bought a three-day pass for them, how many hundreds of shinies would you have saved? Multiplayer titles are a different matter, but they don't comprise 100 per cent of anyone's game collection. For Example, *F.3.A.R.*'s

Motion Control: the console's last stand

Just as the older generation holds *Pac-Man* with the reverence of a holy script and the current generation bows before *Doom*'s iconic pixels, the children of today will dotingly carry a flame for *Wii Sports*. When Nintendo launched the Wii, everything changed. Suddenly we were playing games WHILE STANDING UP. Older relatives overcame their profound suspicion and soon enough, beat us at bowling.

All that flapping around in front of the TV caught on and brought a wider demographic into gaming – and both Sony and Microsoft wanted a piece of motion control pie. The Kinect and Move controllers have acted as technological face lifts, extending their life span as never before in the console market.

OnLive's advent might have pulled their nipped and tucked faced taught, but at least consoles still have motion control in their arsenal, right? Well, it's not something OnLive or Gaikai are looking to move into in the short term at least, but there are competitors on the scene.

Most notable is Movea, a French company looking to bring motion control to everyday TV usage, not just gaming. Using its SmartMotion technology, companies like 4Mod and SMK let you sign in via a unique gesture and browse media at the flick of a wrist. Movea's MoveTV service also adds a pay TV dimension that lets you download apps and games onto your TV, and flap about at them without Sony, Microsoft or Nintendo getting involved.

Korean outfit, Remote Solution is also getting in on the action with its (go on, guess what it's called) remote control. Pairing up with the MoveTV service and using Movea's firmware, it's aiming to create a seamless motion-controlled home media environment.

With stiff competition for their motion control and traditional gaming market shares, current consoles will have a tough time keeping it together – ultimately, each of the console makers will have to rely on their respective brand power, and further innovations.

Return of the demo?

It's hard not to sound like an old man when tracking back to the days of the demo. From week-long shareware downloads on 28k modems to floppy discs to CD-ROMs, demos were a ubiquitous marketing tool, and it was unthinkable to buy a game without first playing the demo.

Demos weren't just about road-testing the games you were already interested in though. Magazine cover discs were full of games you'd never heard of, but played anyway because… you know. There they were. As the 1990s gave birth to exciting new genres and subgenres, demos were our way in.

One view of the demo's decline is that it's inexorably linked to the rise of the internet. Screenshots exploded from magazine pages to every corner of the internet, and with them came video trailers – a media form magazines simply couldn't compete with. The accessibility of this material dulled our senses to the slow retreat of the demo into obscurity.

But carefully controlled screenshots and videos don't give you an accurate impression about a game's quality. A demo most certainly does, and people's reception of that demo content also can't be controlled by marketing types. Perhaps that's why we see so precious few modern demos made available and then months after the game's released.

Then there's the notion of creating unique demo content somewhere in your incredibly tight development schedule. Under increasing pressure, many developers have simply opted out of demos entirely due to nothing more sinister than time constraints.

Enter GaiKai. Its cloud gaming service is simple and as easily accessible as screenshots and videos, and developers don't need to worry about producing new content because now that's what the first 30 minutes of their game is for.

Cloud gaming will mean game developers can create demos for their games cheaply

multiplayer is available in the 'Play Pack', but you can access the brief single player campaign with a three day pass.

Ah yes, the Play Pack. Subscribe for £6.99 and you get unlimited access to a generous bundle of 100 titles that includes the likes of *Bioshock* and *Just Cause 2*, and then 30 per cent off any other title you want to buy full-time. Our Steam accounts are populated by a worrying volume of tantalising weekend deals as it is, and OnLive's deals look set to deplete our precious money reserves even further.

OnLive has buddied up with BT to launch its UK service. Hopefully that partnership will lead to a sensible workaround on data usage limits. A few minutes on OnLive is akin to streaming HD video, so 'fair usage' limitations that ISPs impose could be a real thorn in both OnLive and Gaikai's sides. We quizzed BT on this, and were encouraged to hear that BT/OnLive customers will get a six-month data usage 'holiday' with no fees. We couldn't however get a straight answer out of is spokesman when we asked if unlimited packages might increase in price if OnLive becomes popular. Time will tell.

MORE FIBRE NEEDED

But that's the nature of the beast: ever-changing. When we first got our hands on the two services, the games we played suffered noticeable input lag and looked like YouTube videos. Currently the visual fidelity issues remain to an extent, but the input lag seems to have been minimised lately. As our dear old Blighty's data pipeline gets a bit more 21st century and fibre optic broadband becomes the household standard, we just might see a cloud gaming experience that's imperceptible from a locally run game in the coming years.

And that would be a scary development for hardware manufacturers. Andrew Ditchburn, Gigabyte's mainboard product manager, doesn't seem all that spooked though: "Cloud gaming could be the beginning of something big in the console market, but personally I don't think it will every truly become mainstream in the PC market. Consoles cannot be easily upgraded and [creating] storage space for games, music and movies is always a problem – in the PC market upgrades are not really an issue."

PC gamers will still demand performance gear, Ditchburn maintains: "Personally we don't see the need to adapt. PC gamers are normally very demanding on the requirements of their systems, and upgrading provides an opportunity to gain an advantage over their competition. Also PC enthusiasts tend to take pride in the quality of their PC and hardware installed."

This calm and even encouraging anticipation of cloud gaming's advent is shared by John Inwood, MSI's UK marketing manager. "It is yet to be seen if [cloud gaming] is a phase or something which will become mainstream, however it is clear that there are a number advantages to gaming in the cloud which could see it establish itself for some time to come… however, the gaming experience on the cloud is still a long way from that of gaming on a dedicated PC. It's not likely that we'll see any trends forming in favour of lower spec PCs as a result. If anything, this may have more of a significant effect on the console market – the experience consoles offer is a lot more comparable [than the PC] to that of cloud gaming."

> "The visual fidelity issues remain to an extent, but the input lag seems to have been minimised"

Cloud gaming means business, and in business there are winners

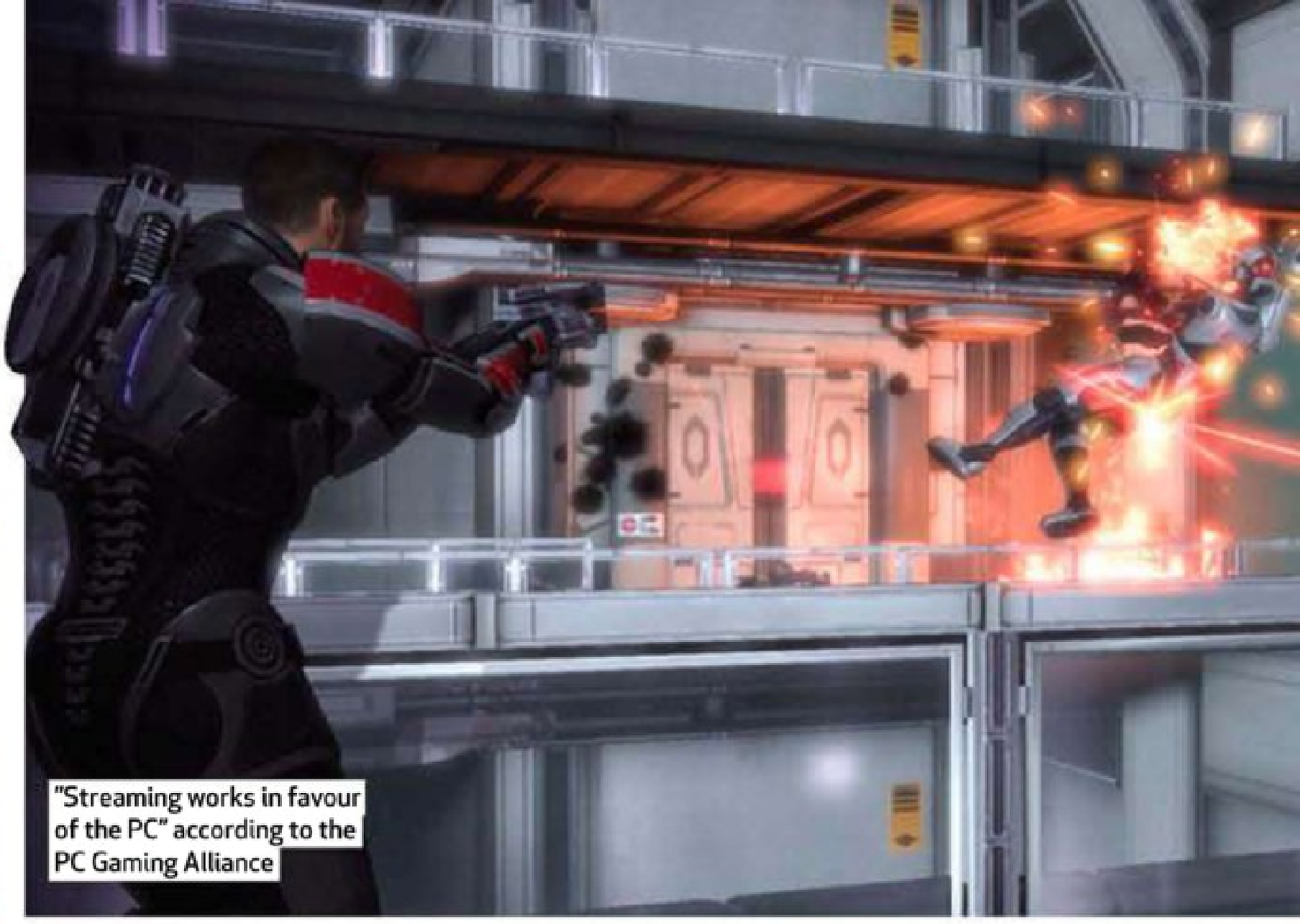
OnLive offers a generous bundle of 100 titles for £6.99

OnLive's Steve Perlman

PC Format: Try to get our heads around the magic that goes on between the end user and the server. What breakthrough tech has enabled OnLive to happen?
Steve Perlman: It's actually many different compression technologies. Just on the device side alone, we use different algorithms to accommodate the limitations of the device. Then you get into characterising the connection. No matter what you do the internet is going be variable. Sometimes you see a little bump or blur, then the algorithm adapts. What's typically happening there is it'll change the parameters of a certain algorithm. We typically adapt the algorithms every four milliseconds. With conventional compression algorithms, one bad packet loss can cause a whole series of frames to be destroyed. What we've designed is a set of technologies which are highly, highly tolerant – we expect a lossy stream. Now the manufacturers all want to be able to run OnLive very efficiently. It's great, we've been able to work with a number of partners: NVIDIA, AMD, Marvell, and Intel. All of these guys are designing their silicon now they know what our requirements are. When you have a zero million user install base, it's kind of hard to convince chip vendors to completely redesign their chips, but once you start getting into larger numbers they suddenly get interested.

> "We've designed a set of technologies which are highly, highly tolerant, we expect a lossy stream"

PCF: So with Intel for example, will that optimisation for OnLive be as soon as Ivy Bridge?
SP: I would think so… Other than what's made publicly available they don't tell us the details of what they're doing in the next gen, but they do know what they need to do. They see this as a growing market, and they want to have a solution for it. Why would you not want to support OnLive? We don't add any cost to the chip. Frequently, it's removing a buffer that introduces delay that is needed for normal video decoding to deal with potential packet loss or other errors.



"Streaming works in favour of the PC" according to the PC Gaming Alliance

and losers. Component manufacturers insist they won't be losers, but messrs Ditchburn and Inwood both agree who will be – the console market.

CONSOLE KILLER?

A recent quarterly report posted by Microsoft's entertainment and devices division (comprising all things Xbox) revealed that the division accounts for just 10 per cent of Microsoft's overall revenue, and generates just 2 per cent profit on that revenue.

Those figures cover Xbox 360's Kinect-related resurgence, too. Sony, whose PlayStation Move motion controllers didn't quite steal the market share from Microsoft and Nintendo is hardly enjoying a golden age either. Both giants have suffered at the idle thumbs of casual gamers, losing market share to iOS apps and social networking site games, such as *FarmVille*.

Current generation consoles are being left behind, and that trend hasn't been missed by some of the industry. Blitz Games' CEO Philip Oliver expects games to be distributed primarily in digital form in the near future: "If you were designing a machine right now, why would you want physical media? It would be crazy."

THQ's Brian Farell went one further at the first cloud gaming conference in San Diego this September, boldly predicting that the next wave of consoles will move to the cloud entirely. From a publisher's perspective, it's exciting: "no physical goods cost for game makers, no inventory, no markdowns, and all the money spent by the consumer would go to the developer or publisher".

You only have to look at OnLive's Game System, a micro-console and controller, to get an insight into their commercial aspirations – it's going after console and casual gamers. PC Gaming Alliance President Matt Ployhar contemplates the impact of cloud gaming: 'By and large I believe that streaming works in favour of the PC. Consoles can also benefit, however due to their proprietary nature, I believe they're somewhat less compelling. Would you rather choose to ship your game for 500 to 600 million households world-wide? Or better yet… integrate PC functionality into every TV and hit close to a billion households? Or would you rather target the individual active users on an Xbox 360, PS3, or Wii which are, on their best days at best one tenth of the active install base of PC users; or one twentieth of TV households?'

The widespread adoption of motion controllers is testament to the current generation of consoles' ability to adapt to rapidly changing user demands. With competitors now jumping on the motion control bandwagon (see page 86), it's clear that Sony, Microsoft and Nintendo will need to reinvent themselves again to compete with cloud gaming services – and by all accounts, it'll be a tough battle.

OnLive's MicroConsole Game System reflects its target audience: casual and console gamers

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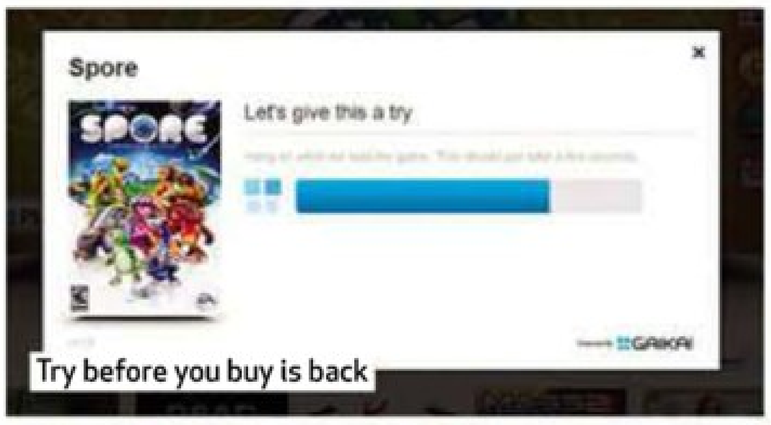

Try before you buy is back

Optimisation of games for the cloud is likely to be the next hurdle

The next step for services such as OnLive is to get developers to optimise their games for the cloud. It's something CEO Steve Perlman is keen to see in the near future, and may well result in a smoother, better quality experience for the gamer. But how receptive are developers to this notion?

CLOUD FRIENDLY

Kieran Brigden, the Studio Communications Manager at Creative Assembly, provides some insight on his very PC-focussed studio's viewpoint: "It's hard to be sure what the technical issues would be, but lag is clearly a big one and would probably require very careful design to hide it or mitigate the impact … With games like the *Total War* series, another issue would be what level of graphics to provide. We design *TW* games to last for many years, so they scale extremely well. The player can 'turn up' the graphics all the way from a cheap netbook to well beyond what current top-end hardware can cope with. What would the cloud be able to cope with? Would it be able to deliver graphics that no home PC is capable of? Is the same true of AI?"

Distribution and developer-publisher relationships are another area for consideration: "There are always going to be many routes to market for a game, even within a single distribution platform. The infrastructure required to make the most of a developer's [product] will still be substantial, and it's publishers that provide that. Large developers could opt to carry that overhead, but in doing so they will become publishers. Nothing has changed in that respect."

Despite his obvious excitement for the possibilities cloud gaming provides, when asked if developers want their games to be played over the cloud rather than locally, Kieran is succinct: 'Not yet…'

What does it all mean for the PC, then? Hardware manufacturers are unlikely to go bust at the expense of cloud gaming. PC traditionalists will always want to own and play their content locally, enthusiasts will gladly pay £500 for a graphics card and twitch gamers will always look to gain a technological advantage over the competition.

Every breed of gamer enjoys a demo though, and thanks to Gaikai it's likely to be easier to try before you buy. Power to the consumer! It's still up to the publishers and Gaikai themselves whether games actually appear prior to release dates, of course.

OnLive looks likely to be massive for the casual gamer, console gamer and tablet user, but it could indirectly benefit our platform hugely. If the PC enthusiast dares to dream, the increased revenue for PC titles could change what publishers see as commercially viable in a game, and give us weird and wonderful new projects. Piracy's unlikely to go away entirely, but the availability of demos and the headaches involved with remotely run content might at least curb it. Then we might be able to kiss goodbye to today's horrible DRM. Our PC renaissance might be just around the corner.

Gaikai's David Perry

PC Format: Is the UK's existing data pipeline infrastructure adequate to support fast-paced multiplayer first-person shooters over Gaikai?
David Perry: Absolutely, the UK seems better connected than the USA! We've been able to get games like *Crysis 2* running at 60 frames per second over here and so we are building the UK servers now, very shortly you will be able to experience that level of quality as well.

PCF: What are the technologies that facilitate this service, from the end user's PC back to the remotely-accessed system?
DP: We have built a global network now across 24 data centres, it will be around 28 in the next 60 days. Each time we add a data centre we support more and more gamers with incredibly fast connections. I did a demo recently for a publisher and got a ping time of 1.5 milliseconds in their office, that's just insane! We are focused on the very high-end games and making them feel amazing. Our roadmap over the next 12 months will deliver all kinds of tricks to shave off one millisecond at a time. Our servers are completely custom made, we have a production line churning them out in Southern California and the result is screamingly fast performance – Intel is an investor. We have a few different server types, some are all about visual performance, some are all about computational performance with raided solid state drives etc. I'm happy because when we started I had to build our prototype servers by hand, finally I can leave that to the experts.

> "We have built a global network across 24 data centres, it will be around 28 in the next 60 days"

PCF: By changing the end user's 'ownership' of a game can cloud gaming help stamp out piracy of PC games?
DP: I've been in the industry 30 years and the piracy conversation still continues, I don't think it will ever truly end … Cloud gaming will be a technical problem for pirates but I'm not convinced they will suddenly stop.

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Gaming

Because gaming is a way of life

GAMES TRUMPET

"One in a long line of games that belongs firmly in the batshit insane racer genre"

Henry Winchester has become completely hooked on *Trackmania* and teledraw.com. The former is the subject of his column, the latter is a completely hilarious online pictorial game of Chinese whispers. Highlight so far: "The devil (his right horn seems to be glued on) wants the angry icecream cone to pay his soul, NOT cash."

As a wee young *PC Formatter*-to-be, my dad called me into the kitchen to tell me a rather interesting fact. "Son," he said. "The downward force exerted by a Formula One car at top speed is such that if it could somehow be flipped upside-down while driving through a tunnel, it would be able to drive on the ceiling of said tunnel. It's all down to aerodynamics, you see, son."

Other parents have an interesting chat with their offspring about the birds and the bees, but my dad was determined to tell me about the aerodynamics of speedy racing cars. My tender mind was considerably blown by my dad's speech, so much so that I wrote to Bernie Ecclestone to demand that loop-the-loops be added to F1 tracks to make the sport more interesting. To date, I still await a response.

Years passed, and my dreams of upside-down racing cars never came to fruition. Until I played *Trackmania*. It basically takes the whole upside-down racing car idea and extrapolates an entire game out of it. It's got it all: gravity-defying loop-the-loops, g-force inducing corkscrews and stomach-churning speed pads. It's great and I love it.

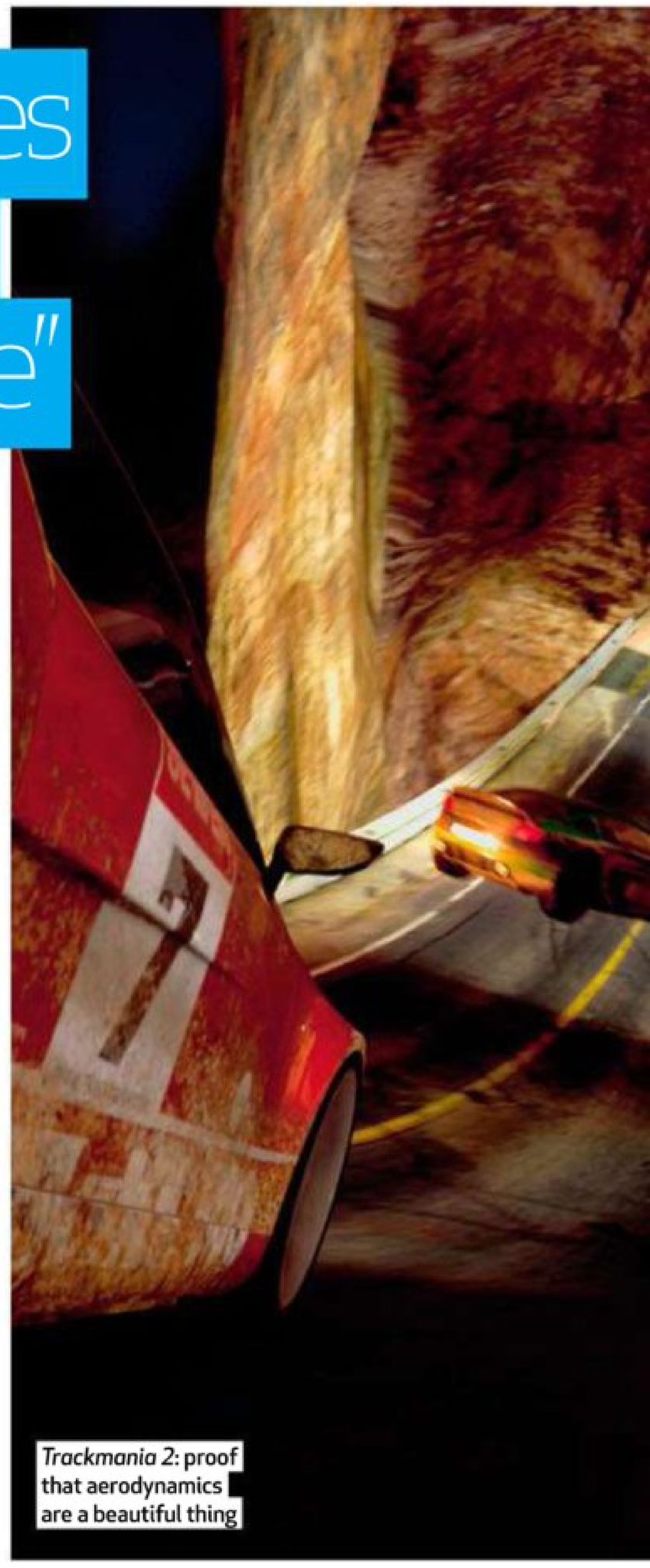
P98
TRACKMANIA 2: IT'S BACK AND EVERY BIT AS BONKERS AS EVER

Trackmania is one in a long line of games that belongs firmly in the batshit insane racer genre. These titles began in 1997 with the double-whammy of *Carmageddon* and *Grand Theft Auto*, both games in which driving at ludicrous speeds towards pedestrians was positively encouraged – fuelling the rage of Daily Mail readers.

From here, the batshit insane racing genre exploded – literally. *Burnout*, *Demolition Derby*, *Flatout* and *SpongeBob's Boating Bash* all used the *Carmageddon* template but – understandably – removed the tender, liquefiable pedestrians. *GTA*'s open-road mechanics inspired the likes of *Driver*, *Saint's Row* and *Just Cause*. And, at the same time, the arcade simulation made its own tracks with *Sega Rally*, *GRID*, *DiRT* and *GTR 2*.

Racers remained in two definite camps: the certifiably batshit insane, and the all-too po-faced. *Trackmania* straddles the niches – it looks and plays like a serious game, but the tracks have bits where you fly through the air like a car-shaped bullet. It's deceptively simple and incredibly addictive, too. Rather than colliding with other players, you race alongside them, passing through their automobiles as if they were transient ghosts trapped in some kind of metallic purgatory. You play tracks until you nail them, watching how others tackle that hairpin, adjusting your trajectory by decimals of a degree. It's a beautiful, innate thing.

Trackmania 2: Canyon is pretty much identical to its predecessor, and that's definitely not a bad thing. Graphically, it's substantially better than *Trackmania*, but most important of all, though, is that the cars can still drive upside-down. ¤



Trackmania 2: proof that aerodynamics are a beautiful thing

Gold Award

If a game is awesome, it gets our Gold Award. If it's just 'good' it doesn't. One award; one towering standard of excellence. Gold Award games played.

Our Gaming Manifesto

This is us. We heap praise on great games and despise bad ones. It's that simple. We use nothing but official review code. You'll see no dodgy 'preview' reviews. Just honest, expert opinion from gamers you can trust.

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Join thousands of other like-minded PC gaming fans by joining our Steam group. Haven't taken the plunge yet? It's easy. Head to store.steampowered.com/about and download the Steam client and install it. Use this alias www.pcformat.co.uk/steam or type in 'PCFormat into the community search and 'join' our public group. Simples.

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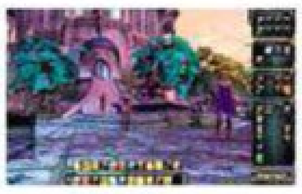
RECOMENDED



RIFT
Trion Worlds
PCF Issue 252
It takes an audacious MMO to unsettle WoW, but *Rift*'s been depopulating Azeroth with its class fiddling and rift battles.
PCFormat Verdict 89

WITCHER 2
Namco Bandai
PCF Issue 253
An engrossing world bursting with varied player interaction, *Witcher 2* puts a cherry atop its RPG cake with superb combat.
PCFormat Verdict 92

FROZEN SYNAPSE
Mode 7
PCF Issue 256
Mode 7's indie masterpiece evokes 90s gaming nostalgia in turn-based form. It'll run on a netbook too.
PCFormat Verdict 90

PORTAL 2
Valve
PCF Issue 254
Valve has delivered an incredibly well-written, well-designed, surprising and challenging puzzler of the year.
PCFormat Verdict 92

DIRT 3
Codemasters
PCF Issue 255
No surprises in the latest version of the rally game. But with a formula as good as *DiRT*'s, more of the same works just fine.
PCFormat Verdict 86

BULLETSTORM
EA
PCF Issue 251
A celebration of FPS conventions that somehow manages to further the genre and assassinate it simultaneously.
PCFormat Verdict 92

IN THE NEWS

ARMA 2 cameo on ITV

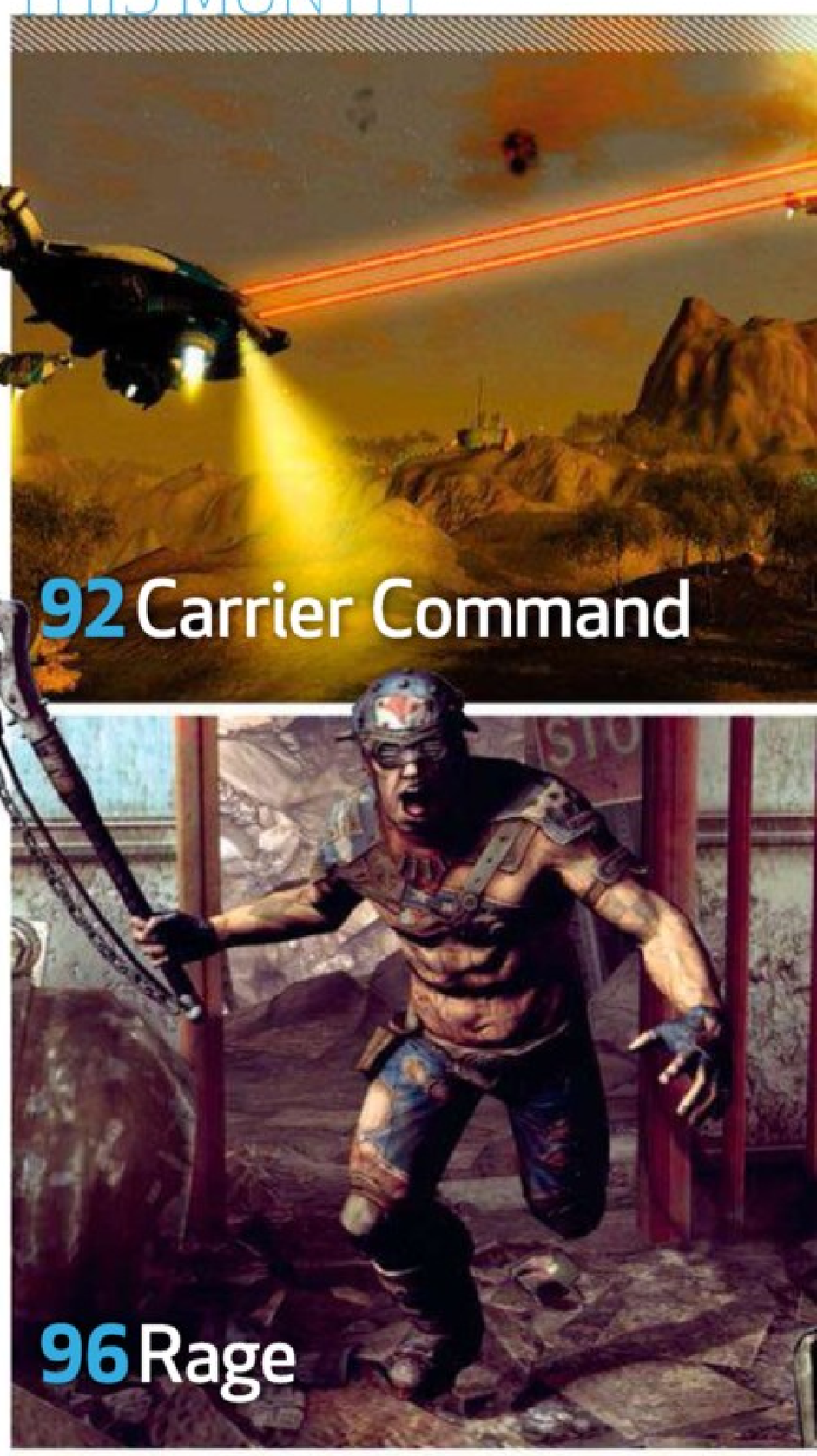
As monstrous games-related cock-ups go, ITV's recent games-related cock-up has to be the most monstrous. Britain's second-favourite TV channel broadcast its documentary *Exposure - Gaddafi and the IRA*, during which it showed some purported footage of the IRA shooting down a chopper. The problem is that it wasn't real footage at all: it was *ARMA II* footage uploaded by a YouTube user riffing off the original footage.

ARMA II developer Bohemia was quite unaware of the footage being used, with CEO Marek Spanel saying: "It is very weird to see our game used this way especially considering the journalists were simply unable to tell difference between reality and game footage…" Could it be that ITV simply didn't understand that the IRA wasn't made of pixellated, jerky soldiers? Not so, according to ITV: "It would appear that during the editing process the correct clip of the 1988 incident was not selected and other footage was mistakenly included in the film by producers," said a spokeperson.

ITV hasn't curried favour with gamers, especially after Alan "geriatric-lover" Titchmarsh dispensed a one-sided criticism of the medium on his TV show. He said that gamers often don't know the difference between games and reality – and neither do ITV producers, by the looks of things.

Oops. An *ARMA II* modder's video found its way into a TV documentary

HIGHLIGHTS THIS MONTH



92 Carrier Command

96 Rage

98 TrackMania 2

MULTIPLAY SERVERS

PC Format has hooked up with Multiplay, www.multiplay.co.uk, Europe's premier game server host. What does this mean for you the reader? Cutting edge server hardware that's what! All hosted in Multiplay's own bespoke network (all orchestrated from a secret lair inside a dead volcano or possibly Southampton).

Our current list of servers is:

Bad Company 2 85.236.100.214:19567
Crysis 2 85.236.100.214:30200
Team Fortress 2 85.236.100.214:27215
Left 4 Dead 2 85.236.100.214:27115
Homefront 85.236.100.214:27015

In-game banter

If you fancy a chat while playing, download the TeamSpeak 3 client from **bit.ly/TS3client** and join our voice server at IP address: 85.236.100.27:17477, Password: **PCFFTW**

RELEASE/Q1 2012

Carrier Command: Operation Gaea

A 23-year cruise comes to an end

VITAL STATISTICS

Publisher Bohemia Interactive **Developer** Bohemia Interactive **Genre** Unique
Web www.carriercommand.com

WHAT'S THE STORY?

Pumping new life into a 23-year old game, Bohemia has brought this classic up to the modern day. You control a sci-fi military carrier, seeking to conquer an archipelago, in a strange mix of RTS, RPG and action.

Those proud resurrectionists who dig through the graveyards of dead games often settle on the more player-friendly titles; simple games, often quite gun-heavy, requiring less brain-usage than *Geordie Shore: Lobotomised Louts*, with names like *Streets of Rage* or *Metal Slug*. Yet 1988's *Carrier: Command* was a hugely innovative creation, combining mobile base-management with a strange island-colonisation metagame, a large military strategy element and location-based action game. This rarely replicated genre (save for 2001's *Hostile Waters*) is what Bohemia Interactive has bravely chosen to resurrect.

Bohemia hasn't gone for a straight recreation, but its version isn't so different from the original, right down to the names of the units and structure of the game. Like the original, you control one of two extremely futuristic carriers, in a contest for a small archipelago of islands on a moon called Taurus. Each carrier is a combined military platform, aircraft carrier and amphibious vehicle deployment unit and mobile factory; yours is the more primitive one, of course.

The aim is to navigate the carrier between the islands, capturing them back from the opposition, to ultimately dominate the archipelago. An overlay map, which can be accessed from anywhere, can be viewed to navigate around and avoid the enemy carrier until you're ready to take it on; the map takes maybe half an hour to drive over, assuming you're not deviating to avoid enemies and island defences.

Air, sea and land

The carrier packs two types of unit; four of the Manta VTOL aircraft, useful for dog-fighting and scouting, and four of the amphibious Walrus, which handles both sea-based combat and island assaults. The player can directly control these and the carrier, but as soon as you change units they revert to a basic AI system where they'll defend themselves but little else. They can be set patrol routes and paths to follow, which they'll do religiously, so a substantial portion of gameplay is that of *Space Hulk*, spinning plates.

To capture islands, the carrier can use its longer-range guns to destroy shore-defences, but to actually seize the island, you need to capture a central

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"Separate campaign and strategy modes promise a wealth of gameplay options"

The action takes place on the moon of Taurus

Fight your enemies on air, sea and land

The climate changes dramatically from island to island

Vehicles are customisable

The Resurrection Mambo

Seeing *Carrier Command* brought back to life makes us get all nostalgic about the games we'd most want remade. With *X-Com*, *Thief* and *Syndicate* on the way (in modern forms), what other franchises or genres do we most want to have a comeback?

The space-sim is certainly due a comeback, having failed as a genre completely in the pressured days before Steam. *Freespace*, *Elite*, *Homeworld*, *Freelancer*, or even *X-Wing vs Tie-Fighter* could bear a remake.

In terms of strategy, first-person strategy-action game *Battlezone* is probably also deserving of an update, as are *Kohan*, *Z* and *Total Annihilation* (*Supreme Commander* never recaptured the glory). The daddies of the strategy genre, though, are the ancestors *M.U.L.E.* and *Herzog Zwei*, revolutionary franchises with strange rulesets.

Stretching to other genres, *Twisted Metal* and *Carmaggeddon* are begging for remakes, as are strange wizardy-adventures *Nox*, *Anachronox* and *Phantasmagoria*. Finally, if EA is reading, a huge range of titles it owns from Bullfrog (*Dungeon Keeper*, *Theme* Park, *Magic Carpet*) and Origin (*Bioforge*, *Crusader: No Remorse*, *System Shock*) are due a revival.

X-Wing: ripe for a remake?

facility hidden away in its interior

This means deploying your vehicles and aircraft, to subjugate then hack internal defences in a mini-RTS, whilst keeping a sea eye on your carrier, to watch out for sneak attacks. Because this is mainly an open world game rather than a series of levels (except in the more arcadey modes), vigilance is essential to avoid being flanked. Some missions may also involve purely first-person shooter elements, which is fine, considering how solid the combat is.

While this is going on, you're also getting resources from your captured islands, which you're using to manufacture the components for your various craft, weapons, facilities and island defences.

You can also customise your vehicles for different functions – a touch closer to *X-Com* than anything else, as you learn new tricks from the captured islands and upgrade your existing ships slowly. Watching it all on screen makes it seem like second-nature, so simply and beautifully it's implemented.

Meanwhile, the enemy carrier is also trying to capture islands, so you have to choose how to customise your domain as defensive strongholds, as factories, as mines or as storehouses.

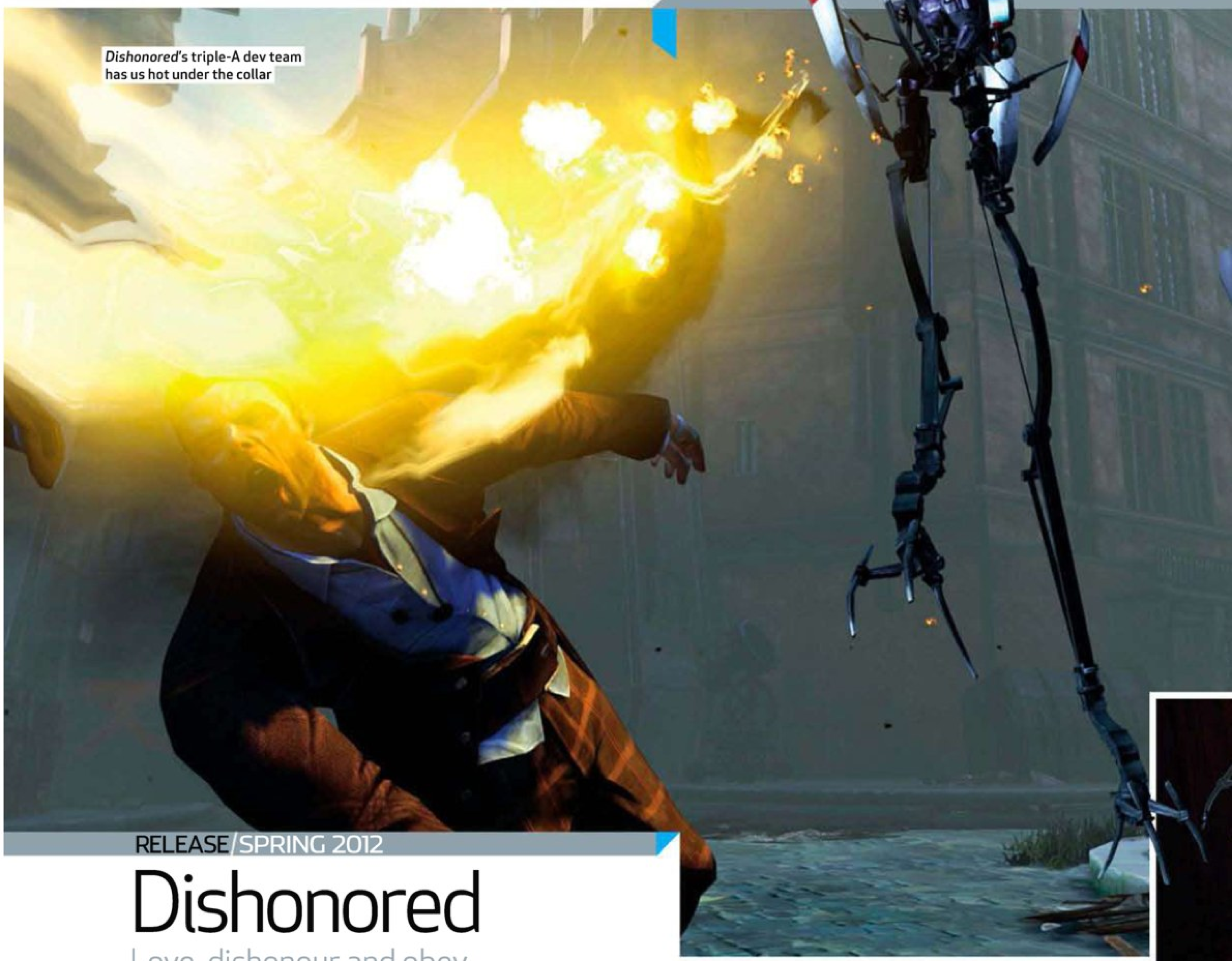
As the islands are linked into a limited network structure that does have bottlenecks, it's important that you don't lose key islands; you'll get cut off from resources and your repairs and production will become impossible, creating a vicious circle. Different island types are better for certain types of facility and the climate can change substantially between them, from frozen tundra to steamy jungle islands, soggy marshes to volcanic mountains.

The control system for flipping between the various units at your disposal – Carrier, Walrus, Manta – is beautifully seamless. Even the research, customisation and manufacturing inside the Carrier is part of the main graphics engine, so you can segue effortlessly from that to the outside of the ship. You can follow a craft from basic resources to design to deployment to combat to death; a Tolstoyian vision of a craft's life. With simply enjoyable combat that rewards you taking personal control, it's a strategy buff's dream, reminiscent of *Battlezone* or *Dungeon Keeper 2*.

We're excited by *Carrier Command* because it's a flagship idea; a perfect reimagining of an alien but obviously compelling gameplay structure; the separate campaign and strategy modes promise a wealth of gameplay options.

If Bohemia can just make it polished enough, and put some multiplayer magic in there too, this will be a welcome resurrection. Let's hope we can set sail soon. **Dan Griliopoulos**

BUZZMETER 'Carry on' 9



Dishonored's triple-A dev team has us hot under the collar

RELEASE/SPRING 2012

Dishonored

Love, dishonour and obey

VITAL STATISTICS

Publisher Bethesda Softworks **Developer** Arkane Studios **Genre** Action FPS **Web** www.dishonored.com

WHAT'S THE STORY?

From the minds behind City 17 and *Deus Ex* comes *Dishonored*, an action-adventure set in an alternative Victorian era, with retro-futurist visuals and shape-shifting protagonists.

The emphasis is on stealth over confrontation

One thing I'd like to learn is what various game developers actually look like. Unlike the film and music industries, there's no real 'face' to game development. So when a young chap introduced me and a handful of other journalists to *Dishonored*, I had no clue who he was. It was only later I learned he was none other than Harvey Smith, designer of *System Shock*, *Deus Ex* and *Thief*. Someone I should really recognise – but at least I didn't make a fool of myself dribbling over how good the level and lighting design in *Thief: Deadly Shadows* was.

Smith joins other big names in games on the title. Fellow designer Raf Colantonio worked on the likes of *Arx Fatalis* and *Dark Messiah of Might and Magic*, and art director Viktor Antonov designed *Half-Life 2*'s City 17. It's a dream team of dystopian visions, and Smith's *Dishonored* presentation was my personal highlight of Gamescom 2011.

Set in the city of Dunwall, *Dishonored* sees you take the role of Corvo, a bodyguard framed for the assassination of Dunwall's Empress. The game takes a first-person perspective, with the emphasis on stealth over direct confrontation – think *Thief*, but with some clever *Deus Ex*-style hacking.

Dunwall itself is an eerily familiar place. Rendered in the same wintry light as City 17, it's like an alternative version of Gordon Freeman's first calling point in *Half-Life 2*. Electronic barriers (known as 'Walls of Light') and striders look almost like carbon copies of their *HL2* counterparts, but closer inspection reveals the barriers to be crude, Tesla-style creations, and the Striders are little more than armed men on stilts.

There are shades of *BioShock*, too. The continent is powered by whale blubber, and one of the first sights is a vast vessel transporting a giant, great white-like creature. Unlike *BioShock* it's set on a distant planet loosely based on Victorian London, and Dunwall has just borne something of an industrial revolution. There's something distinctively French about the bold art style and character design, too, and it's telling that Arkane Studios is based in Lyon.

Demonstration man

Corvo's mission in the demonstration is to assassinate Arnold Tinch, a barrister who's been falsely accusing people of passing on the plague. The first obstacle

Steelseries.com

Where it's rat

There's more to Dunwall than men on stilts and giant marine creatures. Rats swarm through the city, but they're more vital than mere set-dressing. Smith introduces them as: "Dynamic rats – they run away from light, but they're drawn to bodies," he says. "If there are only a few rats they'll run from you, but if there's a swarm they'll attack you. If you move into light they'll run away from you."

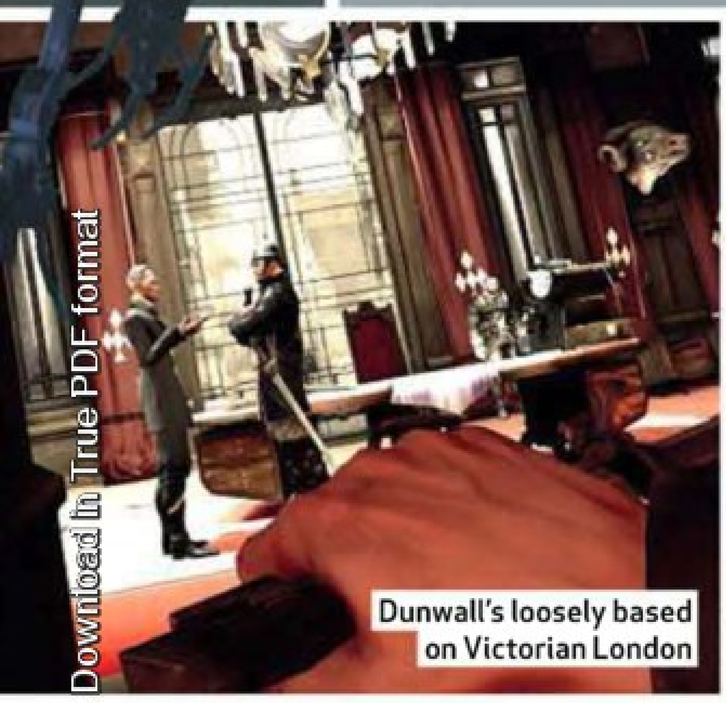
Body dismemberment is key to disposing of recently-dispatched foes, and rats will quickly (and gorily) grind through an enemy's flesh so all that's left is a comedy skeleton. In a stealth game where guards raise the alarm it's a crucial mechanic, and if he does get caught Corvo can even summon a swarm of rats to attack enemies.

Rats also indicate where Corvo can and can't go: if they run through a wall of light, they get zapped. The English Literature student in me points out how well-placed they are thematically. Like Corvo, they're accused of a heinous crime (spreading the plague) and represent creatures forced into hiding by the powers that be.

Rats – good for eating the evidence of Corvo's murdering

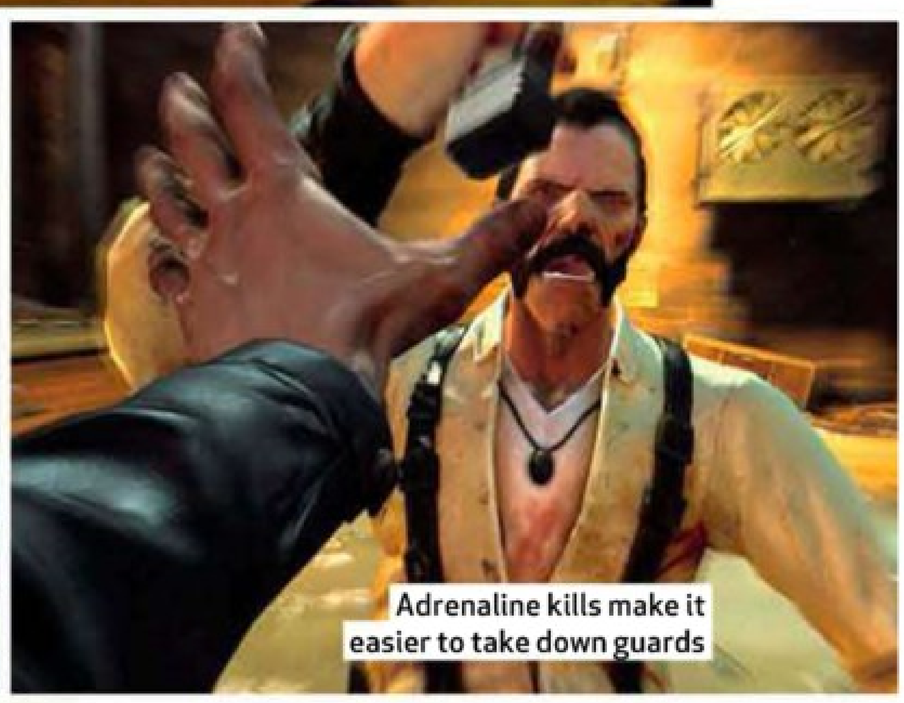
These two posh gents travel in this horseless carriage

There's something distinctively French about the art style



Dunwall's loosely based on Victorian London

As an assassin stealth is easier than a direct attack



Adrenaline kills make it easier to take down guards

is a guard, and Smith points out that you can assassinate him or just sneak around him. As with all classic stealth games, attacking is tricky, but according to Smith, "You can build up adrenaline and achieve a one-shot kill".

Open worldiness

Smith adds that the demo has been designed around one specific area of Dunwall, but the open-world structure of the game means that there are plenty of opportunities for more adventurous players. "There's this crazy guy up on here on the balcony," says Smith. "And there are other places where you can pick up side-quests."

Further into the quest, Corvo finds blueprints for the Wall of Light, and, in true *Deus Ex*-style, hacks it to attack enemies rather than the player. A guard is satisfyingly zapped to bits as he tries to make his way through the gate.

As Corvo approaches Tinch's office, it becomes clear that it's going to be tricky to enter his foe's abode. It's here that the demo became a bit insane, but in a very good way. Corvo is able to possess rats, and sneak into Tinch's office via ducts and passageways. "The rats are quick and sneaky," says Smith. "But if a guard or servant sees one he'll stomp the rat." Corvo continues into the office, and transforms from his rodent form back into a human being. Tinch is dispatched, but it wouldn't be a good demo if something didn't go wrong.

The alarm raised, Corvo begins using a special power that makes being able to transform into a rat look like an issue for *The Jeremy Kyle Show*. Able to instantaneously teleport short distances, he hurtles over rooftops away from his pursuers. It's graceful and doesn't feel anywhere near as clunky as it could be, and it's not often that a stealth game mixes in superhero-style powers.

The industrial age setting means swords are much in evidence

Honourable mention

Dishonored is a game of mind-blowing potential, although while its alternate universe is an innovative mix, it does inevitably feel a little too much like territory we've covered in the likes of *BioShock* and *Half-Life 2*. It's how you get around the territory that makes a difference, and no one's going to argue that transforming into a rat or teleporting over rooftops isn't original, and immensely cool. Okay, maybe Harry Potter. ¤ **Henry Winchester**

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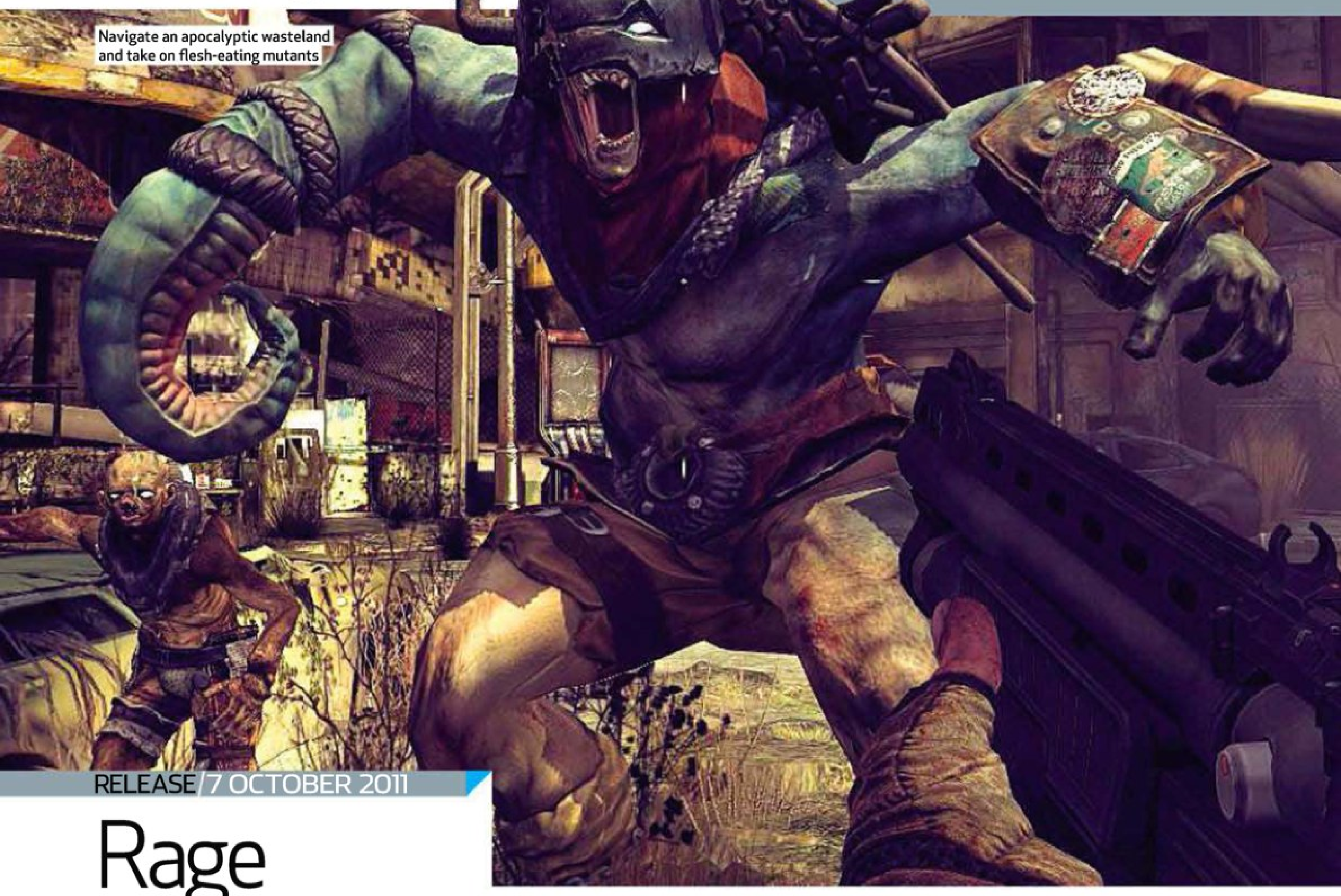


RELEASE/7 OCTOBER 2011

Rage

Is the first new world from id in 20 years worth the wait?

For all of its open roads and bright blue skies, for all its sweeping canyons and town hubs, *Rage* is resolutely an id Software game. The foot-wide keycards scattered throughout this post-apocalyptic landscape are as much a nod to this as the *Doom* mug collectibles players can sell to shopkeepers. This also feels like an acknowledgement to its design lineage: despite the apparent differences, *Rage* is the continuation of the corridor shooter.

Rage starts as you, one of the world's last super-soldiers, are awoken from cryo-sleep. But something has gone a bit wrong. It's 106 years after an apocalyptic Bad Thing Happened, and the destroyed world has split between rival gangs of mentalist bandits, flesh-eating mutants and moustache-twirling evil fascists.

Wasteland

Rage's post-apocalyptic wasteland regularly opens out into bowls and basins, making little thunderdomes for the game's car combat. These give you the space to use the vehicles' boost and handbrake; time to deploy rockets, machine guns and strange pulse weapons to immolate the bandits on your tail. But these sections aren't the norm, just thicker beads on a thread connecting the game's three hub-towns.

Driving between these townships is like working through *Rage*'s more typical shootery bits: murder anyone who gets in your way and never stop moving forward.

Town hubs provide missions, each of which require you to go to an allotted place and introduce bullets to the skulls of everyone who lives there. Accept a quest and you'll be given a little marker. Chug around without a quest though, and there's little to do beyond wreck the handful of bandits that appear each time you poke your head up.

Fortunately, *Rage*'s vehicles are pleasing to drive. Even with the binary input of a keyboard, they feel responsive. But better than that, they feel *fast*. Each comes with a boost capability. It's designed to give you the edge in races, but a tertiary use for this boost can be discovered at the handlebars of the game's first ride. Fresh out of the Ark (the game's *Fallout* Vault-like bunker), you're given the keys to a little quadbike runaround. It isn't the most intimidating machine in the game, but it does enable you to hurtle into immovable bollards at 100+mph and smash your screaming marine's spine against a wall – only to flit back to consciousness next to the quadbike as if his skeleton hadn't been reduced to slurry.

Races

Races – organised by the bored NPCs at each hub – provide a secondary reason to drive. They don't affect the main storyline directly, but success in the ranks affords you with racing credits, which can be pumped into the upkeep and outfit of the cars used in the wasteland.

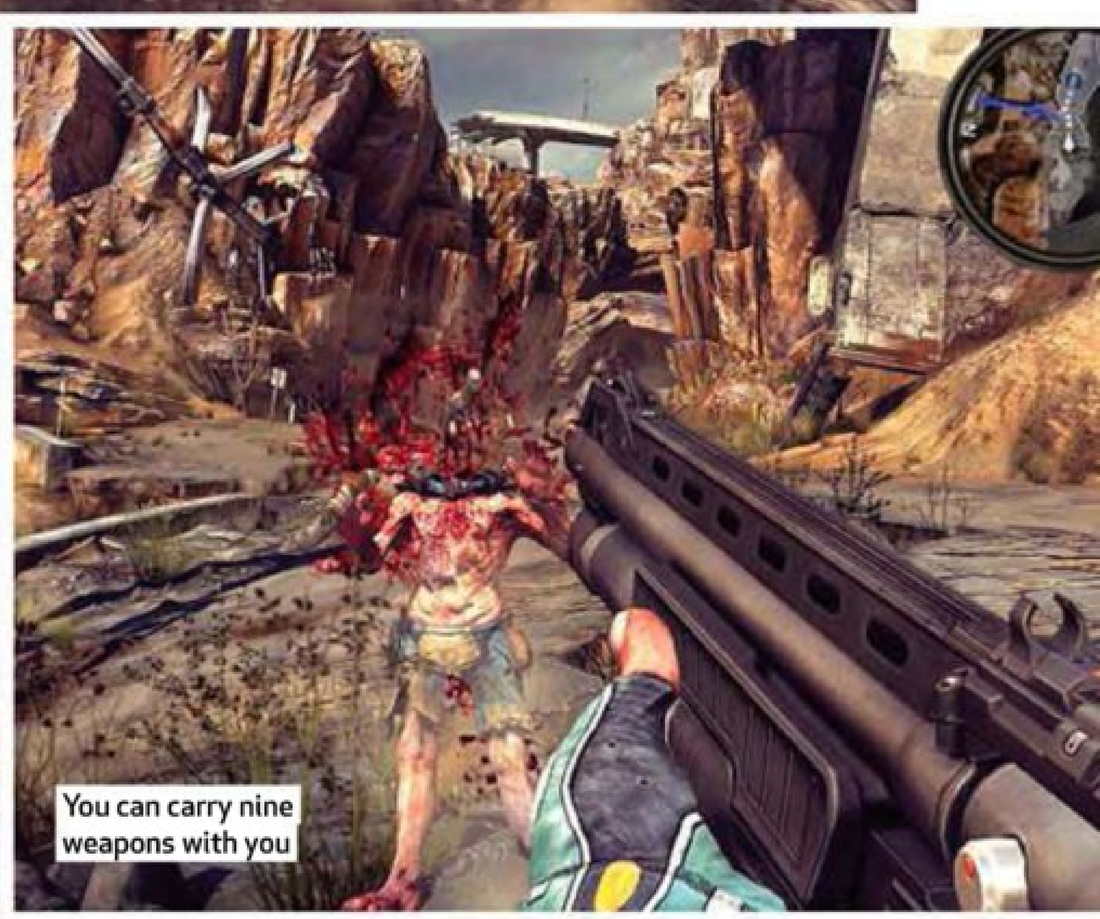
And that shooting? It feels as good as you'd expect, with each weapon blessed with a distinctive bark and kick. id has jettisoned the modern shooter's neurotic arsenal restrictions, letting you carry nine weapons around on your travels, each safely secreted on a number key. Most have two or more ammunition types, their rarity roughly concurrent with either their usefulness

VITAL STATISTICS

- **Price** £30
- **Developer** id Software
- **Publisher** Bethesda
- **Multiplayer** 1-4 or 2 co-op
- **DRM** Steam
- **Web** www.rage.com
- **Community** forums.bethsoft.com
- **Discuss** forum.pcformat.co.uk

Steelkeg.com

"id has jettisoned the modern shooter's neurotic arsenal restrictions"



or ridiculousness. The functional secondary ammo for the Authority machine gun, for example, simply rips through armour faster. The pistol's third ammunition type typifies the other approach: it fires an entire eight-round clip in one go, and the bullets are shaped like Pez dispensers made of human bones.

Sadly, there's some artlessly wedged-in console crossover when it comes to controlling the shooting. Creative director Tim Willits argues that *Rage* plays better on a pad. He could be right, because hot-swapping between ammo and weapon types, we mouse and keyboard-nauts are lumbered with a strange setup that forces us to assign weapons to one of four slots. Ammo can still be switched by cycling, but it makes precise control trickier.

Precise control is important here, as the game's enemies are tricksy bastards, juking and jiving away from your ironsights. We're used to FPS opponents sprinting directly towards us, pointing at their foreheads and screaming "AIM HERE!" *Rage*'s mutants and bandits duck as they close on you, hop out of bullet volleys, and use walls and railings to get the purchase necessary for an attacking leap.

Not everyone in this world is a mutant

It's almost as if they don't want their brains emptied onto the floor, and it's both infuriating and admirable: the former for a millisecond as you waste the ammo, the latter because scraps are kept fresh and tense.

Only later in the game, as the enemies slather on thicker armour and keep their feet on the ground, do firefights descend into cover leapfrog.

But by the end of the game, you're not going to be doing much of the shooting anyway. *Rage* comes with a crafting system, fed by a mini economy. It's a dream game for compulsive tidiers: every surface is dotted with bric-a-brac to sell or use. Recipes can be purchased for various battlefield helpers. The humble wingstick – a razor sharp boomerang that removes heads at 20 paces – is the most useful, but I fell in love with the spiderbot. I spent the game's anticlimactic final level letting my robo-chums do my annihilation for me, stepping out into fire lines only when I wanted to try out the BFG rounds for my chaingun. Both approaches – dirtying your hands and standing back – feel fundamentally satisfying.

Rage isn't a complicated game. Despite what the developers might've suggested and we might've assumed, it's still set in a corridor. Fortunately, id still make some of the finest corridors in the world. ¤

Rich McCormick

PCFormat Verdict

Needs Dual-core CPU, 2GB RAM, 512MB DX9c GPU

Wants Quad-core CPU, 4GB RAM, 1GB DX9c GPU

Quality no-nonsense shooter · Plus driving mayhem · Crafting fun · Nothing really new

id hasn't strayed far from its roots, but it still knows how to make a top quality shooter. Simple, satisfying fun.

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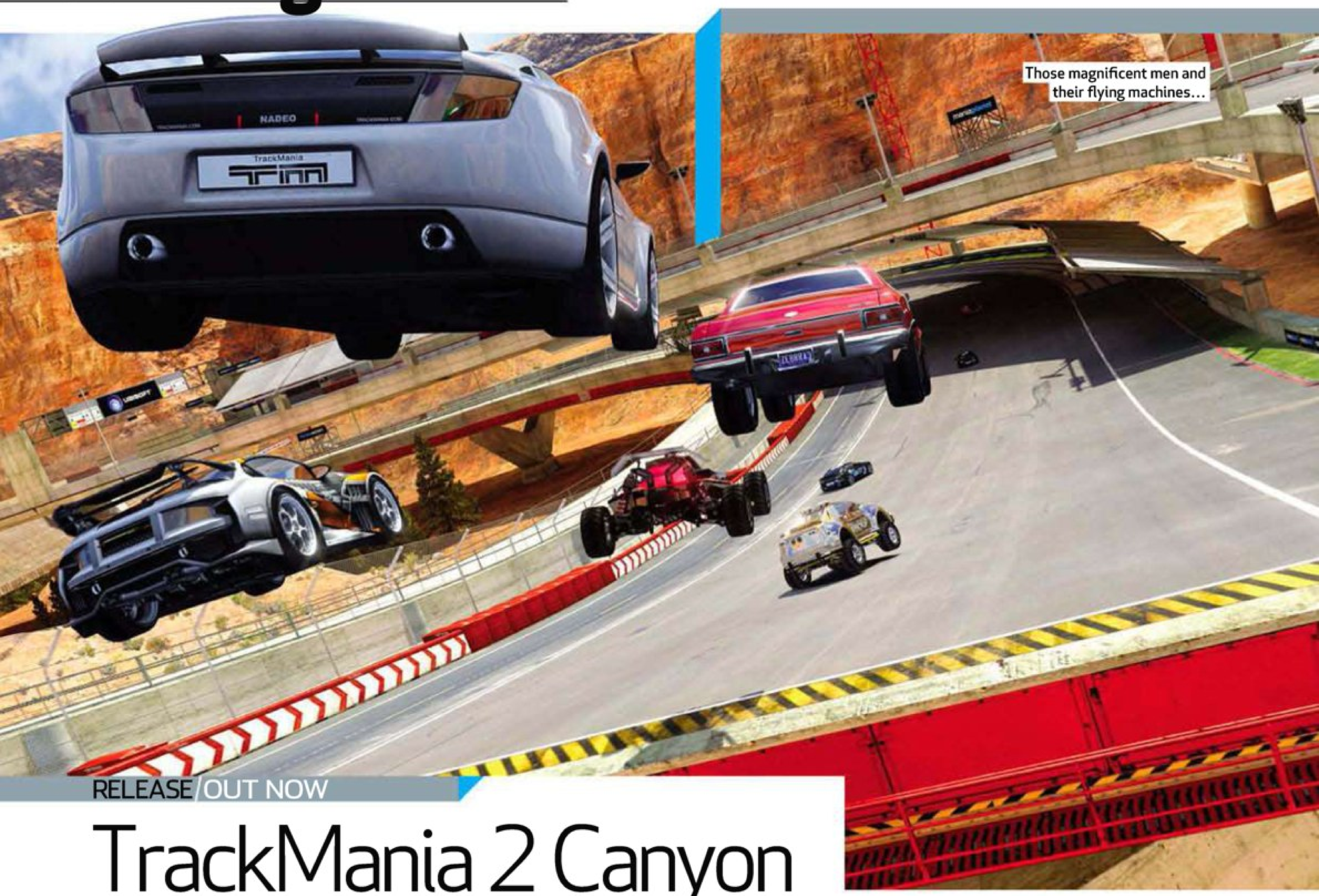


RELEASE/OUT NOW

TrackMania 2 Canyon

TrackMania returns with all the bits as brilliant, baffling, and broken as before

After all this time nothing compares to that opening sprint. One car, purring on the starting block, becomes a swarm of 20 when the countdown hits zero. Latticed tyre tracks; wheels clipping through bumpers clipping through bonnets. A turn is coming: easy left into easy right, then an exit into a suicidal drop. Three degrees off and you'll fluff the angle for the jump at the end. But you've trained for this and while others make mistakes, you glide dead-bang into the tunnel high above – into the mouth of a *mountain*.

Playing the game alone accounts for one third of *TrackMania* though, the rest is in creating (tracks, cars, music, mini-games, general Eurotrash oddness) and sharing (via in-game personal storefronts, forums, YouTube, wherever). This has been happening for eight years now, and the numbers involved are *massive*. Today, however, the one number that really matters is the 'two' tacked onto '*Trackmania*'.

What does it mean when a game that's been updated plenty of times already decides to call itself a sequel? If you ask Nadeo, it means the start of a new adventure. Season two, episode one. *TrackMania 2 Canyon* includes just a single terrain type, a single car/handling model, and a single 'pure' racing mode. No platforms or puzzles. No cities, islands, or stadium. The changes are few, then, but in a game of degrees and milliseconds can feel huge.

The handling, for one is no longer that of a toy racer. The new car is heavier, throatier, and it drifts *big-time*. This car also has no air-brake. That means greater surrender to the science that kicks in when, after all that panicked steering, you finally hit a jump. The tracks feel more natural, the cars animal. Is it better? Try 'different', like *Stunt Car Racer* meets *Daytona*.

The Canyon, for a place made of pluggable building blocks, is magnificent. A Scalextric of the gods: bored into mountains, soaring over lakes, twisting against rhyme, reason and gravity beneath a Sega-blue sky. And the light: baked into the rock, lost in the cracks, gluing it all together and bringing it to life. It's a static environment, too, which means that it's all pre-calculated by the track editor. Result: you don't need god-like hardware to play it, even in the new splitscreen mode.

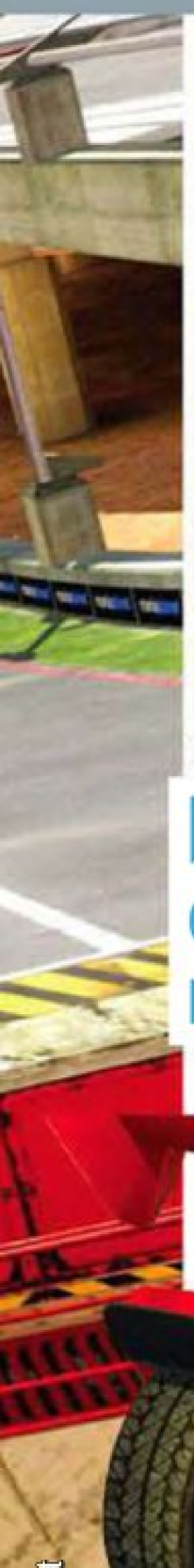
As you can tell, I get rather high on *TrackMania*. It appeals to my inner geek with all its outward-facing technology. If I want to take a screenshot, I can spend hours on the camera angle alone, or on adjusting the replay timeline of every car. Then I can impose *100x* antialiasing on the scene. I can take longer making a movie about driving in circles than it took to make *Inception*.

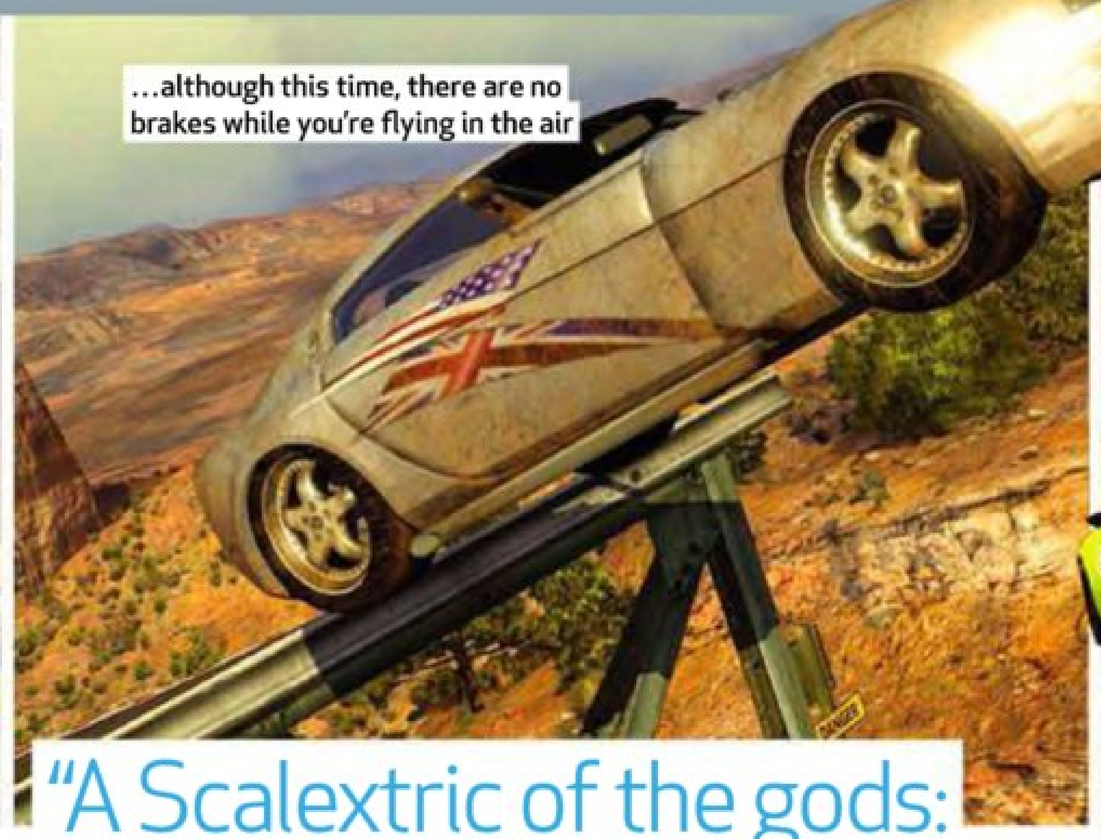
I can build and paint cars and then make myself some Planets, the game's new virtual currency. I can build a casino to waste them in, or a bank to lend them to someone else. And a digital bailiff to go smash that person's fingers? Probably! I can – which is to say I *could* – script all kinds of marvelous things. If only someone would show me how.

Ah yes, the comedown. Being a 'community-driven' game by a studio so small it could barely populate a race, *TM2* has no proper manual. Instead it has a wiki, designed to silence the abject WTF!? from newcomers on the forums - but it begs more questions than it answers. Grilled about the lack of documentation, a studio spokesman

VITAL STATISTICS

- **Price** £20
- **Developer** Nadeo
- **Publisher** Ubisoft
- **Multiplayer** 20 players
- **DRM** Internet connection
- **Web** www.maniaplanet.com
- **Community** www.mania-exchange.com
- **Discuss** forum.pcformat.co.uk





…although this time, there are no brakes while you're flying in the air

The new car is heavier and throatier and likes to drift

"A Scalextric of the gods: bored into mountains, soaring over lakes, twisting against rhyme, reason and gravity…"

By the time you read this there will already be over 20 user-made 3D models for the new car

The track editor looks simple but lacks guidance

posted: "No one at Nadeo knows every feature of the game. We are about twenty people, adding sometimes more than five or six features a day…"

Losing track

Part of the problem is that Nadeo is so active in its community - married to it, effectively - that it thinks the game is spoken for. A major change to how official time trials work, for instance - you have to get the gold medal time in practice first, then wait five minutes between attempts - was left a mystery for new players. Also, as with older games in the series, large portions of its 'interface' are just jumps to websites and forums; others might prefer the term: 'massive bloody holes where the user interface should be'.

The track editor is simple in principle, but it can seem anything but when nothing you select or do conjures a tooltip, warning, or log entry of any kind. It gives you the right number of tools and blocks to 'get it' quickly, then get inventive and build tracks like the official ones. But it's far from painless when it fails to identify what you're trying to do (drive a road through a cliff, maybe), or even hazard a guess. An entire layer of things we take for granted is missing from this toolset, requiring players follow an online paper trail of handy tutorials.

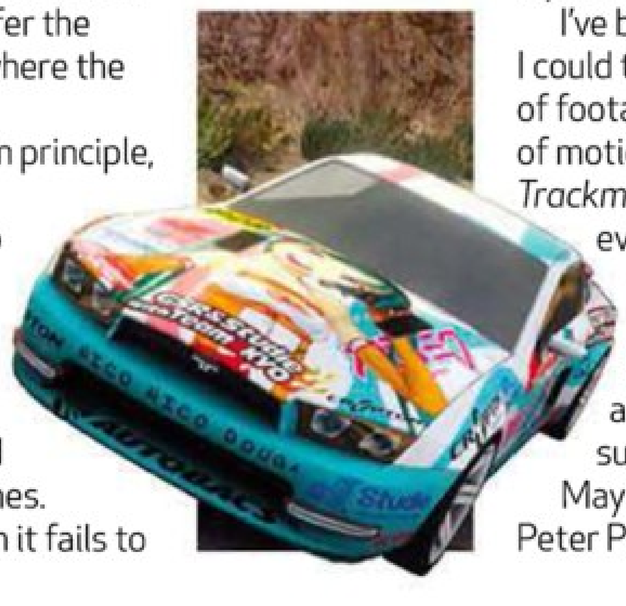
Don't get me wrong: *TM2* is a beautiful, heart-stopping, narcotic racing game. Its readiness to sit there as OS furniture, idling in the background before roaring to the fore is a credit to both its engine and design. And, for all that will be said about the changes to the handling, there's always *TrackMania United Forever*. The *TM* community is huge, and no stranger to divided loyalties. Why be frightened of change?

I've built tracks and made 'paks'. I could tell you just what speed of footage creates just what kind of motion blur, and I'm a proud *Trackmaniac*. But this game is not for everyone, and I'll even go one further: after all this time - with the name of one of the world's biggest publishers splashed across cars and tracks - I'm not sure it's enough.

Maybe Nadeo has some strange Peter Pan complex. Maybe Ubisoft has some strange 'what the hell have we gotten ourselves into?' complex. Whatever the reason, *TrackMania 2 Canyon* should have been ready. Obviously there's a whole lot more to come, but basics like the interface should have been immaculate, or at the very least presentable. It should have had tutorials, pop-ups, tooltips - the works - springing from every mode and button, not sat on someone's esoteric fan site. It should have been bug-free and user-friendly, yet its editors are quirky at best. It should be conquering the world.

Duncan Harris

Trackmania 2 is *Stunt Car Racer* meets Daytona



PCFormat Verdict

Needs 1.5GHz CPU, 1GB RAM, 256MB SM 2.0 card
Wants Dual core CPU, 2GB RAM, 512MB SM 3.0 card

- Beautiful racer
- Huge community support
- Tricky track editor
- Lack of new user guidance

Almost everything you'd want of *TrackMania*, but not of a sequel. The game will blossom, but it could have been so much more.

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Red Orchestra returns with a tortuously accurate recreation of the Battle of Stalingrad

RELEASE/OUT NOW

Red Orchestra 2: Heroes of Stalingrad

No more heroes any more

My kit is perfect. My boots polished, my Heer helmet a shiny green. I poke my head around a corner and get it shot off. The next man in my squad is a sniper, but he's hopelessly out of position, out of cover and is sniped down quickly. Another man is suppressed into terror. Another is blown apart by artillery. And so on, until my squad is down to the last man. We never see the enemy

In that sense, *Red Orchestra 2* is a tremendous success. It replicates the feeling of World War II, the terror and random death of its key setting, the Battle of Stalingrad. It does this as well as anyone has done so far, and it does it with a tremendous desire for accuracy.

The game is, of course, much larger than its predecessor. It's got both two single-player campaigns and the huge multiplayer, which is the core of the game. It's got a range of vehicles, a nice selection of maps, and a range of classes for each side. Everything is meticulously researched to behave exactly like the technology of the day.

There are some flaws though. The control system isn't exactly intuitive, though the FPS elements of it are so familiar. For example, you're holding a heavy machine gun and you want to shoot it. You crouch behind cover using [L-Ctrl], then mount the bipod using the right mouse button. Aim down the barrel and adjust for distance using the mouse wheel. Press [6] and you'll… change the gun's barrel.

While you're getting confused by that, someone attacks you in melee; to fight back, you try to tap the middle mouse button, but that doesn't work for the HMG, instead firing a single shot, so unless you're a crack shot, you're dead. (pressing [6] on a sniper rifle, by contrast, allows you to look through the iron sights instead of the scope – essential if you find yourself in a short-range firefight.) Each weapon type has its own quirks that you need to learn and until you've played a lot (or played through the singleplayer, which is hard to recommend) you simply aren't going to remember them all.

VITAL STATISTICS

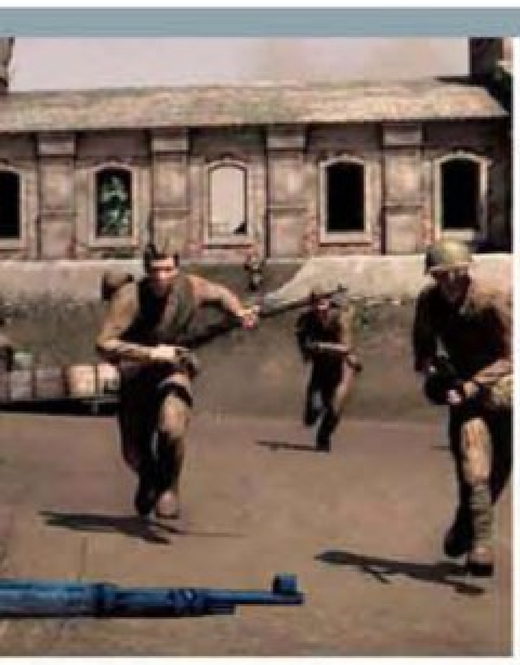
- **Price** £25
- **Developer** Tripwire
- **Publisher** Tripwire
- **Multiplayer** 64player
- **DRM** Steam
- **Web** www.heroesofstalingrad.com
- **Community** steamcommunity.com/games/RO2
- **Discuss** forum.pcformat.co.uk

Each weapon is meticulously researched

Plays well with others

Talking about the single player, it's obviously not the developer's forte. The two campaigns are frankly terrible and repetitive, with dreadful AI and a real feeling of pointlessness – and let's not even talk about the poor voice-acting. You can take part in the various missions, all a variety of 'capture this point' and kill the enemies, but it's easier to just sprint around, hide for a bit and let the AI teams wipe each other out, slowly. These are meant to be the tutorial and you will learn to play the game from these, but they're simply not fun to play through.

Moving to the core multiplayer game, everything suddenly comes alive. A total



Something Unreal

The Red Orchestra team originally got into development by winning the Make Something Unreal competition, with its mooted million-dollar prize pot. However, after expenses and smaller prizes were taken out, it actually ended up around $30,000, so the Tripwire team were on the knife edge of bankruptcy; until, that is, Valve agreed to sell its mod if it was polished up to a full game. Hence *Red Orchestra* was the first non-Valve shooter on Steam, and hence the team got its chance to work on the real dream game – this!

Driving a tank gives you a somewhat restricted view

Veterans get a suitably mussed up uniform to reflect their lack of hygiene

"A very solid multiplayer FPS set in World War II that's going to get better with time"

RO2's control system isn't that intuitive, especially in close quarters

The range of classes and the chaos of 64 player matches...

...brings *Red Orchestra 2*'s brutal and tense multiplayer alive

of 64 players with a range of classes, pummelling each other with guns, tanks and rifle butts is just plain exciting. It's still not particularly original, but realism isn't. For example, tanks are hugely entertaining death traps, with four positions able to be taken by driver, commander, main gunner and secondary gunner; they're also hugely realistic, meaning they break in all sorts of interesting ways.

Combat is fast and players are believably fragile; if you don't die, you often bleed out before you can bandage yourself up. The soundscape is also believable, without the saturation of *Modern Warfare*; you can hear where gun battles are happening from all across the map. Player outfits change as the game goes on; veteran players are differentiated by looking more ragged than new recruits, even when changing into the all-white snow gear. The classes are also more varied and non-combatant than expected; for example, the Squad-leader and Commander classes are designed to keep other team members alive, order other players around, or call in tactical assistance, in the form of artillery strikes.

Das ist mein Gewehr. Es gibt viele es nicht mögen, aber das hier ist mein

War weary

It does have its problems; for example, at the time of writing, it's still very buggy, so that the server browser doesn't always work and players can get stuck moving around on cover. Given Tripwire's expertise with managing its community, we expect some of these to be fixed soon – but check before you buy.

What's most refreshing is that the game feels like the mods of the late 1990s; enthusiastic, determined to justify its existence and keen to stay fun. Except that this time it's been polished up to modern standards. What's depressing is that there's a real lack of imagination; it's not sufficient to take a solid engine, make it beautiful, and replicate World War II. That battle has been fought over and over, and we're bored of it now. What we have is a very solid multiplayer first person shooter set in World War II that's going to get better with time; buy it for that, but nothing else. ¤ **Dan Griliopoulos**

PCFormat Verdict

Needs 2.3GHz dual core, 2GB RAM, 256MB 3D card

Wants 2.6GHz quad core, 3GB RAM, 512MB 3D card

- Superb multiplayer
- Meticulous recreation
- Buggy at launch
- Dreadful single player

An awful single player and bugs ruin the best WW II multiplayer game out there, unforgiving and primitive, like the war.

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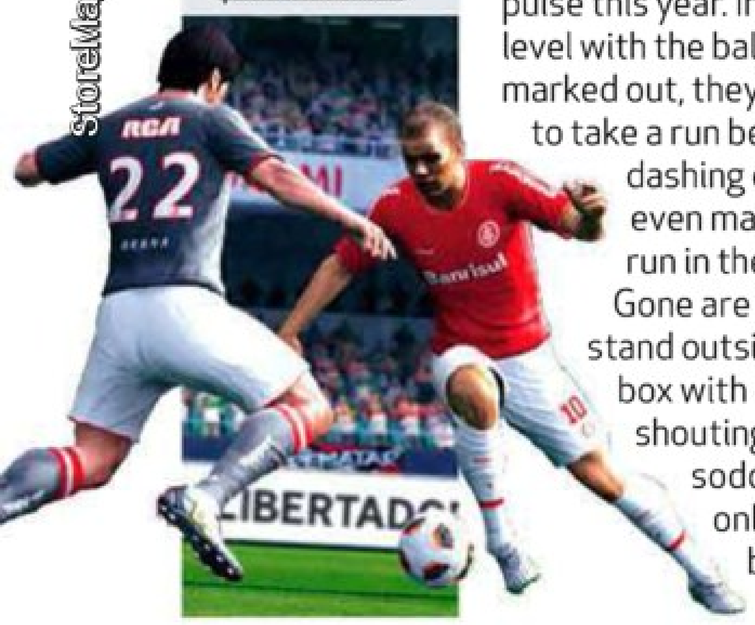
RELEASE/OUT NOW

Pro Evolution Soccer 2012

A rush of improvements brings the once great game back from the brink

VITAL STATISTICS

- **Price** £30
- **Publisher** Konami
- **Developer** Konami
- **Multiplayer** 4-players online
- **Genre** Footie
- **DRM** CD Key
- **Web address** www.konami-pes2012.com
- **Discuss** forum.pcformat.co.uk



On the surface it looks like not much has changed in the yearly updated world of *Pro Evolution Soccer*, but a lack of big new tournaments or flashy features masks the huge work that's gone into improving the football itself.

After the rigmarole of picking a team (mostly unlicensed, so you get the real Manchester United, but Aston Villa are West Midlands Village) you're on the pitch, ready to guide your team to victory.

Attacking players have more of a pulse this year. Instead of tottering level with the ball carrier waiting to be marked out, they're far more inclined to take a run behind enemy lines, dashing down the wings and even making the odd slanted run in the middle of the pitch. Gone are the days when you'd stand outside the opposition's box with one foot on the ball, shouting at your men to sodding do something, only to be knee-capped by the sliding boot of a defender moments later. If your men are starting to loiter, you can command one to start running with a quick point and click of the right stick (play with a joypad, people!). It's an essential move that bypasses occasional AI lethargy and gives you much more precise control.

But all that new attacking movement can leave defenders stuck in the mud. For the most part they're sensible, but their refusal to dive in for a necessary crunching tackle means that a pressing team can get away with too much.

Most improved

No surprise, then, that matches in *PES 2012* tend to be high-scoring affairs, but it's forgivable given how much better the football feels this time around. Everything is faster and more precise. While *FIFA*'s trick stick has players performing ever more convoluted manoeuvres, *PES* is about passing and team movement. Matches have become are far more lively and competitive as a result.

It would be wrong to point to one big factor as the reason behind *PES*'s revival. It's the result of a number of incremental improvements on the pitch. Players are more responsive on the ball, a tricky attacker feels different to a lumbering defender, the animations are more convincing, the crowds noisier and attacking play is enormously improved.

PES still struggles to offer anything its monolithic competitor *FIFA* can't do with more polish, but *PES 2012* is an incisive diagonal run in the right direction. If only the defenders were a little braver. ¤

Tom Senior

PCFormat Verdict

Needs 2.4GHz CPU, 1GB RAM, 128MB 3D card

Wants Dual core CPU, 2GB RAM, 512MB 3D card

- Improvements all round
- Feels sprightly
- Defence lacks balls
- Weak AI

An overhaul of the match engine and lively attacking play bring *PES* back in the contention, but don't expect from the AI.

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They may be evil, but they're not that difficult to kill

Combat soon gets repetitive

Everything goes boom. *Everything*

RELEASE/NOW

Hard Reset

The future shooter takes a giant step back to the 90s

VITAL STATISTICS

- **Price** £23
- **Publisher** Flying Wild Hog
- **Developer** Flying Wild Hog
- **Multiplayer** None
- **Genre** Puzzle
- **DRM** Steam
- **Web address** www.hardresetgame.com
- **Community** bit.ly/pJDnE8
- **Discuss** forum.pcformat.co.uk

Bezoar isn't a city. It's an explosion with streets. Every plaza is piled high with toxic barrels, every kiosk and ATM wired so that a single overly-enthusiastic sneeze can spray arcs of lightning at anyone in sight.

Why? Because *Hard Reset* isn't just a reference to what you're expected to do to an army of killer robots: it's what it tries to do to shooter design itself.

It's a back-to-basics FPS in a shiny modern engine, not so much throwing out such things as moral choices and physics puzzles as declaring them irrelevant. It's you versus roughly 70 squillion enemies, hoping to save at least slightly more of your home than you blow up yourself.

The story doesn't resolve. It just ends

There's a bit more plot than that, but not much. *Hard Reset*'s story bits, which mostly serve to give you something to look at as the next level loads, are a confusing, barely coherent mass of graphic-novel type scenes that fail to introduce any of its characters, or even explain why an army of machines is attacking a city named after a lump of hair dug out of the digestive system.

Blade death

Luckily, it's a much better shooter than storyteller. Weapons and explosions have terrific weight, and enemies attack in hordes of whirling-blade death machines instead of just a couple of tough guys at a time. You spend most of your time circle-strafing and running backwards: cover mostly exists to be blown away by a charging tank and scenery is every bit as deadly to you as the enemies. Ammo is plentiful, as is health. That doesn't mean you won't be seeing your own splattery death a lot, however, especially in multi-wave arena fights where you have to ration your pick-ups carefully to survive.

Yet it doesn't take long to get repetitive. There are few enemy types, and none of them requires anything more advanced than dodging a charge or switching to a rocket launcher to hit a boss's brightly glowing weak points. On Normal difficulty, I polished off the campaign in a casual afternoon's play. There aren't any multiplayer modes, and you'll have all the weapons you actually want long before the end.

As a one-of-a-kind game, perhaps the nostalgia factor would be enough to compensate. Unfortunately for *Hard Reset*, it has company from both the original *Painkiller* and *Bulletstorm*, with *Serious Sam 3* close on its tail. In comparison, this feels firmly in tech-demo territory – albeit really good tech, and with great combat while it lasts. ¤ **Richard Cobbett**

PCFormat Verdict

Needs 2.5GHz CPU, 2GB RAM, 512MB DX9c GPU

Wants Quad-core CPU, 3GB RAM, 512MB DX9c GPU

Gorgeous visuals · Explosions. · Unrewarding and uninspiring · Painfully derivative

An explosive ride of a game, but there's limited long-term satisfaction here. At half the price it'd be more appealing.

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RELEASE/NOW

Call of Juarez: The Cartel

What happens in the wild west, should stay in the wild west

VITAL STATISTICS

- **Price** £20
- **Publisher** Ubisoft
- **Developer** Techland
- **Multiplayer** Up to three players
- **DRM** Steam
- **Web** callofjuarez.ubi.com
- **Community** forums.ubi.com
- **Discuss** forum.pcformat.co.uk

A gangster emerges from cover, points his guns in the wrong direction and slides towards me like a drug-addled crab. How did this man survive this long in a Mexican drug cartel, I wonder. Then I shoot him the face and turn on his two-dozen equally dopey companions. This is justice in Techland's vision of the modern Wild West. Brutal and boring.

Call of Juarez: The Cartel puts you in control of one of three corrupt cops. There's the dual-wielding jerk, the shotgun jerk and the jerk who stands at the back with a rifle. All three roll together through each mission, eliminating hordes of heavily armed drug dealers and the occasional helicopter, earning points with every kill, which can then be used to buy better weapons at the start of the next level. You must protect the daughter of a former drugs official, a key witness in a drugs trial, by killing everyone she has ever witnessed and occasionally ferrying her to new safe houses in rubbish driving bits.

Lacking heart

The previous *Call of Juarez* games were half-decent shooters set in the Old West that had heart. But the modern day setting is brainless, generic and devoid of personality. The engine is capable of throwing out environments of notable scale, but they're always painfully linear wide corridors full of pop-up drug fiends and pop-in textures.

There's some attempt at pacing. Sometimes you'll run into overwhelming fire and have to take it in turns to rush to prescribed cover locations, which is as boring as it sounds. Occasionally you'll breach and enter a locked room in slow motion, blasting mooks who wouldn't have stood a chance even if time was moving at an ordinary clip.

The most interesting addition by far is the secret missions each team member must try to complete for extra experience. These tasks are delivered by mobile phone, and inevitably involve picking something up while no one's looking. If a teammate sees you, they get the experience instead. It's a great idea designed to add extra spice to the three-player co-op, but the dull objectives and poor execution let the system down. Mobile calls come unbidden and slow you to a crawl so your horrible character can swear down the mouthpiece for a few minutes.

There's nothing worse than seeing that goddamn phone loom into view as you're throwing a grenade at a cluster of bad guys. Even as the fire pours in, your out-of-control character pushes the phone into his own face to read a text message, and then actually texts back as the world explodes around him.

The Cartel's finest feature is a mess. Everything else is merely bland, repetitive and dull. ¤

Tom Senior

PCFormat Verdict

Needs: 2GHz dual-core, 2GB RAM, 512MB DX9c GPU

Wants: 3GHz dual-core CPU, 3GB RAM, 1GB DX9c GPU

✓ Can be pretty ✓ Secret missions have potential... ✗ ...but are poorly implemented

Pathetic guns, horrible characters and stupid enemies. There's little good and plenty of bad, but ultimately, it's all ugly.

35

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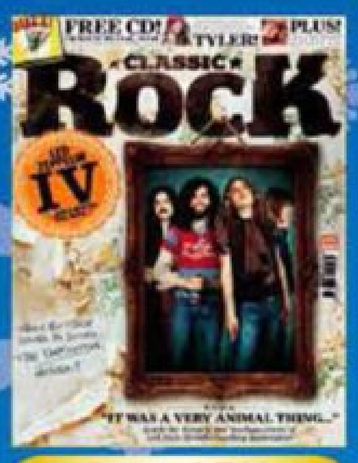

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Ask Luis

All the stuff **you** didn't know

Luis Villazon grinds the grain of your questions into a technical flour and then bakes it into metaphorical loaves

IUTWANID

Restart button

The restart button does not work on my computer. I'm running Windows 7 on a 2.2GHz CPU with 1GB RAM. When I press the restart button, it shows me it's restarting, but it freezes during the booting. Why?
Seth B

The most likely reason is that it never actually starts booting.

When you press the reset button, the motherboard pulls the voltage low for the reset pin on the CPU.

This puts the CPU into a known start state, with default values loaded into all the registers and the instruction pointer set to the start address of the BIOS.

But the CPU can't actually load that first instruction until the motherboard lets go of the reset pin and the voltage floats high again. And it won't do that until it receives the Power Good signal on pin 8 of the ATX connector from the PSU.

If your PC appears to have power to all of the components but the screen stays blank then your PSU is probably not asserting the Power Good signal and you should replace it.

But, if on the other hand, your PC displays some of the early messages from the boot sequence and then just stops, you should take a pair of scissors and carefully cut around the previous paragraph and throw it in the bin, because it is completely off base. After you have done that write down the last message you see on the screen and fire it into your nearest space-time wormhole, so that it travels back in time to arrive with your original email and thus allows me to answer your question correctly.

Since I have received no such addendum, I will assume that my first paragraph must have been correct. You can therefore disregard the second one.

IMRTIUTB

Higher res is worse

I have recently upgraded my PC from the old DDR2 and old graphics card and motherboard etc, to a new Asus motherboard, DDR3 1333 RAM and a 1GB GTS 450 graphics card. I have a 32-inch Samsung screen and its resolution is 1080p but when I set it to 1080p in the Windows resolution thing, it looks as if I have a Pentium 1 PC with a crap old screen. But in 1050p it looks beautiful. So can you help me find out what is going on?
Jonathan Ferguson

It's possible that your monitor doesn't actually allow true 1,920 x 1,080 resolution but rather, accepts a 1080p signal and downscales it to 1,366 x 768. For a TV signal, this might be acceptable but an HDMI signal from a PC will look fairly grim.

This doesn't explain why 1050p looks better, though. Except that 1050p is 1,680 x 1,050, which is a 16:10 aspect ratio. 1080p is a 16:9 ratio so maybe your monitor has a native aspect ratio of 16:10 with a maximum resolution of 1,920 x 1,600.

If you try to run 1,920 x 1,080 through that and it tries to fill the screen, the monitor will be stretching all the pixels vertically, which will look blurry and horrible.

To fix this, you could either change the settings on the monitor, so it letterboxes your 1080p output, or change the screen resolution to the monitor's native resolution of 1,920 x 1,600.

Does that make any sense? I hope so. I've been playing around with different resolutions and aspect ratios for half an hour now, trying to understand your problem and the part of my brain responsible for numbers has now overheated. I need a nice abstract question next, to let it cool down.

> "You could either change the settings on the monitor, so it letterboxes your 1080p output, or change the screen resolution"

IMRTIUTB

Pointlessly throttled

I've noticed that even with the High Performance power profile selected, my laptop (P9600 running Win7 64-bit) throttles the CPU a little so that performance is a little worse than when plugged into the wall. I've measured this with CPU-Z by comparing the "Core Speed" value in each case.

Most of the time, of course, this matters not one iota but when gaming I want to squeeze out all the performance I can get

Free technical support

Email Luis for guaranteed insults and possibly even some technical help as well.

pcfhelpline@futurenet.com
PCF Helpline, 30 Monmouth Street
Bath, BA1 2BW

The six categories of all human misery key

IUTWANID: It Used To Work And Now It Doesn't.
IGAEM: I Get An Error Message.
IMRTIUTB: It's More Rubbish Than It Used To Be.
RATH: Randomly, A Thing Happens.
ICDNT: I Can't Do the New Thing.
IKBTL: I Know Better Than Luis.

Check your monitor accepts true 1080p, like this beast from HP with native 2,560 x 1,600

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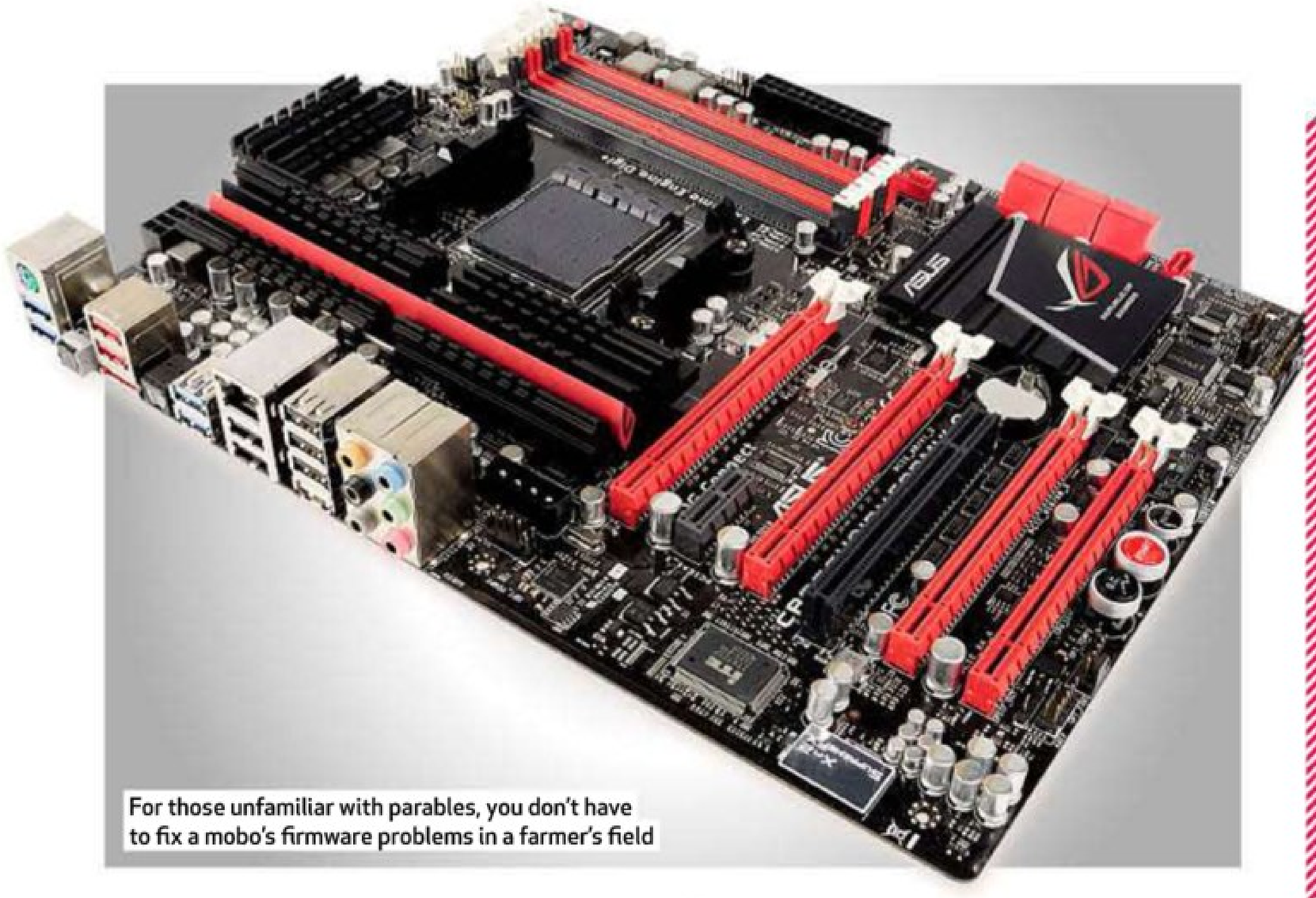


For those unfamiliar with parables, you don't have to fix a mobo's firmware problems in a farmer's field

– even at the cost of battery life. Is there some clever hack or reg edit to deal with this performance reduction?
'Family email'

Is it really too much to ask that people identify themselves when they send an email? You don't write a letter and leave it to the recipient to deduce your name by triangulating the postmark, Google Street View and DNA analysis of the saliva where you licked the envelope, do you?

Similarly, I should not have to poke around your email headers and subpoena your ISP to find out who you are. I'm not after your bank account details and I'm not trying to transfer $25 million from the account of the minister for bribery and corruption (deceased) in Nigeria, I just want a name I can put at the end of your question.

Harumph. Anyway. SpeedStep is the technology that throttles the CPU up and down and it has two components.

One is governed by the Power Plan settings in Control Panel and the other is part of the BIOS.

The BIOS component is much the coarser of the two and essentially only allows the CPU to run at its maximum clock multiplier or its minimum one, with a small tweak to the core voltage to keep everything stable.

When Win7 was still in beta, a few overclockers started reporting that their SpeedStep settings were being ignored and the CPU was throttling down even with your foot on the floor. It took a while for people to realise that this wasn't directly the fault of Win7, but was the BIOS instead. And since the BIOS doesn't automatically check for newer updates, most of us are content to leave it at whatever version was current when we bought our laptop. If you visit your manufacturer's website, you should find a BIOS update somewhere that fixes the "Win7 CPU ratio issue". That's the one you want.

IUTWANID

Troubleshootinians

I have a USB 3.0 Vantec hard drive dock and recently bought an Asus Crosshair V Formula motherboard. I used to connect the hard drive dock to a PCIe USB 3.0 card to use the full speed of USB 3.0.

Now recently, whenever I copy or wipe free space or even the MFT on any hard drive inserted into the dock, the drive disconnects. It is like someone unplugged the USB cable.

The hard drive is not even available in the device manager or disk manager. If I reinstall the USB 3.0 driver I can see the drive again.

I can connect the dock to a USB 2.0 port and then it works fine, so I know it's not the hard drive. This is very frustrating since it only started to happen two days ago. I'd been using it for over a week and it had been fine.

I reinstalled Windows 7 to see if this might fix it but sadly it did not. There are no new motherboard drivers since the board is so new but I updated the BIOS as well to see if it might help, yet again – nothing.
Leon Lewis

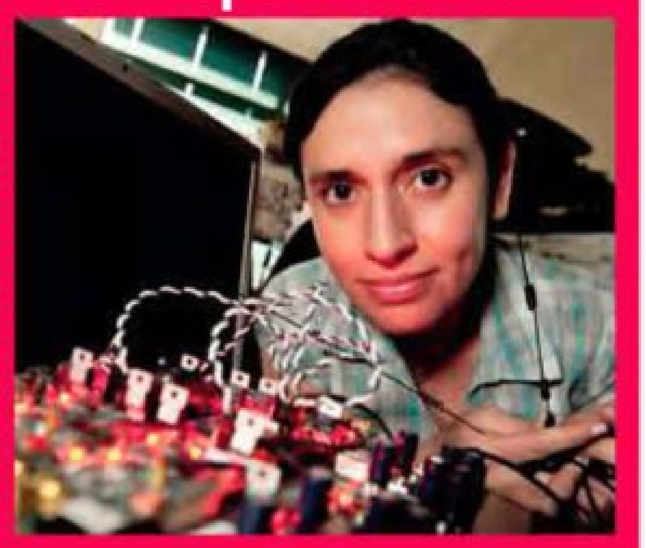
Are you familiar with the Parable of the Sower? I find it is a great comfort to me, at times like these. There was once a farmer who plugged in lots of hard disks. Some were plugged into stony ground and couldn't transfer any data because… well, they were plugged into the ground. And some were plugged in among thorns and their transfer rate was very spiky. And some were plugged into Vantec hard drive docks and there were firmware problems that caused the drives to periodically dismount. But the farmer

"When Win7 was still in beta, a few overclockers started reporting that their SpeedStep settings were being ignored"

YOU ASKED!

FAQ

Full Duplex Wi-Fi



What does full duplex mean?
It's being able to send and receive at the same time.

Can't we already do this with Wi-Fi?
Not over the same frequency. When a transmitter and receiver use the same frequency, all the receiver ever hears is the signal from its own transmitter. To get around this, you either need to take it in turns to transmit, or send and receive on different frequencies. Wi-Fi uses the latter and this effectively halves the available bandwidth.

What's the way around this then?
You give each wireless device two transmitting antennas and one receiver. The transmitters are positioned such that the signals cancel themselves out at the exact position of the receiving antenna. That removes most of the signal and you can subtract the rest in software.

What is the practical benefit?
It ought to allow twice the bandwidth because you don't need to allocate half your channels to listening for traffic in the other direction.

Any downsides?
Using selective signal cancellation when transmitting, will affect the reception from certain directions. With fixed devices like Wi-Fi base stations, you can adjust the placement of antennas, but mobile phones are always changing direction and angle so some directional loss is inevitable.

Who's behind this?
The research team is based at Rice University in Houston.

Read more at:
http://tinyurl.com/3gxfbhd

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trusted in the Lord and so he went to www.vantecusa.com/front/faq/ and downloaded the firmware update from the link at the bottom of the page.

RATH

Repetitively repeating

I have a Dell XPS8100 system (just over a year old) with an Intel Core i5-750 processor and Radeon 5770 card that is just over a year old. I have a big issue with the reliability of the system because it keeps freezing up/hanging on me during use. When it hangs, the entire system just comes to a standstill. The screen still shows a display, but the keyboard and monitor are completely unresponsive.

At first, I believed this to be an issue with my USB connections and drivers since it was prone to occurring while copying data to external HDDs (running a system backup, for instance). Now, however, I am not sure this is the issue since it has been occurring at other times, even when the machine is just sitting idle and not being used.

I am unable to leave the PC on for any period of time without this issue occurring. My only found fix is to do a hard reboot, which is not helping either I'm sure.
Brian Miller

So wait, you have a PC that is just over a year old and a graphics card that is just over a year old as well? What a coincidence! Did they come in the same box? That's even more incredible! Not only are they the same age but you bought them at the same time and in the same place – they were literally part of the same computer!

I'm talking about redundant repetition that says the same thing several times. Redundantly. Of *course* your entire system comes to a standstill when it hangs – *that's what hanging is*. If the keyboard or monitor are still responding, your PC is not at a standstill and hasn't hung.

And then, suddenly in the midst of all this ('sitting idle' = 'not being used') you throw me a contradiction. If a hard reboot isn't helping, how is it a fix? USB connections are not normally associated with random lockups and 'prone to occurring' sounds suspiciously like 'happens sometimes but not at others' so I think we can discount that. But if a hard boot fixes the problem, that suggests that heat isn't the cause either.

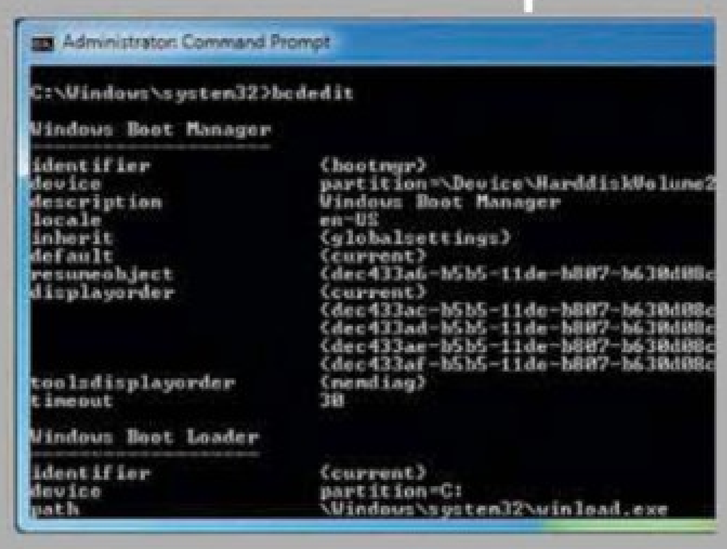
That doesn't leave me much to go on, so I am going to shut my eyes, spin round three times and throw my dart at the space marked 'bad RAM' on the troubleshooting dartboard. Take out and reinsert your RAM modules, to check for loose connections. If the problem comes back, try removing first one module, then the other. Or if you only have one, buy a replacement from www.crucial.com. RAM is fairly cheap. And also inexpensive.

Editing the Boot Menu

Stuck with a scruffy boot menu? Clean it up!

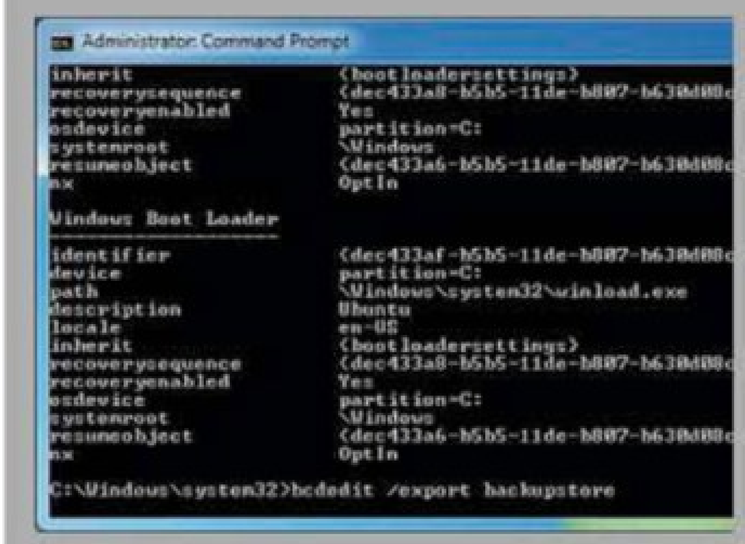
1. Clutter

Windows 7 uses the Boot Configuration Data Store to hold information about the available bootable OSes on your PC. Normally this is just Windows but if you dual boot, you'll see a boot menu when you start and sometimes menu entries get left behind when you uninstall an OS.



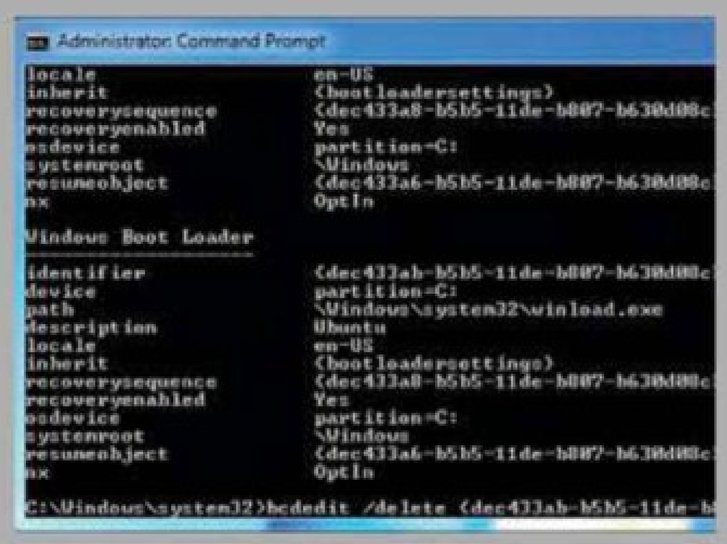
2. List

To tidy this up, you'll need to use the bcedit command. First open a command prompt as an administrator and type bcedit, then hit Enter. Without any parameters, the bcedit command will just list all the boot entries in the data store.



3. Backup

Editing the boot configuration data store is a fairly straightforward task. But there are probably ways to mess it up that will leave you with a computer that doesn't boot. To guard against this eventuality, back up the data store with 'bcdedit /export mybackupfilename'



4. Simplify

To delete the redundant extra boot menu entries, use 'bcdedit /delete {identifier}. The identifier is the huge hexadecimal sequence listed at the top of each separate boot loader entry. Bcdedit automatically saves as it goes, so you can just reboot now.

IUTWANID

Beep, beep, squeeeeeee

I have a Compaq Presario V2000 running (or rather, was running) Windows 7. It's not booting – all I get is the startup screen, then two short beeps followed by a prompt to press [F1]/[F10]. Doing so gets me no response. I tried removing and reseating the RAM, I even replaced it, but to no avail.

I removed the keyboard and tried using it with an external keyboard; still nothing. I also removed the DVD-ROM, and even took out the hard drive and tried booting off a live disk: I kept getting the two beeps.

A bit of Googling suggested that the problem could be a corrupt BIOS, and I went about trying to reset the BIOS (removing the battery and pressing the power button for about a minute). That didn't work.

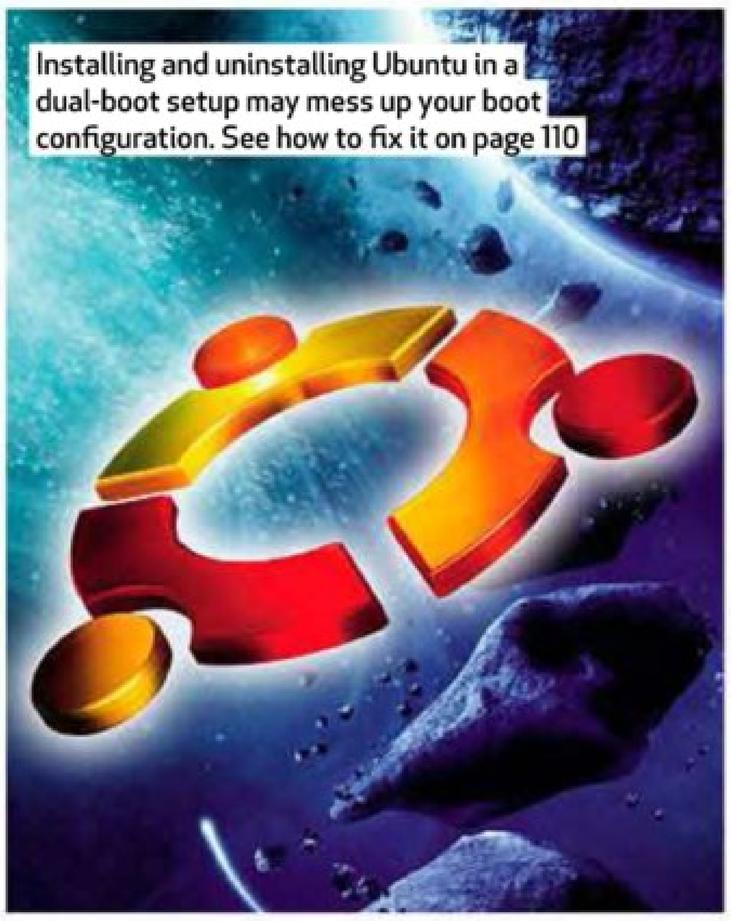
Next, I tried removing and replacing the CMOS battery. That didn't work either. The only other option I think is left is to flash the BIOS. But I have no idea how to go about it.
Lennon

If you have another working computer, you can download the BIOS firmware from Hewlett Packard's support pages. But I absolutely would not bother.

If you want, you can try resetting the BIOS to factory defaults (unplug from the mains, remove the CMOS battery and all

For the love of Lennon (the long-haired one) give up on the laptop man and have a good cry

Evelyn liu, www.sxc.hu


Installing and uninstalling Ubuntu in a dual-boot setup may mess up your boot configuration. See how to fix it on page 110

the RAM, hold the power button in for 30 seconds, reinstall the RAM and battery and restart) but I wouldn't bother with that either. Two beeps means bad RAM. Since you have already replaced the RAM, it means bad motherboard, which in turn means bad laptop. There's nothing more you can do.

"NoooooooOOOOOOO!!!!! Dammit! I'm not giving up"

Hey, come on. He's gone man, he's dead. It's over.

(Pull back to crane shot, as the dust swirls around the prone body of the laptop, with Lennon sobbing in Luis' arms. Bring up the music, fade to credits.)

IMRTIUTB

Too many menu choices

A while ago I dual booted Win7 and Ubuntu but after I uninstalled it I could still choose between Ubuntu and Windows.

I tried reinstalling Ubuntu and then again for the second time uninstalling it, which left me with a startup option of Windows, Ubuntu and *another* Ubuntu. I then tried to make Windows my default startup on MS Config but Ubuntu wasn't showing in the MS Config list. My question is: how do I remove these irritating choices, so that I automatically start with Windows?
Christoff Kruger

Well, what you need to do is install Ubuntu again, and then uninstall it... Okay, no, not that. What you need to do is edit the boot configuration data store.

Mosey on over to this month's step-by-step walkthrough and I'll walk you through it. Step by step, if you will.

IGAEM

Watching the Witcher

I recently started playing *The Witcher 2* and randomly during the game it freezes, turns the screen black and then minimises.

On the desktop a popup tells me that "a display driver has stopped working and has recovered".

It hasn't done this in any other game. I'm running a Sapphire HD 6870 with an i5 2500K and 8GB RAM.

I searched Google and I got a few tips; reinstalling the game, reinstalling DirectX, reinstalling the GPU drivers, checking that my hardware isn't overheating.

I did all that and the problem still persists. Please, oh Darth Sarcasm, help!
Chris "weatbix" Watt

Is your nickname really "weatbix", or did you just misspell "weetabix"?

If you can't even spell your own nickname in your email sig, I fear there may be a cloud of mistrust and uncertainty over all the troubleshoot steps you claim already to have taken. Because it would mean you were an idiot.

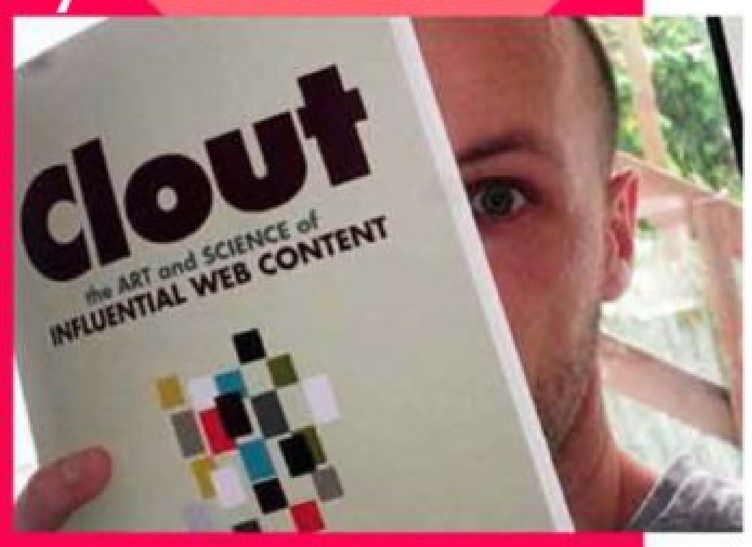
If on the other hand, it was an intentional misspelling – perhaps to get around a cease-and-desist notice from Weetabix Ltd, or because you think it makes you seem delightfully eccentric – then that would make you quite mad, and your

"Two beeps means bad RAM. Since you have already replaced the RAM, it means bad motherboard, which in turn means bad laptop"

Witcher 2: a superb, charismatic and ambitious RPG that needs a few patches to play nicely

NO NEED TO READ!

Clout: The Art and Science of Influential Web Content by Colleen Jones



Name: Clout – The art and science of influential web content
Author: Colleen Jones
Publisher: New Riders
Price: £25.99
ISBN: 978-0-321-73301-6

Motivational business books tend to follow the same template. Each chapter opens with a pithy and generic quote by Einstein or Mark Twain. We get told how we're about to learn something really important. We're shown case studies of firms that have done really well because they understood this point. There are impressive diagrams with lots of arrows and bubbles. Maybe a Dilbert cartoon. Then lots of incredibly obvious platitudes – "make sense to your readers", "build a reliable reputation", don't drink bleach. This goes on for several pages so your eyes glaze over and you start skimming. Then suddenly the chapter ends and you think "Hang on! I missed the important bit." You flick back, trying to locate the crux of the thing – you know, the part where the author actually explains how to make things better – but you can't find it. So you shrug, and push on to the next chapter. Which is exactly the same.

If you stand back and half close your eyes, this is a book that will help organisations to improve their websites. But try to find any advice that isn't hopelessly general or insultingly banal, and it evaporates into the fog. Reading this has given me a bullshit headache caused by my brain trying to locate any concrete points. If you work in marketing, you are probably better than me at tolerating this sort of thing. You may be able to get some sort of Emperor's New Clothes edge over your peers by proclaiming that *Clout* changed your life. But I want no part of it.

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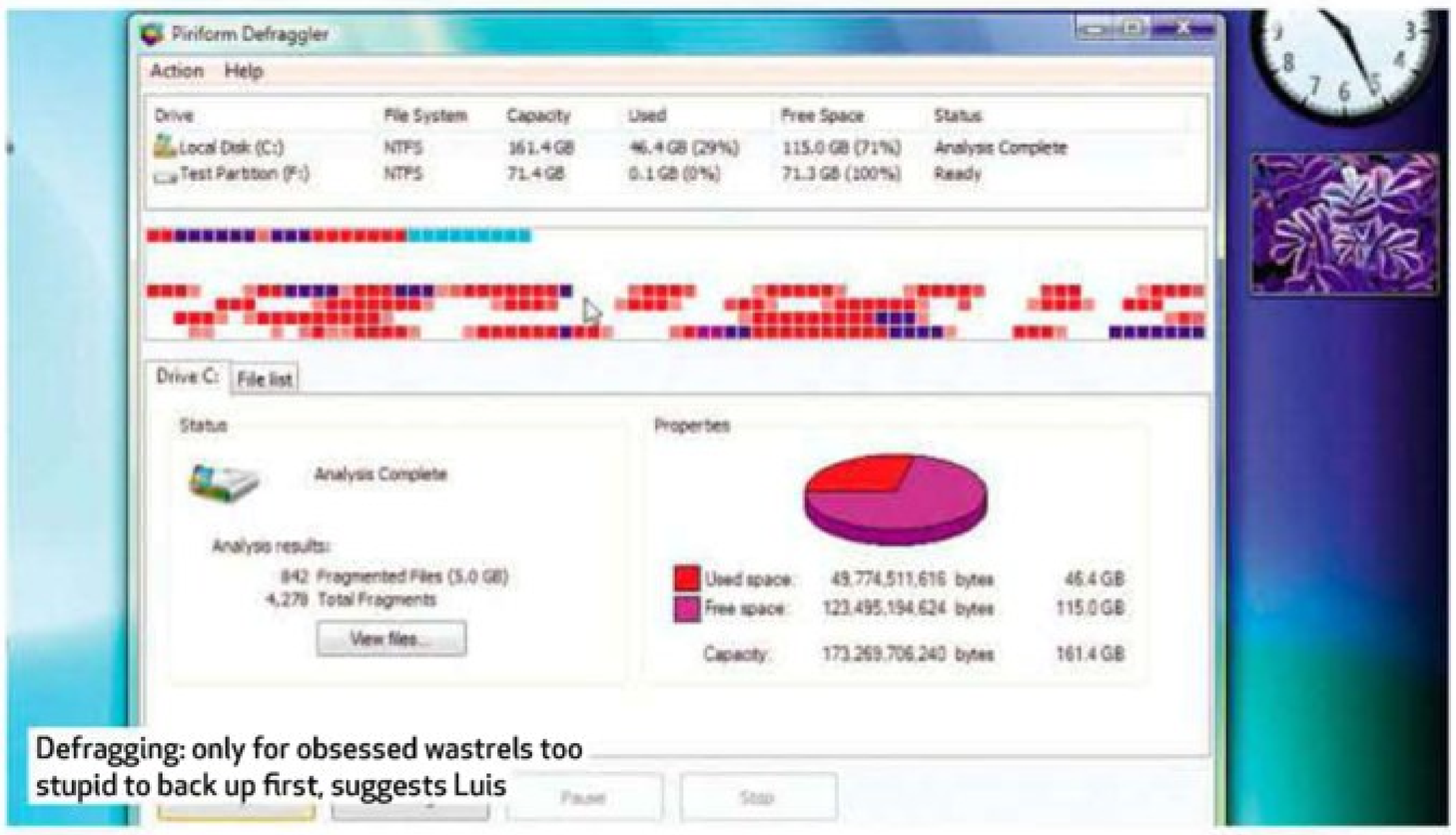

Defragging: only for obsessed wastrels too stupid to back up first, suggests Luis

troubleshooting testimony would be equally suspect as a consequence.

All in all, I can't actually think of any circumstances whereby you would call yourself weatbix and still be a fully functioning human capable of accepting and acting on technical advice.

Which is perhaps just as well, because I haven't really got any.

Witcher 2 is buggy, that's all there is to it. Some games are released with bugs that make them all but unplayable on some combinations of hardware. And the only thing to do is keep an eye on the game developer website and pray for patches.

All that reinstalling stuff is just the sort of fluff you see on forums from people who haven't got any idea either.

There is one known bug with the *Witcher* engine, which causes it to crash if the game is allocated less than 3GB by Windows. But this only affects 32-bit versions of Windows and you have 8GB of RAM installed so you are presumably running a 64-bit version.

Unless you are an idiot or mad, of course…

> "Some games are released with bugs that make them all but unplayable on some combinations of hardware"

RATH

Definitely not the RAM

I am writing to you in pure desperation. As soon as I install Win7 64-bit, my PC blue screens. I restart, five minutes later; blue screen. Restart again, blue screen halfway into the startup. Every time a random blue screen of death that's driving me to death! Each time with a different error message. When I install 32-bit, all is well.

I've got 6GB RAM and I have sent it for testing, but it comes back saying it's all fine.
Dirk Booyse

Take out the top 2GB of RAM and try again. Even though you have tested the RAM, this feels very much like a RAM error, so it's possible that the RAM socket itself is faulty. Win7 32-bit will only use the first 4GB so a fault in that top bank will go undetected. If this doesn't help it is probably a driver fault.

Win7 64-bit uses a completely different set of drivers from the 32-bit version and the 64-bit drivers are newer and therefore less stable, particularly with older hardware. Go to support.asus.com and start with your motherboard drivers.

I've also just seen that there was a BIOS update for your motherboard on 17 January 2011 that improved memory stability, so that may be worth considering.

IMRTIUTB

In memory of mum

My mum asked me to format the memory card of her camera, but I accidentally changed the card to NTFS, which I realise was a stupid thing to do.

I realised my mistake and tried to turn my PC back on to change it back to FAT32, but it went straight into a startup repair. I've been through two system restores and used msconfig, but my system is 10 secs slower than it used to be.

I asked two local PC repair guys what it might be. One said it might be that Windows got hurt and I should do a reinstall; the other suggested that I need to defrag my hard drive and that it's maybe a hard drive issue. How could this have happened from a simple format of memory card?
Philip

Dirk has a blue screen that's driving him to death

www.sxc.hu, Stevenafc

Well it couldn't, obviously. You did a thing and another thing happened afterwards. With a sample size of one, causation and coincidence look exactly the same, which is why we always assume the latter until the sample size grows a bit.

But one thing I can tell you with complete confidence: your hard disk is dying. Absolutely, definitely, irretrievably. In fact, by the time you read this, it has probably already died. Go and buy a replacement, if you haven't already. I hope you used that disk's final functioning moments to make a full backup, instead of wasting them defragging.

I mean, defragging, honestly! What is this human obsession with defragging? ¤

Got yourself a hardware puzzler that just can't wait? Get help on the PCF forums – www.techradar.com/forum/

INVENTOR QUIZ

Quiz

1. Who invented the microprocessor?
a) Frederico Faggin
b) As well as lots of other Intel engineers
c) But under Faggin's project lead
d) And he did most of the design

2. What else did Faggin invent?
a) Silicon Gate Technology
b) The Fairchild 3708
c) The Intel 8008
d) The Intel 8080

3. Where did Faggin become CEO, after Intel?
a) Zilog
b) Cygnet Technologies Inc
c) Synaptics
d) Foveon Inc

4. Which 1980s home computers used Zilog processors?
a) ZX81
b) ZX Spectrum
c) Amstrad CPC
d) Tandy TRS-80

5. Which award was *not* given to Frederico Faggin?
a) Marconi International Fellowship Award
b) Lifetime Achievement by *PC Magazine*
c) European Inventor of the Year
d) National Medal of Technology and Innovation

Answers 1abc&d, 2 all of them, 3 all of them, 4 all of them, 5 none

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Your letters, your pictures, your space

Write to us!

Alan Dexter, Editor, answers your emails on the C64X and Direct Compute. Grab his attention and you could win Mail of the Month!

pcformat@futurenet.com

Your score for *Deus Ex* doesn't match my experiences with the game… how come?

Uploaded on 22 September 2011

Your recent review of *Deus Ex: Human Revolution* aroused my attention, not least because its below-par score line goes against the grain of the game's otherwise positive critical reception.

Of course, reviews are just personal opinions but after reading this particular analysis I feel that some of the disappointment and criticism might be due to an unreasonably high expectation plus an overly rose-tinted view of the original game. Dave James says the game is 'fugly', looks five years old and what a pity it wasn't developed for the PC like its predecessor. I would point out that despite the first *Deus Ex* being developed for the PC alone it also looked heavily dated on its release. Back in 2000 *Quake 3: Team Arena* had been released but *Deus Ex* was using an engine that more resembled Quake 2: all angular surfaces and simple textures with about 4 different character models.

The engine also creaked at the seams and it didn't take much to expose its blatant glitches, such as using wall mines as footholds to jump behind the scenery. Gameplay had issues as well: the weapons were weedy and unsatisfying (does anyone remember using the flamethrower? Anyone?), the stealth side was rudimentary and combat lacked the suspense or intensity of titles such as *Half-Life* and *Quake*.

Yet despite it's technological decrepitude *Deus Ex* is still rightly regarded as a masterpiece. It is true that *Human Revolution* doesn't challenge the market leading technology and does look older than it is, but if anything that just makes it even more in sync with its heritage!

I think most PC gamers, then and now, understand that the experience a game provides counts for a lot more than the tech. As Dave James said in the review, *HR* comes close to playing like the original. I would say that *HR* does everything that *Deus Ex* does, and does it a lot better. The stealth system is slick, the combat is punchy and brutal, and the hacking and conversation mini-games are diverting and fun. Sometimes the game really excels, allowing you to put together a sequence of stealthy observation, tranquillizer sniping, close quarters stun gun action and double takedowns with your invisibility cloak still engaged. The moments where you pull it all off with

Above ***PC Format*** **scored** ***Deus Ex: HR*** **a solid 80 per cent, but Dave's criticism of the game didn't sit well with one reader**

MAIL OF THE MONTH

Promising pixels

AMD's next generation of graphics cards in *PCF257* was an interesting article. All its compute units sound very clever but will any game be written to take advantage of this power? I can't help feeling that the only thing that will bring a new generation of graphics for PC gamers is the next generation of Xbox.
Jason Vardy

It's a cynical outlook Jason, but I can't help agreeing with your sentiment. Graphics hardware has always offered features that are largely ignored by games developers – simply because they want to hit as many potential gamers as possible. On the PC that means that anything outside of the DirectX spec may as well not be there.

Add to this the cost of developing next-generation titles, and that extends to the lowest common platform – or the Xbox 360 in real terms. So while the current PC is capable of so much more, it's hobbled by the costs of developing games.

There is another side of the Direct Compute, and that is that those tiny compute engines can be called be used for more than just games. The likes of vReveal (see next issue) is a great example of what you can do with your graphics card.

Don't forget that each new generation of graphics cards ushers in more power as well. This equates to more effects, higher resolutions and smoother anti-aliasing modes. So while we lament the way that the consoles are holding us back, at least take solace in the knowledge that the PC is still the best way to play the latest games.

Mail in and Win
pcformat@futurenet.com

Have a lovely 8GB USB stick from crucial for sharing your worries with us.

Left **vReveal is one of the many apps that use the power of Direct Compute, in this case for video**

WIN! Imagine not having a USB drive to hand… horrendous, eh? Now imagine winning one, courtesy of those lovely people at Crucial, simply by writing me an email. Now imagine finding out that your prize has EIGHT THOUSAND MB of storage! Oooh!

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Left The new Commodore 64X is actually a PC that emulates the original and its games

no kills and no alarms triggered are outrageously cool and something the first game could never approach.

The narrative may not have the length or variety that the first game did but its theme of how technological change will create a new class of haves and have nots is certainly more relevant than the original's alien experiments and conspiracy-laden silliness. Despite its faults I loved the first game, the experience it provided was astoundingly rich at the time. *HR* takes the good elements of that game and refines them to modern, slick standards. With the game averaging a metascore of 89, Dave James seems to be in a minority. Perhaps if your reviewer concentrated on the experience the game does provide, instead of complaining about what it doesn't, he might have enjoyed it as much as the rest of the community has.
Robbie Shand

Dave James responds: My problems with the game extended beyond what was missing. I wanted to feel like a fully augmented bad-ass, but the enhancements never really delivered and the boss battles made a hideous mockery of giving you license to develop your character in your own way.

When a game pretends to have choices, open world hubs and cutting-edge graphics, I believe we are also entitled to be disappointed when it doesn't deliver on them. But like you say, reviews are just personal opinions. Sadly mine differed from yours and so it is wrong. Perhaps if I had enjoyed the game like you enjoyed the game then I would have enjoyed the game.

I remember when machines made beautiful, beautiful music from the simplest of chips

Uploaded on 14 September 2011
I hope you can help me. I still own a Commodore 64 system. However, I believe there is to be a new version launched called Commodore 64X.

Could you provide more details, if possible, and could you let me know when and if it will be available here in the UK, and where? I believe it is available in The USA.
Dean Sadler

As someone that remembers the Commodore 64 with nothing but fondness, and incidentally can often be found reliving the awesome sounds of the SID chip on YouTube, I read your email with delight.

Unfortunately on closer inspection, this may not be the dream PC you've been looking for. Essentially it's a standard PC that boasts support for those old classic games via emulation; albeit in a very funky chassis. Really though, if you've got a Commodore 64 already, then you don't need anything like this – the best way of playing your old games is to just play them on that. If you really must though, there's no word of the machine making its way onto these fair shores…

You are both brilliant and not so brilliant. Come with me on a journey of complaints…

Uploaded on 29 September 2011
I have just completed my new build, largely based on recommendations from *PC Format* and am very pleased with the result.

Based on this success, I was about to proceed to install IOLO System Mechanic 10, again from your glowing report and the confidence I had in your technical staff. For some reason, I suspect a suspicious itch originating from 30 years in IT management, I thought I would have a look at some of the web reviews. I was met with tale after tale of woe, crashing, trashing, rubbish customer support, liberally scattered amongst the glowing reports.

I understand that bad news on the web is not necessarily unusual as someone always has a problem, but the frequency of the problems of this product were far too many to ignore.

Do your reviewers ever look at customer feedback on the web, or is it a case of install it, if it runs it must be good? Can we have a bit more in-depth testing and reviewing before *PC Format* declares a winner please? Many of us trust you and it would be a shame if you lost that confidence.
Gordon Finlay

As I'm sure you're aware, utilities that are designed to resolve system issues are susceptible to more than their fair share of problems, issues and complaints. Take a look at the forums for any of the apps that featured in the same round-up, and you'll discover a wealth of issues for each one. Some of these are down to conflicts with other apps and others are due to user error. Going by the general consensus wouldn't necessarily make for better reviews. We do check to make sure nothing silly is going on, but for the most part we review products based on our own wealth of experience.

If we were to judge all products by the complaints of users online, it would be too easy to abuse. In fact we doubt we could ever recommend anything if we followed such a regime – everything from Microsoft's OSes to graphics cards to mice would be deemed unusable. Complaints are obviously important though, and we would recommend checking out the forums of any product you're considering just as you have done. ⌑

Below IOLO System Mechanic 10 won a gold in *PCF*257, but Gordon spotted a lot of complaints about it on the web

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PC Format Upload is sponsored by Fasthosts Internet, www.fasthosts.co.uk, a leading UK web hosting provider. Since 1999, Fasthosts has been at the forefront of server technology. Fasthosts has recently launched the brand new DS910 Dedicated Server offering an impressive 2x 2,000GB hard disk space and 12GB RAM. With 2.8GHz Intel Quad Core CPU, and RAID 1 protection, the server is ideal for storage and managing large scale databases and web apps securely. With advanced monitoring, unlimited bandwidth and UK support 24/7, Fasthosts offers a power-user unrivalled performance, quality and great value. More details at www.fasthosts.co.uk

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ADVERTISING FEATURE

WHAT MMO?

CRIME DOESN'T PAY

Taking over the world just got a whole lot cheaper...

Heroes and villains rejoice! Last year's capering *Universe Online* has become the latest MMO to switch over to free-to-play (*www.dcuniverse online.com*). You can now fight crime alongside the Dark Knight or revel in destruction with the cackling Joker, all without paying a penny.

The new account model comes in three tiers: free players will get access to all current content, but will have restrictions on the amount of items and currency they can carry and trade. Spending $5, however, will dramatically increase those abilities, with a full subscription available to those who want access to absolutely everything, without the fuss. So don your spandex and get ready to fight or commit crime online: for truth, justice, and no money down!

DC Online's fellow superhero MMO *Champions Online* has been free for some time, but now it's being joined by its sister game, *Star Trek Online* (*http://bit.ly/freetrek*), which will be free to play before the year is out. Once again a subscription is available, but you can explore nearly all of Cryptic's online galaxy for free, with an already well-stocked store helping support the game through micro-transactions.

The Borg aren't the only evil robots you could be facing this month – jetpack shooter *Global Agenda* has seen the release of *Recursive Colony* (*http://bit.ly/Recurs*), a huge, free update that sees players fighting off an army of self-replicating automatons. The update is the biggest in *Global Agenda*'s history and the first since it went free to play, showing that working on *Tribes: Ascend* won't stop Hi-Rez Studios from supporting their first game.

In other expansion news, *Lord of the Rings Online*, which was one of the first wave of MMOs to turn free-to-play in the west, recently launched *Rise of Isengard* (*http://bit.ly/Isenguard*). The latest update gives players the chance to finally explore Saruman's kingdom. Our advice? Make friends with the Ents and stay the hell away from the Uruk-hai. They have terrible manners.

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ALLODS ONLINE

The latest update gives *Allods* some soul power

The *Allods Online* October update is coming, and it's full of spooky evil. It seems that Tep, the villainous necromancer whose 'Prison of Souls' appeared back in June, has even more nasty secrets. Players will descend into a new area to investigate his nefarious schemes, and this time souls are not only being imprisoned, but ghoulishly experimented upon, draining them of their very life force. That sounds pretty cruel, as they've already died once.

Players will venture into this lab of mad ghost science and try and free the poor souls held within. We're told the captive souls will even lend you their strength in order to help them escape, which we can only hope they do by forming an impromptu group of backing singers and putting on a performance of James Brown's 'Soul Power'.

There's far more than just new narrative in this update, however. The developers have revised and streamlined the first 25 levels of the game to make them more welcoming to new players. The whole levelling experience is now simpler and faster, with the clunky fatigue system now happily removed. Two new classes are also being introduced in this update, so there's never been a better time to roll yourself an alt.

High-level players will also be provided for, with Kingdom of Elements. It's an entirely new zone aimed at hardcore players. Meanwhile the popular Arena of Death PvP area now has a whole new matchmaking system, and will be available 24 hours a day from now on.

Those high-level players who are lucky enough to have their own astral ships will get a further bonus: the ability to customise their boat's interior. Furniture, paintings, rugs and much more are available for you to outfit your mighty vessel as befits a decadent pirate king.

All pirate kings love interior decorating.

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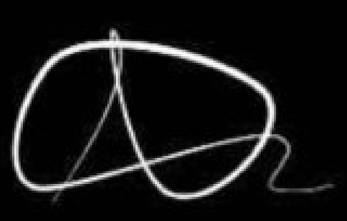
On the Web

These are the apps you are looking for

"Don't worry, we have the best-darn software packs this side of the great divide"

We asked your opinion and we listened: we've despatched the cover disc to the great technological graveyard in the sky. They were a bit inconvenient, we'll admit, especially in this modern age where everything can be downloaded quicker than it takes you to slide a disc into your drive.

Don't worry though, young Ford can still be found piecing together the best-darn software packs this side of the great divide. Head over to the official *PC Format* website (www.pcformat.co.uk) and you'll find four huge software collections that tie into this month's magazine. Here, are the highlights that you'll find in the packs and because they are live links, they'll always point to the latest versions. Why didn't we think of this earlier?



Alan Dexter
Editor
alan.dexter@futurenet.com

WEB PACK 1
TAKE A PEEK AT WINDOWS 8 TODAY!

URL: www.pcformat.co.uk/259webpack1

Did you know that you can install Windows 8, now, for free! As with all things of this nature, you can't rely on this as stable or complete operating system, but hey, the PC enthusiasts that we are makes us want to tinker with this just for the larks.

Win8 Developer Ed

By now you will have poured over our Windows 8 supplement this month (if not, pull out the mini-mag to get the lowdown) and wondered over some of its radical changes, not withstanding it's remarkable one size fits all from tablet to desktop approach. You can try it for yourself now as the Windows 8 developers edition is downloadable without fuss and no form to fill in, just grab the ISO.

VirtualBox

If you'd rather not commit Windows 8 to a dedicated drive or partition, you can still run the OS through virtualisation. Download the Windows 8 ISO and get yourself VirtualBox.

The OS installation is easy enough, just make sure that virtualisation has been enabled in your BIOS before you begin otherwise it will throw out errors and halt during the Windows 8 install process. A couple of other tips: Within VirtualBox, select Windows 7 as the OS to be installed and 20GB of virtual storage for the OS to live on.

Win7 USB/DVD Download Tool

Ignore the ambiguous title, this essential utility from Microsoft automates the process of writing the Windows 8 ISO to a DVD or flash drive, and takes care of the tricky stuff needed to make the ISO bootable for the install process.

EaseUS Disk Copy

For complete piece of mind you may want to backup up your current version of Windows. Easeus Disk Copy is able to clone your system partition for backup purposes.

EaseUS Todo Backup Free

A more advanced and also free for home users step-up from Easeus Disk Copy, supporting drives up to 2TB and functions for migrating OSes from one drive to another. Includes a disaster recovery disc creator.

These are just some of the picks from the full pack. Check out the www.pcformat.co.uk for the entire list of utilities, tools and applications.

WEB PACK 4 LATEST GAME DEMOS

URL: www.pcformat.co.uk/259webpack4

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WEB PACK 2

THE GAMER'S GUIDE TO ONLINE COMMS

URL: www.pcformat.co.uk/259webpack2

If you have a special MMO or multiplayer shooter in your life then things aren't quite complete until you've joined a guild or clan. . Beyond making these new pals, it's still about the game and being the superior group of players against all others, and that takes excellent communication.

Mumble

Mumble is a free open source voice chat app designed for gaming, serving up the low latency, high quality sound required. It's works alongside the Murmur server client that's needed to make it all work.

TeamSpeak

TeamSpeak has been around for a very long time and the software is the most advanced on offer, with a multitude of custom settings, game skins, and peer-to-peer file transfers. TeamSpeak requires a client/server setup, which is completely free on your own PC and bandwidth, but they also offer links to third-party server renting which can cost as little as £2.50 per month.

Ventrilo

This is the other big hitter in the realms of gaming VoIP. Along the same lines as TeamSpeak, Ventrilo provides a freely available client and server software for private users.

Raidcall

If the other voice chat gaming options relying on servers seem like a whole lot of effort, thenRaidcall maybe worth investigating. The software makes the same promises of clear low-latency voice communication suited for FPS and MMO gaming without a server.

TeamSpeak, the granddaddy of gaming VoIP

Palringo

Palringo is an IM client and that's unlikely to tear you away from the likes of MSN, CQ or Google Talk, so instead it focuses on supporting other IMs. Palringo supports a vast array of OS and mobile phones.

These are just some our selection, be sure to check out www.pcformat.co.uk for the other programs featured in this web pack.

WEB PACK 3

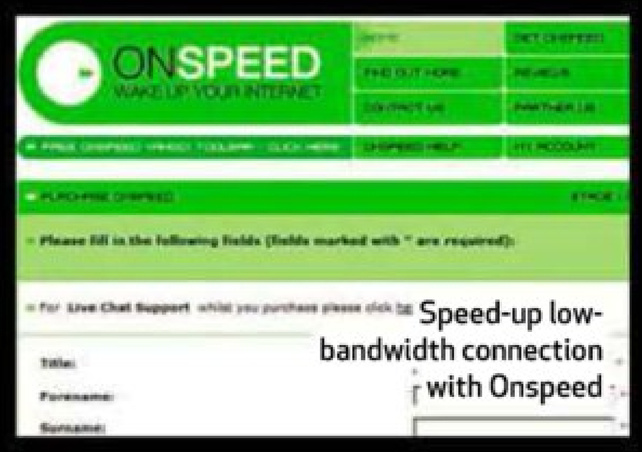
SPEED UP WI-FI & BROADBAND

URL: www.pcformat.co.uk/259webpack3

We all want to ensure we're getting the most from our internet connections, so we've served up some essential free resources to help you manage your bandwidth, troubleshoot problems, and generally extract the most from those copper and fibre optic wires.

ONSPEED

Using selective content compression to reduce the amount of bandwidth required to deliver a web page. At under £30 a year, Onspeed makes sense for people using low-bandwidth connections such as dial-up or mobile internet, but don't expect it to work wonders with a mid-level broadband speed.



Speed-up low-bandwidth connection with Onspeed

Speedtest.net

Want to check your broadband provider hasn't stitched you up on their bandwidth claims? You can test your broadband speed here. They have servers placed in many locations to ensure accurate results.

WEP key generator

You've heard stories of Wi-Fi thieves hacking into networks to suck down those tasty radio waves for nefarious ends. WEP key generator is a handy online secure password creation tool that will make you a fancy password with lots of strange characters.

Propel Accelerator

You're average run-of-the mill home broadband connection will often be advertised at a speed vastly in excess of the real-world rates you'll be able to achieve with it. Using this fine web service you'll be able to turbo charge your connection so it's slight closer to the throughput you were originally drawn to.

DNS jumper

Switch DNS servers easily using this piece of freeware. What's a DNS server? A DNS, or domain name server maps URLs to IP addresses and all vary a surprising amount in terms of reliablility and speed. Use DNS jumper if you find that your browser isn't resolving web addresses as fast as you'd like.

There are a lot more programs from this collection to peruse. Head over to our website at www.pcformat.co.uk to get the full monty… well, list.

PES 2012

Sengoku

Wasteland Angel

THE MONTH IN NUMBERS

27 MILLION

The fine a Chinese woman living in the US received for selling fake Cisco networking kit. Chun-Yu Zhao also faces a five-year jail sentence, plus losing her four homes, three condominiums and two Porsches.

8.429 GHz

The speed AMD has pushed its Bulldozer chip to, setting a new world record. The chip was cooled to below -180° with a mixture of liquid nitrogen and liquid helium, and it's beaten the previous record holder by 0.12GHz.

€1 MILLION

Amount ReactOS developer Marat Karatov asked the Russian president for during the latter's visit to a high school. The OS is intended to replace Windows, but unlike Linux it will actually run Windows programs natively.

$7.2 BILLION

Predicted global ad spend in-game in 2016. That doesn't mean you'll see Go Compare in *Modern Warfare 19*, though: it's more likely to be ads around games on sites like Facebook.

THE VOICE OF REASON

"You wonder if it's just intentionally being as stupid as possible"

PC Format has a mole. A man wedged inside the games industry's nether regions. A man rendered so hideously paranoid by a life spent playing sub-standard PS2 ports that he won't even let us edit his copy. These are his thoughts...

Today I'm wearing my pretentious art-critic hat. Whenever I wear it, I like to think of the death of modernism and the ongoing dialogue of post-modernism. You see, we pretentious art critics like to think that there is nothing new to be said or done. This reasoning started in the 1980s and affected everything from buildings to music: the idea being we can't do anything new, so we'll remix old stuff in a way that negates the boundaries of high and low culture.

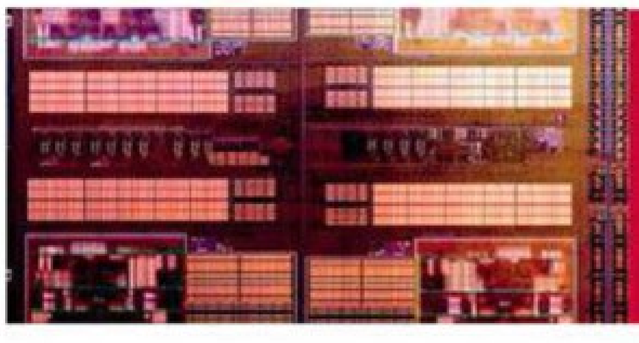
The thing is I've always believed that games, being something that's genuinely new and exciting, are impervious to post-modernism. Sure, *Grand Theft Auto* may take pot-shots at pop culture, but its form and essence as a free-roaming destruct 'em up defies traditional notions of categorisation. Most games over the past decade have done something vibrant and new. But the biggest releases at the moment are *Deus Ex: Human Revolution* and *Space Marine*, and they're both versions of something that's gone before.

Deus Ex is essentially a cover version of the original. There's something rather cold and mechanical about it in comparison, though. Famously, the original's designer Warren Spector was surprised when players stacked trip mines on walls to climb to inaccessible areas or skip puzzles, but in *Human Revolution* the bugs have become features, and you can tell it's been playtested to death. Stacking up boxes around a guard so they can't see you feels like an AI quirk, but it's more likely to be an expressly designed "flaw" in the game.

Space Marine is a bit different. It's a *Gears of War* clone, but, as many have pointed out, the Warhammer 40,000 universe was pretty much cloned wholesale by Epic games for its Xbox shooter. *Space Marine* seems to be an effort to take back the territory Epic has inhabited for the past few years, and has similar unnecessarily-large protagonists and space orcs queuing up to be slaughtered.

With my art critic hat on, I like to think that *Space Marine* is actually a parody of *Gears of War*, and possibly the first big budget AAA title to do so. It's all just so bloody ridiculous that you can't help but wonder if it's just intentionally being as stupid as possible, just to piss on *Gears of War*'s war just a little bit more.

Illustrator **Kevin February**



Next month in PCFormat

Tech of the year - the *PCF* awards issue.

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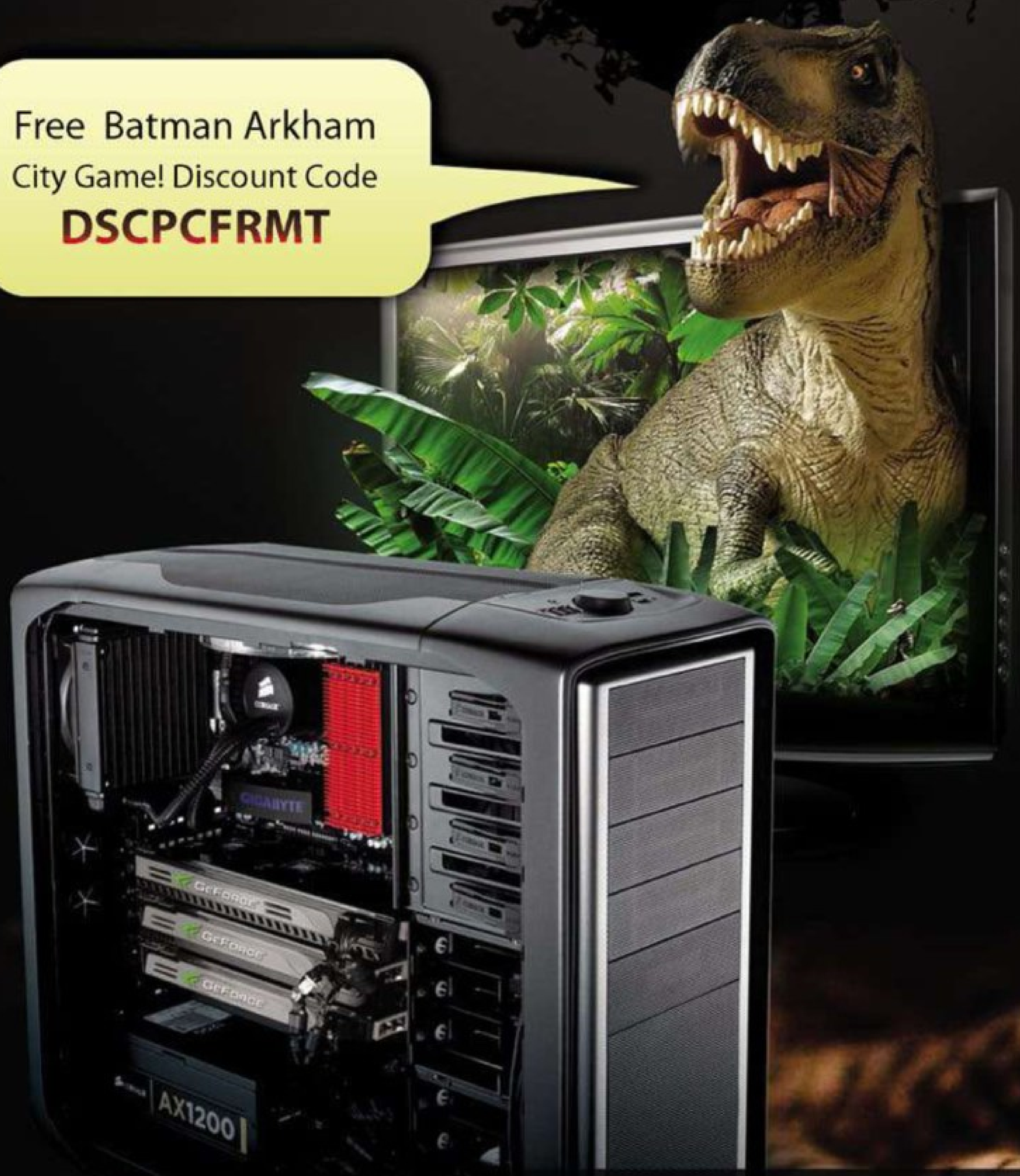

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				1x 500GB SATA HDD	**2x** 500GB SATA HDD
-	RAID 1	RAID 1	RAID 1	RAID 1	RAID 1
2GB RAM	4GB RAM	8GB RAM	12GB RAM	16GB RAM	32GB RAM
FREE FOR THE 1st YEAR	**FREE FOR THE 1st YEAR**	**FREE FOR THE 1st YEAR**	**FREE FOR THE 1st YEAR**	**FREE FOR THE 1st YEAR**	**FREE FOR THE 1st YEAR**
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WINDOWS 8 PREVIEW

It's already better than Vista

The launch of a new operating system from Microsoft is always a major event. The whole industry suddenly sits up like a smacked dog and starts paying attention – if only because it's a great opportunity for many of them to sell their gear. New technologies are supported, the Earth rotates a little smoother, and life in general is better.

touching it. The new interface, the apps supplied with the developer build and the whole ethos behind the way you log in, all make sense the moment you use them on a tablet or a touch-screen display.

The future of hardware looks like it's more touchy than we're used to, and it would appear that Microsoft wants a slice of this.

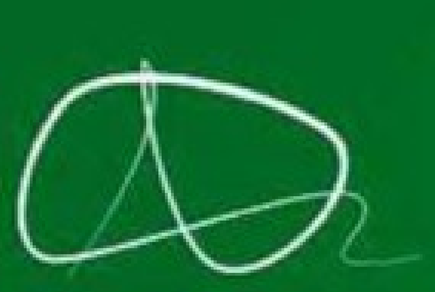
So turn the page to see what's on the way from the Redmond giant,

> "The future of hardware is touchy and it appears that Microsoft wants a slice"

Even so, there's a bit of a problem for Microsoft's next OS when it comes to the vast majority of us, and it goes by the name of Windows 7. Win7, for short, is ace. It works, looks good, makes doing normal things a breeze, and is everything many of us could wish for. Why should we be even interested in Windows 8? Because it's the future, that's why.

As you'll find out in more detail over the page, Windows 8 is at its most interesting when you're

and what it means to you. Apart from anything else, we tell you how you can download it and try it out yourself. So, what's holding you back? Go on, dive in!



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So here we are. Microsoft has laid its cards on the table by making a pre-beta developer preview of its new OS available at the recent Build conference

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Weather

The stakes are high. Apple rules tablets and comes a close second to Google in smartphones. In both arenas, Microsoft is looking like an also ran and desperately needs a reversal of fortunes. So does Windows 8 measure up?

This is a pre-beta version so there are some limitations and rough edges. The most critical of them is that this version is x86 only. The hardware support for the much trumpeted ARM versions hasn't been finished yet.

So what does this version tell us about the final release? Well, the certainties are as follows: Windows 8 is Microsoft's combined desktop, laptop and tablet operating system. The same system is designed to be used on screens in your living room, ultra-portable notebooks, massive gaming systems and business desktops.

The new OS also embraces Windows Phone 7 Metro-style touch interface of live tiles. If you're not seen the mobile

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operating system, tiles are essentially super-icons. An application such as a stock price checker may work purely as a tile, whereas other tiles might trigger full screen apps.

Windows 8 also features gesture controls. These will work on both touch enabled tablets and also on traditional mouse and keyboard controlled machines. The gestures will, amongst other things, let you put two apps on screen side by side. They will also work on the traditional Windows desktop and let you control and interact with richer and more complex apps.

One single answer

So, no other single operating system has tried to be as all-encompassing as Windows 8. The question is, does it work or has Microsoft been overambitious?

The spirit of Windows Phone 7's Metro interface is clear in the interface for the Windows 8 Lock screen and Start screen (which completely replaces the Start menu). Windows 8 isn't a slavish copy of the phone operating system look, though.

Swipe to the left and right and lines of app will swish before your eyes

It may still have the live tiles and the personalisation, enabling you to pin people, RSS feeds and web pages alongside apps. But it's more colourful, more flexible and better designed, to enable you to arrange and explore large numbers of apps.

You can also customise both the image you see on the Windows 8 Lock screen and the details of unread emails and missed instant messages that it shows. And you can pin desktop apps such as Office or Task Manager, and even a link to the desktop, to the Lock screen.

Tiles to apps

Once you launch apps, you can use gestures to arrange them. Swiping from the left switches to the next app, but you can also swipe and drag to put two on a screen side by side. One of those can be the Windows desktop.

There are only three window sizes for apps arranged like this (counting full screen). This means that developers don't have to worry about making an infinite number of layouts look good. One app is a thin QVGA 'snap' view on either side of the screen, and the other is a larger VGA full view – which is why this only works on 1366-resolution widescreen PCs.

But if the Windows 8 desktop is in full view you can still use

At last you can have different backgrounds in each display

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Windows 8 has plenty of new features, but loses the much loved and familiar Start menu

Aero Snap to arrange two windows. If it's in snap view you get thumbnails for all the running desktop apps that you can tap to open, too.

This is a good combination of enabling you to use two apps at once on a tablet. This is something only the dual-screen Android tablets enable you to do, and then only for a limited number of apps. It also makes it easy to switch from Metro apps to desktop apps and back.

Swipe in from the right of the screen and you get what Microsoft is calling the Windows 8 "charms": search and share, which work across different apps; devices and settings; plus a button for switching between the Start menu and the desktop.

The Settings charm gives you the settings for the current Metro application. You also get options for volume, brightness, notifications, networking, switching language and choosing to sleep, shut down or restart.

One place for all

It's great to have one place to do that in every application. It's also a logical place for commands such as Restart that used to be on the Start menu, simply because there was nowhere else to put them. We kept looking in there for a link to the Control Panel, which is currently just a tile on the Start screen.

Open an app that needs the Windows desktop and you get the familiar desktop view with Recycle Bin, Task bar and Start button. Here's the twist for traditional Windows users: the Start button opens the Start screen again. The Start menu is gone in Windows 8.

The look of the desktop and desktop apps will change before the Windows 8 release date. We're expecting the new-look Task Manager to be a clue to the final interface style, but the ribbon makes an appearance

TILES YOUR WAY

You can group tiles together – giving groups a name or leaving them blank – and make any tile single or double width. Just swipe the tile up a little to get the option to change the size, unpin the app or uninstall it completely.

You'll be able to do that for pre-installed Metro software too (which is what Microsoft is encouraging OEMs to bundle on new Windows 8 PCs). As well as moving a tile to a new location by dragging it, you can also drag it up to the top of the screen with one finger and hold it there while you swipe across the screen to get to where you want to drop it. This is a much easier way of dealing with a long list of tiles.

Future builds of Windows 8 will also enable you to pinch to zoom out so you can see all the tiles on screen at once, and rearrange groups at the same time.

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INTERNET EXPLORER 10

IE10 runs in Windows 8's Metro interface as well as the desktop. If you want to change settings – such as turning on the Tracking Protection Lists or saving a favourite or home page – you'll need to swipe for the app bar and tap the button to open the page on the desktop.

Swiping also shows the address bar and the list of open tabs. Press '+' to open a new tab; press and hold to open a new tab for InPrivate browsing that doesn't save cookies or history.

Most of the time that's all you need from a browser, so IE10 works very well as a Metro app. It also works well as a modern browser: it has the vast majority of usable standards in HTML5 and CSS3. The browser is also fast because of the hardware acceleration and it has excellent security. IE10 in Windows 8 also has Flash, Silverlight and other plug-ins tablet browsers often lack.

You can access IE as either a Metro tile or a more traditional fullscreen application

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in Explorer. This is always controversial, but we think it works well for organising options and tools together.

If you use multiple monitors, you finally get better desktop management. You can choose to have the Start screen on one monitor and the desktop on the other, which keeps the two interfaces separate.

If you're using multiple screens it's more likely you're using desktop apps, so you'll like the option to duplicate the task bar on both screens or pick which icons you see on the task bar for each screen.

You can also finally put a different desktop background on each screen.

Windows 8 search

As we've said, there's no Start menu in Windows 8, but you can search as if it was still there. Hit the Start button on the keyboard (or on a tablet PC) and start typing. The results you see on screen are for apps, so you don't have to go swiping through the tiles to launch programs. The system lets you see if there are matches in settings or file names.

You can pick apps that you can search directly here, including social and music apps and Internet Explorer, which searches on Bing.

This is the way sharing works too; choose the Share charm and you can pick a contact to email or a social app that has signed up for sharing. In practice this means you could send a tweet or upload a photo to Facebook the same way from any Metro app. How successful this is depends on how many apps use these features, which is something developers have to build into their apps.

Windows 8 has a limit number of basic but very promising apps

Windows 8 applications

Metro apps don't have to work the same way in Windows 8 as Microsoft apps, but some things are consistent. Swipe up from the bottom of the screen or down

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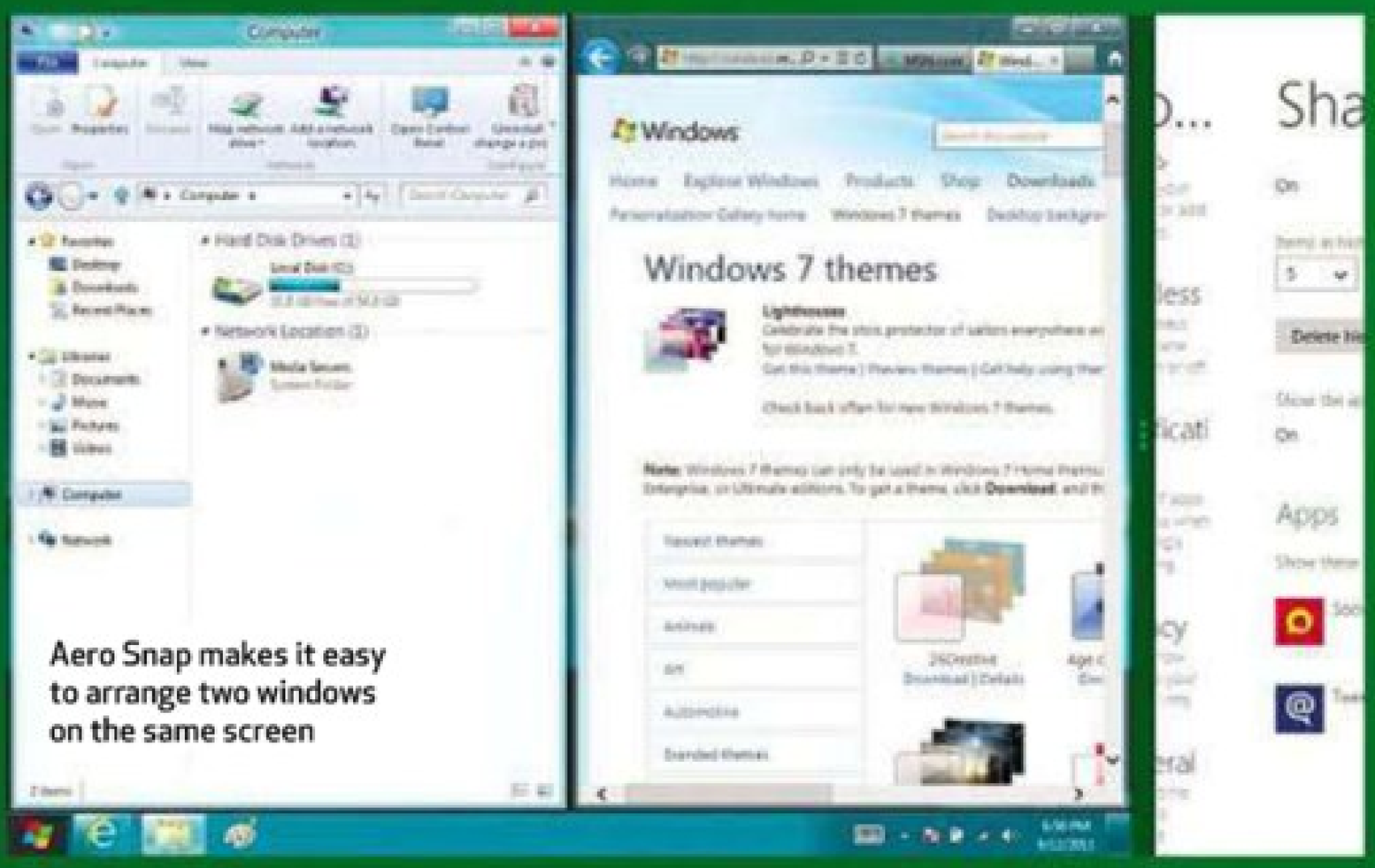

from the top and the app bar and any controls appear. This is similar to the Windows Phone 7 menu gesture, but is better suited to the larger screen.

The developer preview has a couple of dozen Metro apps, from utilities for setting alarms to games to the obligatory Facebook and Twitter tools.

One of these is a media app, which is fun but basic. We haven't yet seen Media Center, Windows Media Player or Zune for Windows 8. Displaying imagination, another app lets you paint with your fingers and handwrite notes and reminders. Explore some more and you can waste hours reading RSS feeds laid out like magazine pages. These Windows 8 apps were written by Microsoft interns in 10 weeks this summer, and they range from pretty but basic (Tweet@rama isn't going to replace Seesmic) to accelerometer games that are huge fun to play.

They're very like Windows Phone apps scaled up, and they're easily better than many trivial apps for Android tablets and the iPad. While they don't match the best apps on other platforms, they bode well for what developers with more time and inspiration will be able to deliver.

Windows 8 app creation

Desktop Windows apps are the same Windows apps they've always been, at least on x86. At this point, although we've seen a prototype ARM Windows version of Office, Microsoft is saying that all ARM applications will be Metro apps.

But that doesn't mean they have to be just web apps. Developers can write Metro applications that use the new Windows 8 runtime application interfaces in HTML, CSS and JavaScript – or in Visual Basic, C#, C++ or Silverlight. However, Silverlight code designed to run on Windows Phone 7 or in a browser will need some fairly minor changes to make it work as a Metro app.

> "There's no Start menu but you can search as if it was still there"

FUTURE TECH

If you're going for something more modern, Windows 8 supports the new sector sizes on larger hard drives.

It also supports a range of interesting sensors – temperature, pressure and current as well as the usual light, motion and location.

It even supports specialised sensors such as blood pressure, for building health-tracking tools.

With the developer preview of Windows 8, you have to do a clean installation on your PC, and that's going to be true of the beta and any release candidate version too.

The release version of Windows 8 will be able to upgrade Windows 7 PCs.

The problem for pre-release versions is that there's no way of undoing the installation, so you can't go back if anything goes wrong.

It's also likely that you will have to do a clean install of each new test version of Windows 8 as they come along.

From the testing we've done so far, the developer preview of Windows 8 itself is pretty reliable, but the same isn't true of some of the Metro apps.

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"Install an app from the Windows Store and it will show up on all your PCs"

Even if your handwriting is very scruffy, Windows 8 will make a good fist of interpreting it

Metro apps run in their own sandboxes for security. While they can use your location – if you give them permission – access files and share information with other apps, that's limited to accessing documents and pictures rather than being able to get at the whole file system.

The developer tools for creating Metro apps are the same powerful tools Microsoft has for writing standard Windows programs and Windows Phone apps, but with templates for the Metro layouts.

These include full screen, snap view and full view in landscape and portrait at different screen resolutions.

This broad language support should reassure developers who have been complaining about lack of Silverlight support since ex-Microsoft server chief Bob Muglia suggested last year that Silverlight was being sidelined. We're not sure why Microsoft didn't come out and explain the position much earlier.

Now developers can concentrate on building interesting apps, and we're looking forward to seeing what they come up with.

Windows Store

We've previously seen a preview of the Windows Store, but it's not in the developer preview of Windows 8. The Store is a Metro app that looks similar to the Windows Phone Marketplace, but it'll include desktop apps as well.

You can search for something specific or browse the categories, which highlight new apps as well as top rated, top free and top paid apps. Developers can offer trial versions and see how popular their apps are and what errors have been reported.

Windows chief Steven Sinofsky suggested that Microsoft would also learn from Apple's mistakes and allow in-app purchasing, but there's no news on what the charges to developers will be.

The Windows Store should be filled by the time the OS ships

Gazing into the cloud

You can use the Sync PC settings system to share files between your collection of PCs and laptops. Install an app from the Windows Store and it will show up on all your PCs. Give it a Live account and Windows 8 will also sync settings between all your PCs. It'll sync your desktop background, lock screen, what you have pinned to the task bar, IE favourites, passwords and your browsing history so you can

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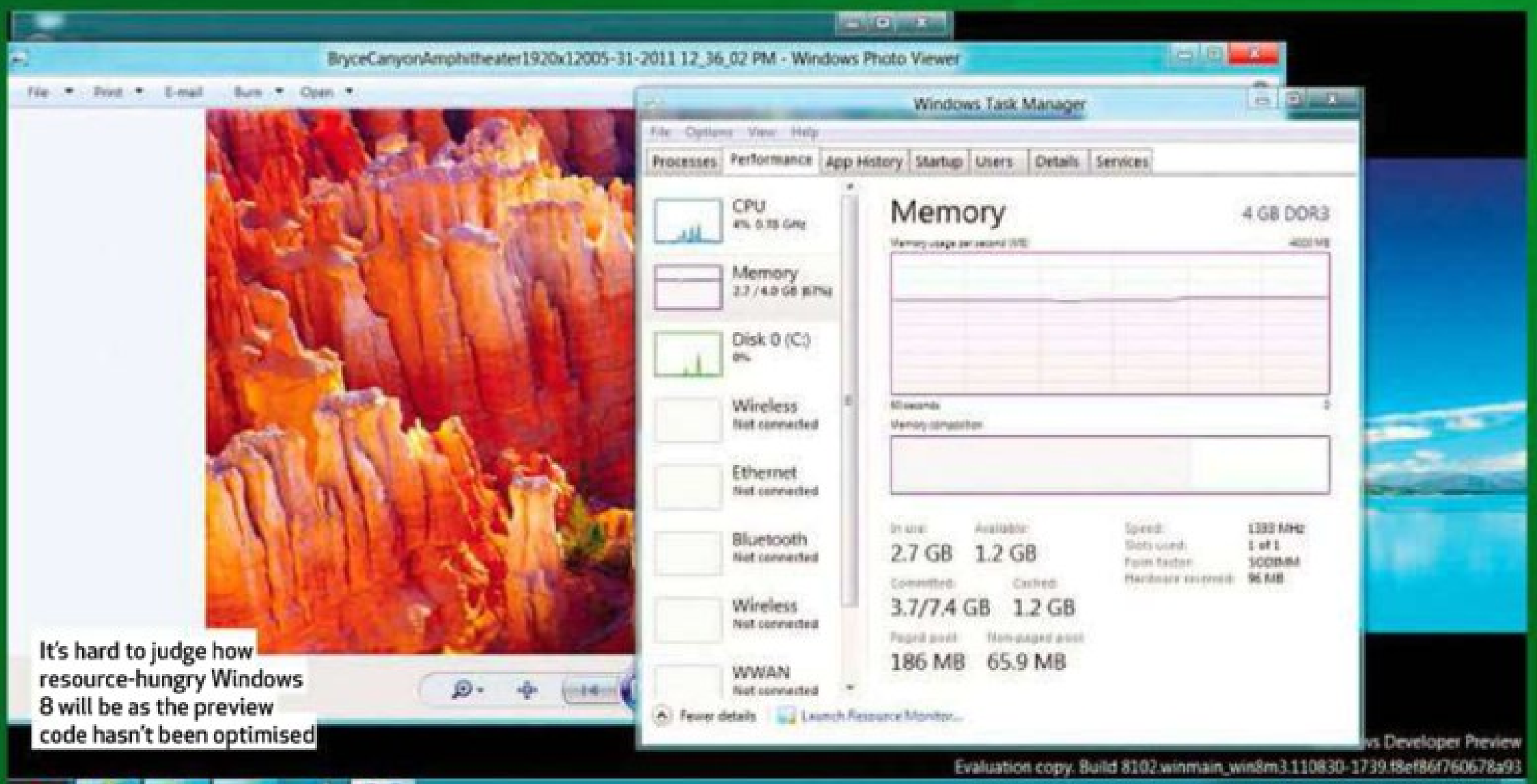

It's hard to judge how resource-hungry Windows 8 will be as the preview code hasn't been optimised

WINDOWS 8 PERFORMANCE

It's hard to judge the performance of code that's this early in development, but running Windows 8 on a recent notebook gave the same excellent performance as Windows 7, at least for desktop apps.

Cold boot and full shutdown are both impressively fast, even on hard drive systems (not just with an SSD).

If anything, the system requirements for Windows 8 are less demanding than Windows 7, thanks to the need to write code that can run on an ARM tablet. Microsoft tells us to expect slightly improved battery life on x86 laptops compared to Windows 7, too.

The minimum spec is a 1GHz processor, 1GB of RAM (2GB for 64-bit PCs), 16GB of disk space (32GB for 64-bit) and DirectX 9 graphics with WDDM 1.0.

Windows 8 makes understanding the demands of and interplay between apps immediate

The system tries to save on memory by sharing it between applications rather differently. Because a lot of apps use the same libraries and runtimes, they can have a lot of the same code in memory. So whenever Windows 8 finds that one of the 4K pages of memory one app is using is the same as the one another app is using, it only keeps one of them and shares it between them.

Initially, Windows 8 seems to be using less memory than Windows 7 on similar hardware, but we need to test this in greater depth to see how it affects performance.

find the page you were looking at, whether you opened it at home or at work. You can also use SkyDrive to access one PC from another, remotely over the web, even if it's behind a firewall. This is pretty clever feature and means the Photos apps will be able to collect images from all your PCs. Metro apps can also sync information using SkyDrive, although if they have a lot of data they have to ask permission before they fill up your space. Desktop apps can do the same, but coding that up isn't as simple.

When disaster strikes

Hardware fails and PCs crash. And sometimes Windows gets in so much of a mess that it's easier to start from scratch. That's all easier to deal with in Windows 8, with yet another Metro-style interface.

This enables you to choose between a full reset and a refresh. A full reset requires an admin account, because it formats the drive and deletes

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all your data. A refresh installs a clean copy of the Windows 8 operating system but keeps your files, favourites, pinned tiles and applications.

Windows 8 networking

The new Metro Settings charm and control panel make it very easy to connect to Wi-Fi or mobile broadband, with built-in drivers for 3G dongles as well as built-in radios.

Windows 8 will automatically use the fastest connection, and it knows that you have to pay for mobile broadband and keeps track of what you're spending.

It won't download Windows Updates on your 3G connection and it can automatically use less bandwidth – for example, telling photo apps to send low resolution thumbnails rather than full images.

When can I get it?

Although it has previously hinted at a Windows 8 release date, Microsoft isn't officially talking about a release date for x86 PCs or for new ARM devices. We don't know anything about price, either, or about which different versions of Windows will be on sale.

This is a developer preview to encourage developers to start writing Metro applications, and to remind users that an iPad or Android tablet isn't the only option.

We'd say it succeeds in that. Windows 8 is on target to give you a tablet experience that's very like Windows Phone on a bigger screen, with the same fluid, responsive and very personal experience, plus the same sort of smart integration between different applications. But you also get the desktop that's almost what you're used to, with all the applications people are still buying PCs for – at least on x86 PCs.

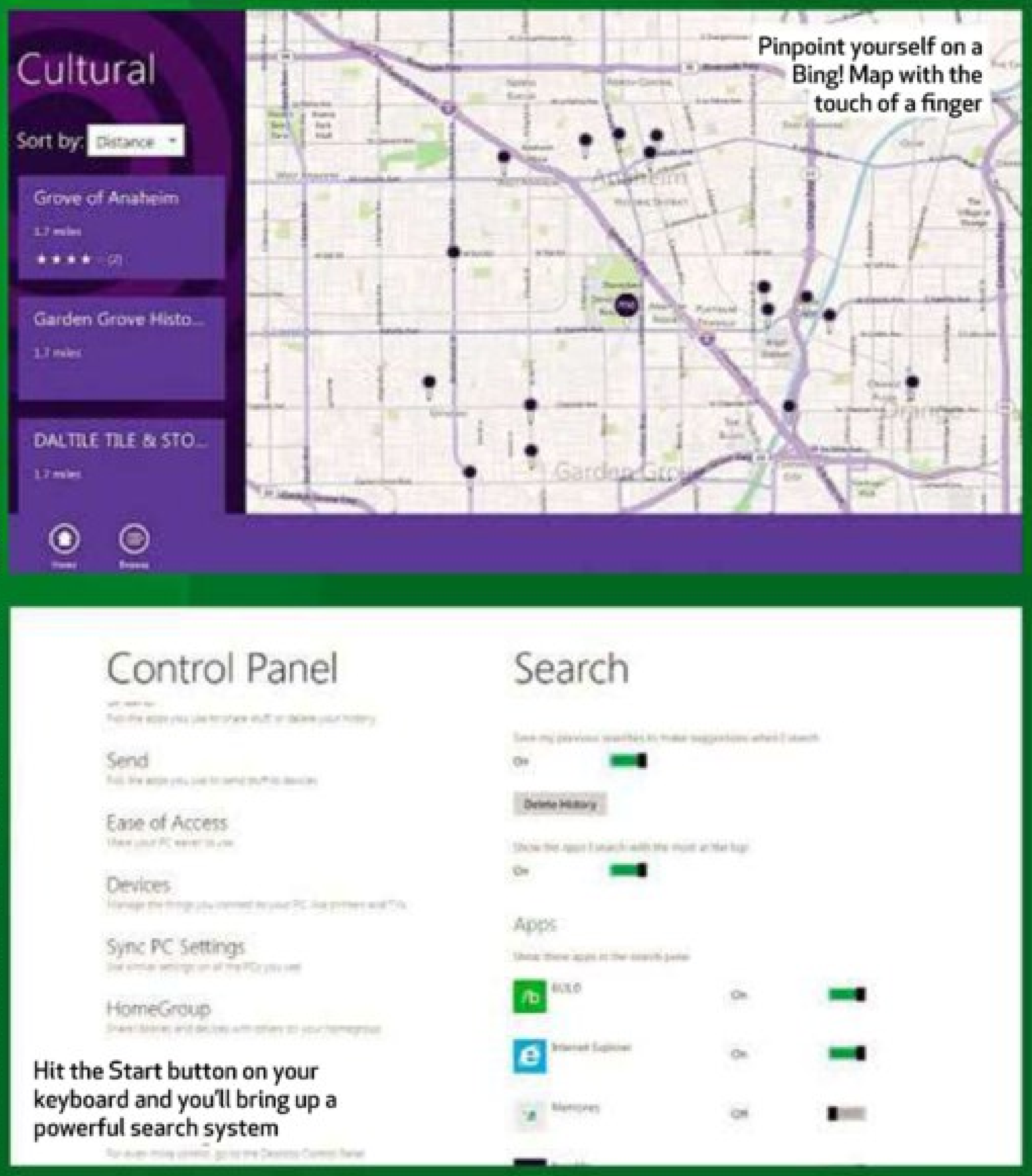
The Start screen is a very different way of working from the Start menu, and we're not convinced everyone will take to it. However, upcoming features such as semantic zoom may make a difference there.

The transition between the Start menu and the desktop is also a little jarring, even though switching from Metro to desktop apps works well.

It may be that Microsoft will refine the experience, or it may be that people will get used to it.

At this stage there are certainly rough edges, but the Windows 8 experience is also extremely compelling and genuinely innovative. ¤

> "There are rough edges, but the experience is compelling"



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GET WINDOWS 8 FREE

There's an early version of Windows 8 out for everyone to try – and you can download it right now, for free!

The finished version of Windows 8 may not be out until the second half of 2012, but the Developer Preview is free to try right now.

Because this is a very early version, it's buggy; it's incomplete; it only supports clean installs (that is, it can't upgrade an existing version of Windows so you'll need a sacrificial drive on which to install it); it can't be removed other than by reformatting; and it isn't supported by Microsoft.

Still, if you've a spare laptop or PC with nothing you need on its hard drive, installing Windows 8 Developer Preview will at least let you see how it performs. No spare hardware? An even more convenient route is to use the free VirtualBox, which allows you to run Windows 8 in a window on your current system's desktop.

The Developer Preview is a huge download (at least 2.8GB), so get that underway first. Head to msdn.microsoft.com/en-us/windows/apps/br229516 and grab the version you need. If in doubt, pick the 32-bit file.

If you're going to install on a laptop or PC you may want to burn the ISO file to disc. Windows 7 can do this, but if you're running XP or Vista, use a third-party tool such as ImgBurn. You'll need a double layer disc and the burner to go with it, since the ISO is larger than a standard single-layer DVD-R. (Alternatively, install from USB; see box, top right).

If you're taking the virtual machine route, VirtualBox provides everything you need. Head over to its website at www.virtualbox.org and download a copy of the latest version.

Install

Installing the Developer Preview on a physical PC is straightforward: just

ImgBurn is one of the better free ISO burners

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Virtualbox is a safe way to try Windows 8

burn your ISO image to a disc, boot your system from it, and follow the instructions (it's just like installing previous versions of Windows).

VirtualBox, though, requires a little more work. Launch the program, click New | Next. Give the virtual machine a name, such as Windows 8. Select Microsoft Windows as the operating system, Other Windows as the version. Click Next and choose how much RAM you'd like the virtual machine to have. Give it 1024MB, then keep clicking Next, accepting the default settings until the wizard is complete.

Now right-click the new virtual machine, and click Settings | Storage. Right-click IDE Controller, click Add CD/DVD | Choose Disk, point the program at your Developer Preview ISO file and click Open. Right-click the other CD icon, labelled Empty, and click Remove | OK.

Double-click the new virtual machine to launch it, click OK to clear the mouse capture message, press a key when you're prompted to boot from the disc, and the installation process will begin. Keep in mind that the Windows 8 window will by default capture your mouse once you click inside it. Just press the right Ctrl key if you want to return to your regular desktop and do something else.

First steps

Once setup is complete, your PC will reboot to launch Windows 8. The installation disc will ask you to "press any key" to boot from it, but don't, or you'll start the installation again. Remove the disc from your PC once Windows 8 has loaded or, in VirtualBox, return to the virtual machine's Storage settings when you've next closed it down, right-click the ISO file (under the IDE Controller) and select Remove.

Back at Windows 8, you'll open on the lock screen. Hold down the left mouse button and drag upwards, or just use the mouse scroll wheel to reveal the logon window. Enter the password you created earlier and click Submit.

In a few seconds you'll see the Metro interface appear, with tiles for Explorer, IE, Control Panel and more. Before you use those, click Desktop to see the old-style Windows desktop. Right-click this, select Screen Resolution, and make sure you're using the highest resolution available on your system (it needs a vertical resolution of 768 or better for the Metro applications to work).

When you're done, move your mouse to the bottom-left corner and click Start. This won't launch the Start menu – that's gone now – but instead displays the main screen. You can also press the Windows key on your keyboard to return here at any time.

Now start exploring! Scroll to the right to see all the Metro apps. Click one of the app tiles to launch it. Drag and drop the tiles to rearrange them. Right-click these for more options. Try the Internet Explorer app to get online with IE10. Move the mouse cursor to the bottom-left of the screen for more options. If you get lost at any point, press the Windows key to return to your home screen.

To finish, click your user name in the top-right; select Log Off; use the mouse scroll wheel to reveal the logon screen again, click the icon to the bottom right of the screen and click Shut Down.

These are early days: some elements of the Preview will change, others will disappear altogether. Still, there's a lot to like, and it's interesting to get a feel for what the next generation of Windows might offer.

INSTALLING FROM USB

No spare DVD-DL discs kicking about? Read on.

Installing Windows 8 via USB is pretty simple. First you'll need to create a bootable USB stick.

Get a stick of around 8GB capacity then download the Windows 7 USB Download Tool from http://emea.microsoftstore.com/UK/en-GB/Help/Windows-7-USB-DVD-Download-Tool – this is the official tool issued to build Windows 7 USB sticks with ISOs downloaded from the Microsoft Store. Install it and run through the process.

You need to be running the same version of Windows (32 or 64-bit) as the version of Windows 8 you wish to install, otherwise the stick won't be made bootable.

Once it's all up together, take your USB stick to your donor machine (remember, the Windows 8 dev build doesn't play nicely with other operating systems, so be prepared to lose everything), plug it in, and set the BIOS to boot from USB.

Good luck!

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The Preview Tablet is built on the ultra-thin Samsung Series 7 tablet

WORLD'S FIRST WINDOWS 8 TABLET

Mary Branscombe tries out the Samsung Windows 8 Developer Preview tablet

There aren't any Windows 8 PCs yet, especially not any running on ARM chips, although we've seen demonstration prototypes from Qualcomm and Nvidia at Microsoft's Build event running the Metro-style Windows 8 Start screen interface.

So what we have here is a Windows 7 slate running the pre-beta developer preview of Windows 8. The Windows Developer Preview tablet is based on the ultra-thin Samsung Series 7 tablet that was recently announced for Windows 7, and it has a lot of the design language of the ultra-thin Series 9 notebook as well.

You can't make a tablet with the curves of the Series 9, but the line of that curve is still there along both sides, albeit interrupted by the ports that stud the case – without making it uncomfortable to hold.

Windows 8 tablet up close

On the right of the Windows 8 tablet is the power button, the rotation lock button for when you don't want turning the screen to flip the orientation, and the SIM slot. On the top is a micro SD slot, and twin array microphones – with front and rear-facing cameras these are going to be good for Skype video calls.

On the left side is the only USB port, with a neat USB blanking plate that you're going to lose as soon as you prise it out, the combined headphone and speaker jack next to the volume buttons, which are slim but have a nice positive feel to them, and the mini HDMI port.

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The docking stand keeps everything nice and tidy

Touch accuracy is superb on the screen

It gets a little hot when Wi-Fi, 3G and Bluetooth are all running

Specifications

This is a premium Windows tablet that really shows what pen and touch can do when you put a Sandy Bridge Core i5 into a sleek metal case with 4GB of memory, a 64GB SSD and a beautiful and bright 11.6-inch Super PLS screen. That screen, naturally, has the 1,366 by 768 resolution that Windows 8 needs to show two apps side by side in the Metro interface.

The screen looks gorgeous

At the lower left corner is the power jack, which looks absurdly large on the slim edge.

The power brick itself isn't as small as some tablet chargers – about the size of a pack of cards, with sleek rounded edges.

The bottom edge of the Windows 8 tablet has the docking port for the rather neat docking stand (which keeps the power cable tidily out of the way, as well as giving you another USB port, plus HDMI, gigabit Ethernet and a headphone socket).

The tiny speakers on either end of the bottom edge give you the same surprisingly good sound as the Series 9. And even when it's in the dock, the all-important Windows button is easy to press to switch between the Metro Start screen and the desktop.

> "It's ideal for showcasing Windows 8 for developers"

Fantastic screen

The inch-wide bezel around the screen is as absurdly shiny as on any other Samsung device, but having the flat glass surface right across the tablet from edge to edge is what you want because of the gestures where you swipe onto the screen from the side to switch apps or open the 'charms'.

The screen isn't as reflective as the bezel, and the fact that it will always be peppered with fingerprints might even reduce the minimal glare. Thanks to the brightness, clarity and beautiful colour of the screen you won't notice the fingerprints until the screen is off.

Touch accuracy is superb on the screen; the high touch digitiser resolution helps, as does the fuzzy hit targeting in Windows 8 and we could

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Connectivity is surprisingly impressive for a tablet

It's thicker and heavier than most tablets

Boot up times are very fast

select every single icon, link, control and menu flyout we tried, as well as being able to swipe quickly and accurately.

The 909g weight is very light for a Windows slate this large (most Atom-based Windows tablets have 10-inch screens) and it's nicely balanced, whether you're holding it in portrait mode for reading web pages or in landscape – which works well for typing with the on-screen thumb keyboard, playing games and enjoying video and photos.

Thanks to the processor, the Samsung tablet has no problem running Windows 8 Metro apps, Windows desktop apps such as Photoshop, games, hardware-accelerated web pages in Internet Explorer 10 or any combination of those at once.

Ten second start up

As this is definitely pre-beta hardware we're not surprised to find that the processor runs a little hot when you have Wi-Fi, 3G and Bluetooth all running.

The UEFI BIOS makes for a very fast boot; it goes from powered down to the lock screen in just 10 seconds – and as soon as you swipe the lock screen up you're at the Start screen, ready to launch apps. It's actually quicker than turning on most phones.

With a Core i5 (and a screen this size), you can't expect the battery life of an ARM tablet. With Wi-Fi on, battery life is around three and a half hours; turn off the radios and get four and a half to five hours usage.

And while the Samsung tablet is sleek and slim, 13mm might count as slim for a PC but not for less powerful tablets – the hardware means it's still thicker and heavier than most tablets (although it makes the TouchPad look chunky and makes every Oak Trail Atom tablet we've seen looking both ugly and chunky by comparison).

Even with Windows 8, this is still a PC – but it's a very nice tablet PC, with far more power and functionality than any other tablet.

It's also the ideal device for showcasing Windows 8 for developers, getting them to think in terms of "touch first".

Microsoft is convinced that in a few years every screen will be a touch screen, even the ones that also have mice and keyboards.

For now, though, the Bluetooth keyboard that comes with the Samsung tablet is a necessity. But the point of giving this tablet to the Build attendees is to get them to build a new generation of apps that mean using a keyboard becomes a choice.

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MICROSOFT SPEAKS

Microsoft's Steven Sinofsky insists Metro is not the end of keyboard-and-mouse computing

Credit: Microsoft

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Steven Sinofsky, President of Microsoft's Windows Division, has insisted the Metro approach in Windows 8 does not sound the death knell for the traditional desktop or the humble mouse.

Speaking to our sister site TechRadar at the Build developers' conference in September, Sinofsky pointed out that 'precision' is still a major factor in our computing lives, and that this will keep traditions going strong. "We don't think the desktop is some old place you never want to go like the penalty box," he said. "It's a perfectly reasonable place to go for precision."

Windows 8 aims to unify very different devices, but Sinofsky believes that it's possible to scale an OS even if people are switching between mouse and finger. "There are new form factors like tablets, but there are [also] desktops and multi-monitor systems – the whole range of possibilities," he said.

"We envision an operating system that scales from small form factor keyboard-less tablets all the way up to the high end. It's an incredibly bold vision. The reason we made this bold bet saying 'let's build on Windows' is that we looked around and we don't see these apps being replaced by something else."

Platform swapping

At the Microsoft Build conference we saw Windows 8 running on familiar x86 PCs, with the occasional glimpse of prototype ARM hardware from Qualcomm and Nvidia. Sinofsky explained what the difference between the x86 and ARM platforms will be – and it's not just battery life.

"There's huge potential for new apps to run across all platforms," he explained. "You can use different graphics cards and we make them look like they're all the same. Something that's unique to Windows is that historically we have let the differences of that hardware shine through. When those hardware makers do the work to differentiate – if your graphics card can do some cool tessellation then you can see the differentiation."

So features such as the low-power Connected Standby state that ARM and system-on-a-chip PCs support and current x86 chips don't will make ARM PCs different. "Not every chip has that, but when a chip [does] it will shine through the whole operating system," Sinofsky said.

But making the most of what the different hardware offers means Windows ARM tablets won't do everything. "There's a giant installed base of x86 software, which is a huge asset, but it's not an asset we're going to port to ARM. Those apps don't take advantage of all the things that make ARM a unique offering.

"Now Intel might do more work and bring many of those same advantages to x86, but the reason you use the ARM chip is that you want great power management, like Connected Standby. An x86 app doesn't respect standby so the app is going to just drain the battery. We decided early on that unless we could deliver the value proposition of that hardware there was no point doing this. It would just undermine this whole thing."

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UNDER THE HOOD

Gabriel Aul explains how Microsoft developed a lean, flexible operating system

The whole of Windows has been improved to boot faster, use less memory, be more secure and handle networks better.

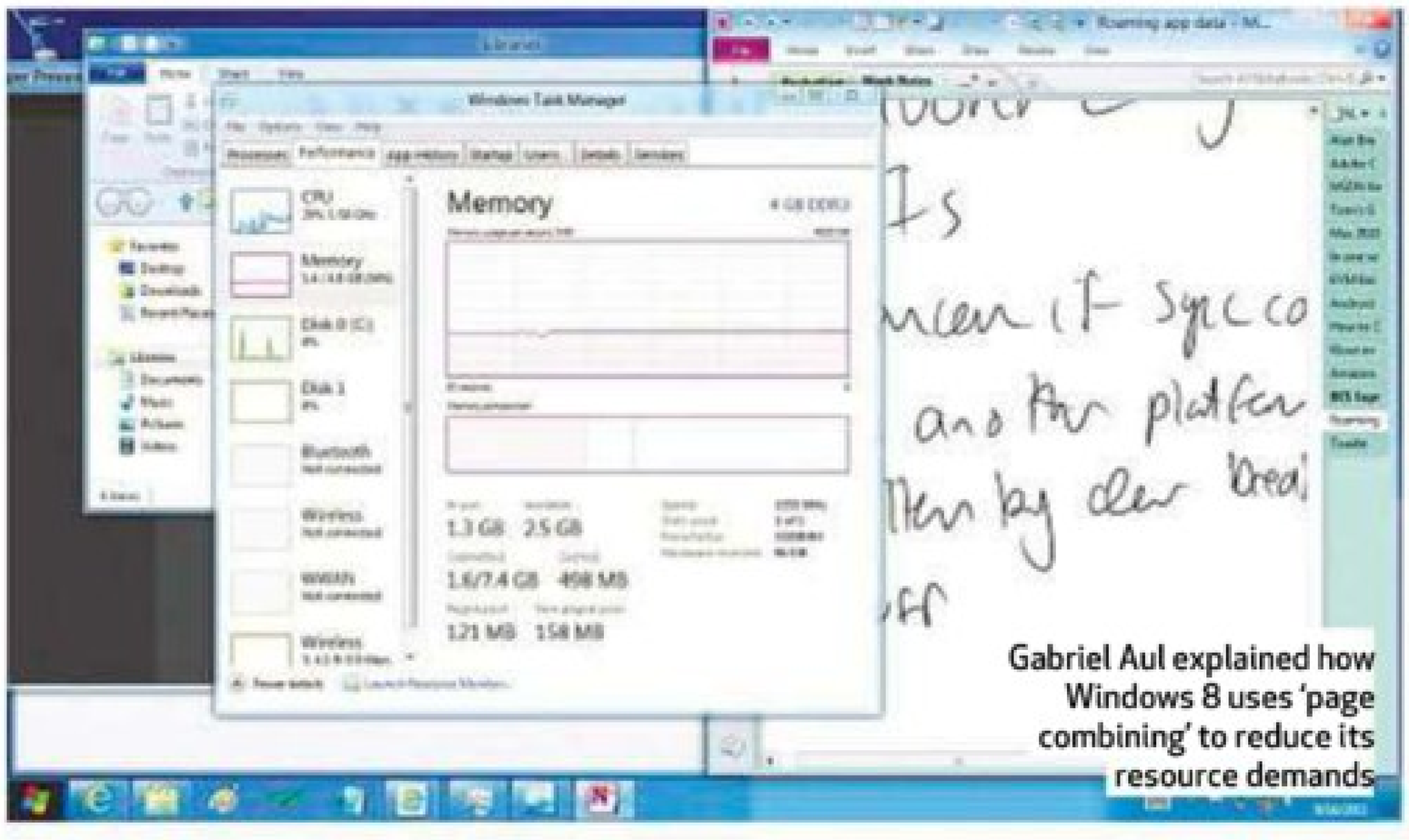
"When you have a lot of apps open," Gabriel Aul, Director of Windows Program Management, told us, "you'll have different apps that have [pieces of] memory that are identical, but they'll each have their own copy; these things could be a common runtime or a shared library. Throughout memory you'll have lots of little 4k pages that are really identical, but we're maintaining separate copies.

"We have a new feature called page combining. Windows can look through memory to find copies and basically condense them down to one shared copy. If an app writes to its copy of memory it splits apart and gets its own private copy again but the cumulative effect can actually be quite significant."

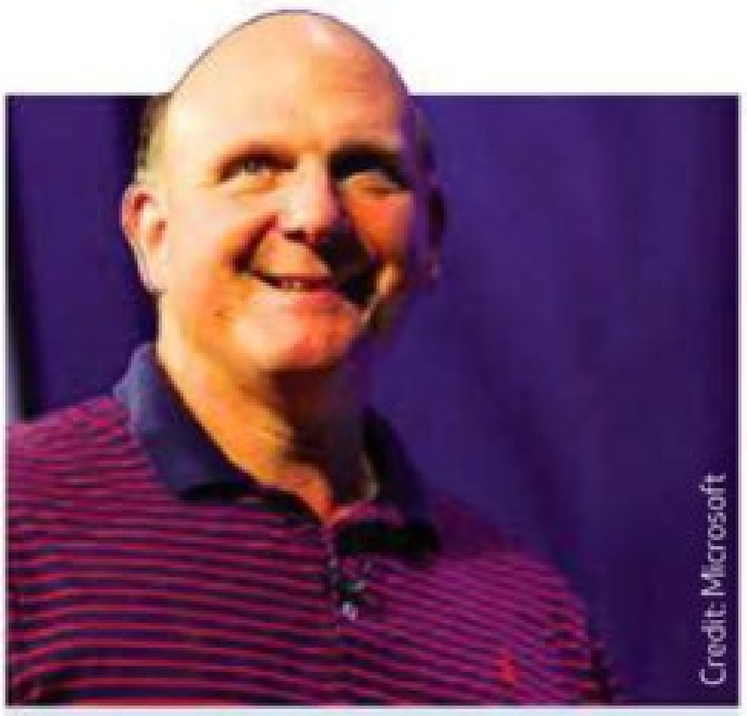
Windows 8 boots in just a few seconds, but one of the things Microsoft is getting used to with phones is not having to boot. The new state, which he calls 'Active Standby', will give Windows 8 longer battery life on low-power PCs running ARM, and the next generation of Intel and AMD CPUs.

"When we press the power button, Windows 8 just turns on at once and it's fully active: it's even been refreshed with your latest email." That's because when the system is 'off' the Wi-Fi is still on, but only accepting traffic from servers you get email, messages and VoIP calls from.

"If you look at the power chart," said Sinofsky, "the system is just waking up for a second, doing a quick burst of background activity then going quiet again." So if you leave a PC on standby when you get home from work and turn it back on in the morning (call it 16 hours) it will use up no more than five per cent of the battery charge.



Gabriel Aul explained how Windows 8 uses 'page combining' to reduce its resource demands



Credit: Microsoft

MICROSOFT REIMAGINED

It's a new start for the company, says Ballmer

Steve Ballmer claimed that the new Windows 8 platform is also a reimagining of Microsoft itself during a surprise appearance at the Windows Build conference in September.

The Microsoft CEO implied that the launch of the new OS is part of a shift in the company's whole philosophy, during his keynote address to developers. "If Windows 8 is Windows reimagined, we're also in the process, and Windows 8 is an important step of that, of reimagining Microsoft," he said.

Ballmer added that when Windows 8 is released to the public next year, it will available on 500 million devices, in a rallying call to developers at the show in Anaheim, California.

"It's a time of unprecedented opportunity for developers, and betting on us will be valuable," he said. "It's the day and age of the Windows developer. Let's move forward together and seize the opportunity for developers, developers, developers." His speech rekindled Ballmer's infamous, emotional and downright sweaty "Developers, developers, developers" call to action back in 2006.

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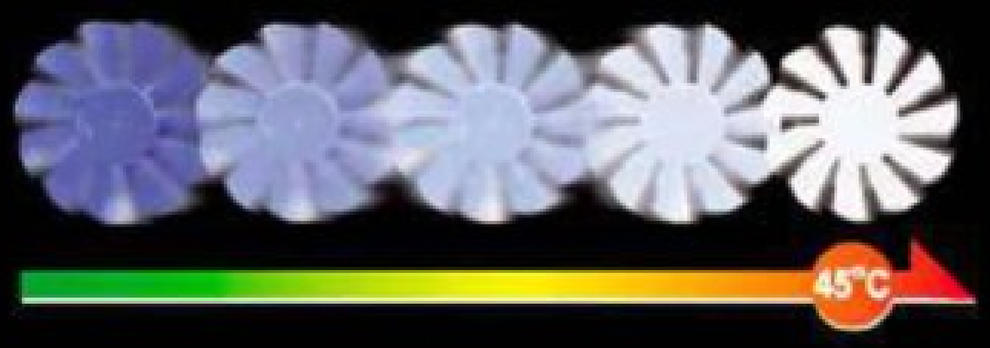

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WINDOWS 8 PREVIEW

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