



## Games

# PS4 and Xbox One: so why aren't they backwards compatible?

**The new consoles from Sony and Microsoft are selling in their millions, but customers hoping to play their old games will be disappointed. Here's why backwards compatibility is no longer an option**

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**Keith Stuart**

🐦 @keefstuart

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Once upon a time, when you bought a new games console, it was often possible to play most of the games designed for the previous machine. This was a handy feature for people who didn't want to have multiple plastic boxes under their television sets, or for those who didn't own the previous device, but *did* want access to its inevitably much larger and cheaper array of games. Now however, it seems that for Sony and Microsoft, backwards compatibility, is itself a relic. Unless you have a Wii U, which steadfastly supports its successful predecessor, the present doesn't want anything to do with the past.

Take a look at the sleek new PlayStation 4 and Xbox One consoles - neither is backwards compatible with their predecessors. You can't put a PS2 game into PS4 and expect it to work, just as your Xbox One will shrug indifferently if you slot in, say, the original Halo: Combat Evolved. There are plenty of gamers who don't care about this - they'll keep their old machines anyway. But there are clearly enough consumers who *do* want backwards compatibility to become the targets of an internet hoax. A recent post on the notorious 4Chan forum encouraged gamers to access the developer mode on their new Xbox Ones and then enter a code that would ostensibly "unlock" the machine's hidden ability to play Xbox 360 titles. It didn't do that, however, it instead locked the machine into an endless reboot cycle, effectively rendering it useless. What japes!

So if there's enough desire out there for backwards compatibility to warrant a hilarious internet trick, why don't the manufacturers supply it? These are expensive, technically advanced consoles, after all. How hard can it be? Well, the answer is, "very hard and getting harder with every successive generation".

### **Implement or emulate**

There are effectively two ways to provide compatibility with previous consoles: through hardware implementation, or via software emulation of the old machine. In the former case, it involves actually including some of the chips from the old machine in the new machine. The Nintendo Wii, for example, was in many ways just a more powerful version of the older GameCube, so backwards compatibility was reasonably straightforward - indeed the Wii originally had GameCube controller sockets and two memory card slots. It was like a GameCube in disguise. The PlayStation 2, meanwhile, had the original PlayStation chipset built in, so it ran pretty much any PSone title - and when that chip wasn't being used for backwards compatibility it doubled as an input/output processor, which was pretty canny.

"What's different now is the increased complexity in hardware and software, and heat issues," says veteran coder and game designer Martin Hollis. "The best way to support your old console, in terms of broadest support of all old games, is to actually include the hardware of the old system inside the new one. CPU, GPU, sound chips, ideally the whole caboodle.

"This works well enough when you look at the price list for components, as the old chips have become cheap enough to include without bumping the cost of the new system. Sadly though, with the high frequency clock rates (GHz), designing your board

to incorporate the entire old machine is not easy or cheap, and worse, it will emit just as much heat as the old system did on its own. Heat is a big factor with modern system designs and you do not want to add 100 watts to your output, and another jet turbine style fan."

So as new hardware becomes more complex, the inclusion of older chips and processors becomes more expensive, and with margins so tight (manufacturers often make a loss on new machines anyway), it's an easy feature to jettison. Indeed, although both the original versions of the Wii and the PS3 included old feature-sets in the architecture, later versions ripped these out to cut down on costs and allow for price drops.

## Virtual boy

So what about emulation? This involves running a program on the new console that effectively pretends to be the old machine so that it can play classic games. Nintendo, for example, offers its Virtual Console service for the Wii and 3DS which allows owners to download and play classic Super Nintendo, Game Boy and even Sega Mega Drive titles in their original form.

Once again, however, the problem with emulating more recent consoles is technological advance. "It was when the PS3 tried to emulate the PS2 that the increase in technology began to present problems," says developer Byron Atkinson-Jones, whose new game Blast 'Em has just been released. "Like the PS1, the PS2 had a single processor but the graphics system was a lot more complex, allowing for parallel processing, which meant it could run more than one bit of code at a time. You can emulate this on the more modern processors but you have to get the timing between the true hardware-based parallel processing and the software emulated version exactly right. And that timing would also have to take into account the differences between the territory versions, i.e. a game running on PAL or NTSC. Along with other factors that might be enough to break a game."

And timing is not the only issue - the increasing adaptability of the hardware itself is also causing problems. "It's complexity versus schedule," says Hollis. "If your emulated graphics processor is programmable (as PS3 and Xbox 360 are) that creates a huge explosion of possibilities to emulate and test - easily trillions of cases. We are talking large possibility spaces here. No way you are going to be able to emulate all the games, and do the job in a rush. If you had ten years, well maybe.

"The second piece of bad news is performance headroom. To emulate an old system's hardware in software you need a system which is significantly more powerful, I'd say ten times more powerful is a good rule of thumb. This current generation is simply not that much more powerful than the last, especially in terms of general purpose compute. Moore's law is basically over for CPUs, and has been for around five years. That means new machines do not have the power to emulate last generation in software."

### Cloud saves the day?

So does this mean we'll never see old games on new consoles? Of course not. Nostalgia sells, after all. Next year we'll see the launch of the [Gaikai](#) service on PlayStation 4, which will allow gamers to live stream games over the internet from a central server. Sony has [already promised](#) to make key PlayStation 3 titles playable via this platform, which removes the need for the console itself to perform the emulation. Of course, this won't let you play your old PS3 discs on your PS4, but it will at least let you re-discover (and of course, re-pay for) old classics. Meanwhile, Xbox One could theoretically perform the same service via cloud computing, but [the company has expressed doubts](#) that current broadband speeds would be able to provide a playable experience.

In short, backwards compatibility is becoming a complex problem for manufacturers and one they would rather push to one side, especially as only a minority of gamers seem interested. The incredibly successful launches of both the PS4 and [Xbox One](#) this November have shown that there is still huge demand for new hardware, whether it plays old games or not. And for those who don't want to let go of favourite games and treasured machines, it's likely there will be enough support for the PS3 and Xbox 360 to keep these old-timers going for at least a year.

But for modern machines it seems, the past is very much a Foreign country; people do things way too differently there.

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