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# 64-Bit Comes To The Notebook
## AMD Delivers Portable Power, But Is The Market Ready?

The evolution of the personal computer market has been a steady progression of wider and wider processor bus width. From the 8-bit days of the Z-80 and the 6502 to the heady 32-bit world of today, each generation has found a need to bump up the address space available to the processor and throw in some snazzy new features while they are at it.

Wider processor buses have an immediate payoff for users with memory-intensive applications. Today's 32-bit processors max out at 4GB of RAM; they are not capable of addressing more than that. By comparison, a 64-bit processor could address about 18,446,744,073GB. In reality, however, the theoretical maximums are rarely realized in actual chip implementations (current 64-bit chips typically max out at 8GB, for example).

In addition, with new processor families come new instruction sets that can dramatically boost processor performance. This means that in a single clock cycle, a processor can deliver more computing power. So a 64-bit processor could perform faster than a 32-bit processor running at the same speed. The caveat is that in order to take advantage of the greater performance, the software must use the new instructions, which can also make it incompatible with older processors.
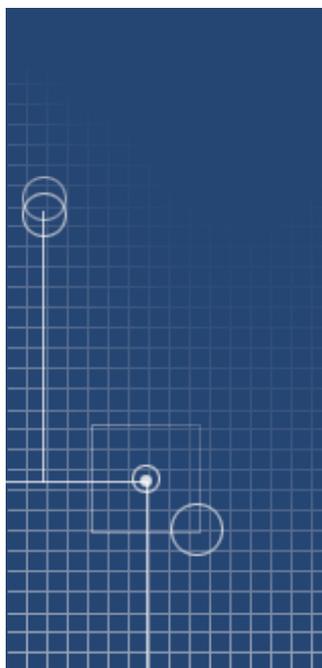
Although Intel came out with a 64-bit processor family designed for servers (Itanium) some time ago, it hasn't been until very recently that desktop and notebook users could take advantage of the new chips. AMD has now released the Athlon 64 processors, and Intel is poised to follow suit later this year, according to Simon Yates of Forrester Research.

At least one vendor (eMachines) already has a midrange notebook available based on the Mobile Athlon 64 technology, and the rest of the notebook manufacturers are sure to be close behind. "I know HP and Fujitsu are developing products around it," says Yates.

### Is It A Notebook Or A Frying Pan?

But is it worth the extra money to move up to 64 bits? Not according to Yates. To begin with, these new processors are not what you'd call a cool customer. "Basically, the heat that's put out by a 64-bit chip is hot enough that a notebook computer putting out that kind of heat is going to be very hot to the touch."

To keep the machines from melting holes in customers' pants (and to reduce battery draw because a hot processor is also a power-hungry processor), AMD uses a technology it has developed called "Cool and Quiet." When the customer is not doing tasks that require the full power of the 64-bit processor, the chip throttles itself down to consume less power.

"So even though people have bought a 64-bit computer, most of the time it isn't running at that," says Yates, "because the system turns down the clock speed to reduce power consumption."

For a typical corporate notebook user, this won't be a factor. Applications such as Word and Excel put little demand on the processor, so it can slow down and keep cool. But woe unto the gamer who tries to run Halo at a high refresh rate on his cross-country air trip. He might find his battery quickly exhausted and his leg hairs singed. While power concerns will become less of a factor as fuel-cell technologies replace traditional batteries, the thermal issues aren't going to go away.

Not only can they make for an uncomfortable user experience, they also play havoc inside the chassis. "When you have a lot of heat, then each little device on the board becomes a little radio antenna that transmits a signal and can throw off any other device on the board," explains Yates.

### Waiting For Longhorn

In addition, in order to really take advantage of the processor, you must be running applications specifically tailored for the new instruction set of the chip. Right now, that means you'd need to be running either Linux or an Apple G5. Ordinary 32-bit applications, such as QuickBooks or Photoshop, as well as all the current Windows implementations, will just see your PC as a run-of-the-mill 32-bit computer. And because the AMD 64-bit mobile processors run at around 3GHz, they're not even particularly fast ones, considering that 4GHz Pentiums are expected from Intel by the end of the year.

Yates sees the primary short-term market for the 64-bit processors in the high-performance computing market, notably gamers. However, with the release of Microsoft's next operating system, codenamed Longhorn, he expects things to change considerably.

"64 bits in notebooks don't make much sense today. However, the reasons that

companies are starting to look at it is [that] Longhorn and future Microsoft technologies will probably be so CPU-intensive that you're going to need 64-bit chips," says Yates. "People are concerned that the computer that they buy today will become essentially obsolete with the next iteration of Windows. So they figure if they buy [64-bit computers] now, the applications will come, and that their hardware will last longer."

Yates notes that with four years passed since the last major IT refresh cycle (driven by Y2K), companies are due for a new round. By offering 64-bit processors now, companies can upgrade their hardware without it becoming useless when Longhorn is released.

Yates notes, however, that Longhorn isn't scheduled for release until 2005, and given Microsoft's previous track record, expects that 2007 may be a more realistic estimate. So if you are doing all right with your current notebooks, there's no pressing need to upgrade to 64-bit anytime soon. ■

*by James Turner*

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