

# Flash memory gets boost from x4 technology

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Memory cards, USB ports and iPods are about to get smaller and cheaper to produce, according to a company that has just unveiled 4 bit per cell NAND flash technology.

NAND flash is the technology that makes your portable memory devices go. Kfar Saba, Israel-based M-Systems' "x4" technology boasts four times as much capacity as single layer cell (SLC) NAND and double the capacity of the most advanced product currently on the market, the multi-layer cell (MLC) NAND.

"Think of a (flash) wafer like a coin," explained M-Systems Director of Investor Relations Elana Holzman. With SLC NAND, you can put x number of cells on the coin. With MLC, or 2-bit NAND, you can put twice as much information on a coin of the same size, and with the new x4, 4-bit technology, the same coin holds four times as much information, Holzman told United Press International.

This translates into a 30-percent cost reduction in producing a 1 gigabyte wafer (as compared to an MLC wafer), she said, and the wafer itself will be smaller.

According to a company statement, developing the 4-bit technology was previously thought to be physically and practically impossible. "The challenge was not (manufacturing), but in being able to use it," Holzman said.

Managing data on a 4-bit NAND wafer had been more complicated than

with 2-bit, because the distances between the cells were shorter and data management was less and less reliable, Holzman said.

M-Systems' innovation, then, was the ability to "overcome the unreliability," she continued. Furthermore, existing manufacturers can use their existing fab to produce x4 wafers with "very little retooling," Holzman said.

The company plans to work with partners to have the technology on the market by 2007, though Holzman said M-Systems hasn't yet discussed whether it will license the technology or jointly manufacture the wafers with partners.

According to DRAMeXchange, a company that provides "future intelligences, in-depth analysis reports and advisory services on (the) DRAM and Flash memory industry," the spot and contract price of NAND flash is rising for almost all types and capacities.

The 16 gigabyte 2Gx8 NAND, the only price the site quotes as stable, on Tuesday had a spot price of \$36.31, while the NAND 2 gigabyte 256Mx8 had a spot price of \$5.53.

The development of x4 comes on the cusp of an explosion in demand for NAND, according to analysts. Technology consultant and research firm Gartner placed 2006 demand for NAND -- from users of mobile phones, portable music players, PCs, USB drives and other technologies -- at about 1 trillion megabytes.

By 2007, Gartner said in May 2006 research, the demand will approach 2 trillion and steadily increase by about 2 trillion megabytes for a while after that. Between 2009 and 2010 Gartner projects the demand will jump from about 7 trillion megabytes to almost 13 trillion megabytes.

"Judging by the undisputed success of 2-bit per cell MLC NAND flash technology and the significant cost savings x4 technology is designed to deliver to NAND flash manufacturers, we believe x4 NAND components are set to further push flash memory from prevalent to pervasive," M-Systems Chief Executive Officer Dov Moran said via a company statement.

The change will "(usher) in new generations of affordable, multimedia-rich, personal storage for consumer electronics devices," Moran continued.

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