**Crossbar takes on DRAM and flash storage with super fast, super long-lasting RRAM tech**

Startup Crossbar emerged from stealth mode Monday to announce its version of RRAM (resistive random-access memory), a new type of memory that could be a successor to flash storage and DRAM.

The company, founded in 2010, will make and license its RRAM, a nonvolatile memory, which will be smaller, faster and more power-efficient than NAND flash and RAM, said George Minassian, CEO of Crossbar.

"It is higher density ... and the current is much lower," Minassian said, adding that the memory's physical and power attributes make it a suitable replacement for storage in smartphones, tablets, PCs and servers.

Crossbar is claiming RRAM will deliver 20 times faster write performance, 20 times less power consumption and 10 times more durability than NAND flash. The memory chips will be stacked, and a 1TB module will be roughly half the size of a NAND flash module with similar storage, Minassian said.

He could not estimate the price of a 1TB RRAM module, but said it will cheaper than NAND flash partly because RRAM is less expensive to manufacture.

Crossbar

Crossbar will also license the technology to third parties. It could be two or three years before the memory shows up in products, but that depends on demand for the product, Minassian said.

"It's a matter of what company appears at what time," Minassian said.

RRAM differs from the way NAND flash and RAM operate. Unlike NAND flash, Crossbar's technology does not use transistors or trap a charge. Instead it uses a layered approach to store data. An RRAM cell has three layers, with a switch in the middle that helps determines whether the cell is storing a 1 or a 0. The top layer has a metallic electrode, while the lower layer has a nonmetallic electrode. The top layer passes metal ions into the switching media and into the lower layer, which creates a filament to keep the electrodes connected, what Minassian called a "short wire." Applying a negative charge breaks the wire and leaves a gap between the electrodes, which leaves no resistance, changing the status of the memory cell.

"This is not a gate you use in standard NAND and NOR. This is resistive, which is where RRAM comes from," Minassian said.

RRAM uses existing material and can be made in factories. Prototypes are being made in factories of TSMC (Taiwan Semiconductor Manufacturing Co.), Minassian said.

Crossbar's RRAM doesn't contain transistors, so it is easy to make as chips become smaller, Minassian said.