THE WALL STREET JOURNAL.
WSJ.com

JULY 19, 2010, 8:12 PM ET

Xilinx Say New Chips Adept at Surviving Space Radiation

With all the chatter lately about cellphone reception it's easy to forget that some companies have much tougher technical challenges–particularly those that make hardware that is sent into space. Xilinx thinks it can help.

The Silicon Valley company, which specializes in programmable chips, on Monday announced what it believes is a major leap in making such components impervious to the radiation that strikes spacecraft after they leave the earth's atmosphere. Harmful streams of high-energy particles can play havoc with semiconductors, causing damage such as interrupting the switching functions of individual transistors on chips.

Radiation is an enormous problem, says Scott Anderson, founder and owner of SEAKR Engineering, a company in Centennial, Colo. that designs specialized computers and other hardware used in satellites and other space-oriented applications. "If you don't design for it properly, it can take down your whole system," he says.

For that reason, some companies have long relied on special aerospace-oriented chip factories that use special materials that are resistant to radiation. But that's an expensive proposition; those "fabs," as chip fabrication facilities are called, don't typically benefit from the huge economies of scale that drive down the cost of chips produced in high volumes.

Another approach is to use standard production processes, but design chips that have many redundant transistors on them for each function; if one fails, another is nearby to take its place. That is also an expensive option; the upfront costs of designing that kind of custom chip can run up to $20 million or $30 million, estimates Amit Dhir, senior director for aerospace, defense and high-performance applications.

Xilinx tries to compete with custom chips with what the industry calls FPGAs, for field programmable gate arrays. These are standard chips that can be electrically configured after they are in customers' hands. Indeed, they can be remotely reprogrammed after equipment using such chips are already in the field–or in the case of a satellite, already circling the globe.

Dhir says Xilinx chips already are widely used in aerospace applications. But in cases where radiation is a problem, customers might use three chips to provide redundancy where one chip would typically be needed.

Xilinx thinks it has a much better answer with what it calls the Virtex-5QV, an FPGA it says is 100 times more resistant to radiation than previous radiation-resistant models and offers a ten-fold increase in performance. It is built using standard manufacturing processes, but gains greater resistance by adding redundant copies of esoteric components–including what engineers call configuration control logic.

Anderson says he has not tested the new chips. But if they work as advertised, they could dramatically reduce development costs of hardware headed for space, he says.

Rich Wawrzyniak, an analyst at Semico Research, says he is hopeful that such developments could reverse the tendency of designers to put much of the real calculating power for spacecraft on ground-based supercomputers, making them have to effectively call home for key decisions rather than doing the computing themselves. "This allows you to do more things when you get up there," he says.

Xilinx says samples of the chips will be available in the current quarter with full-scale production in the first half of 2011. Pricing hasn't been disclosed, but Dhir expects the chips to cost somewhat more than current radiation-resistant chips sold by Xilinx.