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departments		Souped-up FPGAs execute FFTs					
Semiconduc		By Stephan Ohr					
Systems & S EE Times' R		EE Times June 2, 2003 (2:58 p.m. ET)					
Technology		Julie 2, 2003 (2.56 p.iii. E1)					
EE Times' Work & EE Times' Resource		San Jose, Calif New cores from Altera Corp. configure programmable logic to perform floating-point DSP operations, allowing fast Fourier transform operations to be executed by the company's Stratix FPGAs.					
EE Times' A	Analog &		- al		amm!!aat	tions.	
EE Times' Resource Your information		In addition to supporting high-performance medical and military-imaging applications, Altera said, its FPGA will be cost-competitive with dedicated fast Fourier transform (FFT) processors and general-purpose floating-point DSPs like Texas Instruments Inc.'s C67xx and Analog Devices Inc.'s Sharc.					
		Altera's cores comply with the IEEE 754 standard for binary floating-point arithmetic, said Martin Langhammer, chief scientist and driver for DSP development at Altera (San Jose, Calif.). The Stratix family of devices, architected with up to 115,000 logic cells and 7 Mbits of memory, are particularly good for operations with a big mantissa, a numerical value whose floating decimal point can make it extraordinarily precise, he said.					
		While the IEEE 754 single-					
		precision format calls for 1 sign bit, 8 exponent bits and 23					
		mantissa bits for both data and "twiddle" manipulation, Altera's					
		floating-point cores use the					
		standard's extended precision arithmetic, with 1 sign bit, 8					
		exponent bits and 31 mantissa bits. Thus, the Altera FFT floating-					
		point core will perform 36 x 36- bit-wide multiplies at 250-MHz					
		cycle rates. Altera's Radix 4 core will achieve a 1,024-point					
		transform in 25 microseconds,					
Network Re	sources	while the Radix 2 will take 50 microseconds.					
		Power processing					
		The cores are meant to support designs that require p such as military radar, signal intelligence and industria					

processing extensions] to process our wideband data," Langhammer said.

customers previously used either off-the-shelf standard products or multiple compute engines-computer farms-with quad Altivec systems [PowerPC processors with vector-

Satellite imaging is one of the biggest applications for floating-point processors, said Will

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Strauss, principal analyst at Forward Concepts (Tempe, Ariz.), a DSP market tracker. FFTs and FIR filters are the two most popular DSP operations, Strauss said. High resolution-a 65,000-point FFT-is required to find an airplane or missile battery hidden among the "ground clutter" on a battlefield, Strauss said.

Dedicated FFT devices like the Butterfly processor marketed by Sharp Microelectronics (Vancouver, British Columbia) are not "cheap chips," Strauss said. "They cost a few hundred dollars each." A few custom parts use an FPGA architecture to execute a floating-point operation, Strauss said, like one marketed by Texas Memory Systems Inc. (Houston), but Altera is the first to make such a part a "catalog item."

Altera said its Radix 4 core uses only about 10 percent of the resources in a midrange Stratix FPGA. The Radix 2 is half the size of the Radix 4. Additional versions of the cores are under development, the company said.

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