

Spartan-3 Family Opens New Markets and Applications

Spartan-3 FPGAs invade traditional ASIC markets with competitive price points and value-added reprogrammability.

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Nineteen years ago, Xilinx introduced the field programmable gate array, or FPGA. The concept was simple: by building a gate array based upon SRAM technology, you could develop a chip directly on your desktop, doing away with the high non-recurring engineering costs associated with custom ASICs. The benefits of this technology were immediate and obvious – instant turnaround time and infinite reprogrammability. The idea of a “foundry on the desktop” caught on over time as designers began to rely on FPGAs for product development and limited production deployment.

However, because of the inherent silicon overhead cost for reprogrammability (easily more than 20:1 for an FPGA vs. ASIC), FPGAs were not considered cost-effective for higher volume applications.



In 1989, Xilinx forever changed the playing field with the introduction of the Spartan™ FPGA family. Based on the highly successful XC4000 FPGA architecture, the Spartan FPGA family heralded a new era in programmable logic by delivering products at price points previously not considered possible in the industry. Through streamlined packaging, speed grades, test, and process technology, Xilinx achieved significant cost reductions. These reductions opened a wide range of new markets and applications that could reap the time-to-market benefits and flexibility of programmable logic.

Since the introduction of the first Spartan family, Xilinx has maintained an unabated trend of delivering successively improved Spartan families almost yearly. Each new family offered significant cost and performance benefits over the previous families. Additionally, each family provided additional, new features leading to an even greater reduction in bill of materials costs.

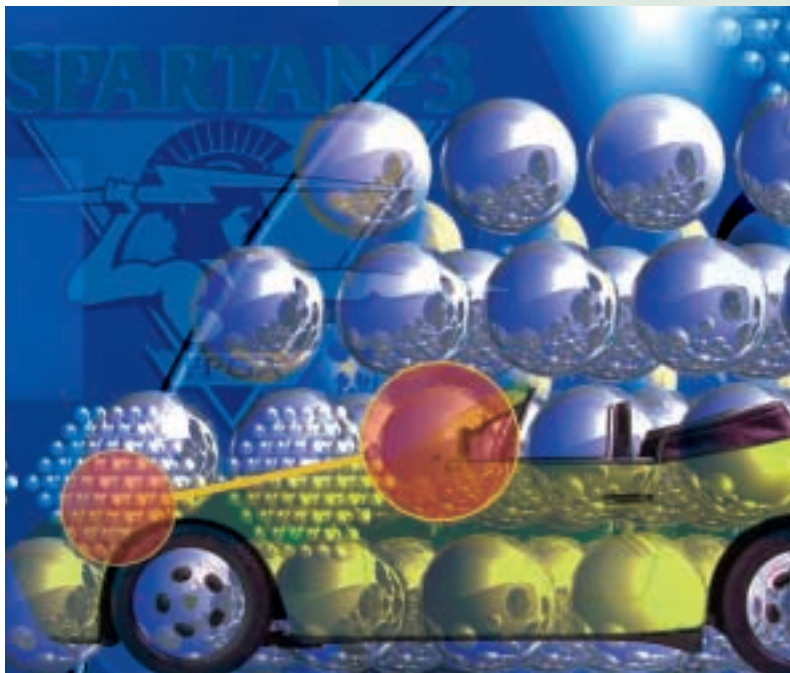
The extent of the cost reductions cannot be overstated: The Spartan-II, the third-generation Spartan family, featured the 100,000-gate XC2S100 family member for just \$10. This represents a 100:1 reduction in cost over the equivalent density device that was introduced just five years earlier.

The Spartan-II FPGA not only delivers a lower cost per gate than its predecessor, it also includes embedded features, such as logic level translators, embedded memory blocks, and integrated phase locked loops, all at the \$10 price point. Thus, it's no surprise that more than 45 million units of the Spartan-II series family have been shipped since its introduction.

Equally as impressive is the range and types of applications where Spartan FPGAs are used in production. Applications such as PC add-in cards, children's digital cam-

eras, CD players, DVD players, personal computers, set-top boxes, personal video recorders, plasma displays, MP3 players, home theater, home audio, karaoke machines, and a host of other applications too extensive to list here. It's almost safe to say that if you can think of an application, there's a very good chance that it contains a Spartan FPGA.

The effect of a low-cost FPGA hasn't gone unnoticed on the Xilinx bottom line: Today more than 13% of Xilinx revenue is generated in nontraditional consumer applications.



With the recent introduction of the Spartan-3 family, Xilinx continues to build on the momentum established six years ago – delivering FPGAs at price points that are unmatched in the industry. Based on a 90 nm SRAM technology and manufactured on 300 mm wafers, the Spartan-3 family enjoys the industry's most advanced process technology. This technology allows the Spartan-3 family to maintain an inarguable price/performance advantage over not only competitors' FPGAs but also ASICs.

The Spartan-3 family also represents a significant breakthrough both in density range and I/O pin count when compared to previous the Spartan families. With a 100:1 range in density spanning from 50,000 gates to 5,000,000 gates and an I/O count

of up to 1,120 user I/Os, the Spartan-3 FPGA family opens up the world of programmability to an even greater suite of applications than ever before.

Driving New Markets

With such a wide density range and pin count, the Spartan-3 family can compete with the majority of ASIC design starts. In effect, in the future, it's going to be harder to figure out where you won't find Spartan-3 FPGAs than where you will find Spartan-3 FPGAs. Although this comment may be

somewhat fanciful, the list of markets and applications in those markets that are a perfect match for the new, low cost Spartan-3 family is quite broad:

Automotive

The newest innovations in automobiles today are not centered on improved fuel efficiency or improved performance, but instead are focused on improving the driver and passengers' driving experience and safety. This emerging new technology is called telematics.

Telematics represents the greatest innovation in the automotive industry since perhaps the introduction of the car itself. Imagine what would be possible if all of your personal information appliances and entertainment devices could communicate and share information with one another in a single environment. In such a scenario, your cell phone could communicate directly to your PDA, which would allow you to review your email, download a MP3 audio track, and play it on the car stereo while you checked your stock portfolio and looked for the best route to go to work. Multifunction telematics is both possible and available in high-end cars today.

The challenges to optimal telematics, however, are many, because the emergence of new standards, technologies, and short development cycles complicate product

development and deployment. Cost-effective, flexible solutions such as those made possible by Spartan-3 devices will enable you to stay current in this rapidly growing and evolving market.

Medical

The latest breakthroughs in telemedicine leverage advances in networking and broadband technologies to provide local care by a remote physician or a team of dispersed specialists.

New programs, such as Telestroke, have been developed to support medical doctors who practice medicine in small rural communities or in community hospitals where there are no local specialists in stroke treatment. The Telestroke program is a system to connect medical staffs who work at emergency rooms of small hospitals with stroke specialists by using videoconference systems, ISDN, and desktop computers. These two parties examine the patient simultaneously, test the extent of the stroke, investigate scanned films of the patient's internal organs, and determine the types of strokes that the patient may have suffered. The system enables stroke specialists to tell doctors in the emergency room what appropriate medication to prescribe and what operations to perform. The cost sensitivities of this technology, which combine a wide range of complex technologies, are again well addressed by Spartan-3 FPGAs.

Digital Video

The digital television set market is poised to enter a period of sustained growth. Various regional digital broadcasting standards have been established in most countries – ATSC high definition in the U.S. and South Korea, ISDB in Japan, and DVB in most of the rest of the world. More countries continue to roll out digital television services every month. And there is more to come. In the U.S., high-definition cable signals are being offered by an increasing number of cable service providers in an increasing number of markets.

Meanwhile, digital terrestrial broadcasts are expected to begin in Japan this year. The deployment of digital video services will



drive the long-awaited consumer demand for digital television sets. The image processing requirements demand both a cost-effective yet high-performance digital signal processing technology such as that offered by Spartan-3 devices.

Home Networking

The connected home market – consisting of home networking equipment, software, residential gateways, home control, and automation products – is estimated to be \$9.2 billion worldwide by 2006. The current growth of the connected home market has been spurred over the past year by a surge in popularity of wireless networking technology and basic home routers to enable broadband and resource sharing, including file and printer sharing.

Multiple other factors will continue to fuel this growth, including the need for network security. Home routers and residential gateways will need “firewall” protection for always-on connections. Additionally, the release of Windows™ XP, the first true “home network friendly” operating system from Microsoft, has greatly simplified the task of interconnecting and sharing resources. The next wave in home networking will be the broad-based sharing of video and audio – adding new complexities and challenges but also benefits to the consumer. Localized media centers with global sharing will drive new solution models that will again greatly benefit from the programmability and flexibility of Spartan-3 FPGAs.

These examples are but a small sampling of the many exciting new markets and applications for Spartan-3.

eSP Simplifies System Design

Two years ago, Xilinx introduced the industry's first Web portal dedicated to accelerating product development for a wide range of markets and applications. With a focus on providing solutions and tutorials primarily targeting new and emerging standards and protocols, the aptly named eSP (emerging standards and protocols) Web portal has proved to be an effective industry resource validated by more than seven million visits to date.

The eSP portal covers a wide range of markets and applications, including:

- Both consumer and professional digital video technologies
- Wireless networking
- Home networking
- Automotive telematics
- Metro access networking technologies.

With the introduction of the Spartan-3 family, Xilinx has expanded the breadth of the eSP portal to highlight and provide solutions and tutorials on the new markets and applications now addressed by this revolutionary new FPGA family. To learn more about the new Spartan-3 markets, applications, and solutions, visit the eSP portal at www.xilinx.com/esp/. ❧