Lucent Technologies Gets a Time-to-market Advantage

When Lucent Technologies set out to design the Cajun P880 Routing Switch, designers quickly determined that a traditional ASIC design would require too much time.

by Tamara Snowden
Corporate PR Manager, Xilinx
tamaras@xilinx.com

The Cajun P880 Routing Switch is the newest member of Lucent's next-generation, enterprise data networking solutions that provide network managers with an easy and flexible way to optimize their network designs; it had an extremely aggressive development schedule.

"We originally designed the P880 with an ASIC at the heart of the switching fabric," said Brian Ramelson, design manager at Lucent. "We soon realized that if we stuck with an ASIC design, the product would be late to market." Ramelson had recently attended a Xilinx Virtex series presentation and decided to contact Xilinx personnel to find out more.

As a result, a close working relationship developed between Ramelson and John DePapp, Xilinx field applications engineer, over the next several weeks. The two spent over 100 hours working together on the project. "The design process went very smoothly," said Ramelson "the support provided by DePapp was second-to-none."

Virtex FPGAs - a Test Case

Ramelson's team selected the Virtex XCV150 and XCV800 FPGAs to supply the functions they needed. "At the time we were skeptical that any FPGA could implement these functions," said Ramelson. "We decided to try Xilinx FPGAs for this project as a test case for future designs." The Virtex series devices range from 50,000 to 1,000,000 system gates at clock speeds up to 200 Mhz and include many new features that address system-level design challenges. Fully supported by the Alliance Series software, the Virtex family offered a complete solution for Lucent, ready to meet the design challenges for their groundbreaking product.

> "By going with Xilinx we were able to ship the P880 months earlier than we would have with a traditional ASIC design"

The Software Solution

Lucent's design team chose Synopsys FPGA Express for synthesis, VCS for a Verilog simulator, and Xilinx Alliance Series tools for place and route. Ramelson especially appreciated the ability of the Alliance Series software to perform multi-pass timing-driven place-and-route. "If a layout initially failed to meet timing requirements, we let the system work on the problem," said Ramelson. "In one case we let the software perform about twenty successive iterations over a weekend resulting in two or three workable layouts."

The Alliance Series provides the flexibility to select the best EDA design environment for a specific application. Combining the advanced implementation technology of Xilinx with the strengths of its partners provides a powerful overall design solution, the highest clock performance and the highest densities in the industry.

The Cajun P880 Switch

The 17-slot Cajun P880 is a major step up from Lucent's P550 7-slot switch, although the two share a common architecture. The P880 can use any of the company's existing 50-series boards for Ethernet, Fast Ethernet, or Gigabit Ethernet. This provides net managers an obvious migration path. By mid-2000 even more capable 80-series boards will become available and can be deployed beside the 50-series boards in the same P880 chassis.

The P880's backplane scales upward from 56 Gigabits per second to 139 Gigabits per second providing the P880 with the capability of switching or routing from 41 to 106 million packets per send. Designed with no single point of failure, the highly reliable Cajun P880 supports up to 768 10/100 megabits per second Ethernet ports, up to 384 fiber Fast Ethernet ports, and up to 128 Gigabit Ethernet ports in a fault-tolerant, modular chassis.

The P880's switching fabric consists of six switch elements, each using two XCV150 devices for a total of 12 per chassis. The controller used a single XCV800 device. The design allows for high redundancy to maximize reliability. A second backup controller is optional with the P880, while a seventh switch element can be added for redundancy. Ramelson estimates a typical place and route for the controller took just about two hours.

Conclusion

Ramelson notes this was a far different experience from the last time he worked with an FPGA. "The element that best represents the success of this program was how fast we were able to complete the design. End to end the design process was completed within six weeks—we had a working model in about a month."

Because of the breadth of its capabilities, the P880 spans both the "internetwork" and "wiring-closet" market sectors. This makes the Lucent switch a potent competitor. But specs mean little unless you can deliver product on time and that was where Xilinx FPGAs entered the picture. "By going with Xilinx we were able to ship the P880 months earlier than we would have with a traditional ASIC design," concluded Ramelson.

More information on the Cajun P880 can be found at http://www.lucent.com/ins/products/p880/