

Synopsys and Lucent Technologies

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Silvio Fernandez, Technical Manager in the Bell Labs, Advanced Technologies Division of Lucent

Business

Agere Systems, formerly the Lucent Microelectronics Group, is the world leader in sales of communications semiconductors. They design, develop, and manufacture optoelectronic components for communications networks and integrated circuits for a broad range of communications and computer equipment.

Issues

- Meet the challenges of a complex design with limited staffing resources
- Adhere to an ambitious development schedule for three chip versions in 18 months
- Employ a new development process and technology for the first time

Solution

- Synopsys Professional Services Consulting Design Services with expertise in synthesis, static-timing analysis, and formal verification
- Synopsys experience with managing silicon vendor relationships
- Synopsys tool suite including ECO Compiler™, PrimeTime®, and Formality®

Benefits

- Optimized design with high-quality netlist
- Rapid timing closure for complex design
- Implementation of ECOs without impact to schedule
- Improved productivity and resource utilization

Design Optimization Speeds Timing Closure for the Advanced ATLANTA ATM Port Controller

Look inside almost any high-performance ATM switching system, by any manufacturer, and you are likely to find a chip that belongs to the highly successful ATLANTA ATM device family. Now in its second generation, the ATLANTA family includes an ATM Port Controller SoC developed by Lucent's Bell Labs, Advanced Technologies division for the new company Agere Systems, with assistance from Synopsys Professional Services. The Synopsys contribution started with synthesis and design optimization, and rapidly expanded into other responsibilities, enabling the in-house team to optimize its productivity and meet its rapid succession of deadlines.

An SoC for More Economical High-speed Internet Access

The ATLANTA ATM switch chip set is a hugely successful product family for good reason. Take the ATLANTA ATM Port Controller (APC) for example. It is a programmable SoC that performs many functions previously available only in high-end core ATM network switches.

The ATLANTA APC combines data streams from multiple access applications, such as digital subscriber lines, into high-bandwidth network trunks. It monitors the incoming data streams for voice and video applications, and processes and prioritizes the streams according to the quality of service (QoS) levels that business and residential customers expect. The increased port density, improved QoS management, efficient buffer management, and many additional features of the ATLANTA APC make it a cost-effective SoC solution for a wide variety of system platforms.

By moving intelligence from the core to the edge of the network, the ATLANTA APC promotes efficient network design and utilization and makes services such as high-speed Internet access more economical for homes and businesses.

Overcoming Limited Resources

No matter how successful a product is, however, the hard realities of short schedules and limited resources still apply. This was true for the APC development team, which faced a rapid succession of three chip deadlines over 18 months. Based on available in-house staffing, the project team chose to concentrate its resources on design and verification and bring in Synopsys experts in design optimization and timing closure to synthesize the design.

"We believe that Synopsys' ASIC design and synthesis tools are the best available. We wanted Synopsys engineers to fine tune and implement the synthesis process and methodology for this project," said Silvio Fernandez, Technical Manager in the Bell Labs, Advanced Technologies Division of Lucent, which developed the APC for Agere. Initially, Synopsys' responsibility was to synthesize the RTL code and deliver the netlist, essentially a six-week engagement, but they delivered much more.

"The consultants understood the kind of functionality we needed and expanded their contributions," said Fernandez. "Synopsys began by creating synthesis scripts, moved on to modifying RTL code, and eventually helped architect and develop some of the ASIC functions. They were excellent engineers and we rewarded them with more work. They quickly assumed a role at the core of our APC development team."

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Optimizing the Design

Timing closure was achieved very quickly for the APC. Synopsys Professional Services has vast experience in achieving predictable timing closure and delivering the highest-performance circuits in the shortest time.

“Synopsys delivered a very high-quality netlist that virtually eliminated internal timing issues which might have occurred during the physical placement and route phase,” said Fernandez.

Synopsys also assisted with chip-level static-timing analysis by specifying the methodology and creating the infrastructure and PrimeTime scripts. PrimeTime is the Synopsys tool for rapidly performing full-chip timing analysis and debug on million-gate designs.

The Synopsys role also expanded to formal verification. This involved comparing the RTL code to the post-synthesis netlist and verifying their equivalency at various stages of the design flow. It also involved implementing engineering change orders and verifying that the new netlist and RTL match in functionality, while minimizing the impact of the changes on the schedule.

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Managing the Vendor Relationship

The Synopsys contribution extended even beyond netlist sign-off. The new APC required a development process and flow that had not been used for any other in-house projects. Synopsys managed the new library, which contains all of the APC design elements, and assumed the primary interface role with the fabrication team. According to Fernandez, “This was a big contribution because they resolved any issues, and we didn’t have to be involved at all. The turnaround time was outstanding.”

Conclusion

The ATLANTA chip-set family has been a huge success because it keeps evolving to meet market demands for more integration. “ATLANTA has virtually no competition,” said Fernandez. “It is in use by more than 60 customers worldwide, and was mentioned in a New York Times article as being one of the best ATM solutions available.” The ATLANTA ATM Port Controller continues the success and dominance of the ATLANTA family, integrating more functionality in a single chip than ever before. “The complexity of the functionality made it challenging to design, challenging to synthesize, and challenging to verify. We used Synopsys’ help for all of that,” summed up Fernandez. “All of Synopsys’ contributions to the APC team were critical to our success.”

For more information about Synopsys Professional Services, or any Synopsys products, training, or support services, visit us on the Web at www.synopsys.com, contact your local sales representative or please call 650.584.5000. To contact Synopsys Professional Services directly, call 866.537.6654.

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