

Synopsys and Marvell

Marvell Reduces Networking SoC Die Size by 10% With DesignWare STAR Memory System Multi-Memory Bus Processor



Synopsys' STAR Memory System and Multi-Memory Bus Processor is unique to the industry. No competitive solution can match its flexibility, high test coverage, and ability to minimize test area, power and cost."

Gevorg Torjyan

Principal Architect, Marvell Semiconductor, Inc.

Business

A leading fabless semiconductor company, Marvell provides expertise in microprocessor architecture and digital signal processing that drives high-volume storage solutions, mobile and wireless, networking, and consumer products. Marvell's networking search engine product line delivers high capacity, fast performance and low power consumption for mobile and Internet of Things (IoT) applications.

Challenges

- ▶ Maintain high standards for timing and performance
- ▶ Realize comprehensive memory test coverage and implement effective repair solution for increased yield
- ▶ Reduce area of networking system-on-chip (SoC)

DesignWare IP Solution

- ▶ DesignWare® STAR Memory System including
 - Multi-Memory Bus (MMB) processor
 - Yield Accelerator

Benefits

- ▶ Reduced SoC die size by 10% using multi-memory bus processor with no performance impact
- ▶ Quickly and efficiently generated test vectors to reduce silicon bring-up time and minimize test engineering effort
- ▶ Received excellent, responsive technical support from an expert team

Overview

Marvell's networking technology supports the explosive growth of mobile devices, IoT and automotive connectivity while addressing the future scaling requirements of both bandwidth and service density from a system cost, power, form-factor and reliability perspective. Marvell's products help carriers and service providers introduce, manage and rapidly scale new revenue-generating services while offering enhanced security and network quality.

Marvell's latest custom memory SoC is designed to increase the search capability of routers. With a design of this complexity, Marvell required a memory test and repair solution that would allow it to meet its timing requirements and achieve high quality test coverage while minimizing the test area overhead. Marvell's SoC includes more than 7,500 memory instances in which a traditional built-in-self-test (BIST) implementation would require test wrappers around every memory instance, increasing overall area and routing congestion. To avoid these issues, Marvell required an area-efficient memory test and repair solution. In addition, Marvell needed to use its engineering resources on product differentiation and automate otherwise tedious vector development.

High-Quality DesignWare IP

After evaluating both internal and third-party memory test solutions, Marvell chose Synopsys' STAR Memory System due to its MMB processor and Yield Accelerator. The MMB processor provided common test and repair logic for all memory instances mapped to a shared bus, reducing SoC die size by 10 percent.

"The MMB processor flexibly decouples embedded test and repair logic from the performance- and area-critical block under test, enabling us to maintain our high performance requirements while providing layout flexibility and simplifying routing," said Sohail Syed, Sr. Director of Engineering, Marvell Semiconductor, Inc. "During post-silicon bring-up, the Yield Accelerator's automated test features enabled the team to instantaneously run the test vectors that previously would have required tedious engineering work."

"The automation provided in the STAR Memory System accelerates our SoC development," said Gevorg Torjyan, Principal Architect, Marvell Semiconductor, Inc. "Our test goals could have been met at the expense of consuming more area, using more process layers and/or implementing fewer features, but Synopsys' memory test solution let us achieve all of our SoC and test goals efficiently with a lower cost."

Expert and Responsive Technical Support

Marvell found the STAR Memory System to be easy to use and Synopsys' product documentation to be accurate and complete. When further assistance was needed, Marvell found Synopsys' technical support to be available and knowledgeable.

"The support from Synopsys' experienced team of engineers was extremely knowledgeable and responsive," said Syed. "The staff was consistently available to make sure the process ran smoothly."

"The quality and automation of the STAR Memory System exceeded our expectations and the responsiveness and expertise of Synopsys' technical team was superb," said Torjyan. "This was our first project to use a third-party BIST solution and we have no doubt that we will use STAR Memory System in our next project as well."

"With a project this big, test automation was critical. Only Synopsys' STAR Memory System gave our team the confidence to focus on product differentiation and leave the BIST to a third-party tool."

Sohail Syed

Sr. Director of Engineering, Marvell Semiconductor, Inc.

