

# Synopsys and SeaMicro

Synplify Pro Enables First Time Success Reducing Area by 15% for Next Generation Design, Lowering Risk and Bill of Materials Cost



*We were very impressed with Synplify Pro's ability to meet all targets – area, performance and timing – on the first try. We succeeded in reducing both risk and cost for multiple designs.”*

**Dhiraj Mallick**

 **SEAMICRO** VP of Hardware and System Engineering, SeaMicro

## Business

SeaMicro was founded by industry veterans who have helped build some of the world's largest data centers. SeaMicro builds servers that reduce power draw by 75% per unit compute, and increase compute per rack inch by 400%.

## The Design

- ▶ 1 Xilinx Virtex®-5 production storage FPGA
- ▶ 1 Xilinx Virtex-5 fabric FPGA, as ASIC prototype

## Challenges

- ▶ Reduce area for fabric FPGA prototype by 15% while accommodating increased functionality over a previous generation design
- ▶ Create next generation design without requiring prototype board respin
- ▶ Retarget entire ASIC design into single FPGA prototype chip for maximum verification coverage
- ▶ Reduce BOM costs for storage FPGA by meeting a more aggressive timing target

## FPGA Design Solution

- ▶ Synplify Pro® FPGA synthesis

## Benefits

- ▶ Reduced fabric FPGA area by more than 15%, fitting increased functionality into the same prototype chip as used in prior generation design, avoiding costly board redesign
- ▶ High verification coverage using single prototype FPGA, reducing design risk
- ▶ Reduced timing and BOM cost for storage FPGA with lower cost -1 speed grade device instead of original -2 device

## Overview

SeaMicro offers high density, low power servers for data centers. Designed to replace 40 1 RU Dual Socket Quad Core servers, the SeaMicro SM10000-64 integrates 512 Intel Atom low power cores (256 Dual Core Intel x86-64 processors), top of rack Ethernet switching, server management, and application load balancing in a single 10 RU “plug and play” standards-based server. The SM10000-64 consumes under 2.5KW and takes 10RU the space – 1/4th the power and 1/4th the space of the best in class volume servers in the industry without requiring any modifications to existing software.



*Synopsys' support team provided not only expertise, but also a willingness to push the boundaries, helping us stay innovative while successfully managing costs and risk."*

**Dhiraj Mallick**

VP of Hardware and System Engineering, SeaMicro

SeaMicro's core technology is a super computer style interconnected Fabric architecture and CPU I/O virtualization which helps significantly reduce power use in data centers. SeaMicro used the Synplify Pro® FPGA synthesis tool to both optimize their storage FPGA device and to prototype their latest Fabric ASIC design on an FPGA. The design team used Xilinx Virtex-5 devices for this project.

### **FPGA Design Solution**

For the storage FPGA the team needed to meet timing performance goals and had originally only been able to do so using a -2 speed grade FPGA. Synplify Pro software enabled them to meet timing using a lower cost -1 speed grade FPGA.

To prototype the functionality for their fabric chip, the team's goal was to use the same FPGA device from the previous generation design, and thus avoid redesigning the board. However, due to added functionality in this latest generation ASIC design, they were faced with the choice of dealing with lower verification coverage and higher risk, or needing to use a larger FPGA requiring a board respin and impacting schedule.

With Synplify Pro software, the team succeeded in attaining a 15% area reduction and fit their new design into the FPGA prototype without a board respin. The result was a low risk, high test coverage and low cost design project.

SeaMicro continues to introduce innovative, next generation server technology and will continue to use Synplify Pro software for FPGA synthesis projects.

SeaMicro is a venture backed by Khosla Ventures, Draper Fisher Jurvetson and Cross Link Capital. More information about SeaMicro can be found at <http://www.seamicro.com>.



**The SeaMicro SM10000-64 Server has 2,048 CPU cores per rack and provides the first server architecture that can support any CPU instruction set.**

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