

# Synopsys and Nitero

Fast Integration of DesignWare IP for PCI Express Enables First-Pass Silicon Success for Mobile 60GHz SoC



*Selecting Synopsys DesignWare IP and design tools for our low-power NT4600 Wi-Fi SoC enabled us to integrate the IP in just a few weeks, helped us meet our aggressive tapeout schedule, and provided a seamless end-to-end design process, resulting in first-silicon success.”*



**Sebastian Ahmed**

Vice President of Engineering, Nitero

## Business

Nitero is a fabless semiconductor company developing high performance, low power 60GHz solutions. The company has delivered the industry's first end-to-end 60GHz Wi-Fi solution designed from the ground up for mobile. The first product from Nitero's 60G<sup>®</sup> family of 60GHz Wi-Fi solutions, the award-winning NT4600, meets the power, performance and form-factor requirements for the mobile platform, while delivering the convergence of PC, gaming and media capabilities onto a single mobile device. Nitero is headquartered in Austin, Texas with a design center in Melbourne, Australia.

## Challenges

- ▶ Obtain a portfolio of proven, easy-to-integrate IP solutions from a trusted IP supplier
- ▶ Minimize SoC power consumption and area in a high-performance mobile solution
- ▶ Meet aggressive time-to-market schedule
- ▶ Minimize design risk while focusing on differentiating aspects of the design

## Synopsys Solutions

- ▶ DesignWare<sup>®</sup> Root Complex Controller IP for PCI Express<sup>®</sup> 2.0 with bridge to ARM<sup>®</sup> AMBA<sup>®</sup> AXI3<sup>™</sup> protocol
- ▶ DesignWare Library IP including SPI Controller, CRC Engines and bus interconnect components for AMBA 3 AXI<sup>™</sup> protocol
- ▶ Verification IP for PCI Express 2.0

- ▶ Synopsys Galaxy<sup>™</sup> Design Platform tools including Design Compiler and PrimeTime<sup>™</sup>

## Benefits

- ▶ Integrated DesignWare IP in less than one month
- ▶ Focused design resources on core competencies
- ▶ Reduced integration risk and achieved first-pass silicon success with DesignWare IP
- ▶ Received excellent technical support from an expert team

## Overview

The NT4600, Nitero's first 60GHz product in its 60G<sup>®</sup> portfolio, is the industry's only end-to-end IEEE 802.11ad SoC built to meet the power, performance and form-factor requirements of mobile applications. Designed in Samsung's advanced 28nm RF process, the NT4600 is up to 10x more power efficient than 802.11ad solutions designed for PCs while meeting the cost and area of existing 802.11ac Wi-Fi solutions.

Nitero's high-performance NT4600 supports low-latency 4K display and peer-to-peer wireless connectivity which delivers console-equivalent mobile gaming and allows seamless use of productivity applications in a mobile office. In addition, the low-power NT4600 supports transmit and receive beamforming to provide full coverage throughout an office, living room or conference room.

Nitero required a reliable, low-power IP solution that would minimize integration effort, help meet its tapeout schedule, and function as expected.



*After evaluating multiple IP vendors, we found that the DesignWare IP for PCI Express was noticeably smaller and used less power than competitive IP solutions. Integrating the right IP was definitely a competitive advantage for us. DesignWare IP was the right choice.”*

**Sebastian Ahmed**

Vice President of Engineering, Nitero

Synopsys' DesignWare IP portfolio and design tools provided exactly what Nitero needed, making it possible for Nitero to obtain all of its required IP and tools from a single, trusted supplier.

### High-Quality DesignWare IP

Bringing a multidisciplinary design that incorporates both analog/mixed-signal and radio frequency (RF) technology to the highly competitive mobile market requires a single, trusted supplier who could support Nitero's IP and tool needs. Synopsys DesignWare IP and tools offered a complete portfolio of proven solutions that helped Nitero achieve first-pass silicon success.

The DesignWare Root Complex Controller IP for PCI Express 2.0 with bridge to AMBA AXI3 protocol offered the low pin count, low power consumption and high performance that Nitero required, with Synopsys SystemVerilog-based VC Verification IP confirming the design. Nitero knew that it could rely on the proven DesignWare Library of IP, including SPI Controller, I2C, CRC Engines, and AXI Bus Interfaces. Using only Synopsys tools, including synthesis, verification IP, simulation, timing, and signoff tools, meant that Nitero benefitted from a seamless end-to-end solution.

“After evaluating other IP providers, we selected Synopsys DesignWare IP due to its superior performance, power, and area,” said Sebastian Ahmed, Vice President of Engineering, Nitero. “Knowing that the IP and tools were proven to work together was important to mitigating our schedule risk. We trusted that the IP was going to work, and what we designed is working exactly as expected.”

*“As a small company, we didn't want to take any chances. We just wanted technology that was proven to work. Using Synopsys Galaxy Design Platform tools including Design Compiler and PrimeTime gave us the features and efficient design flow that our high-performance, low-power design required.”*

**Sebastian Ahmed**

Vice President of Engineering, Nitero

### Expert and Responsive Services and Support

Nitero's IP integration went smoothly, but when additional assistance was needed, Synopsys application consultants were ready to help. Using both IP and tools from Synopsys gave Nitero the benefit of a unified end-to-end support structure. “Synopsys support was easy to engage with and was very quick to connect us to the right person,” said Ahmed. “Despite some fairly major design changes late in the process, Synopsys support was effective and timely, helping us hit our aggressive tapeout schedule.”

### Future Product Development

Nitero's NT4600 is just the first product in the company's 60G portfolio, and Nitero will develop future generations of the product line. “Synopsys offers the combination of tools, high-quality IP, and excellent technical support we need for success,” said Ahmed. “We expect to continue building our strong relationship with Synopsys.”



**Figure 1: Nitero NT4600: Industry's first 802.11ad SoC for Mobile Applications**

